XISAAB

BUUGGA ARDAYGA

Fasalka 8aad

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JAMHURIYADA DIMOQRAADIGA FADARAALKA ITOOBIYA
WASAARADDA WAXBARASHADA

MOE

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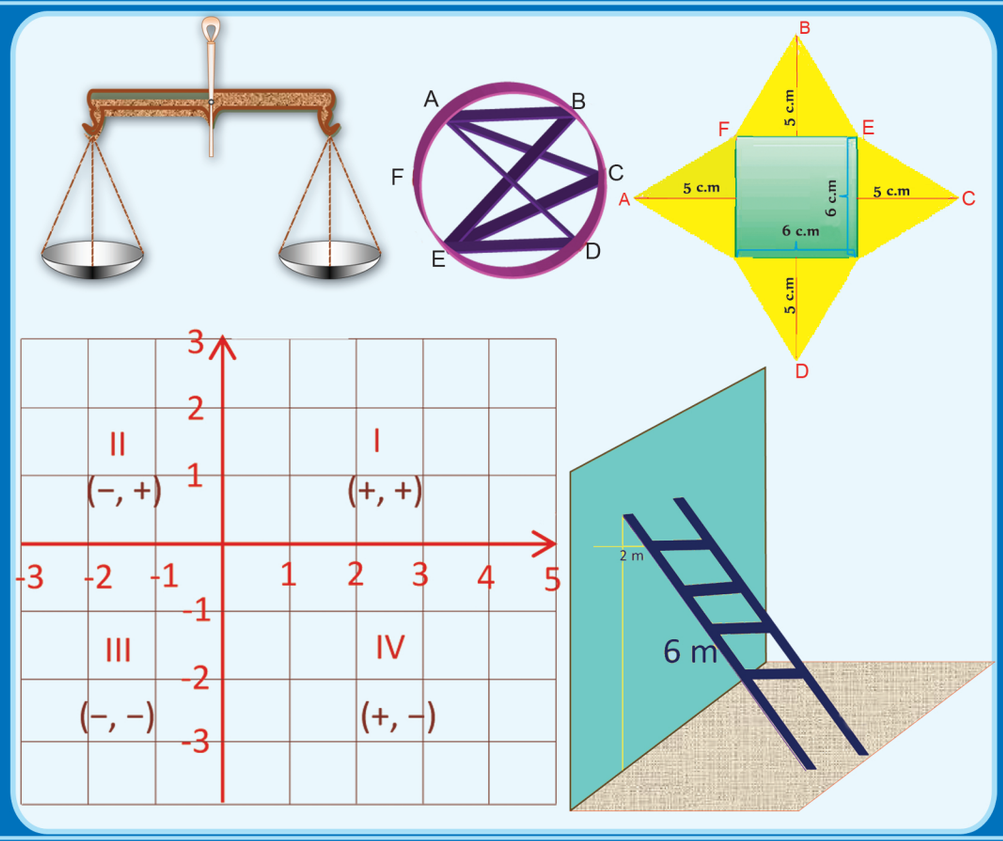

JAMHURIYADA DIMOQRAADIGA FADARAALKA ITOOBIYA
WASAARADDA WAXBARASHADA

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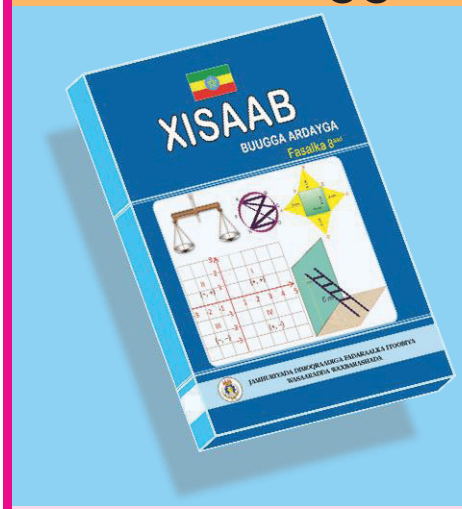

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2. Markasta meeshaad buuga dhigaysaa waa in ay ahaataa meel nadiif ah oo engagan.
3. Buugga marka aad isticmaalaysid waa in ay gacmahaagu nadiif ahaadaan.
4. Waxna ha ku qorin buugga jaldigiisa ama boggaga dhaxdiisa.
5. Isticmaal waraaqad yar ama kaardi yar markaad bog calaamadaysanaysid.
6. Waligaa ha ka jeexin ama haka gooynin sawir ama bog.
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8. Buugga markaad dugsiga u qaadanaysid boorsada ama shayga aad ku qaadanaysid qumaati u dhaxdhig si uunan u jacdadin ama u jajabin.
9. Buugga markaad qof kale u dhibaysid si taxadar leh ugu dhiib.
10. Buugga cusub marka ugu horeysa ee aad isticmaalkiisa bilaabaysid dhinicisa ay boggagiisa u dan beeya ay ku yaaliin u jiifi kadibna markiiba dhawr bog fur ama bannee. Marka aad bog rogaysid, Cidhifka uu ka taxan yahay gacanta kale ku yar xaji. sidaasina daryeelka jaldiga buugga ayey u wanaagsan tahay.

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FASALKA 8^AAD

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Kuwa haysta ogolaashaha qoraalka lookiin lagu eedeeyo inay gaf ka galeen xuquuqda buugga. Waa in ay la xidhiidhaan xafiis waynaha wasaaradda Waxbarashada ee ku taala Arata kiilo. Adiss Ababa Itoobiya.

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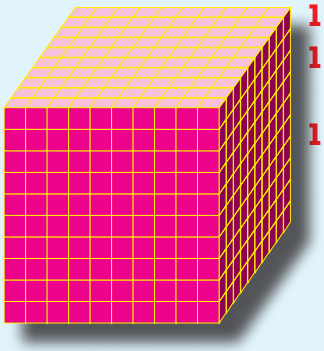

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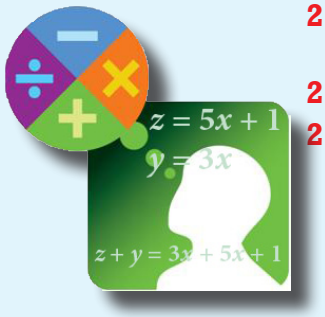

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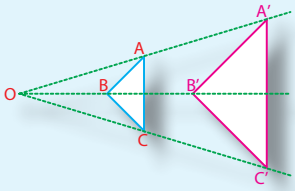

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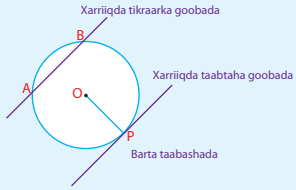

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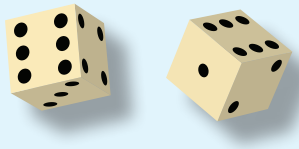

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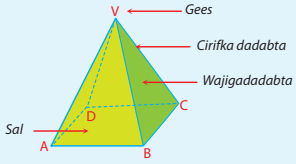

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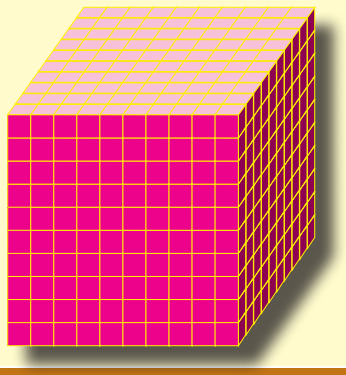


LABA JIBBAARKA, XIDID LABA JIBAARKA, SADDEX JIBBAARKA IYO, XIDID SADDEX JIBBAARKA

UJEEDDOOYINKA CUTUBKA

Cutubkani marka uu dhamaado ardaydu waxay awoodi doonaan iney:

- Xisaabiyaan jibbaarka tiro.
- Raadiyaan jibbaarka, tiro, iyagoo ka raadinaya shaxda jibbaarka.
- Qeexaan, xidid laba jibbaarka tiro lakab oo aan aheyn eber.
- Qeexaan laba jibbaarka, oo ay xisaabiyaan xidid laba jibbaarka Qeexaan sadddexjibbaarka tiro
- Caddeeyaan saddex jibbaarka tirooyinka.
- Qeexaan xididka sadexjibbaarka tiro.
- Caddeeyaan xididsaddexjibbaarka iyo saddexjibbaarka Quman

TUSMOOYINKA MUHIMKA AH

1.1 Laba jibbaarka tirooyinka

1.2 Xidid laba jibbaarka tirooyinka lakab.

1.3 Saddex jibbaarka iyo xidid saddex jibbaarka.

Furaha Tibxaha

Sookoobida Cutubka

Nakhtiinka layliska

HORDHAC

Fasalladii hore waxaad kusoo barateen qaabka ay tirooyinka u shaqeeyaan sidoo kale waxaad soo aragteen sida tiro la isugu dhufto (loo jibbaaro). Raadinta tiro jibbaarkeedu yahay dhawr tiro, iyo sidoo kale sida tiro la isugu dhufto saddex jeer iyadoo la raadinayo saddex jibbaarkeeda. Cutubkan waxaan xoogga saaraynaa dhammaan furfuritanada si qoto dheer, sidoo kale waxaynu baraneynaa raadinta tiro saddex-jibbaarkeeda. Waxaan u adeegsanaynaa labajibbaarka iyo xidid laba jibbaarka, saddexjibbaarka iyo xidid saddex jibbaarka. Bangiyada, fiisigiska iyo joomatariga.

1.1 LABA JIBBAARKA TIRO

Dhammaadka qaybtan waxaad awoodi doontaan:

- Xisaabinta laba jibbaarka tiro.
- Raadinta laba jibbaarka tiro iyadoo laga raadinayo shaxda laba jibbaarka.

1.1.1 Laba jibbaarka tiro lakab

Hawl-galka 1.1

1 Adigoo adeegsanaya aqoontaada joomatariga ee bedka laba jibbaaranaha ku buuxi shaxdan soo socota.

Dhinaca laba jibbaarka (sm)	Bedka laba jibbaarka (sm^2)
1.	
2.	
3.	
4.	
5.	
6.	

2 Iyadoo lagu salaynayo bedka shaxda sare ku xusan. Raadi bedka

b. Laba jibbaarka dhererka dhinaca.

Masalo furan:

➢ *Nin beeeraley ah ayaa u beeray geed bun ah qaab laba jibbaarane ah sida ku muujisan jaantuska dhinaca midig (Jaantus 1.1). Haddii uu ninku beeray 20 saf, isla markaana saf kasta ay ku beeran tahay 20 geed oo bun ah, soo saar wadarta tirade geedaha bunka ah ee uu beeray ninka beeraleyda ah.*

Jaantuska 1.1

Hawl-galka 1.2

1 Raadi Bedka laba jibbaarka ee dhinacyadan.

b 8 sm **t** 10 sm **j** 15 sm **x** 20 sm

2 Raadi bedka laydi dhererkiisu yahay 2 cm, ballaciisuna yahay 5 sm.

3 Dhammaystir shaxdan soo socota.

x	1	3	4	5	6	7	9	12	13	16	20
$x+x$	2	6	8	10	12						
$x \times x$	1	9	16	25	36						

b Waa maxay faraqa u dhexeeye $x + x$ iyo $x \times x = x^2$

t Tirooyinkan maxaa loo yaqaanaa 1, 4, 9, 16, 25 … ?

Hawlgalka kor ku xusan ee 1.2, waxaad ku soo aragtay Qeexitaan $1 \times 1 = 1,4$ in loo cadeyn karo $2 \times 2 = 4$, 9 in loo cadeynkaro $3 \times 3 = 9$, Dhammaan tirooyinka noocaa ah waxaa loo cadeyn karaa iskudhufashada tirada laf ahaanteeda. Sida 1, 4, 9, 16, 25, … waxaana loo yaqaanaa **laba jibbaar tiro**. Markaad tiro iskudhufatid laf ahaanteeda waxaad heleysaa tiro kale oo loo yaqaano taranta labo tiro sida, $5 \times 5 = 5^2 = 25$.

Qeexid 1.1 *Habka iskudhufashada tiro lafteeda laba jeer waxaa loo yaqaanaa laba jibbaarka tiro, taranta tirolafteeda waxaa loo yaqaanaa laba jibbaarka tiro, waxaana lagu asteeyaa $x \times x = x^2$. Waxaana loo akhriyaa laba jibbaarka x, $x \times x = x^2$.*

Tusaale 1:

b $3^2 = 3 \times 3 = 9$, sidaas darteed 9 waa laba jibbaarka 3.

t $6^2 = 6 \times 6 = 36$. Sidaas darteed 36 waa laba jibbaarka 6.

Dhanka kale marka tiro loo geeyo iyada lafteeda waxan helaynaa tiro kale, taasoo ah wadarta laba tiro oo isle'eg, sida $5 + 5 = 10$.

Xusuus: *Tiro kasta oo ay tahay y, waxa jira farqi u dhexeeya 2y iyo y^2.*

Qeexid 1.2 *Tiro idil oo ah W waxaa loo yaqaanaa laba jibbaarka qumman ama laba jibaarka tiro. Haddii la laba jibbaaro tiro idil oo ah x, markaa x iyo y waa tirooyin idil, $y = x^2$.*

Tusaale 2: Tirooyinka idil ee 0, 1, 4, 9, 16, 25, 36, …, 169, waa laba jibbaaraneyaal qumman. Ma tixi kartaa laba jibbaaraneyaasha qumman ee ka yar 200?

Furfuris: laba jibbaaraneyaasha qumman waxa sameeya jibbaaridda tirooyinka idil. Sidaas darteed laba jibbaaraneyaasha qumman ee ka yar 200, waxaa lagu helaa jibbaaridda tirooyinka idil, adiga oo ka bilaabaya 0, 1, 2, 3,… oo kuna joojinaya inta ka hoosaysa 200 (laba boqol). Taasina waa sidan:-

$0^2 = 0 \times 0 = 0$, $1^2 = 1 \times 1 = 1$, $2^2 = 2 \times 2 = 4$

$3^2 = 3 \times 3 = 9$, $4^2 = 4 \times 4 = 16$, $5^2 = 5 \times 5 = 25$

$6^2 = 6 \times 6 = 36$, $7^2 = 7 \times 7 = 49$, $8^2 = 8 \times 8 = 64$

$9^2 = 9 \times 9 = 81$, $10^2 = 10 \times 10 = 100$, $11^2 = 11 \times 11 = 121$

$12^2 = 12 \times 12 = 144$, $13^2 = 13 \times 13 = 169$, $14^2 = 14 \times 14 = 196$

Hawl-galka 1.3

1 Adigoo isticmaalaya aqoontaadii hore ee isirraynta mutuxan, waxaad raadisaa isirraynta mutuxan ee tirooyinka soo socda?

b 15 **t** 194 **j** 400 **x** 1025

2 Tirooyinka aan su'aasha hore ku soo sheegnay tiradee ayaa u qormi karta taranta laba tiro oo ay isku mid yihiin isirrayntooda mutaxani?

Waxaad isticmaali kartaa isirraynta mutuxan si aad u hubisid, inay tirooyinka idil yihiin laba jibbaaraneyaal qumman iyo in kale. Marka hore raadi isirraynta mutuxan ee tirada. Haddii ay suuragal tahay waxaad habeysaa isirrada tirada, adigoo u habeynaya taranta laba tiro oo isirrayntooda mutuxani ay isku mid tahay.

Haddaba haddii ay suurtagal noqon weydo, arrintaas aan kor ku soo xusnay tiradaas ma aha laba jibbaar qumman.

Tusaale 3: Kuwan soo socda keebaa ah laba jibbaar qumman?

b 144 **t** 125 **j** 625

Furfuris:

b $144 = 2 \times 2 \times 2 \times 2 \times 3 \times 3 = (2 \times 2 \times 3) \times (2 \times 2 \times 3)$

$= 12 \times 12 = 12^2$

Haddaba isirrada 144, waxaynu u habeyn karnaa taranta laba isir oo isku mid ah waana sidan $12 \times 12 = 144$, sidaas darteed 144, waa laba jibbaarane qumman.

t $125 = 5 \times 5 \times 5$, maadaama ayna isirradeedu u haybeysmaynin sida taranta laba isir oo isku mid ah ma aha laba jibbaar qumman.

j $625 = (5 \times 5) \times (5 \times 5) = 25 \times 25 = 25^2$ maadaama oo ay isirradeedu u habaysmayaan taranta labo tiro oo isku mid ah waxaan odhaneynaa waa laba jibbaar qumman.

Hawl-galka 1.4

1 Fiiri taranta laba jibbaaraneyaasha qumman ee soo socda.

b $4 \times 9 = 2^2 \times 3^2$ ma tahay taranta laba jibbaarane yaal qumman?

t $25 \times 16 = 5^2 \times 4^2$ ma tahay taranta laba jibbaar qumman

2 Waxaad hubisaa taranta laba jibbaaraneyaalka qumman inay tahay laba jibbaaraneyaalka qumman?

3 Adigoo laba jibbaaraya 5 tiro ee ugu horeysa tirooyinka ee idil cabbirka god danbeedkoodu yahay 5.

$5^2 = 25$ $15^2 = 225$ $25^2 = 625$ $35^2 = 1225$ $45^2 = 2025$

Waxaad fiirisaa 25 inay isir u tahay dhammaantood.

b Raadi laba jibaarka 55 iyo 65.

t Maxaad ka fahmaysaa, $1 \times 2 = 2$, (2^2), $2 \times 3 =$, (6^2), $3 \times 4 = 12$, (12^2), $4 \times 5 = 20$, (20^2) iyo 4×5, markaad eegtid natiijada taranta laba jibbaarka.

Laba jibbaarka tirooyinka lakab ee qaabka Jajabyada ah:

Fasalladii hore waxaad ku soo aragtay in tirooyinka lakab ay u qormaan qaabkan $\frac{a}{b}$ marka ay a iyo b ay yihiin abyooneyaal, $b \neq 0$. Sidaas darteed laba jibbaarka $\frac{a}{b}$ waa $\left(\frac{a}{b}\right)^2 = \frac{a}{b} \times \frac{a}{b} = \frac{a \times a}{b \times b} = \frac{a^2}{b^2}$.

Tusaale 4: Raadi laba jibaarka tirooyinka soo socda.

b $\left(\frac{2}{3}\right)^2 = \frac{2}{3} \times \frac{2}{3} = \frac{2 \times 2}{3 \times 3} = \frac{2^2}{3^2} = \frac{4}{9}$

t $\left(\frac{5}{4}\right)^2 = \frac{5}{4} \times \frac{5}{4} = \frac{5 \times 5}{4 \times 4} = \frac{5^2}{4^2} = \frac{25}{16}$

Hawl-galka 1.5

Raadi laba jibbaarka tirooyinka lakab ee soo socda.

b $\frac{10}{13}$ **t** $\frac{14}{11}$ **j** $\frac{19}{20}$

Haddii tirada lakab u qoran tahay qaabka jajab tobanle waxaad laba jibbaarkeeda u raadin kartaa iskudhu fashada tirada laf ahaanteeda.

Tusaale 5: Raadi

b $(2.37)^2$ **t** $(32.4)^2$

Furfuris:

b

$$\begin{array}{r} 2.37 \\ \times\ 2.37 \\ \hline 1659 \\ 711 \\ 474 \\ \hline 5.6169 \end{array}$$

t

$$\begin{array}{r} 32.4 \\ \times\ 32.4 \\ \hline 1296 \\ 648 \\ 972 \\ \hline 1049.76 \end{array}$$

Sidaas darteed $(2.37)^2 = 5.6169$

$(32.4)^2 = 1049.76$

Layliska 1.1

1 Raadi lab jibbaarka tirooyinkan soo soda

b	$\frac{11}{3}$	**j**	$\frac{17}{100}$	**kh**	0.112	**r**	0.0001
t	$\frac{3}{11}$	**x**	1.12	**d**	0.025		

2 Caddee oo tusaale ka bixi wadarta laba tiro oo laba jibbaaraneyaal qumman ah inayna noqonaynin laba jibbaaraneyaal qumman.

3 Caddee wadarta 10 tiro ee kisiga,ah ee tirooyinka idil. 1 + 3 + 5 + … + 19 inay noqonayso laba jibaaranayaal qumman.

1.1.2 Isticmaalka Shaxda qiimaha laba jibbaarka

Qaybihii hore waxaad ku soo aragtay in laba jibbaarka tiro lakab oo aan ahayn eber in lagu raadin karo, iyadoo la adeegsanayo iskudhufashada.

Hawl-galka 1.6

Raadi laba jibbaarka mid kastoo ka mida ah kuwan soo socda

b	5.34	**t**	9.87	**j**	37.4

Haddii aad adeegsatid habka iskudhufashada si aad u raadisid laba jibbaarka tiro lakab mararka qaarkood way adag tahay inaad habkan ku heshid laba jibbaarka, ama waxay kaa qaadan wakhti helitaanku. Sidaas darteed baa loo diyaariyay shaxdan waxaana loo yaqaanaa shaxda tirooyinka. Shaxdana waxaad ku arki doontaan dhamaadka buugan, qaaciido shaxdani waa $y = x^2$ shaxda laynkeeda jiifka ahna waxaa ku asteysan "x" Taas oo ay kutaxantahay tirooyinka 1.0 ilaa 9.9 laynka qotonka'ah waxaa ku taxan 0 ilaa 9 Hadaba haddii aad doontid inaad laba jibbaarka tiro karaadisid shaxda tirooyinka. Habka aad raacaysid waxaa uu ka muuqdaa tusaalaha soo socda.

Tusaale 6: Raadi $(5.67)^2$ laba jibbaarka adigoo ka raadinaya shaxda tirooyinka.

Furfuris:

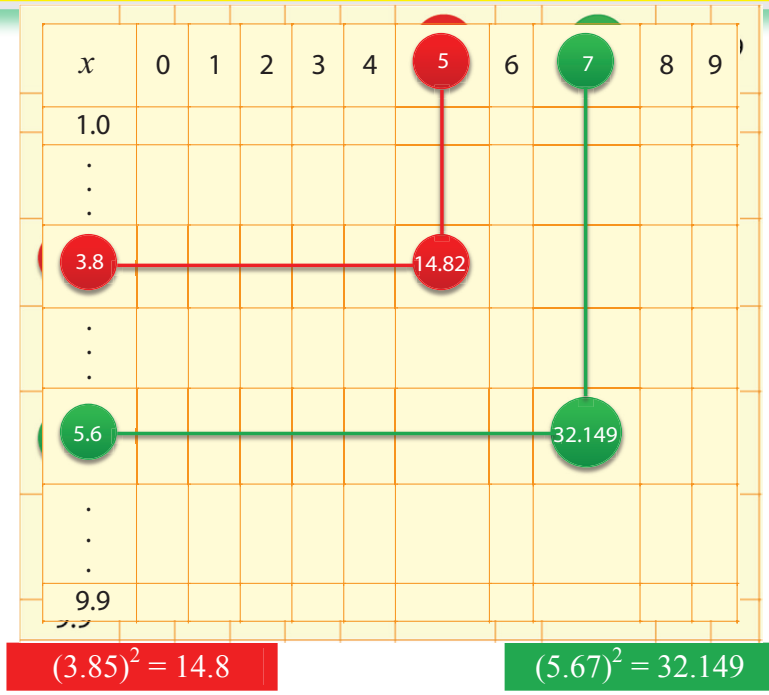
Tallaabada 1: Shaxda qotonka ah ee ugu horeysa ee kubilaabanta (x) waxaad ka raadisaa shaxda jiifka ah eek u bilaabanta 5.6.

Tallaabada 2: Shaxda jiifka ah ee kubilaabanta (x) waxaad ka raadisaa shaxda qotonka ah ee kubi laabanta (7)

Tallaabada 3: Ka dib akhri tirada dhextaalka u ah shaxda jiifka ah ee ku bilaabanta 5.6 iyo shaxda qotanka ah ee ku bilaabanta 7 taas oo ah 32.149, markaa $(5.67)^2 = 32.149$

Dhinaca teknoolajiga:

A digoo isticmaalaya kaalkuleetarka sayntifiga waxaad laba jibbaarka tiro u isticmaalaysaa astaanta (x^2)



Xusuusnow:

i *Tallaabooyinka 1 ilaa 3 waxaa lagu soo gaabiyey 5.6 iyo 7.*

ii *Qiimaha aad ka heshey shaxda laba jibbaarka badanaaba waa ugu dhawaansho.*

iii *Shaxda tirooyinku waxay ku kooban tahay oo kaliya 1.00 ilaa 9.99 oo lagu siiyey.*

Iskuday inaad dib u xusuusatid aqoontaadii hore ee ahayd tirooyinka jajab tobanle tirooyinkan oo ah tirooyin lakab waxaa loo qoraa inta u dhexeysa 1 ilaa 10 iyo jibaarada toban.

Tusaale ahaan $3245 = 3.245 \times 1000 = 3.245 \times 10^3$ marka aad rabtid inaad raadisid laba jibbaarka tiro taasoo aan ku jirin kuwii aan kor ku soo sheegnay ee shaxda tirooyinka. Marka hore waa inaad tirada taranta tirada u qortid inta dhexeysa 1 ilaa 10 iyo jibaarka 10.

Tusaale 7:

Raadi

b $(32.4)^2$ **t** $(567)^2$ **j** $(3251)^2$

Furfuris:

b $32.4 = 3.42 \times 10$, sidaas darteed $(32.4)^2 = (3.24 \times 10)^2 = (3.24)^2 \times 10^2$.

Raadi $(3.24)^2$ shaxda tirooyinka, keebaa ah $(3.24)^2 = 10.50$ sidaas darteed, $(32.4)^2 = 10.50 \times 100 = 1050$

t $567 = 5.67 \times 100$.

Ka dib $(567)^2 = (5.67 \times 100)^2 = (5.67)^2 \times 100^2$

Ka raadi $(5.67)^2$ shaxda tirooyinka $(5.67)^2 = 32.149$

Sidaas darteed $(567)^2 = 32.149 \times 10000 = 321490$.

j Raadi laba jibbaarka 3251 marka hore ku durki tirada saddex god dhinaca bidixda.

Taasina waa 3250, ka dib $3250 = 3.250 \times 1000$ iyo $(3250)^2$

$= (3.250)^2 \times 1000^2$.

Ka raadi $(3.250)^2$ shaxan tireedka. $(3.250)^2 = 10.56$.

Sidaas darteed, $(3250)^2 = 10.56 \times 1000000 = 10560000$.

Xusuus: *Adigoo adeegsanaya kaalkulaytar santifig ah waa in aad hesho kuwan soo socda.*

b $(32.4)^2 = 1049.76$

t $(567)^2 = 321489$

j $(3251)^2 = 10569001$

Xusuus:

Tiro badan, jidka ugu fiican aad u heleysid jibbaarkeeda waa in aad adeegsato kaalkulaytar sayntifig ah.

Layliska 1.2

Ka raadi mid kastoo ka mida ah kuwan soo socda shaxda laba jibaarka.

b $(8.54)^2$ **t** $(35.42)^2$ **j** $(0.151)^2$

x $(3.58)^2$ **kh** $(14.68)^2$ **d** $(9230)^2$

1.2 XIDID LABA JIBBAARKA TIROOYINKA LAKAB

Marka qaybtani dhammaato waxaad awoodi doontaan.

- Qeexida xidid laba jibbaarka tirooyinka togan ee lakabka leh.
- Xisaabinta xidid laba jibbaarka, jibbaarka qumman.
- Ka saaridda xidid laba jibbaarka tirada lakab adigoo adeegsanaya shaxda xidid laba jibbaarka.

Masalo furan:

Haweenay ayaa rabtay jikadeeda oo ah qaab laba jibbaarane in ay sibdhiso, taasoo bedkeedu yahay 16 m^2

- *Raadi dhererka dhinac kasta oo jikada ka mid ah.*
- *Qaybtii hore waxaad ku soo aragtay iskudhufashada tiro lafteeda taasoo ah laba jibbaarka tiro, qaybtana waxaad ku arki doontaa habka rogaalka laba jibbaarka tiro.*

Hawl-galka 1.7

1 Raadi dhinaca laba jibbaarane bedkiisu yahay 25sm^2?

2 Raadi tirada laba jibbaarkeedu yahay:-

b	1	**t**	9	**j**	36
x	0.01	**kh**	$\frac{4}{9}$	**d**	64

Tusaale 8: Raadi dhinaca laba jibbaarane bedkiisu yahay 64 sm^2.

Fur-furis: Haddii aad ka soo qaadid dhererka dhinaca inuu yahay "S" markaa

$64 = S \times S = S^2$.

Sidaas darteed si aad dhererka dhinaca u heshid waa in aad heshaa tiro laba jibbaarkeedu yahay 64. Tiradaasina waa 8.

- ✓ Inagoo ka duuleyna xaaladaha sare ku xusan oo dhan waxaan u baahanahay inaan raadino laba jibbaarka ina siinaya tiradaa.

  Helidda tiradaasna waxa loo yaqaanaa xidid laba jibbaar.

1.2.1 Xidid labajibaarka Jibaarka Quman

Rogaalka furfurista isugayntu waa kalagoynta, sidoo kale rogaalka iskudhufashadu waa isuqaybinta, sidaa si la mid ah rogaalka furfurista laba jibbaarka tiro waa helitaanka xidid laba jibbaarka tirada.

Qeexid 1.3 *Ka soo qaad $y \geq 0$.*

Hadii y ay tahay laba jibaarka tirada x, taasi oo ah, $x^2 = y$ kolkaa x waxa lagu magacaabaa xidid laba jibbaarka y, summad ahaana waxaa loo qori karaa sida $x = \sqrt{y}$, Summadda ah $\sqrt{}$ waxa loo yaqaanaa astaanta xididka, y – na waxaa loo yaqaanaa xididsane

$\sqrt{x^2} = x;\ x \geq 0$

Xusuus taarikheed:

Xusuusta taariikh ahaaneed, calaamada xididka ee aan hadda isticmaalno, waxa laga soo xigtay astaantii uu isticmaali jiray saynisyahankii la odhan jiray Christoff Rudolff sanadkii 1525.

Christoff Rudolff

Tusaale 9:

b $\sqrt{0} = 0$ maxaa yeelay $0^2 = 0$

t $\sqrt{9} = 3$ maxaa yeelay $3^2 = 9$

j $\sqrt{0.36} = 0.6$, maxaa yeelay $(0.6)^2 = 0.36$

x $\sqrt{49} = 7$, maxaa yeelay $7^2 = 49$

x —laba jibbaarka→ x^2

Ka saaridda xidid laba jibbaarka

x^2 → x $(x \geq 0)$

Waxaad isticmaali kartaa isirraynta mutaxan si aad u heshid xidid laba jibbaarka, laba jibbaaraneyaasha qumman.

Hadda waxaad fiirisaa isirraynta mutuxan ee tirooyinka soo socda iyo laba jibbaar kooda

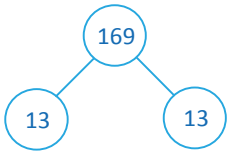
Isirraynta mutuxan ee tiro	Isirraynta mutuxan ee laba jibbaarka
$4 = 2 \times 2$	$4^2 = 16 = 2 \times 2 \times 2 \times 2 = 2^2 \times 2^2 = (2 \times 2)^2$
$6 = 2 \times 3$	$6^2 = 36 = 2 \times 2 \times 3 \times 3 = 2^2 \times 3^2 = (2 \times 3)^2$
$15 = 3 \times 5$	$15^2 = 225 = 3 \times 3 \times 5 \times 5 = 3^2 \times 5^2 = (3 \times 5)^2$
$12 = 2 \times 2 \times 3$	$12^2 = 144 = 2 \times 2 \times 2 \times 2 \times 3 \times 3 = 2^2 \times 2^2\ 3^2 = (2 \times 2 \times 3)^2$

Tusaale 10: Adigoo adeegsanaya isirraynta mutuxan. Raadi xidid laba jibbaarka kuwan soo socda.

b $\sqrt{169}$ **t** $\sqrt{196}$ **j** $\sqrt{625}$

Furfuris:

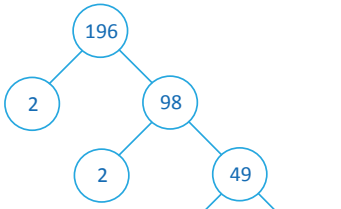
b



$169 = 13 \times 13 = 13^2$

Sidaas darteed $\sqrt{169} = \sqrt{13^2} = 13$

t

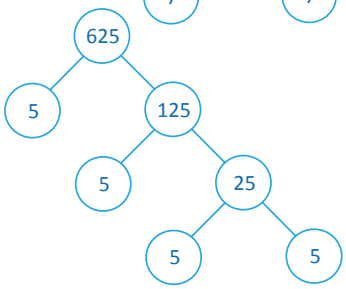


$196 = 2^2 \times 7^2 = (2 \times 7)^2 = 14^2$

Sidaas darteed $= \sqrt{196} = \sqrt{14^2}$

$= 14$

j



$625 = 5^2 \times 5^2 = (5 \times 5)^2 = 25^2$

Sidaas darteed $= \sqrt{625}$

$= \sqrt{25^2} = 25$

Dhinaca teknoolajiga:

Waxaa kalood isticmaali kartaa kalkuleetarka sayntifiga ka astaanta tusaale ahaan $\sqrt{}$

Layliska 1.3

Raadi xidid laba jibbaarka tirooyinka soo socda

b	100	**t**	121	**j**	729
x	900	**kh**	10,000	**d**	841

1.2.2 Isticmaalka shaxda xidid laba Jibaarka

Tusaale 11: Raadi $\sqrt{92.93}$ shaxda tirooyinka

Furfuris:

Tallaabada 1^{aad}: Tirada shaxda laga raadinayo qaaciidada lagu helayo waa $y = x^2$ haddaba raadi 92.93.

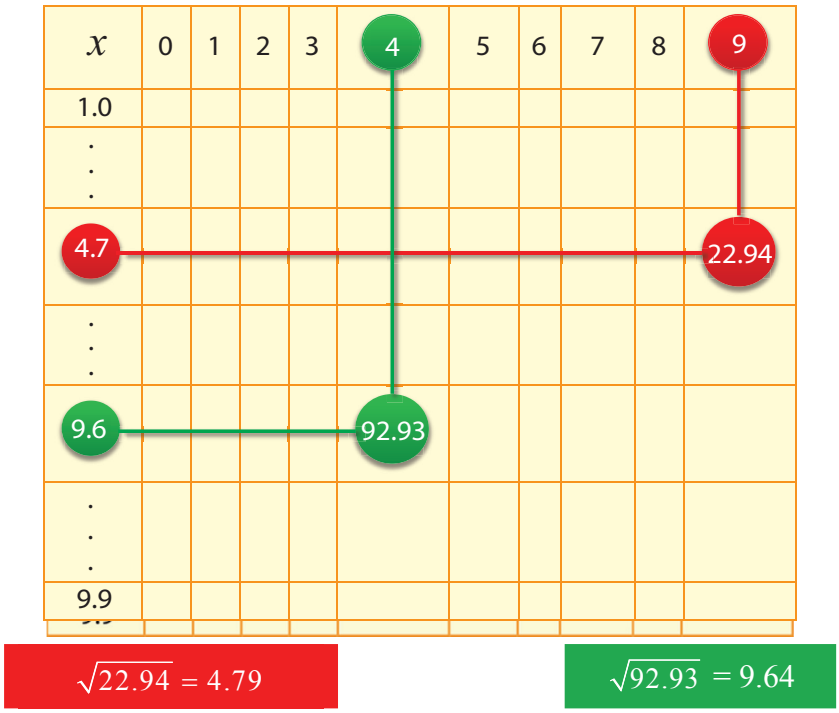
Tallaabada 2^{aad}: Shaxda jiifka ah ee ay kujirto 92.93 uga dhaqaaq dhinaca bidix. Ka dibna akhri tirada ku jirta shaxda qotonka ah ee ugu horeysa taas oo ah 9.6

Tallaabada 3^{aad}: Shaxda qotonka ah ee ay ku jirto tirada 92.93 uga dhaqaqaaq dhinaca kore oo akhri tirada ku jirta shaxda jiifka ah ee ugu horeysa taas oo ah 4

Tallaabada 4^{aad}: Sidaas darteed $\sqrt{92.93} = 9.64$

Horey waxaad u soo aragtay sida loo raadiyo laba jibbaarka tiro iyada oo laga raadinayo shaxda tirooyinka. Haddana waxaad arki doontaa habka duwan, kaas oo ah ka saarida xidid laba jibbaarka shaxda tirooyinka, kaas oo aad isticmaali jirtey marka aad raadineysid laba jibbaarka tiro.

Waxaanad ku arki doontaa tusaalahan soosocda.



Xusuus: *wakhtiyada qaarkood waxa laga yaabaa in aad tirada ka weydid shaxda tirooyinka, sida xaaladahan oo kale waxad qaadan kartaa xidid laba jibbaarka tirada ugu dhaw tirada lagu siiyay.*

Tusaale 12: Raadi $\sqrt{56.90}$

Furfuris: tirada 56.90, kuma jirto shaxda tirooyinka, laakiin waxay u dhexeysaa 56.85 iyo 57, tirada ugu dhaw labadaa tiro 56.90 waa 56.85, iyo $\sqrt{56.85} = 7.54$. Sidaas darteed $\sqrt{56.90} \approx 7.54$.

Shaxda tirooyinka waxaa loo isticmaalaa si loo helo xidid laba jibbaarka tirooyinka u dhexeeya 1.00 ilaa 9.99. qaaciidada lagu helo xidid laba jibbaaka tirooyinka ka weyn 10.0, waxayna ku cadahay hoos iyada oo lagu adeegsanayo tusaalaha soo socda.

Tusaale 13: Raadi $\sqrt{2841}$,

Furfuris: marka hore waxaad u qortaa sidan $2841 = 28.41 \times 100$, markaa $\sqrt{28.41} = \sqrt{28.41 \times 100} = \sqrt{28.41} \times \sqrt{100} = \sqrt{28.41} \times 10$. Raadi $\sqrt{28.41}$, oo ka raadi shaxda tirooyinka taas oo ah 5.33.

Sidaas darteed $\sqrt{28.41} = 5.33 \times 10 = 53.3$

Xusuus: *Ha iloobin qiimeyaasha aad ka heshay tuseyaal tireedkainay yihiin ugu dhawaansho.*

Layliska 1.4

1 Ku qor run ama been mid kasta oo ka mid ah kuwa soo socda:-

b $0.9 > (0.3)^2$ **j** $\sqrt{0.01} < 0.1$

t $\sqrt{0.04} > 0.4$ **x** $(0.04)^2 > 0.4$

2 Raadi xidid laba jibbaarka mid kasta.

b $\sqrt{9}$ **t** $\sqrt{2.25}$ **j** $\sqrt{441}$

x $\sqrt{0.36}$ **kh** $\sqrt{\frac{121}{225}}$

3 U habee mid kasta oo ka mid ah kuwa (tirooyinka) soo socda sida ay u sii kordhayaan.

$$\frac{1}{2},\ \sqrt{0.01},\ \sqrt{\frac{1}{2}},\ 3,\ \sqrt{7},\ \sqrt{10}$$

4 Tax dhammaan tirooyinka idil uu laba jibbaarkoodu dhexeeyo 1 iyo 100.

5 Haddi 69 laadhu ah loo habeeyo labaJibaar ahaan, imisa laadhu ah, ayaa hadhaysa?

6 Sharax sababta – 16 ayna u lahayn xidid laba Jibbaar.

7 Adigoo isticmaalaya Isirraynta mutuxan waxaad raadisaa xidid laba jibbaarka taranada soo socda.

b 16×9 **t** $25 \times 49 \times 9$ **j** $20 \times 35 \times 63$

8 Raadi xidid laba jibbaarka tirooyinka soo socda adigoo ka raadinaya shaxda tirooyinka.

b 234 **t** 12,321 **j** 0.099 **x** 4.356

9 Adigoo isticmaalaya shaxda tirooyinka raadi dhinacyada laba jibbaarane bedkiisu yahay $4.63\ sm^2$.

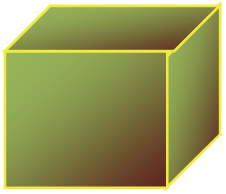
1.3 SADDEX JIBBAARKA IYO XIDID SADDEX JIBBAAR

Dhammaadka qaybtan waxaad awoodi doontaa

- Inaad qeexdid saddex jibbaarka tiro.
- Inaad raadisid saddex jibbaarka tiro.
- Inaad qeexdid xidid saddex jibbaarka.
- Inaad raadisid xidid saddex jibbaarka ee saddex jibbaarada qumman.

1.3.1 Saddex Jibaarka tiro

Joometeri ahaan waxaad garanaysaa erayga "Saddex jibbaarane". Waa sanduuq ay isle'eg yihiin dhammaan geftinadiisa.



Shaqo-kooxeedka 1.1

Idinkoo adeegsanaya qalabka laga helo deegaanka waxaad samaysaan saddex jibbaarane dhinnacyadiisu yahay halbeeg.

Isla markaana kaga jawaaba su'aalaha soo socda qaab-dhismeedka saddexjibbaaraneyaasha aad samayseean:-

1 Imisa saddexjibbaaraneyaal oo gedtinku halbeegyahay kara cidhifka hal cabbir, sidoo kale imisa sadex-jibaar ayaa ka samaysmi kara cidhifka laba cabbir?

2 Imisa saddexjibaar ayaa ka samaysmikara cidhifka hal cabbir, sidoo kale imisa saddexjibaar ayaa ka samaysmi kara cidhif ka sadex cabbir?

Fiiri tirooyinka 1, 8, 27, 64, 125, mid kastoo ka mid ah tirooyinka waxaa helaa, markaa tiro la iskudhufato saddex jeer isla laf haanteed.

Taas oo ah:

$1 = 1 \times 1 \times 1 = 1^3$ $8 = 2 \times 2 \times 2 = 2^3$ $27 = 3 \times 3 \times 3 = 3^3$

$64 = 4 \times 4 \times 4 = 4^3$ $125 = 5 \times 5 \times 5 = 5^3$

tirooyinka waxa loo yaqaanaa saddexjibaaraneyaal qumman, ama tirooyinka saddex-jibaaran.

Hawl-galka 1.8

1 Raadi mugga sadexjibaarane geftinkiisu yahay 4 cm.

2 Imisa sadexjibaarmayaal oo geftinkoodu yahay 1 sm ayaa ka samaysmi kara sadex jibaarane geftinkusu yahay yihiin.

b 6 sm? t 7 sm?

3 Dhamaystir tusaha soo socdta.

x	−4	−3	−2	−1	0	1	2	3	4
x^3		−27							

Qeexid 1.4 *Habka tiro laysugu dhufto saddex jeer lafahaanteeda ayaa loo yaqaanaa saddex jibaar tiro. Marka x, laysku dhufto saddex jeer ayaa layidhaahdaa saddex jibaarka "x". Waxaana lagu asteeyaa* $x^3 = x \times x \times x$. *Isla markaana loo akhriyaa "x saddex jibbaaran" ama "x lagu jibbaaray 3".*

Tusaale 14:

Raadi saddexjibaarka mid kasta oo ka mid ah tirooyinka soo socda.

b 9 **t** 11 **j** – 10

Furfuris:

b $9^3 = 9 \times 9 \times 9 = 729$

t $11^3 = 11 \times 11 \times 11 = 1331$

j $(-10)^3 = (-10) \times (-10) \times (-10) = -1000$

Qeexid 1.5 *Tirada idil ee "a" waxaa loo yaqaanaa saddex jibaar quman haddii ay la mid tahay saddexjibbaarka tiro idil oo b ah. Taasoo ah* $a = b^3$.

Tusaale 15: Caddee in tirooyinka idil ee 0, 1, 8, 27, 125. Inay yihiin saddex jibaaraneyaal quman.

Furfuris:

$0 = 0 \times 0 \times 0 = 0^3$, $1 = 1 \times 1 \times 1 = 1^3$,

$5^3 = 5 \times 5 \times 5 = 125$ $27 = 3 \times 3 \times 3 = 3^3$,

$125 = 5 \times 5 \times 5 = 5^3$,

Tusaale 16: 9 miyey tahay saddex jibaar quman?

Furfuris:

$9 = 3 \times 3$, haddaba majirto tiro idil oo marka saddex jeer laysku dhufto ina siisa 9. Sidaas darteed 9 ma aha saddex jibaar quman. Waxaad adeegsan kartaa isiraynta mutuxan si aad u hubisid inay tirada idil tahay mid saddex jibaar quman ah iyo inayna ahayn.

Fiiri tusaha soo socda

Isiraynta mutuxan ee tiro	Isirraynta mutaxan ee saddexjibbarkeeda
$4 = 2 \times 2$	$4^3 = 64 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 = 2^3 \times 2^3$
$6 = 2 \times 3$	$6^3 = 216 = 2 \times 2 \times 2 \times 3 \times 3 \times 3 = 2^3 \times 3^3$
$15 = 3 \times 5$	$15^3 = 3375 = 3 \times 3 \times 3 \times 5 \times 5 \times 5 = 3^3 \times 5^3$
$12 = 2 \times 2 \times 3$	$12^3 = 1728 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 3 = 2^3 \times 2^3 \times 3^3$

Hawl-galka 1.9

Maxaad ka ogaatay isirrada mutuxan ee tiradaa saddexjibaarkeedu ka muuqdo tusaha sare?

Isiraynta mutuxan ee tiro kasta, haddii isirkasta muuqdo saddex jeer, kolkaa tiradu waa saddex jibaar quman.

Tusaale 17: Kuwan soo socda keebaa ah saddexjibaar quman

b 729 **t** 500 **j** 8000

Furfuris:

b $729 = (3 \times 3 \times 3) \times (3 \times 3 \times 3)$ Isiradu waxaa loo kooxayn karaa saddex-saddex. Sidaas darteed 729 waa saddex jibaar quman.

t $500 = (2 \times 2) \times (5 \times 5 \times 5)$ hadab taranta waxaa ah saddex saddex shanaad laakiin 2 waa laba jeer oo keliba. Sidaas darteed 500 ma aha saddexjibaar quman.

j $8000 = (2 \times 2 \times 2) \times (2 \times 2 \times 2) \times (5 \times 5 \times 5)$ haddaba Taranta 2du waa laba koox ro saddex-saddex ah taranta saddex 5^{aad} jeer, Sidaas darteed. 8000 waa saddex jibaar quman.

Dhinaca teknoolajiga:

Si aad kaalkuleetarka seyntifiga u adeegsatid waxaad taaban si aad u heshid 53, adeegso kalkulaytar sayntifig oo cadaadi

$$5^3 = \boxed{5}\boxed{x^y}\boxed{3}$$

Layliska 1.5

1 Raadi saddex jibaarka mid kasta oo ka mid ah tirooyinka soo socda:-

b $\frac{1}{2}$ **t** 0.3 **j** $\frac{-4}{5}$ **x** $\frac{3}{7}$

2 Kuwan soo socda kuwee ah saddexjibaaraneyaal quman:-

b	343	**t**	400	**j**	3375
x	9000	**kh**	15625	**r**	2025
d	6859	**s**	512000		

1.3.2 Xididada saddex jibaarka

Qaybtii hore waxaad ku soo aragtay sida loo raadiyo xidid laba jibaarka tiro. Kaas oo ah rogaalka labajibaarka ee tiro. Sidoo kale raadinta xidid saddexjibaarka, waa rogaalka furfurista saddexjibaarka.

Hawl-galka 1.10

1 Haddii muga saddexjibaarane yahay $125sm^3$, markaa waxaad raadisaa dhererka geftinkiisa?

2 Mid kasta oo ka mid ah kuwan soo socda soo saar tirada uu saddexjibbaar keedu yahay:

b 0 **t** 1 **j** 27

x 64 **kh** 1000

Hawl-galka 1.10 waxaad ku naaqtiimi furfurida saddexjibaarka. haddaba habka rogaalka raadinta saddex jibaar tiro waxaalo uqeexay sida soo socota:-

Qeexid 1.6 *Haddii y ay tahay saddex jibaarka x, markaa $y = x^3$ kolkaa x waxaa loo yaqaanaa xidid saddex jibaarka y, kaas oo astaan ahaan loo qori karo $x = \sqrt[3]{y}$ $\sqrt[3]{x^3} = x$: astaantan $\sqrt[3]{y}$, 3 waxaa loo yaqaanaa muujiyaha. $\sqrt[3]{}$ waa astaanta xidid saddex jibaarka.*

Tusaale 18: Raadi xiddid saddex jibaarka kuwa soo socda

b 27 **t** $\frac{64}{125}$

Furfuris:

b $27 = 3 \times 3 \times 3$, sidaas darteed $\sqrt[3]{27} = 3$.

t $\frac{64}{125} = \frac{4 \times 4 \times 4}{5 \times 5 \times 5}$. Sidaas darteed $\sqrt[3]{\frac{64}{125}} = \frac{4}{5}$

Waxaad adeegsan kartaa isiraynta mutuxan si aad u raadisid xidid saddex jibaarka ee tiro.

Fiiritusaalaha soo socda

Tusaale 19:

b $1000 = (2 \times 2 \times 2) \times (5 \times 5 \times 5)$

$= 2^3 \times 5^3 = (2 \times 5)^3$ sidaas darteed,

$\sqrt[3]{1000} = \sqrt[3]{(2 \times 5)^3} = 10$.

t $8000 = (2 \times 2 \times 2) \times (2 \times 2 \times 2) \times (5 \times 5 \times 5)$

$= 2^3 \times 2^3 \times 5^3$

$= (2 \times 2 \times 5)^3$.

Sidaas darteed, $\sqrt[3]{8000} = \sqrt[3]{(2 \times 2 \times 5)^3}$

$= 2 \times 2 \times 5 = 20$.

Dhinaca teknoolajiga:

Marka aad adeegsaneysid kaalkuleetarka siaad u raadisid $\boxed{\sqrt[3]{8}}$, cadaadi $\boxed{8}$ $\boxed{2nd}$ $\boxed{x^y}$ $\boxed{3}$

Xusuus: *Marka ay tiro u qoran tahay taranta saddex isir oo isleeg, isir kasta waxaa lagu magacaabaa xidid saddexjibaarka tirada.*

Layliska 1.6

1 Raadi xidid saddexjibaarka mid kasta oo ka mid ah tirooyinka soosocda adiga oo adeegsanaya isiraynta mutuxan.

b 512 **j** 27000 **kh** 15625

t 2744 **x** 10648

2 Raadi xidid saddex jibaarka kuwan soo socda:-

b $\sqrt{\frac{64}{729}}$ **t** $\sqrt{\frac{1,000,000}{117,649}}$

Furaha Tibxaha

- Labajibaar
- Labajibaar quman
- Xidid laba jibaarka
- Xidid saddex jibaarka
- saddex jibaarka quman
- Xidid kasaarida saddex-jibaarka

Sookoobida Cutubka

- ✓ *Habka la iskugu dhufto tiro laf ahaanteed waxa lagu magacaabaa laba-jibaarka tiradaa.*
- ✓ *Haddii tiro idil oo ah y loo cadayn karo sida x^2 haddii x tahay tiro idil, markaa y waxa lagu magacaabaa laba jibbaar quman.*
- ✓ *Haddii ay isiraynta mutuxan tiro laba jeer soo noqoto tiradaas waxaa loo yaqaanaa laba jibbaar quman.*
- ✓ *Xidid laba jibaarku waa rogaalka xisaabfalka laba jibbaarka.*
- ✓ *Xidid laba jibbaarka togan ee tiro waxaa lagu asteeyaa calaamadan $\sqrt{\ }$. Tusaale $3^2 = 9$ sidaa darteed $\sqrt{9} = 3$.*
- ✓ *Tirooyinka soo baxa marka tiro iyada lafteeda sadex jeer la isku dhufto waxa lagu magacaabaa, saddex jibaarka tiro, Tusaale: 1, 8, 27.*
- ✓ *Haddii tiro isiraynteeda mutuxan uu isir kasta saddex jeer soo noqdo, tiradaa waxa lagu magacaabaa saddexjibaar-quman.*
- ✓ *Rogida xisaab falka ee helidda saddexjibaarka tiro waa helidda xiddid saddex jibaarka tiro. taasoo ah helidda (raadinta) tiro saddexjibaarkeedu yahay tirada lagu siiyay.*
- ✓ *Astaantan $\sqrt[3]{\ }$ waxa lagu suntaa xidid saddex jibaarka. Tusaale $\sqrt[3]{27} = 3$.*

Nakhtiinka layliska cutubka 1aad

1 Tirooyinka soo socda kuwee ah laba jibbaaranayaal qumman?

b	8	**t**	100	**j**	30,000
x	90,000	**kh**	1210000		

2 Tirooyinka soo socda kuwee ah saddex jibaarenayaal quman?

b	64	**t**	1000	**j**	216000
x	250,000	**kh**	15,000		

3 Raadi xidid laba jibaarka mid kasta tirooyinka soo socda adigoo ka raadinay tusaha, tirooyinka.

b 397 **t** 9.231 **j** 0.81

4 Raadi xidid saddex jibaarka mid kasta tirooyinka soo socda, adigoo ka raadinaya tusaha tirooyinka

b 66 **t** 7382 **j** 13400

5 Shakhsi ayey lacagi u taalaa bangiga lacagtaas oo dhan 20,000 $(1.06)^3$. Haddaba waxaad raadisaa xadiga lacagta bangiga u taala tirada ugu dhaw ee tirada idil ah

6 Raadi saddex jibaarka tiro, labajibaar keeduna yahay 0.09.

7 Raadi xididka mid kasta oo kuwan kamida.

b $\sqrt{36}$ **t** $\sqrt{0.16}$ **j** $\sqrt{\frac{25}{16}}$ **x** $\sqrt{\frac{169}{400}}$

8 Fududee mid kasta kuwan soo socda

b $\sqrt{\frac{6}{36}}$ **t** $\frac{\sqrt[3]{27}}{\sqrt{64}}$ **j** $\frac{\sqrt[3]{-125}}{\sqrt{25}}$ **x** $\sqrt[3]{\frac{a^3}{8}}$

9 Ku qor Run ama Been kuwan soo socda mid kasta

b Saddex jibaarka tiro kasta oo kisi ah waa tirokisi

t Haddii jibaarkadu tiro ku dhamaado 5 markaa tiradaas saddex jibaarkeeduna wuxuu ku dhamaadaa 25.

j Ma jiro saddexjibaar qumman oo ku dhamaada 8.

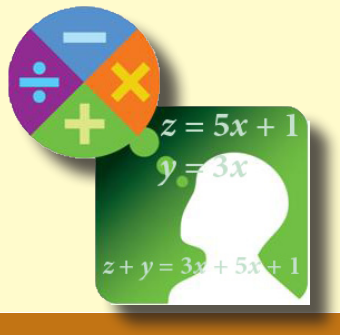
10 Saamiga laba jibbaarka laba tiro ayaa'ah 25:9. Waa imisa saamiga tirooyinka?

11 Haddii saddex jibaarka tiro yahay 64 waa maxay xidid laba jibaarka tiradu?

12 Raadi xidid laba jibbaarka wadarta $1 + 2^3 + 3^3 + 4^3$.

13 Raadi mugga saddex jibaarane geftinkiisu yahay $\sqrt[3]{2}$.

Cutubka 2aad



FAAHFAAHINTA SHAQADA DOORSOOME YAASHA

UJEEDDOOYINKA CUTUBKA

Cutubkani marka uu dhamaado ardaydu waxay awoodi doonaan:

- Xalinta masalooyinka idinkoo adeegsanaya doorsoomeyaasha.
- Iskudhufashada laba tibxaalaha iyo hal tibixlaha iyo raadinta taranta laba tibxaaleyaasha
- Raadita Isiweynaha ay wadaagaan tibaaxaha aljebraad.

TUSMOOYINKA MUHIMKA AH

2.1 Faahfaahinta tibxaha aljebrada iyo tibaaxaha
2.2 Iskudhufashada laba tibxaaleyaasha
2.3 Isir weynaha ay wadaagaan.
Furaha Tibxaha
Sookoobida Cutubka
Nakhtiinka layliska

HORDHAC

Cutubkii koowaad waxaad ku soo aragtey shaqada labajibaaraneyaasha, saddex, jibaarka, xidid labajibaaran iyo xididka saddex jibaaran, kuwaas oo ah fur-furi taanada tirooyinka.

Doorsoomeyaasha waxaa lagu asteyn xarfo sida x, y, z, … w.m.ah.

Tirooyinkana waxaa lagu asteyn astaanta tirooyinka, halka xarfaha ahna waxaa looyaqaanaa astan xarfo ah.

2.1 FAAHFAAHINTA TIBXAHA ALJEBRADA IYO TIBAAXAHA

- Nakhtiinka doorsoomeyaasha, tibxaha iyo tibaaxaha.
- Sidii aan ku soo sheegney cutubkii hore astaanta xarfaha waxaa loo isticmaali karaa aljebra. Haddii astaanta xarfaha aynu u adeegsano aljebrada waxay u taagan tahay waxyaabo kale duwan ama waxaa lagu bedeli karaa qiimaha tiro, kaa soo loo yaqaano **doorsoome.** Haddii uu xarafku u taagan yahay tiro cayiman ama isku mid ah waxaa loo yaqaan, **ma doorsoome.**

Hawl-galka 2.1

1 Adigoo nakhtiin ku sameynaya qeexda aljabra ee tibaaxaha iyo tibxaha soo saar tibxaha kujira tibaaxaha soo socda.

b $3xy$ **t** $3x + 2y$

j $x + y + z$ **x** $xyz + x^2y + xyz^3$

2 Caddee lamaanayaasha tibxaha ah ee soo socda kuwa, tibxaha isleh iyo kuwa aan islehayn.

b xy, iyo $-xy$ **t** xy^2, iyo $\frac{4}{5}xy^2$

j xy^2, iyo $3xy^2$ **x** $5x^2$ iyo $-x^2$

3 Ka samee kooxo, adigoo isugu-ururinaya dhammaan tibxaha isku midka ah hal koox.

$$y^2, -2x^2, xyz, 8xy^2, 12x^2, -5xyz, -5xy^2, y^2, 6y^2x.$$

4 Tibixda lagu siiyey ee $3xy^2$, raadi:

b Tirada horgalaha **t** Horgalaha x. **j** Horgalaha y^2.

Qeexid 2.1 Horgaluhu *waa taranta tirooyin iyo sumada xarfaha, taas oo lagu dhufto isir kasta oo lagu siiyey.*

Qeexid 2.2 *Tirada horgalaha ee tibaaxaha aljabrada, waa tirada isirka ee ka muuqata tibaaxaha aljebraad.*

Qeexid 2.3 *Isir waa dhufsanaha ay sameeyaan taranta laba xaddi ama in ka badan.*

Hawl-galka 2.2

Dhammaystir shaxda soo socota adigoo caddeynaya nooca tibaaxaha aljabreed sida hal tibixle, laba tibixle, iyotibxaale.

Tibaaxaha aljebraad	x	x^2	x^3+8xy^2	$12x+5$	$x+y+z$	$3x-5y$
Nooca	Hal tibixle					

Qeexid 2.4 Hal tibixle, *waa tibaax aljabreed oo leh hal tibix.*

Laba tibixle *waa tibaax aljabreed oo leh laba tibxood.*

Tusaale, ahaan hal tibixlaha $3x^2y$, horgalaha x^2 waa $3y$, horgalaha y waa $3x^2$ sidoo kale tirada horgaluhuna waa 3.

Laylis 2.1

1 Caddee keebaa tibaaxaha aljebraad ee soo soosocda ah hal tibixle kuwee ah laba tibixle iyo keebaan labada midna ahayn. Sidookale waxaad caddeysaa tibaaxaha

b xy **t** $\sqrt{x+y}$ **j** $x+\sqrt{x+y}$ **x** $x+y+z$

kh $\dfrac{xy}{x+y}$ **d** $x(x+y)$ **r** x^2+y^2 **s** $xy+xz+yz$

2 Sheeg tirada horgalaha tibaaxaha aljebraad ee soo socda.

b $3xy$ **t** $-x$ **j** x^3y **x** $\dfrac{2}{5}xz$

3 Raadi horgalayaasha mid kasta oo isirada lagu siiyey ka midah, sida ay tilmaamayaan tibaaxaha aljebraad.

b xy iyo $3xy^2$ **t** xz^2 iyo $-3xy^2z^3$

j xy^2 iyo $-5x^4y^3z^2$

2.1.1 Isticmaalka doorsoomeyaasha qaaciido ahaana

Waligaa ma isticmaashay qaaciido? ma xusuusan kartaa joometariga ama sayniskaba? Waa maxay qaaciido?

Haddaba, si aan u fahano macnaha qaaciidada iyo ka shaqeysiinteeda waa inaynu isku daynaa qabashada shaqo koo xeedke soo socda.

Shaqo-kooxeedka 2.1

1 Qora, kana dooda qaaciidooyinka aad taqaanaan ee xisaabta, ama maadooyinka kale. Sida qaaciidada bedka, mugga, heerkulka, i.w.m ah.

Sidoo kale waxaad ka doodaan sida qaacidadu shaqaysi.

2 Qaaciidadan joometariga Hooskuqoran N, waxay utaagan tahay tirada xaglo gooyeyaasha geesoole, dhinacyadiisu yihiin "n" sidan la inagu siiyey, haddaba $N = \frac{n(n-3)}{2}$. Markaa dhamaystir shaxdan.

Tirada dhinacyada	4	6	10	20
Tirada xaglo jooyeyaasha	2			

3 Ma fuddahay inaad garatid tirada xaglo qooyeyaasha geesoole leh 100 dhinac adiga oo adeegsanaya qaaciidada suaasha 2? Waxaad ka warantaa adigoo isticmaalayn qaaciidada, hababka dhismaha joometariga iyo tirinta?

Qeexid 2.5 *Qaacidadu waa xeer aljebraad oo lagu qiimeeyo xadiyada. Qaaciidadu waa weedh leh laba ama in ka badan oo doorsoomeyaal ah.*

Qaaciidooyinka joometariga ee la isticmaalo waxaa ka mida kuwa lagu xisaabiyo bedadka iyo wareegyada.

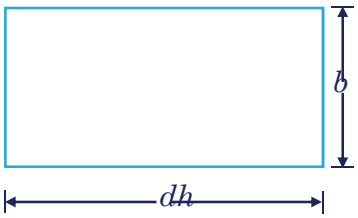
Tusaale 1: Jaantusyo0 joometeriyeed ee *b* ilaa *j* Bededka "*B*" iyo wareega "W" waxaa loo tibaaaxaa tibxo doorsoomeyaal.

b Laydi

B = dh × b

W = dh × b

W = 2dh + 2b = 2 (dh + b).

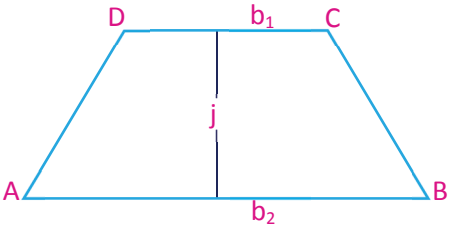


Markaa dh waa dhererka laydiga

W waa ballaca laydiga

Qaacidada B = dh × b, waa kuwee doorsoomeyaashu?

t Koor

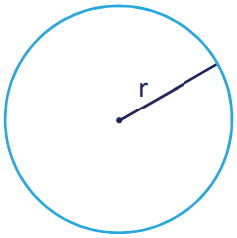


$$B = \frac{1}{2}(b_1 + b_2)\, j$$

$$W = AB + BC + AD + CD$$

marka, b_1 iyo b_2 ay yihiin dhererada dhinacyada barbarada ah, h waa joogga koorta.

j Goobo



$$B = \pi r^2$$

$W = 2\pi r$, marka "r" waa gacanka goobada.

Shaqo-kooxeedka 2.2

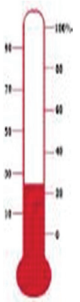
Ka dooda mid kasta oo ka mida hawraarahan soo socota, u sameeya qaaciidoo xaddiga loo baahan yahay?

1. x waa 10% ee y
2. Beeroole ayaa, geedo kubeerey beerleh qaab leydi, oo leh "dh", mitir iyo "b" mitir dherer iyo balac. Haddii geedkastaa ku fadhiyo bed dhan $4m^2$,

   Raadi qaaciidada aad ku heleysid tirada geedaha.

   Go'aami qiimaha dh iyo b, adigoo kasoo qaadaya beerta meelna ineyna kabanaaneyn.

Tusaale 2: Qaaciidada iskubedelka heer-kullada ee ferenheet dhigrii (F) iyo dhigrii sentigireedh (C) waa $C = \frac{5}{9}(F - 32)$.



b Waa kee doorsoomaha ku jira qaaciidadu?

t RaadiC° haddii F = 68°.

Furfuris:

b Halkan F waa doorsoome

t $C = \frac{5}{9}(F - 32) = \frac{5}{9}(68 - 32) = \frac{5}{9} \times 36 = 5 \times 4 = 20°C.$

Tusaale 3: xisaabi maxsuulka (Natiijada) tibaaxa aljebraad ee soo socda marka lagu siiyo qiimaha doorsoomeyaasha.

b $3x + y$, marka, $x = 2$, $y = 3$ **t** $3x + y^2$, marka $x = 3,\ y = 1$

j $\frac{1}{2}(x + y)z$ marka $x = 4$ $y = 2$, $z = 5$

Furfuris

b $3x + y = (3 \times x) + y$.

Sidaas darteed marka $x = 2$, $y = 3$, waxaynu heleynaa

$$3x + y = 3 \times 2 + 3 = 6 + 3 = 9$$

t $3x + y^2 = (3 \times x) + (y \times y)$.

Sidaas darteed $x = 3$, $y = 1$ markaa waxaynu heli

$$3x + y^2 = (3 \times x) + (y \times y) = (3 \times 3) + (1 \times 1) = 9 + 1 = 10$$

j marka $x = 4$, $y = 2$, $z = 5$, waxaynu heli

$$\frac{1}{2}(x + y)z = \frac{1}{2}(4 + 2)5 = \frac{1}{2} \times 6 \times 5 = 3 \times 5 = 15$$

Layliska 2.2

Haddii $a = 1,\ b = 2,\ c = 3,\ d = 4,\ e = 0$, markaa qiimee tibaaxaha aljebrada ee soo socda.

1	$2b$	**2**	$3ac$	**3**	$c + d$
4	$2a + d$	**5**	$2a + 3b - d$	**6**	$ab + be$
7	$3bc + d$	**8**	$4ad - \frac{1}{2}bd$	**9**	$\frac{abc}{d}$
10	b^2	**11**	$3c^2$	**12**	$(3c)^2$
13	$e(a + b)$	**14**	$c(d - 3e)^2$	**15**	$2b^2(a + c)$
16	$\frac{2(2a + 3b + 4c)}{d}$	**17**	$\sqrt{d}$	**18**	$2\sqrt{3c}$

19 $\sqrt[3]{bd}$ **20** $\sqrt{4c+d}$

21 Qaaciidoo yinka soo socda ku furfur doorsoomaha la sheegay.

b $B = l \times w,\ l$ **t** $s = \frac{(u+v)}{2}t, v$ **j** $xy + a = w, y$

x $v = u + at, a$ **kh** $B = 4\pi r^2, r$ **f** $B = \pi(R^2 - r^2), r$

r $u^2 - v^2 = 2as, s$ **s** $B = \frac{3k + 5m}{2}, k$

22 Laydi leh wareeg dhan 62.5 sm. haddii balaciisu la laban laabo, dhererkiisuna la kala badho weereegiisa cusubi waa 72.5 sm. Waa intee bedka laydigu?

23 Xisaabi bedka koor leh salalka 4sm iyo 10sm iyo joog, dhan 5sm.

24 Barta karka ee biyuhu waa $100^{\circ}\mathrm{C}$. Waa imisa dhigrii oo ferenhayt ah heerkulkani?

2.1.2 Doorsoomeyaasha, tibxaha, iyo tibaaxaha

Qaybtii hore waxaynu ku soo baranay sida qaaciidooyinka loogu adeegsado doorsoomeyaasha ku jira qaacidooyinka waxayna u taagan yihiin xaddiyo. Qayb waxaan ku eegi doonaa sida loo fududeeyo doorsoomeyaasha iyada oo la isticmaalayo xeerar xisaabeedka gaarkood iyo isku ururinata tibxaha isku midka ah.

Hawl-galka 2.3

1 **a** qiimee $3((154-26)\div 2^4)+12\times 3$ oo qor natiijadaado

b imisa xisaab falo ayey leedahay su aasha kore (sare)?

c Natiijooyinkaaga barbardhig natiijooyinka ay heleen ardayda fasalkaaga.

d miyey horsanaanta xisaabfaladu, xisaabintoodu, keeneysaa, kala duwanaansho xisaabeed, ku fiiri jidad kale duwan.

2 Qiimee $\frac{\left((x-y)^2+3x-\frac{20}{y}\right)}{4}$ haddii $x = 8$, $y = 5$ imasa xisaab fallo, ayey ka kooban tahay?

Si looga hor tago, xisaabinta maangad ee xisaabfalada, waa in la isticmaalaa xeerka kala horeynta xisaab falada.

Horsanaanta xisaab faladu waa sidan soosocota

1 *Fiiri qowska, hadii uu jiro, haddii ay u baahan yihiin qiimee, haddii laba qows ay jiraan marka hore ka gudaha ku bilaw.*

2 *Fiiri Jibaarka, haddii ay jibaaran tahay.*

3 *Iskudhufo ama isuqaybi, adigoo ka bilaabaya dhinac bidix una soconaya dhinaca midig.*

4 *Isugee ama kalajar, adigoo kabilaabaya dhinac bidix una soconaya dhinac midig.*

Tusaale 1: xisaabi $32 - 4\,[(3 + 6)^2 \div 3] + 2$

Furfuris: $32 - 4[(3+6)^2 \div 3] + 2 = 32 - 4[(9)^2 \div 3] + 2$

$= 32 - 4[81 \div 3] + 2$

$= 32 - 4[27] + 2 = 32 - 108 + 2$

$= -76 + 2 = -74$

Tusaale 2: qiimee tibaaxaha hoos,

Waxaana lagu siiyey: $a = -5, b = 0.25, c = 3, d = 8$

$(a + c)^2 - bd$

Furfuris: $(-5 + 3)^2 - (0.25)8 = (-2)^2 - 2 = 4 - 2 = 2$

Hawl-galka 2.4

1 Miyey $3 + 4$, lamid tahay $4 + 3$? miyey 4×5 la mid tahay 5×4?

Haddii x iyo y ay u taagan yihiin tirooyin maxaad ku gabagabeyn lahayd $x + y$ iyo $y + x$, $y \times x$ iyo $x \times y$? Ma odhan kartaa sidaa.

b $y + x = x + y$? **t** $y \times x = x \times y$?

2 Dhul-beereedka cali ayaa leh dhinac 100m oo bari ah iyo 50 m oo wagooyin ah halka dhul-beereedka cibaado uu leeyahay dhinacyo 50 m oo bari ah iyo 100 m oo wagooyi ah. Qofkee ayaa dhul-beereedkiisu leeyahay bed weyn? Sabab?

3 Ahmed wuxuu faaiiday 12 birr maalintii Isniinta, 15 birrna maalintii Talaadada. Halka faadumo, ay faa'iiday 15 birr maalintii isniinta, 12 birr na maalintii Talaadada. Qofkee anaa faa'iido badan muddada labada maalmood ah?

Astaan xisaabeed noocee ah ayaa loo isticmaaleyaa halka?

4 **b** Miyey $x - 2y$ la mid tahay $2y - x$? sabab?

t Miyey $x + 2y$ la mid tahay $2y + x$? sabab?

j Miyey $x - 2y$ la mid tahay $-2y + x$? sabab?

Qeexid 2.6 *laba doorsoome oo kasta sida x iyo y, xeerarka soo socdaa waxay ku noqonayaa run.*

1 *Astaanta kala hormarinta ee isugeynta* $x + y = y + x$

2 *Astaanta kala hormarinta ee iskudhufashada* $xy = yx$

Astaantaamaha kala hormarinta waxaan ku dari karnaa tibxo, ama qiimeyaal siday doonto ha u kala horeeyaane. Sidoo kale waxaan kudhufan karnaa tibxo ama qiimeyaal inagoon eegayn kala horeyntooda. Arinkanina wuxuu inaga caawinayaa inaan isugu ururino tibxaha isku midka ah hal dhinac iyadoon loo eegayn horsanaantooda.

Xusuus: *Astaanta kala hormarinta ma ogola kala jaridda iyo iskuqaybinta.*

Isticmaal xeerarkan soosocda fududaynta tibaaxaha Aljebrada.

1 $x = 1.x = 1x$

2 $-x = -1.x = -1x$

3 $x - x = x + (-x) = 0$ *Tiro akasta oo ay x tahay.*

4 $x + 0 = 0 + x = x$ *Tiro kasta oo ay x tahay.*

5 $0.x = x.0 = 0$ *Tiro kasta oo ay x tahay.*

6 $\frac{x}{x} = 1$ *haddii ay x = 0 Tibaaxdu waxay noqoneysaa maqeexane.*

7 xy waa $x \times y$ islamarkaan xisaab falka udhexeeya x iyo y waa iskudhufasho.

8 *Marka aan doorsoome isku mid ah isuga dhufano si noqnoqod ah (dhawr jeer) sida* $x \times x =$ *waxaynu u qori ama* $x \times x = x^2$ *halki aan qori lahayn xx sidoo kale* $x \times x \times x = x^3$*, halkii aan ka qori lahay xxx.*

9 *a(x +y) waa a* $\times$ *(x +y) sidaas darteed xisaab falka u dhexeeya a iyo* $x + y$*, waa iskudhufasho.*

Tusaale 1: Soo saar bedka laydi dhererkiisu yahay 7 sm, ballaciisuna yahay 5 sm.

Furfuris: B = dh × b

B = 7 sm × 5 sm = 35 sm^2

Iskudhufashada tiro iyo hal tibxaale

Marka tiro lagu dhufto hal tibxaale, tirada lagu dhuftay waa tirada horgalaha haltibxaalaha.

Tusaale 2: $-8\times y=-8y$, $-1\times y=-y$, $4\times -y=-4y$, $4\times(-3xy)=-12xy$

Hawl-galka 2.5

1 Isbar-bar dhig qiimayaashan $xy+xz$ iyo $x(y+z)$

b marka $x=5, y=6, z=10$ **t** marka $x=-25, y=16, z=8$

2 Isbar-bardhig qiimayaashan $xy-xz$ iyo $x(y-z)$

b marka $x=12, y=8, z=3$ **t** marka $x=11, y=-8, z=-4$

3 Qor howraar qeexaysa xidhiidhka u dhexeeya

b $xy+xz$ iyo $x(y+z)$ **t** $xy-xz$ iyo $x(y-z)$

Qeexid 2.7 *Saddex doorsoome oo kastaa waxay ku rumoobaan xeerarka soo socda:*

i *Astaanta kaladhiga iskudhufashada ee isugaynta.*

$x(y+z)=xy+xz$

ii *Astaanta kala dhigga iskudhufashada ee kala jaridda.*

$x(y-z)=xy-xz$

inkasta oo aan badanaa la isticmaalin astaanta kala dhigga iskudhufashada ee isugeynta waxay inaga caawisaa soo saarida isirka ay wadaagaan wadarta ama kala jarida labo oo aljebro tibaaxood, tanina waxay inaga caawin isugeynta tibxaha isku midka ah.

$$4x+5x=4\times x+5\times x=(4+5)\times x=9\times x=9x$$

$$3xy^2+6x^2y=3xy\times y+3xy\times x=3xy(y+x)$$

Isugeynta tibxaha isku midka ahi waxay kusaleysan yihiin astaanta kala dhigga iskudhufashada ee isugeynta.

Tusaale 1: $x+5x=1\times x+5\times x=(1+5)\times x=6\times x=6x$

Hadda waxaa la iskugeeyey tirooyinka.

Tusaale 2: $x-4x=1\times x-4\times x=(1-4)\times x=-3\times x=-3x$

Marka la isugeynayo tibxaha isku midka ah ma muujineyno astaanta kala dhigga.

Xusuusnow:- $x-4x=x+-4x=1\times x+(-4)\times x$

$x-4x=x+-4x=1\times x+(-4)\times x=(1+(-4))x=-3x$

ama $x-4x=1\times x-4\times x=(1-4)x=-3x$

Hawl-galka 2.6

1 **b** xisaabi wadarta saddexda tibxood ee 1 + 2 + 3 adoon beddelin Horsanaanta tibxaha, isugeytooda hal jid oo suurtagal ahi waa kooxaynta tibxaha sida (1 + 2) + 3. Sidoo kale, $1+2+3=1+(2+3)=6$.

t Waa kee jidka kale ee aan uga shaqeynkarno inaga oo aan bedelin horsanaanta tibxaha.

j Isbarbardhig natiijada aa ka heshey "t", marka loo eego "b".

2 haddii x, y, iyo z ay u taagan yihiin tirooyin miyey $(x+y)+z$ la mid tahay $x+(y+z)$?

3 Ku celi masalooyinka 1 iyo 2, adiga oo isugeynta ku beddelaayo iskudhufasho.

Qeexid 2.8 *Saddex doorsoome oo kasta x, y iyo z, run bay ku yihiin xeerarka soo socda.*

i *Astaanta hormogalinta ee isugeynta.*

$x + (y + z) = (x + y) + z$

ii *Astaanta hormogelinta ee iskudhufashada.*

$x(yz)= (xy)z$

Tibxaha waa la kooxayn karaa iyadoo la adeegsanaya astaanta hormogelinta ee isugeynta ama astaanta hormogelinta ee iskudhufashada. Waxaad xusuusataa in aanay kooxaoyntu ahayn dib u habayn, markeynu koo xaynayno tibxaha, tibxuhu isma badaleyaan oo waxay ahaanayaa sidoodii, laakiin waxaynu fiirineynaa qowska, hadba xisaab falka ku haboon marka hore.

Tusaale 1: Fiiri $x+3x+5x$

Adeegso labadan hab mid ka mid ah

Natiijadu waa:- $(x+3x)+5x$ ama $x+(3x+5x)$

$x+3x+5x=x+(3x+5x)=x+8x=9x$

Tusaale 2: fududee $x^2+3x^2+5xy-2xy$

Fulfuris: isugu ururi tibxaha isku midka ah hal dhinac

Sida:- $x^2+3x^2+5xy-2xy=(x^2+3x^2)+(5xy-2xy)=4x^2+3xy$

Tusaale 3: $3\times 5x=(3\times 5)\times x=15\times x=15x$

Tusaale 4: $3x\times 12x\times 3y$

Fulfuris: $3x\times 12x\times 3y=(3x\times 12x)\times 3y=36x^2\times 3y$

$=(36\times 3)\times(x^2\times y)=108\times x^2y$

$=108x^2y$

Layliska 2.3

1 Adigoo adeegsanaya astaanta kala dhigga iskudhufashada ee isugeynta ama kala jaridda.

Raadi wadarahan:

b $x+5x$ **t** $3x-x$ **j** $-x-3x$

x $x-11x$ **kh** $x+5x+7x$

2 Ka soo saar isirka ay wadagaan tibaaxaha aljabrada.

b $xy+x^2y^2$ **t** $4x+8xy$ **j** $3x^2y+6xy$

x $3xy+6x^2y^3$ **kh** $5x-10x^2$

3 Maku fidin karnaa astaanta kala dhigga iskudhufashada ee isugeynta marka ay tibxaha qowska ku jiraa ay ka badan yihiin labo? Marka ay tibxaha ku jira isku qawska ay xidho astaanta ka goyntu?

4 Imisa hab oo kala duwan ayaad u dhigi kartaa isugeynta tibxaha isku midka ah ee soo socda adigoon dhaqaajin tibxaha? Caddee jawaabaha inay isku mid yihiin dhamaan jidadku?

b $x+2x+5x$ **t** $x+2x+3x+4x$

5 Fududee tibaaxaha aljebrada ee soo socda. Adeegso astaanta hormogelinta ee isugeynta.

b $x+(3x+y)$ **t** $5y^2+(y^2-2xy)$

j $(x+y)-3y$ **x** $(2x+3)+12$

6 Fududee $(x+2y)+5x$ ma fududeyn kartaa adigoo isticmaalaya astaanta hormogelinta ee isugeynta oo kelinf?

7 Fududee tibaaxaha aljebrada ee soo socda:-

b $3[4x-(2x-5)]$ **t** $pq^2+4p^2q^2+3pq^2$

j $-[(5-2p)-(3p+10)]$ **x** $3a-2c+4+6c-2a$

8 Adigoo isticmaalaya Horsanaanta xisaab falada ku haboon fududee tibaaxaha aljebrada ee soo socda?

b $m^2-2\{n-4-[5-3(m^2-2n)]+7n\}$

t $4r-\{(s-2r)-[4s-(r-s)]\}$

j $2x-[4+5x-3(8-2x)]$

2.1.3 Isticmaalka Doorsoomeyaasha oo lagu furfurayo masalooyinka

Qaybtii hore waxaad ku soo nakhtiinteen doorsoomayaasha, tibxaha iyo tibaaxaha iyo sida loo fududeeyo tibaaxah aljebrada iyada la isku ururinaya tibxaha isku midka ah. Waxaa kale oo aad soo aragtay sida doorsoomeyaasha loogu adeegsado qaaciidooyinka. Hadaba maxaa kale oo aad umaleynaysaa in loo adeegsado doorsomeyaasha?

Hawl-galka 2.7

Nolol maalmeedkeena waxaynu la kulanaa masalooyin u baahan in lagu furfuro xadiyo aan la gareynin. Kuwan soo socdaa waa kuwo gaar ahaaneed ee iskuday inaad furfurtid?

1 In ka badan saddex sano, ayuu Ahmed awawgii 6 laab ka weynaa da'da Ahmed jirey, sanadkii hore. Marka da'da Axmed ee hada uu jiro lagu daro da'da awawgii uu hada jiro, wadartoodu waa 68. Mid kasta waa imisa jir iminka?

2 Kala badhka da'da Daahir laba sano ka dib marka loo geeyo saddex meeloodka da'duu jiray saddex sano kahor waa labaantansano. Waa imisa jir hada Daahir?

3 Ka soo qaad Aabahaa ayaa lacagta uu ku shaqeeyo dhan tahay 500 Bir bishii haddaba haddii shaqada laga joojiyo bisha dhamaad keedii oo ayka hadhsan tahay 12 maalmood. Imisa lacag ah ayuu helayaa? Waa kee doorsoomaha kujira masaladan? Ma u dhigi kartnaa doorsoome ahaan? Sidee baynu u xalineynaa masaladan?

Furfurista masalooyinka macnahoodu wuxuu yahay raadinta xadiga maqan (doorsoomaha) adigoo adeegsanaya waxa lagu siiyey. Furfurista masalooyin xisaabta waa xadiga aan la garaneyn (doorsoomaha) kaasoo hawraarta ka dhigaya Run, marka lagu bedelo doorsoomaha. Tusaale ahaan $x + 5 = 8$, keliya waxay run noqoneysaa marka x lagu bedelo 3, sidaas darteed $x = 3$, waa furfuris $x + 5 = 8$ masalooyinka xisaabta xadiga aan la garaneynin waxaa u taagan doorsoomaha.

Tusaale 1: furfur isle'egtan $3x = 120$

Furfuris: $\frac{3x}{3} = \frac{120}{3} = x = 40$

Sidaas darteed furfuristu waa $x = 40$, $3 \times 40 = 120$.

Hawl-galka 2.8

Haddii masalada lagugu siiyo erayo ahaan waxaad u badali kartaa isle'egyo xisaabeed. Iyada oo loo badalayo doorsoomeyaal. Hadaba marka la rogayo ama labadalayo masalooyinka iyagoo loo badalayo isle'egyo xisaabeed.

Waa inaad raadisaa tibaaxo aljebro u taagan cadeymaha weedhaha.

Dhamaystir shaxdan soo socota adigoo tibaaxaha aljebraad ku astaynaya astaamaha u qoran weedhaha.

Caddeymahaweedhaha	Tibaaxaha abjebrada calaamad ahaan
Lix lagu dhuftay tiro	
Lix oo lagu daray tiro	
Tiro laga jarey lix	
Tiro usoo noq noqotay isir ahaan saddex jeer.	
Tiro usoonoq noqotey tibix ahaan saddex jeer	
Wadarta saddex tiro oo isku xiga oo tirooyin idil, ah [Fikrad ahaan:- uqaado x iney tahay tirada hore]	
Sided wayka yar tahay laban laabka tiro.	
Hal loo geeyey saddex laabka tiro.	

Tusaale 2: Shaxda hoos ku qorani waxay inoo sheegeysaa xidhiidhka ka dhexeeya caddeymaha, weedhaha iyo tibaaxa aljebrada.

Caadeymaha weedhaha	Tibaaxaha Aljebrada
Tiro	x
Rogaalka tiro	$\frac{1}{x}$
In ka badan hal tiro	$x + 1$
In ka yar hal tiro	$x - 1$
Laban laab ka tiro	$2x$
In shan ka badan laban labka tiro	$5 + 2x$
Laba jibaar tiro	x^2
Farqiga laba tiro	$x - y$
Laba jibaarka wadarta laba tiro	$(x + y)^2$
Qeybta (saamiga) laba tiro	$\frac{x}{y}$
Wadarta labajibaarka laba tiro	$x^2 + y^2$

Tusaale: *Wadarta sadex abyooneyaal oo isku xiga ayaa ah 18. Hadaba waa kee abyoonaha ugu yari?*

Furfuris: u qaado x inay tahay abyoonaha ugu yar markaa abyoonaha ku xiga, x waa $x + 1$ islamarkaana abyoonaha ku sii xigaa $x + 1$ ii yahay $x + 2$.

Sidaas darteed, $x + (x + 1) + (x + 2) = 18$

$$3x + 3 = 18$$

$$3x = 15$$

$$x = 5$$

Sidaas darteed abyoonaha ugu yari waa 5.

Tusaale 4: Dhererka laydi ayaa ah afar laabka ballaciisa. Bedka laydiguna waa 36 sm^2. Raadi dhererka iyo ballaca laydiga?

Furfuris: U qaado ballaca laydiga b dhererkiisuna yahay dh.

Maadaama uu dhererku yahay afar laabka ballaciisu dh = 4 b.

Laakiin B = dh × b = 4b × b = $4b^2$

Bedka la ina siiyey na waa 36 sm^2

Sidaas darteed $\frac{4}{4}b^2 = \frac{36}{4}sm^2 = b^2 = 9\ sm^2$

$b = 3\ sm$

hadaba balac, $b = 3$ sm

$dh = 4b$

$dh = 4 \times 3$

$dh = 12$ sm

Tusaale 5: Saamiga laba tiro ayaa ah 2:5 wadarta tirooyinkuna waa 21. Raadi tirooyinkan

Furfuris: u qaado x iyo y inay yihiin laba tiro $x : y = 2:5$

Tan macnaheedu waa $\frac{x}{y} = \frac{2}{5}$

Markaa haddii si isweydaar ah

isugu dhufatid waxay noqon sidan, $5x = 2y$ ama $y = \frac{5}{2}x$

Tallaabada labaad waa $x + y = 21$.

Sidaas darteed, $x + y = x + \frac{5}{2}x = (1 + \frac{5}{2})x = \frac{7}{2}x = 21$

Sidaas darteed $x = \frac{2}{7} \times 21 = 2 \times 3 = 6$ sidoo kale

$$y = \frac{5}{2}x = \frac{5}{2} \times 6 = 5 \times 3 = 15$$

Sidaas darteed tirooyinku waa 6 iyo 15.

Layliska 2.4

1 Furfur isle egyada soo socda.

b $x + 10 = 40$

t $3 - (7 - x) + 10 = 40$

j $30 - (7 - x) = 10$

x $3x^2 = 108$

kh $x + 2x + 5x + 2 = 100$

d $x + y = 100$ iyo $y = 3x$. Markaa raadi x iyo y

r $xy = 40$ iyo $y = 10x$. raadi x iyo y.

s $y = 3x^2$ iyo $x = 2$. raadi y

sh $\frac{x}{y} = 1$ iyo $y = 2x - 1$. raadi x iyo y.

2 Badri wuxuu ku yidhi Ibraahim, waxaan maanka ku hayaa tiro, tiradaas haddii aan laban laabo jawaabtu waxay noqoneysaa lix? Waa imisa tirada uu ka fikirayey Badri?

3 Raadi saddex abyooneyaal oo isku xiga oo wadartoodu tahay 24.

4 Raadi afar tiro oo isku xiga oo abyooneyaal kisi ah oo wadartoodu tahay 128.

5 Qoys ayaa leh saddex carruur ah oo mid waliba midka kale saddex sano ka weyn yahay, haddaba haddii wadarta da'adoodu tahay 21 sano. Waa imisa jiro?

6 Tuulo ayey ku nool yihiin dad dhan 261. Raggu haddii ay 7 dheer yihiin haweenka carruurtuna ay ragga dheer tahay 16 waa imisa tirada raggu?

7 Aqal ayaa 2m dheer dhererka ballaciisa. Haddii uu wareeqqiisu yahay 32m, waa imisa dhererku?

8 Ninbaa wiilkiisa wuxuu ka wayn yahay 8 jeer. Shan sano gudahood wuxuu noqday in uu afar jeer kawaynaado wiilkiisa. Waa imisa jir wiilka hadda?

9 Ahmed da'diisu waa laban laabka dada Daahir hadii muddo dhan 20 sano wadarta da'doodu noqoto 85 sano, imisa jirro ay noqonaysaa da'doodii muddo dhan 10 sano gudaheed ah?

10 Mushqaayada 10 nin iyo 4 wiil ayaa ah 100 birr maalintiba halka 5 nin iyo 6 wiil ay mushqaayadoodu ka tahay 70 birr. Haddaba waa imisa mushqaayada uu helayo mid walba?

11 Tareen ayaa ka dhaqaaqay saldhig. Tareen kale oo daba socday ayaa isaguna ka daba dhaqaaqay hal saac ka dib,kuna socda xawaare ah 10 km/saac. Kal uu sii socday imisa ayuu ahaa xawaaraha tareenka kowaad?

2.2 ISKUDHUFASHADA LABA TIBIXLAYAASHA

2.2.1 Iskudhufashada hal tibixlayaasha iyo laba tibxaalayaasha

Waxaad ogsoontahay in hal tibixluhu yahay tibaax aljebro oo leh hal tibix ah oo kaliya laba tibixlayaashuna waa tibaaxo aljebro oo leh laba tibxood.

Hawl-galka 2.9

1 Waa imisa qiimaha $10\times(12+13)$? Imisa jid oo kala duwan baad u xisaabin kartaa? Xeer xisaabeedkee ayaad u adeegsatay hababka midkood?

2 Caddee hal tibixlayaasha iyo laba tibixlayaasha mid kastoo ka midah taranta isla markaana ka shaqee tarantu oo fiiri farqiga u dhexeeya masalooyinka.

b	$213\times(12+127)$	**t**	$15\times(x+1)$	**j**	$2\times(x+y)$
x	$(3+14)5x$	**kh**	$5y\times(11-7)$	**d**	$2(x-11)$
r	$4y\times(2x+3y)$	**s**	$2x\times(5y-7x)$		

Tusaale 1: u fiirso tibaaxda $4(x+3)$

$4(x+3)$ macnaheedu waa 4 lagu dhuftay $(x+3)$ ama afar laabka $(x+3)$.

$$4(x+3)=(x+3)+(x+3)+(x+3)+(x+3)$$

$$=(x+x+x+x)+(3+3+3+3)$$

$$=4\times x+4\times 3=4x+12$$

Tusaale 2: Fududee $\frac{2}{5}(x+5)$

Furfuris: $\frac{2}{5}(x+5)=\frac{2}{5}\times x+\frac{2}{5}\times 5=\frac{2}{5}x+2$

Xusuusnow waxaynu isticmaalnay astaanta kala dhigga iskudhufashada ee isugeynta.

Tusaale 3 : Fududee $2x(3y-5x)$.

Furfuris : $2x(3y-5x)=2x\times(3y)-2x\times(5x)=6xy-10x^2$

Tusaale 4: Fududee $5y(2x+3y)$.

Fur-furis: $5y(2x+3y) = 5y\times 2x + 5y\times 3y = 10yx + 15y^2$

Guud ahaan, marka laba tibixaalle lagu dhuftoaah, hal tibxle taranta la helayaa waa iskudhufashada labada tibxood ee laba tibixlaha iyo hal tibixlaha marka loo eego astaanta kala dhigga iskudhufashada ee isugeynta.

Tusaale 5: Fududee mid kastoo ka mid ah tibaaxaha soo socda.

$x+3(x+y)$, $x-3(x+y)$, $x-3(x-y)$, $x+3x(x-y)$

Furfuris: $x+3(x+y) = x+3x+3y = (x+3x)+3y = 4x+3y$

$x-3(x+y) = x-3x-3y = (x-3x)-3y = -2x-3y$

$x-3(x-y) = x-3x+3y = (x-3x)+3y = -2x+3y$

$x+3x(x+y) = x+3x^2+3xy$

Tusaale 6: Fududee tibaaxaha aljebrada ee soo socda:-

$2(x-y)+2(3x+y)$, $-2(x+y)-3(2x-y)$, $3(x-y)+(x-y)$

Furfuris: $2(x-y)+2(3x+y) = 2x-2y+6x+2y$

$= (2x+6x)+(-2y+2y) = 8x+0 = 8x$

$-2(x+y)-3(2x-y) = -2x-2y-6x+3y = -8x+y$

$3(x-y)+(x-y) = 3x-3y+x-y = 3x+x)+(-3y+-y) = 4x-4y$ or

$3(x-y)+(x-y) = 3\times(x-y)+1\times(x-y)$

$= (3+1)(x-y) = 4(x-y)$

$= 4x-4y$

Qeexid 2.9 *Laba tibaax aljebro waxaa la odhan karaa waa isku mid haddii midda laga soo dhex saarey midda kale ay sax ku tahay xeerar xisaabeedka.*

Tusaale ahaan $4(x+y) = 4x+4y$

Sidaas darteed $4(x+y)$ iyo $4x+4y$, waa tibaaxo aljebro oo isle'eg. Laakiin $4(x+1) \neq 4x+1$, maxaa yeeley 4 $(x+1)$, 4 waa in lagu dhuftaa labada tibxood ee qowska ku jira, iyada oo loo eegayo astaanta kala dhigga iskudhufashada ee isugeynta.

Layliska 2.5

1 Raadi taranta iyada oo la isku dhufanayo hal tibixle iyo laba tibxaale.

b $2(x-5)$ **t** $15(x+10)$ **j** $5(2x+4)$

x $-3(4x-5)$ **kh** $-8(-3x-12)$ **d** $-6x(2-4x)$

2 Ka shaqee mid kasta oo ka mid ah weydiimaha soo socda.

b $2x(x+y)$ **t** $5x(3x-2y)$

j $-8x(xy+x^2))$ **x** $-12xy(4x-7y)$

kh $6xy(xy+y^2)$ **d** $12x^2y^2(10x+21xy)$

r $-2x^2y(3xy-5xy^2)$ **s** $-6xy(2x^2-3y^2)$

3 U kala saar lammaane kasta ee tibaaxaha aljabrada lagu siiyey inay isle'eg yihiin ama in kale.

b $x(x+y),\ x^2+yx$ **t** $-3x(x-y),\ -3x^2-3xy$

j $-x(-2x+3y),-2xy+3y^2$ **x** $yx(x-3y),\ x^2y-3xy$

kh $xy(x+y),\ x^2y+y^2x$ **d** $-3x(-5x-4y),\ 15x^2+12xy$

r $2x(-4x+5y),\ 10xy-8x^2$ **s** $3-2x,\ -2x+3$

2.2.2 Iskudhufashada laba tibxaale yaasha

Waxaad ogsoon tahay in marka la iskudhufanayo hal tibxle in aad adeegsan jiray astaanta kala dhigga iskudhufashada ee isugeynta. Sidoo kale waxaad adeegsan kartaa isku xeer la mid ah marka,la iskudhufanaya laba tibxaayaasha.

Hawl-galka 2.10

Nin beeraley ah ayaa dhul-beereedkiisii qaab-laydiyeedka ahaa u waangaabeeyey (u qayb qaybiyey) gaballo afar ah oo uu mid kastaba yahay mid leh qaab-laydiyeed iyo dhinaeyo (ku halbeegan mitirro) sida uu tilmaamayo jaantuska la ina siiyey. Ka jawaab kuwa soo socda.

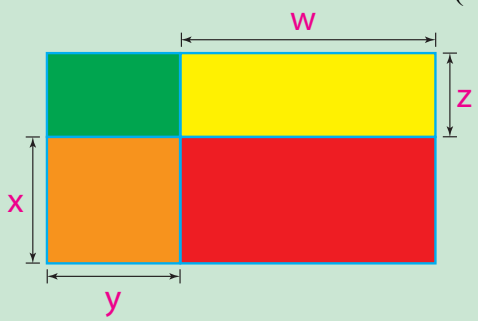
1 Hilaadi bedka waangaab kasta.

2 Soo saar wadarta bededka waangaabyada oo idil ee aad ka soo lulaadisay weydiinta (1).

3 Hilaadi bedka ugu weyn laydiga idil ahaan afarta waangaab uu ka kooban yahay.

4 Isbarbardhig jawaabaha aad ka soo heshay weydiinta (3) iyo weydiinta (4).

5 Maxaad ku soo gunaanadi kartaa tarantala xidhiidha $(x + z)\ (y + w)$.



Tusaale 1: Raadi taranta $(2x + 1)(3y + 2)$.

Furfuris:

Habka 1^{aad}:- Waxaad u kala dhigi kartaa tibxaha ku jira qowska hore iyo tibxaha ku jira qowska dambe.

Sidan $(2x + 1)\ (3y + 2) = 2x\ (3y + 2) + 1(3y + 2)$

$$= 6xy + 4x + 3y + 2$$

Habka 2^{aad}:- Waxaad u kala dhigi kartaa tibxaha ku jira qowska dambe iyo tibxaha ku jira qowska hore.

Sidan $(2x+1)(3y+2) = (2x+1)3y + (2x+1)2 = 6xy + 3y + 4x + 2$;

Tusaalaha 2:- **Raadi taranta** $(2xy + 3y)(-5x + 7xy)$

Furfuris: $(2xy+3y)(-5x+7xy) = 2xy(-5x+7xy) + 3y(-5x+7xy)$

$$= -10x^2y + 14x^2y^2 - 15yx + 21xy^2$$

$$(2xy+3y)(-5x+7xy) = 2xy(-5x+7xy) + 3y(-5x+7xy)$$

$$= -10x^2y + 14x^2y^2 - 15yx + 21xy^2$$

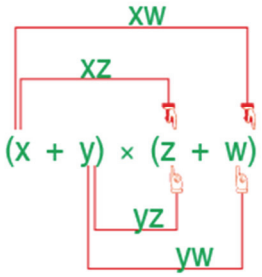
Hadaba guud ahaan marka la isku dhufanayo laba tibxaalayaal waxaan haysanaa laba isir oo isirkii walbaa leeyahay laba tibxod.

Fiiri shaxannada soo socda.

Tibxaha sida xy, xz, yz, yw,

Taranta $(x + y)\ (z + w)$ waxaa loo yaqaanaa qayb tarameedyo.

$$(x + y)(z + w) = xz + xw + yz + yw$$



Tusaale 3: Raadi taranta $(2x - y)(5m - 3n)$

Furfuris: $(2x - y)(5m - 3n) = 2x(5m - 3n) + (-y)(5m - 3n)$

$$= 10xm - 6xn - 5ym + 3yn$$

Tusaale 4: Raadi taranta $(3x + 4y)(2xy - 5x^2)$

Furfuris: $(3x + 4y)(2xy - 5x^2) = 3x(2xy - 5x^2) + 4y(2xy - 5x^2)$

$$= 6x^2y - 15x^3 + 8xy^2 - 20yx^2$$

Hawl-galka 2.11

1 Raadi mid kasta tarannada soo socda.

b $(x + 2)(x + 3)$ **t** $(x + 2)(x - 3)$ **j** $(x - 3)(x + 3)$

x $(x - y)(x + y)$ **kh** $(2x - y)(2x + 3y)$ **d** $5(3x + y)(2x - 3y)$

2 Iskudhufashada laba tibixlayaasha tibix kasta oo ka midah laba tibxaalaha hore ayaan ku dhafanaynaa tibix kasta oo ka mid ahi laba tibxaalaha dambe. Maka fikirtay sida aan ku heleyno tarantan oo kale?

b $(x + y + 2)(2x + 3y)$ **t** $(x + y + 2)(2x - y + 1)$

Layliska 2.6

1 Raadi taranta soo socota adigoo iskudhufanaya laba tibxaalayaasha:-

b $(x + y)(x - y)$ **t** $(2x + 4y)(6x - 9y)$

j $(4xy + 3y)(4x - xy)$ **x** $(x + xy)(xz + x^2yz)$

kh $(xy + yz)(xz + yz)$ **d** $(1 + x)(x^2 + y^2)$

r $(-12xy + 5y^2)(2xz + 4xyz)$ **s** $(3x^2y + 2y^2x)(2x - 5y)$

2 Fududee mid kaata tibaaxaha aljebrada ee soo socda.

b	$3(x+2)(2x-1)-2(3x-2)$	**t**	$(x+3)(4x-1)+(2x-3)(2x+3)$
j	$(x+y)^2-2(x-y)^2$	**x**	$3x[(x+y)^2-y^2]$
kh	$(x-y)^2+2xy$	**d**	$x(x-y)+y(x-y)+x+y$
r	$(x-y)^2-(x^2-y^2)+2xy$	**s**	$2x(x+3y)-2y(x-y)$

Waxaad soo aragtay sida la isugu dhufto laba tibxaalayaasha. Isu dhigan ahaan waxaad u tibaaxi kartaa tibaaxaha qaarkood sida taranta tibaxaalayaasha.

Tusaale, ahaan

$$xy+y+x+1=(xy+y)+(x+1)=y(x+1)+(x+1)$$

$$=(y+1)(x+1)$$

Shaqo-kooxeedka 2.3

U tibaax tibaaxaha soo socda sida taranta laba tibxaaleyaasha.

1 $xy+x+2x+2$

2 $x^2+xy+x+y$

3 $ax+ay+bx+by$

4 x^2y+y+x^2+1

5 $2xy+2ax+3y^2+3ay$

2.3 ISIR WEYNAHA AY WADAAGAAN

Waxaad ogsoon tahay isirku inuu yahay qayb ka mid ah taranta. Tusaale ahaan $12 = 3 \times 4$ hadaba 3 iyo 4 ma'aha isirada keliya ee 12.

Sidoo kale 1, 2, 6, 12, waa isirrada 12 sida $12 = 1 \times 12$ ama $12 = 2 \times 6$.

Hawl-galka 2.12

Dib u xusuuso qaybtii 1.2, isla markaana iskuday inaad ka jawaabto masalooyinka soo socda.

1 x miyey isir u tahay x^2?

2 x^2 miyey isir u tahay x ?

4 Raadi dhammaan isirada suurtagalka ah ee x^3.

5 **b** Tax isirada x^2y sida $1, x, \ldots$

t Tax isirada xy^2 sida $1, y, \ldots$

j Tax isirada ay wadaagaan x^2y iyo xy^2.

x Dhamaan isirada ay wadaagaan x^2y iyo xy^2 kuwaas oo aad ku soo taxday (j), caddee isirka ay wadaagaan dhammaan isirada kale.

kh Jawaabta aad ka heshay (x) waxaa loo yaqaanaa Isir weynaha ay wadaagaan x^2y iyo xy^2. Ma sheegi kartaa sababta loogu magacaabay sidan?

6 Ku celi su'aasha, (ii) adigoo u qoraya sidan x^2yz, x^2y^2z iyo x^2yz^2.

Ogow, haddii a iyo b ay yihiin tirooyin idil marka $a \times b = ab$ isla markaana a waa isirka ab, b, waa isirka ab. Sidaa si la mid ah waxaynu u fiirineynaa isirada tibaaxaha aljebrada.

Tusaale ahaan $3uv$ waxay leedahay isiradan:- $1, 3, u, v$ isku darkooduna wuxuu noqonayaa $3u, 3v, uv$ iyo $3uv$ laf ahaanteeda.

Tusaaleyaal kale

1 $2ab = 2 \times a \times b$ waxay leedahay $1, 2, a, b, 2a, 2b, ab$ iyo $2ab$

2 xyz waxay leedahay isirada $x, y, z, xy, xz.yz, 1, xyz$.

3 xy waxay leedahay isirada $1, x, y, z$ iyo xy.

Marka aynu fududaynayno tibaaxa aljebrada waxaan u baahanahay isirka ay wadaagaan laba tibaaxood oo kasta waxay leeyihiin isiro ay wadaagaan isirada oo loo qaybinayo labadaba.

Tusaale 1:

b $3ur$ iyo $6u$ isirada ay wadaagaan waa 1, 3, u, iyo $3u$.

t $2xy$ iyo $4xyz$ isirada ay wadaagaani waa 1, 2, x, y, $2x$, $2y$, $2xy$, iyo xy.

Isir weynaha ay wadaagaan tirooyinku waa isirka ugu weyn ee u qaybsama labada tibaaxood. Sidaas darteed isirka ugu weyn ee ay wadaagaan $3ur$ iyo $6u$ waa $3u$. isirka ugu weyn ee ay wadaagaan $2xy$ iyo $4xyz$, waa $2xy$.

Tusaale 1 Fiiri tibaaxda aljebrada ee x^3y

$x^3y = x \times x^2y = x^2 \times xy = x^3 \times y = x^3y \times 1$

Sidaas darteed isirada x^3y waa:- $1,\ x,\ x^2,\ x^3,\ y,\ xy,\ x^2y,\ x^3y$

Qeexid 2.10 *Isirka ay wadaagaan laba tibaax aljebro waa tibix kasta oo isir u ah labada tibaax aljebro.*

Tusaale 2: Fiiri tibaaxan aljebro x^2y^3 iyo x^3y^2

Isirada x^2y^3 waa:- $1, x, x^2, y, xy, x^2y, y^2, xy^2, xy^3, x^2y^2, y^3, x^2y^3$

Isirada x^3y^2 waa:- $1, x, x^2, x^3, y, xy, x^2y, x^3y, y^2, xy^2, x^2y^2, x^3y^2$

Isirada ay wadaagaan labada tibaax aljebro waa:- $1, x, x^2, y, y^2, xy, x^2y, xy^2, x^2y^2$

Qeexid 2.11 *Isirweynaha ay wadaagaan laba tibaax aljebro, waa tibix aljebro oo ay labaduba wadaagaan.*

Isirweynaha ay wadaagaan waxaa loo soo gaabiyaa sidan I.W.W

Tusaale 3 Hubi x^2y^2 inuu yahay isir weynaha ay wadaagaan x^2y^3 iyo x^3y^2.

Furfuris: Sidaad kor ku soo aragtay x^2y^2 waa isirka ay wadaagaan x^2y^3 iyo x^3y^2. Haddaba dhammaan isirada ay wadaagaan x^2y^3 iyo x^3y^2 waa sidan

$1, x, x^2, x^3, y, xy, x^2y, x^3y, y^2, xy^2, x^2y^2, x^3y^2$ waa isirada x^2y^2.

Sidaas darteed x^2y^2 waa isir weynaha ay wadaagaan (I.W.W). x^2y^3 iyo x^3y^2.

Tusaale 4: $18a, 45b$

Furfuris $18a = 2 \times 3 \times 3 \times a$

$45b = 3 \times 3 \times 5 \times b$

Sidaas darteed I.W.W $= 3 \times 3 = 9$

Hawl-galka 2.13

Raadi isir weynaha ay wadaagaan (I.W.W) tibxaha lamaaneyaasha ah ee soo socda.

b	$6ab,\ 8a^2$	**t**	$9a^2b, 45a^2b^3$
j	$15a^3b^2, 45a^2b^3$	**x**	$8x^2y^3z^3,\ 16xy^2z$

Habka ugu gaaban ee lagu raadiyo (I.W.W) laba ama in ka badan oo tibaaxo, aljebraad ah

i *Caddee dhammaan doorsoomeyaasha ku jira tibaaxaha aljebrada.*

ii *Doorsoomeyaasha ku jira (i) ka raadi doorsoomaha ugu jibaarka badan kaasoo isir, u ah dhammaan tibaaxaha aljebrada ee lagu siiyey.*

iii *Raadi I.W.W tirooyinka horgaleyaasha tibaaxaha aljebrada ee lagu siiyey.*

iv *Dhis tibaaxo aljebraad kuwaas oo ah taranta jibaarada ee (ii) iyo I.W.W tirooyinka horgaleyaasha u ah (iii).*

Xusuus:

1 *Jibaarada x waa tibxahan soo socda* $1.x^2, x^3, x^4, x^5, \ldots$, *I.W.M*

2 *Haddii doorsoomaha x laga waayo tibaaxda aljebrada, jibaarka ugu weyn ee tibaaxda aljebrada waxaa loo qaadanayaa inuu yahay 0.*

Tusaale 4: Raadi I.W.W $2xy^2, 6x^2y^2$ iyo $4x^3yz$

Fur-furis: Doorsoomayaasha ay ka kooban yihiin saddexda tibaax aljebro waa x, y iyo z. Ka ugu jibaarka weynina waa x, kan oo ah isirka ay wadaagaan $2xy^2, 6x^2y^2$ iyo $4x^3yz$, waa x.

Jibaarka ugu weyn ee ay wadaagaan y, $2xy^2, 6x^2y^2$ iyo $4x^3yz$, waa y.

Jibaarka ugu weyn ee z, kan oo ah isirka ay wadaagaan $2xy^2, 6x^2y^2$ iyo $4x^3yz$, waa 1.

Tirooyinka horgaleyaashuna waa 2, 6 iyo 4 I.W.W 2, 4 iyo 6 waa 2.

Sidaas darteed I.W.W $2xy^2, 6x^2y^2$ iyo $4x^3yz = x \times y \times 1 \times 2 = 2xy$

Xusuus: *Sidaad ku soo aragtay tusaaleyaashii hore laba tibaax aljebro waxay yeelan karaan dhawr isir oo ay wadaagaan, I.W.W laba tibaax aljebrana waa mid keliya mana noqon karo mid wax ka badan.*

Tusaale 5: Isiree tibaaxahan soo socda.

b $x^2 + 4x$ t $3x^3y^2 - 6x^2y^3$

Furfuris

b $x^2 + 4x = x(x+4)$

t $3x^3y^2 - 6x^2y^3 = (3x^2y^2)x - (3x^2y^2)2y = 3x^2y(x-2y)$

Tusaale 6: $9xy$ iyo $15xz$ waxay leeyihiin I.W.W oo ah $3x$.

Tusaale 7: $6a$ iyo $5b$ I.W.W, waa 1.

Marka aynu ka shaqeyno wareega leydiga waxaan xisaabinaa dhererka laba jeer sidoo kale balacana laba jeer.

$$W = 2dh + 2b$$

Inagoo isireyneyna waxaynu ubadali tibix fudud sidan $W = 2(dh + b)$.

Marka aynu isireyno tibaaxaha aljebrada waxaynu fiirineynaa isirka ay wadaagaan tibxuhu inaga oo dibada ugu saareyna qowska isir ka ay wadaagaan. Si uu u sameeyo taran sida tusaaleha kore.

Tusaale 8: $9x + 24y = 3(3x + 8y)$

Tusaale 9: $9x^2 + 3x + 15x^3 = 3(3x^2 + x + 5x^3)$

Laakiin tibxaha ku jira qowska isir ay wadaagaani waa x, $9x^2 + 3x + 15x^3 = 3x(3x + 1 + 5x^2)$. Hadaba waa inaan isireynta tibxaha kujira qowska aan joojinaa maadaama ayna jirin isiro kale oo ay wadaagaan.

Tusaale 10: $2ab^2 + ab^2c + 3ab = ab(2b + bc + 3)$

Tusaale 11: $-2xy^2 - 4x^2y = -2xy(y + 2x)$

Tusaale 12: Fududee $5(x + 2) + y(x + 2) = (5 + y)(x + 2)$

Waxaan xusuusanahay $(x + 2)$ iney tahay isirka ay wadaagaan, marka aynu ka saaro isirkan waxaynoqoneysaa, sidan $5(x + 2) + y(x + 2) = (x + 2)(5 + y)$

Tusaale 13:- $7(y + 1) - x(y + 1) = (y + 1)(7 - x)$

Layliska 2.7

1 Isiree tibaaxahan soo socda

b	$7x + 4$	**t**	$20x - 4$	**j**	$18xy - 3yz$
x	$12mn + 18mp$	**kh**	$16m^2 - 4m$	**d**	$3x^2 + 6x - 18$
r	$-6x - 24$	**s**	$-2xy - 8x$	**sh**	$24mn - 16m^2n$
dh	$-x^2y - y^2x$	**c**	$12m^2n + 24m^2n^2$	**g**	$72y^2p - 18y^2p^2$

2 Isiree tibaaxaha soo socda

b	$4(x+3)+m(x+3)$	**t**	$x(x-1)+5(x-1)$
j	$y(y+4)-6(y+4)$	**x**	$x^2(x+7)+x(x+7)$
kh	$3x(x-4)-7(x-4)$		

Isireynta waxaa kale oo aan u istimaalaa fududeynta tibaaxa aljebrada ee jajabyada. Hadaba inaga oo isticmaalayna hab isku mid ah ee jajabyada caadiga ah waxaynu ka saari isirka ay wadaagaan tibaaxaha aljebradu si uu u samaysmo jajab fudud oo la mid ah.

Tusaale 14: $\frac{x}{2x}=\frac{1\times \cancel{x}}{2\times \cancel{x}}=\frac{1}{2}$ inaga oo isu jareyna isirka ay wadaagaan ee sareeyaha iyo hooseeyaha oo ah x.

Tusaale 15: $\frac{5x^2y}{15xy}=\frac{5xy\times x}{5xy\times 3}=\frac{x}{3}$

Tusaale 16: $\frac{4a+2ab}{2a}=\frac{2a(a+b)}{2a}=2+b$

Adoo xusuusan isirka $2a$ inuu yahay isirka aywadaagaan wadarta labada tibxood.

Tusaale 17: $\frac{7x^2}{5y}\times\frac{15yz}{x}=\frac{x\times 7x}{5y}\times\frac{5y\times 3z}{x}$

$$=\frac{\cancel{x}\times 7x\times \cancel{5y}\times 3z}{\cancel{5y}\times \cancel{x}}=7x\times 3z=21xz$$

Xusuusnow in hadii la, isu jaro sareeyaha iyo hooseeyaha ay noqonayaan 1, laakiin ayna noqoneynin, 0.

Tusaale 18: $\frac{x}{3}\div\frac{2x^2}{3}=\frac{x}{3}\times\frac{3}{2x^2}=\frac{1}{2x}$

Tusaale 19: $\frac{6x+18}{20}\div\frac{3x+9}{15}=\frac{6(x+3)}{20}\times\frac{15}{3(x+3)}$

$$=\frac{6\times 15}{20\times 3}=\frac{3\times 2\times 5\times 3}{5\times 2\times 2\times 3}=\frac{3}{2}$$

Tusaale 20: Fududee tibaaxahan $\left(\frac{4x+20}{5}\right)\times\left(\frac{8x+40}{20}\right)$

Furfuris: $\left(\frac{4x+20}{5}\right)\times\left(\frac{8x+40}{20}\right)=\frac{(4x+20)\times(8x+40)}{5\times 20}$

$$=\frac{32x^2+320x+800}{100}=\frac{32x^2}{100}+\frac{320x}{100}+\frac{800}{100}$$

$$=\frac{8x^2}{25}+\frac{16x}{5}+8.$$

Layliska 2.8

1 Waa maxay isirrada 18?

2 Waa maxay isiraada ay wadaagaan;

b 12 iyo32 **t** 24 iyo 40 **j** 32 iyo 48

3 Soo saar dhammaan isirrada suurtagalak ah mid kasta oo ka mid ah tibaaxaha aljabra ee soo socda.

b $4x$ **t** x^2 **j** $3x^2$ **x** $5xy^2$

kh y^3 **d** $3x^2y$ **r** xyz **s** xyz^2

4 Isirree mid kasta oo ka mid ah tibaaxaha aljabra ee soo socda.

b $-3x+21$ **t** $6x^2+3x$ **j** $18x^2+12xy$

x $6tm-24m^2$ **kh** $8x+12y+10x+15y$ **d** $x^2-7x+3x-21$

5 Soo saar dhammaan isirrada ay wadaagaan iyo isir weynaha ay wadaagaan (IWM) mid kasta oo ka mid ah tibaaxaha soo socda.

b x^2, x^3 **t** x^2, x^2y **j** $6x^3y^2, -12x^2y^3$

x $8x^2y^2, 6x^3y^3$ **kh** $2x^3, 3xy$ **d** $2x^3y^2,\ 6x^2y, 8xy^2$

r $3x^2yz^2, 6x^3y^2z, 15x^2y^2z^2$

6 Fududee mid kasta tibaaxaha soo socda.

b $\frac{3x}{15}$ **t** $\frac{2x+10}{4}$ **j** $\frac{x^2+4x}{x+4}$

x $\frac{9x+27}{9x+18}$ **kh** $\frac{x^2-5x}{2x+10}\times\frac{3x+15}{4x}$ **d** $\frac{24x-8}{12}\div\frac{9x-3}{6}$

r $\frac{6xy+18x}{12}$ **s** $\frac{7mn}{24}\div\frac{8x+4}{20}$

Furaha Tibxaha

- Tibxaha Aljebrada
- Qaaciido
- Doorsoomeyaal
- Labatibxaale
- Isir weynaha ay wadaagaan
- Hal tibixle
- Tibix

Sookoobida cutubka

- ✓ *Tibaaxaha aljebro waa iskudar kasta oo ka kooban tirooyin iyo doorsoomeyaal.*
- ✓ *Tibix waa qayb ka midal tibaaxaha aljebrada oo wadata calaamadeeda kuxidheysa qeybta kale ee tibaaxaha aljebrada oo isugeynaysa.*
- ✓ *Tibaaxda Aljebro waxay ka koobnaan kartaa, haltibixo oo looyaqaano haltibixle ama waxayka koobnaankartaa laba tibxood oo looyaqaano labatibxaale.*
- ✓ *Doorsomeyaashu waxay utaagan yihiin tirooyin ama xadiyo waxa kaloo loo adeeg sadaa qaaciidooyinka kala duwan. Sida qaaciida bedka, shaxamada joometariga iyo xadiya duleed ee kale, sida heer-kulkka*
- ✓ *Waxaynu isticmaalaynaa xeerarka xisaabta sida*

  Astaanta kala hormarinta ee isugeynta.

  Astaanta kala hormarinta ee iskudhufashada

  Astaanta kaladhiga iskudhu fashada ee isugeynta

  Astaanta hormo galinta ee iskudhufashada

  Astaanta hormo galinta ee isugeynta.
- ✓ *Waxaan u adeegsanaa astaanta kala hormarinta isku habeynta tibxaha si aan isugu ururino tibxaha, iskumidka ah astaanta hormo galintana waxaan u adeegsanaa inaan tibxaha u kooxeyno iskudhinacyo inaga oo isticmaaleyna qows. Astaanta kaladhiga iskudhufasha ee isugeynta waxaa u, adeegsanaa ka saarida isirka ay wadaagaan iyo isku dhufashada laba tibxaale iyo haltibixle.*
- ✓ *Marka ay tibxuhu lee yihiin hal xisaabfal inka badan waxaan uqaabeynaynaa siday ukala horeeyaan waxaan kabilaabeynaa qaws, waxaan kuxijisiineynaa jibaarada markaa waan iskudhufaneynaa ama waan isuqeybineynaa markaxiga waa isugeynagnaa ama waan kala jareynaa, marka ay qowsas badani jiraan waxaanka bilaabeynaa ka gudaha kujira marka hore.*
- ✓ *Isirka aywadaagaan laba tibaax aljebro, waa tibaax kasta oo isir u ah labada tibaax aljebro, Isirweynaha ay wadaagaan laba tibaax aljebro waa tibix aljebro oo ah isirka aywadaagaan, oo isirada kalena sidoo kale isir u,ah Isirweynaha ay wadaagaan waxa loo soo gaabiyaa (I.W.W)*

✓ *Waxaa u adeegsanaa I.W.W laba iyo inkabadan oo tibaaxo aljebro ah inaan ku isireyno tibaaxaha, iyo inaan kufududeyno tibaaxaha la inasiiyey inaga oo ufududeynayna. Qaabka isuqeybinta, ee sareeye iyo hooseeye.*

Nakhtiinka layliska cutubka 2aad

1 Qor tirada tibxaha ee tibaaxahan soo socda

b $x + y + z$ **t** $x + 2x + 3x + 4x$ **j** $\sqrt{1 + x + y + z}$

2 Adigoo adeegsanaya astaanta hormo gelinta isugu gee tibxaha isku midka ah ee soo socda laba jid oo kala duwan.

b $2x + 3x + 5x$ **t** $-3y + 13y - 4y$

3 Adigoo u adeegsanaya astaanta hormo galinta isugu kooxee tibxaha astaanta kala hormarintana inaad tibxaha isku midka ah isugu ururisid fududee tibaaxaha aljebrada ee lagu siiyey.

b $x + 2y + 5x$ **t** $5y + 7x - 3y$ **j** $8x + 2y - 20x$

x $2x + 3y - 5x - 8y$ **kh** $x^2y - xy + 7x^2y$ **d** $xy + 7xy^2 - 12xy$

4 Qor taranta adigoon muujineynin calaamada iskudhufashada (x).

b $x \times y$ **t** $x \times y \times z$ **j** $3 \times x$

x $x \times x$ **kh** $y \times y \times y$

5 Qaabee taranta oo qor natiijada adigoon muujineynin calaamada iskudhufashada (x)

b $2x \times 3y$ **t** $-3x \times 7y$ **j** $-2x \times 4x$

x $-3x \times -5x$ **kh** $2y \times 3y \times 7y$

6 U adeegso astaanta hormogelinta meelaha laba tibxoodleyda astaanta kala dhigga iskudhufashada ee isugeynta meelaha wadarta leh, tibxaha isku midka ah ee soo socda.

b $x + 2x$ **t** $x + 2x + 3x$ **j** $x^2 - 5x^2 + 7$

x $2xy - 8xy$ **kh** $8xy^2z^3 + 12xy^2z^3 - 5xy^2z^3$ **d** $x^2 + 12x^2 - 3x^2$

7 Wadarta shan abyoone oo isku xiga waa 35 waa kee abyoonaha u yari?

8 50° digrii farenhet imisa digrii centigradh?

9 Dhererka laydi ayaa ah laban laabka ballaciisa. Haddii wareegu laydigu yahay 30 sm, xisaabi bedka laydiga?

10 Raadi I.W.W $24x^2y^3$ iyo $60x^3y^2z^2$.

Cutubka 3aad

ISLE'EGYADA TOOSAN IYO DHEELIYADA

UJEEDDOOYINKA CUTUBKA

Cutubkani marka uu dhamaado ardaydu waxay awoodi doonaan iney:

- fahmaan fikradaha Isle'egyada iyo dheeliyada.
- horumariyaan xirfadahooda dib u habaynta, iyo xalinta isle'egyada iyo dheeliyada.
- sawiraan xariiqda dhexmaraysa xudunta taas oo is le'egteeda lagu siiyay.

TUSMOOYINKA MUHIMKA AH

3.1 Faahfaahinta dheeliga oo ku saabsan xalinta isle'egyada.

3.2 Faahfaahinta dheeliyada toosan.

3.3 Habka kulanka dhidibada kaartis.

Furaha Tibxaha

Sookoobida Cutubka

Nakhtiinka layliska

HORDHAC

Cutubkani wuxuu ka kooban yahay saddex qaybood oo muhiim ah. Qaybta koowaad waxaan dib ugu eegi doonaa isle'egyada iyo sida loo xalliyo oo faahfaahsan. Qaybta labaad waxaan ku baran doonaa dheeliyada, qaybta saddexaad waxaan ku eegi doonaa habka dhidibada kaartiishiyaan iyo sawiridda xariiq toosan oo isle'egtiisu tahay mid toosan.

3.1 FAAHFAAHINTA FURFURISTA ISLE'EGYADA TOOSAN

Qaybtan waxaan ku bilaabaynaa shaqo-kooxeedka soo socda.

Shaqo-kooxeedkan 3.1

1 Shaqo-kooxeedkan wuxuu ku saabsan yahay ciyaar. Marka hore wada ciyaara, kadibna wuxuu barahaagu halkan kuugu soo bandhigi in ciyaartu tahay sidan hoos ku cad.

Waxan haystaa sanduuq, $\square$, ay ku jirto xadi lacag ah, waxaan kuu sheegi waxoogaa xog ah; adigoo adeegsanaya (raacaya) xogtaa waxad ii sheegi lacagta sanduuqa iigu jirta. Haddii aad garato waadguulaysanaysaa.

b Haddii aan ku daro xaddigii sanduuqa ku jiray 5 Bir oo dheeri ah waxay noqon 15 Birr Hadaba imisaan sanduuqa ku haystay? $\square + 5 = 15$

t Hadii aan ka jaro 3 Birr lacagta sanduuqa ku jirta markaa waxaa soo hadhi 5 Birr. Imisaa sanduuqa ku jirtey? $\square - 3 = 5$)

j Hadii 3 laabka xadiga ku jira sanduuq uu noqdo 18 Bir, markaa imisa ayaa sanduuqa ku jirta?

x Hadii aan u qaybiyo xaddiga ku jira sanduuqa 2. Wuxu noqonayaa 6. Markaa imisa ayaa ku jirta sanduuqa?

Kh Hadii xadiga sanduuqa ku jiraa laba laaban yahay, oo 5 Bir lagu daro, markaa wuxuu noqonayaa 11 Bir. Hadaba imisaa sanduuqa ku jirta?

2 Waxaad isku deydaa inaad ciyaar noocan oo kale ah inaad la ciyaartid, saaxii badaa.

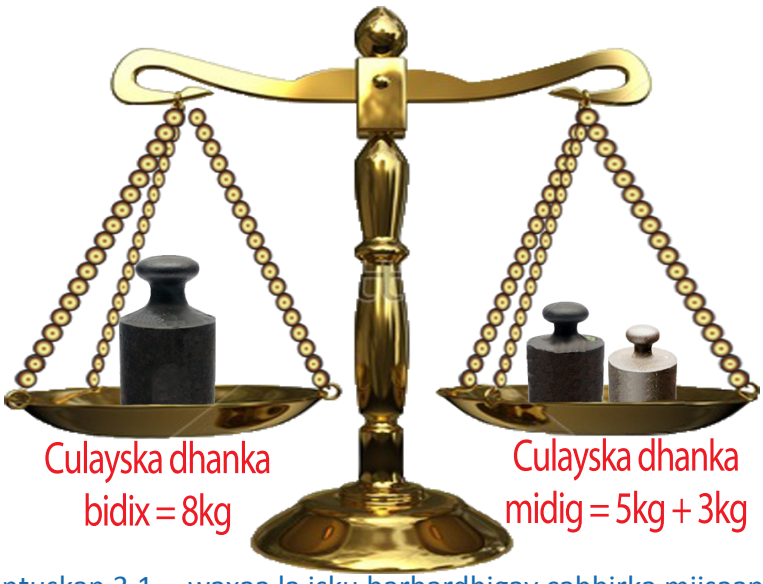
Shaqo kooxeedkii hore, xaddiga aan lagaranayn ee la rabo in la cadeeyo waxa u taagan sanduuq $\square$. Si kastaba ha ahaatee laguma qanci karo in loo isticmaalo sanduuq qeexitaanada xisaab ahaaneed ee culculus. Hadaba halkii sanduuqa waxaan badanaa u isticmaalnaa xarfaha x ama y, si ay ugu taagnaadaan tirada maqan ee qiimaheeda la raadinayo, hadaba xarfahan x ama y waxa loo yaqaanaa doorsoome, sidaas darteed meesha $\square + 5 = 15$, waxaan u qori karnaa $x + 5 = 15$. Waxa intaa dheer raadinta qiimaha x ee isle'egtan waxay la mid tahay buuxinta sanduuqa.

Qeexid 3.1 *Isle, egtu waa hawraar muujinaysa inay laba tibix xisaabeed ay isle'eg yihiin.*

Tusaale: x + 5 = 15, 2x + 5 = 11, iwm, waa tusaalayaasha isle'egta.

✓La soco in ay isle'egtu ka koobantahay laba qaybood. Midi waa isle'egta bidixda, halka ay ta kale tahay dhanka midig midka calaamada isle'egta dhinaca bidixda ka xiga waxa loo yaqaanaa Isle'egta dhinaca bidixda. Halka qaybta dhanka midigtana loo yaqaan Isle'egta dhanka midig.

Isle'egta dhanka bidix iyo isle egta dhanka midig waa isle'egta guud ee isugu beegan labada culays ee miisaan-garboolaha eeg jaantuskan 3.1.



Jaantuskan 3.1 waxaa la isku barbardhigay cabbirka miisaanka.

Hawl-galka 3.1

Hawl-galka waxaan ku eegaynaa miisaanka kor ka muuqda dhiniciisa bidix waxaa ku jira 8 kg dhiniciisa midig waxaa kujira 5 kg + 3 kg. sidaas darteed cabirka miisaanku wuu iskudheelitiran yahay.

1 Haddii 2kg lagu daro miisaanka dhinaca midig, maxay tahay inaad ku darto dhinac bidix si miisaanku isugu dheelitirmo? Waxaad ka warrantaa haddii 3 kg laga qaado miisaanka dhinaca midigta iyadoo la rabo in miisaanku isku dheelitirmo?

2 Haddii culayska dhinaca bidixdu labalaabmo maxaa ku dhacaya culayska dhinaca midig iyadoo la rabo in miisaankuna isku dheeli tiraado?

Hawl-galka kor ku xusan waxaad kusoo aragteen isbedelka ka samaysmaya kafadda in uu yahay lagama maarmaan oo uu noqdo miisaanku mid dheelitiran.

- ✓ Furfurista isle'egyadu waxay ku salaysan tahay xeerar isku mid ah. Isle'egyada dhinaca bidix iyo dhinaca midig waa inay iskumid ahaadaan.
- ✓ Si loogu sameeyo furfuris sax ah oo iskumid ah ee labada dhinac waa in laraacaa xeerarkan soo socda

Xeerka 1^{aad}: *Haddii* $A = B$, *markaa* $A + C = B + C$.

Xeerka 2^{aad}: *Haddii* $A = B$, *markaa* $A - C = B - C$.

Xeerka 3^{aad}: *Haddii* $A = B$, *markaa* $AC = BC$.

Xeerka 4^{aad}: *Haddii* $A = B$ *markaa* $\frac{A}{C} = \frac{B}{C}$, *oo ay* $C \neq 0$.

- Laba isle'egyo waxa la odhan karaa way isku dhigmaan, haddii ay leeyihiin urur-rumeedyo iskumid ah.

Tusaale: $2x = 6$ iyo $4x = 12$, waa isle'egyo isku dhigma maadaama urur-rumeedka labada isle'eg yahay $\{3\}$.

- Waxaad xusuusan tahay $4x = 12$ in ay ka timid taranta labada dhinac ee isle'egta $2x = 6$ oo lagu dhuftay 2.

Furfurista noocan oo kale ahi ee isle'egtii u bedeshay isle'eg isu dhiganta waxaa loogu yeedhaa **isleegyo isku dhigma.**

- Waxaad xusuusataa in mid kasta oo ka mida 4 tii xeer ee aan kor ku soo baranay uu samaynayo isbedel isudhigma.

Qeexid 3.2 *Isle'egta loo qori karo qaabka $ax + b = 0$, halka a iyo b ay yihiin tiro kasta oo cayiman, marka $a \neq 0$, waxa loo yaqaanaa Isle'eg toosan.*

Si aad u hesho qiimaha doorsoomaha ee isle'egta toosan u bedel Isle'egta lagu siiyay isle'eg fudud oo u dhiganta adigoo u xallinaya tallaabo, tallaabo ilaa aad doorsoomaha soo saarayso. Waxaad samayn kartaa tan adigoo isticmaalaya afartii xeer ee aan kor ku soo caddaynay.

Xusuus :

1 *Xallinta isle'egtu waa helida qiimaha doorsoomaha, ka dhigaya isle'egta mid run ah, marka lagu bedelo doorsoomaha isle'egta xallinta noocan ah waxaa layidhaa dhamaystirka isle'egta.*

2 *Xallinta isle'egta macnaheedu waa helida qiimaha doorsoomaha ee isle'egta dhamaystiraya.*

Tusaale 1: Furfur $4x - 27 = -3$.

Furfuris: $4x - 27 + 27 = -3 + 27$ … *kudar 27 labada dhinacba.*

$$4x = 24$$

$$\frac{4x}{4} = \frac{24}{4} \quad \ldots\ldots\ldots \text{ U qaybi labada dhinacba 4.}$$

Sidaa darteed $x = 6$

Ugu dambayn, ku hubi jawaabta isle'egtii hore.

$$4x - 9 = 1$$

$$4(6) - 9 = 15$$

$$24 - 9 = 15$$

$15 = 15$, kaasoo run ah.

Sidaa darteed, $x = 6$ waa jawaab sax ah, urur rumeed ku waa $\{6\}$.

Tusaale 2: Xalli $-4x + 8 = 5$

Furfuris: $-4x + 8 - 8 = 5 - 8$ ……. ka jar 8 labada dhinacba.

$$-4x = -3$$

$$\frac{-4x}{-4} = \frac{-3}{-4} \quad \ldots\ldots\ldots\ldots\ldots \text{ U qaybi labada dhinac } -4$$

$$x = \frac{3}{4} \text{ (Hubi).}$$

Tusaale 3: furfur isle'egta toosan $ax + b = 0$, marka a iyo b ay ka yihiin tirooyin madoorsoomayaal, $a \neq 0$.

Furfuris:- $ax + b - b = 0 - b$ ..... *ka jar b labada dhinacba.*

$$ax = -b$$

$$\frac{ax}{a} = \frac{-b}{a}$$ ..... *U qaybi labada dhinacba.*

$$x = \frac{-b}{a}$$

Hadaba tani waa urur-rumeedka isle'egta $\left\{\frac{-b}{a}\right\}$.

3.1.1 Furfurista isle'egyada toosan ee Qawska ku jira

Qawsku wuxu ka muuqan karaa isle'egyada si uu kuu tusiyo ama u muujiyo habka furfurista, Qawsaska sidan oo kale ah waa laga saari karaa iyadoo la isticmaalayo astaamaha ku haboon furfurista, sida astaanta hormogelinta, kaladhiga, IWM.

Hadaba halkan waxad dib ugu eegi doontaan astaamaaha aan sare ku soo xusnay, tiro kasta oo ah a iyo b.

- ✓ $-1 \times b = (-1)\, b = -b$
- ✓ $a - b = a + (-b)$.

Hawl-galka 3.2

1 **b** Qor astaanta kala hormarinta ee isu gaynta iyo iskudhufashada.

t Tax lamaanaha horsan oo tirooyin ah ka dibna xaqiiji astaanta kala hormarinta ee isugaynta, iyo astaanta kala hormarinta iskudhufashadu inay sax ku tahay midkasta.

j Adigoo isticmaalaya tirooyin lammaane horsan ah cadee inayna kala jarista iyo isuqaybintu aaney lahayn astaanta kala hormarinta.

2 **b** Qor astaanta hormogelinta ee isugaynta iyo iskudhufashada.

t Tax sadex tiro oo kala ah a, b, iyo c oo xaqiiji in.

i $a + (b + c) = (a + b) + c = a + b + c$

ii $a(bc) = (ab)c = abc$.

j lamid matahay –2 – 5 – 3 = –2 –(5 – 3)?

Lamid matahay (2 – 5) + 3 = 2 – (5 + 3)?

x Adigoo adeegsanaya sadex tiro waxad tustaa inaanay kala jarida iyo isuqaybintu lahayn astaanta hormogelinta

3 b Qor astaanta kaladhiga ee isugaynta.

t Tax urur ka kooban sadex tiro [a, b, c], oo xaqiiji

i $a(b + c) = ab + ac$

ii $(b + c)\, a = ba + ca$.

haddii uu qaws ka dhex muuqdo isle'egta waa laga dhexsaari karaa iyadoo loo isticmaalayo astaanta ku haboon iyo qeexitaanada u dhigma furfuritaankan.

Tusaale 1: waxaad ku soo aragteen Hawlgalkii aan horay usoo **marnay** in astaanta hormagelinta ee isugaynta iyo isku dhufashada loo isticmaali karo iyadoo laga saaray qawska.

$a + (b + c)$ iyo $a(bc)$, sidoo kale astaanta kaladhiga ee isku dhufashada iyo isugaynta waxay kaa caawin kartaa in aad ka saartid qawska.

$a + (b + c) = a + b + c$; $(a + b) + c = a + b + c$. iyo

$a(bc) = abc$; $(ab) \times c = abc$

$a(b + c) = ab + ac$ ama $(b + c) \times a = ba + ca$.

si kastaba ha ahaatee waxaad aad uga taxadartaa markaad qawska ku dhex aragtid astaanta ka jarta (–). Tusaale ahaan waxad Hawlgalkii hore kusoo aragteen in

$$– 2 – 5 – 3 \neq – 2 – (5 – 3)$$

Maxaa yeelay –2 – 5 – 3 = – 10. Laakiin –2 –(5 – 3) = –2 – 2 = –4

Tusaale 2: i ka soo qaad in $b = 5$, $c = 8$, iyo $a = 2$ muujin

b $–(b + c) = –b – c$ t $–(b – c) = –b + c$

j $a(b – c) = ab – ac$

Furfuris: b –(b + c) = –5(8) = –13; –b – c = –5 – 8 = –13

Sidaas darteed, $–(b + c) = –b – c$

t $–(b – c) = –(5 – 8) = –(–3) = 3$; $–b + c = –5 + 8 = 3$

Sidaas darteed, $–(b – c) = –b + c$.

j $a(b-c) = 2(5-8) = 2(-3) = -6$; $ab - ac = 2(5) - 2(8)$

$= 10 - 16 = -6$

Sidaas darteed, $a(b-c) = ab - ac$.

ii Hada waxaad qaadataa dhawr tiro oo kala duwan, kadibna waxaad fiirisaa in mid kasta oo ka mida saddexdii isle'eg ee lagugu siiyay tusaalihii hore in ay run yihiin. Hawshii aan kor ku soo qabanay waxaa ku soo gunaanadaynaa sidan soo socota.

Tiro kasta oo ah a, b, c iyo k.

i $a-(b+c) = a-b-c$ **ii** $a-(b-c) = a-b+c$

iii $a+k(b-c) = a+kb-kc$

Haddii uu qaws ka muuqdo isle'eg toosan waad ka saari kartaa qawska adigoo adeegsanaya mid kasta oo kamida astaamaha aan ku soo sheegnay ama xeerarka ku haboon, taasoo kaa caawin doonta in aad u badashid isle'egta isle'eg fudud oo u dhiganta.

Tusaale 3: furfur: $2x-(x+2) = 1$.

Furfuris: $2x-(x+2) = 1$

$2x - x - 2 = 1$ ……ka saar qawska.

$x - 2 = 1$ …… $2x - x = x$

$x = 3$ …… ku dar 2 labada dhinacba.

Sidaas darteed $x = 3$ waa furfurista isle'egta (hubi)

Tusaale 4: furfur: $-2x + 5(x-3) = -3$

Furfuris: $-2x + 5(x-3) = -3$

$-2x + 5x - 15 = -3$ …… ka saar qowska

$3x - 15 = -3$ …… $-2x + 5x = 3x$

$3x = 12$…… Ku dar 15 labada dhinacba

$x = 4$ ……u qeybi 3 labada dhinacba

Hubi oo ku gabagabee inuu urur rumeedku yahay {4}. Doorsoomaha ku jira isle'egta toosan wuxu ka muuqan karaa isle'egta dhinaceeda bidix iyo dhinaceeda midigba.

Tusaale 5: $5x + 1 = 17 - 3x$ ka fikir sidii aad u furfuri lahayd isle'egtan. Isle'egta sidan oo kale ah waxaad tibxaha doorsoomaha wata isugu ururin dhinaca bidixda, tirooyinka madoorsoomaha ahna dhinaca midigta adigoo adeegsanaya iskubedelka ugu haboon ee udhigma, tana waxaa loo yaqaanaa ururinta tibxaha isku midka ah.

Si aad u furfurtid isle'egtan $5x + 1 = 17 - 3x$.

Marka hore tibxaha doorsoomaha wata waxaad keentaa dhinaca bidixda, adigoo ku daraya $3x$ labada dhinacba

$3x + 5x + 1 = 17 - 3x + 3x$

$8x + 1 = 17$

$8x + 1 - 1 = 17 - 1$ …… *ka jar 1 labada dhinacba.*

$8x = 16$

Hada adoo u qaybinaya 8 labada dhinacba waxaad heli $x = 2$

Tusaale 6: Furfur $16 - 2x = 3(x + 2) - 5$

Furfuris: $16 - 2x = 3(x + 2) - 5$

$16 - 2x = 3x + 6 - 5$ …… *Adoo qawska ka saaraya*

$16 - 2x = 3x + 1$

$16 - 2x - 3x = 3x - 3x + 1$ …… *ka jar 3x labada dhinac*

$16 - 5x = 1$

Furfuridani waa qaybtii hore ee aad heshay $x = 3$.

Hubi Jawaabtan oo ku gabagabee urur rumeedka inuu yahay {3}.

Mid kasta oo kamid ah tusaalayaashii isle'egyada, ee aan horey usoo aragnay wuxuu lahaa urur rumeed leh ku tirsanayaal, laakiin waxaa dhacda in isle'egyada qaarkood leeyihin urur rumeed madhan.

Tusaale 7: Raadi urur rumeedka $2(x - 3) = 2x + 1$

Furfuris $2(x - 3) = 2x + 1$

$2x - 6 = 2x + 1$ …… *ka saar qawska.*

$2x = 2x + 7$ …… *ku dar 6 labada dhinacba*

$2x - 2x = 7$ …… *ka jar 2x. labada dhinacba*

$0 = 7.$

Isle'egta kor ku xusan waa 0 = 7, waa hawraar been ah, taasoo macnaheedu yahay malaha urur rumeed maadaama oo uuna jirin tirada urur rumeedkeeda cadeynaysa urur rumeedkeedu waa urur madhan = { }.

Hadaba waxaa Jira isle'egyo urur rumeedkoodu yahay dhamaan tirooyinka lakab.

Tusaale 8: Raadi urur rumeedka $3(x + 2) = 6 + 3x$, marka uu horaadkoodu yahay tirooyin lakab.

Furfuris: $3(x + 2) = 6 + 3x$

$3x + 6 = 6 + 3x$ …… *kasaar qawska*

$6 = 6$ …… *ka jar 3x labada dhinacba*

$6 = 6$

Hadaba isle'egta aan kor ku soo xusnay waa run, qiimo kasta oo uu doorsoomuhu noqdaba, sidaas daraadeed urur rumeed ku waa. Ururka tirooyinka lakab = Q.

Layliska 3.1

1 Adigoo isticmaalaya Astaanta kala dhiga ee iskudhufashada iyo isugeynta waxaad cadaysaa kuwan soo socda tiro kasta oo ah a, b, iyo c

i $-(b - c) = -b + c$ **ii** $-(b + c) = -b - c$ **iii** $a(b - c) = ab - ac$

Xusuusnow *$-b = (-1)\,b$ iyo $b - c = b + (-c)$*

2 Raadi urur rumeedka isleegyadan soo socda Adigoo u qaadanaya horaadkooda Tirooyinka lakab.

i $1 - 3x = 5$ **ii** $2x + 3 = -4x - 9$

iii $4x - (6 + x) = 3\,(2 - x)$ **iv** $2x - 3(1 - 4x) = 4x + 2$

v $6x + 3(4 - 2x) = 0$ **vi** $4x - 2(3 - x) = 6(x - 1)$

3.1.2 Furfurista isle'egyada toosan ee jajabyadu sameeyaan

- Hadii horgalaha doorsoomaha iyo tibixda madoorsoomaha ee isle'egta toosan ay yihiin jajabyo, markaa isle'egta waxa loogu yeedhi isle'eg jajab ah. Kuwan soo socdana waa tusaalayaal isle'egyada ah.

$$\frac{1}{x} = \frac{3}{4},\ \frac{3}{4x} + 1 = \frac{5}{2},\ 1 - \frac{4x}{10} + \frac{1}{4} = \frac{x}{2} - 1$$

Xeerarkii isku bedalka isu dhigma ee aan qaybtii hore ku soo aragnay weli way kusii shaqaynayaan isle'egyadan, habka la raacayo xalintooduna waa iskumid, kaliya kala duwanaanshahoodu waxa ku biiray habka aad u xalinaysid tirooyinka jajabka ah. Hadaba halkan waxaan ku eegi doonaa xeerarka aasaasiga ah ee jajabyada.

Hawl-galka 3.3

1 Ka shaqee mid kastoo ka mida kuwan soo socda.

b $\frac{2}{5}+\frac{3}{5}$ **t** $\frac{4}{7}-\frac{1}{7}$ **j** $\frac{2}{9}+\frac{5}{9}-\frac{1}{9}$

2 **i** Raadi dhufsane yaraha ay wadaagaan tirooyinkan soo socda.

b 2.5 **t** 4.6 iyo 3 **j** 12, 18

ii ka shaqee mid kastoo ka mida kuwan soo socda.

b $\frac{1}{2}+\frac{3}{5}$ **t** $\frac{1}{2}-\frac{3}{5}$ **j** $\frac{-1}{12}+\frac{5}{18}$

x $\frac{1}{4}+\frac{5}{6}-\frac{2}{3}$

3 ka shaqee jajabyadan soo socda:

b $\frac{2}{3}\times\frac{3}{2}$ **t** $\frac{-3}{2}\times\frac{5}{4}$ **j** $\frac{1}{2}\times\frac{3}{3}\times\frac{4}{6}$

4 ka soo qaad inay M tahay dh.y.w 4, 6 iyo 3 markaa m = dh.y.w (4, 6, 3)

i xisaabi mid kasta oo ka mida kuwan soo socda oo ogow in ay natiijada soo baxaysaa tahay abyoone.

b $\frac{3}{4}m$ **t** $\frac{-5}{6}m$ **j** $\frac{2}{3}m$

➢ *adoo ku dhufanaya tiradan labadeeda dhinacba m* $\frac{1}{4}x+\frac{2}{3}=\frac{1}{6}$

xali (furfur) isle'egta samaysmaysa

ii qaado iminka lamaane kasta oo jajab ah

Tusaale ahaan hadii $\frac{a}{b}, \frac{c}{d}$ ay yihiin jajabyo m, ay tahay dh.y.w. markaa m = dh.y.w (b, d), markaa waxaad hubisaa $\frac{a}{b} \times m$ iyo $\frac{c}{d} \times m$ in ay yihiin abyooneyaal (Tan waxaad ku hubin kartaa inay run tahay laba jajab iyo wax ka badan.

- Shaqadaadii aad kor ku soo baratay waxaad ku soo ogaatay waxyaabahan soo socda
- Haddii ay isle'egtu ka kooban tahay tirooyin jajabyo ah, markaa waxaad labada dhinac kaga dhufanaysaa isle'egta dh.y.w, hooseeyayaasha jajabyadu, tani waxay ina siineysaa isle'egyo fudud oo isu dhigma, kuwaas oo aan lahayn jajabyo, qaabka noocan ahna waxa loo yaqaanaa fududaynta jajabyada isle'egta.

Tusaale 1: furfur $\frac{3}{4}x+1=\frac{5}{2}$

Fur-furis: kudhufo dh. y. w. oo ah 4 labada dhinacba $\left(\frac{3}{4}x+1\right)4=\left(\frac{5}{2}\right)4$

$3x + 4 = 10$ ..... *ka jar 4 labada dhinacba.*

$3x = 6$ ..... *u qaybi 3 labada dhinacba.*

$x = 2$

Sidaas darteed $x = 2$.

Tusaale 2: furfur $\frac{2}{3}x+\frac{1}{2}=\frac{3x-5}{6}$

Furfuris: hooseeyayaasha jajabyadani waa 3, 2, 6, dh.y.w waa (3, 2, 6) = 6

$6\left(\frac{2}{3}x+\frac{1}{2}\right)=6\left(\frac{3x-5}{6}\right)$ ..... *ku dhufo labada dhinacba dh.y.w.*

$4x + 3 = 3x – 5$

$4x – 3x = –5 – 3$

$x = –8$

Hubi furfuristan oo ku gabagabee inuu urur-rumeedku yahay {–8}.

Layliska 3.2

Furfur isle'egyadan soo socda oo hubi jawaabtaada

1 $\frac{1}{2}x-\frac{3}{4}=0$

2 $\frac{x}{4}-\frac{x-3}{6}=1$

3 $\frac{2x-1}{3}+\frac{3x+2}{8}=\frac{23}{24}$

4 $\frac{x+2}{9}-\frac{1}{3}=\frac{1-x}{3}$

5 $\frac{1}{2}(9-x)+\frac{1}{3}(2x+7)=\frac{5}{2}$

3.1.3 Furfurista masalooyinkan adoo adeegsanaya isle'egyada toosan

Nolol maalmeedkeena iyo shaqooyinka aan qabano waxaa jirta in masalooyinka qaarkood ay furfuristoodu u baahan tahay aqoon xisaabeed. Masalooyinkani inta badan waxay u muuqdaan masalooyin eray ahaaneed. Xaaladahan oo kale waxaa laga yaabaa in aad u baahato inaad u bedesho erayada astaamo xisaabeed, qaabka isle'egta oo kadibna xalliso isle'egyada iskuday in aad ka shaqayso kuwan hawlgalka soo socda.

Hawl-galka 3.4

1 Laban laabka tiro oo loo geeyey shan ayaa ah kow iyo labaatan, sheeg tiradaas?

2 Balaca leydi ayaa 3sm ka yar dhererkiisa hadaba haddii wareega leydigu yahay 20sm, waxaad raadisaa balaca iyo dhererka leydigan?

3 Maxamed haddii uu ku iibiyey hal buug 3.5 Birr sidoo kale Maxamed wuxuu halkii baakeet ee buugta ah wuxuu ku soo iibsadey 36 birr.

Wuxuuna ka soo iibsaday bakhaar magaalada udhaw, halkii baakeetna waxaa ku jira 12 buug, wuxuu arinta ka ganacsanayey todobaadyo, wuxuu nooligiisu ku kacay 6 Birr. Wuxuuna keeney 10 baakeet oo buugaag ah hadaba waxaad raadisaa qiimaha uu halkii buugba ku iibayey adigoo xisaabta ku darsanaya nooligiisii, haddii uu buugtii oo dhan uu todobaad ku dhameeyey waa imisa faa'iidada uu faa iidey todobaadka?

Markaad xalineysid masalo xisaabeedka waxaad u baahan tahay inaad masalo xisaabeedka u qortid tibix ahaan, oo aad u qeexdid isle'eg ahaan, kadibna aad fur-furtid hadaba masalo xisaabeedku waxay noqon kartaa mid dheer sida masalada ugu danbeysa hawlgalka kor ku xusan, haddaba markaad masalooyinkan oo kale la kulantid waxaad raacaysaa talaabooyinka soo socda si, aad u furfurtid masalada

1 Inaad fahantid masalada oo aad cadaysid erayada ugu muhiimsan

2 Caaddee tirada maqan ee masalada waxaanad u qortaa doorsoome ahaan; sida x, y.

3 Adigoo isticmaalaya doorsoomaha x, waxaad u qortaa tibix ahaan. Taasoo u dhiganta masalo xisaabeedka lagu siiyey.

4 Waxaad dhistaa isle'eg u dhiganta erey xisaabeedka lagu siiyey.

5 Furfur isle'egta.

6 Ka jawaab su'aasha adigoo u eegaya masalada islamarkaana cadeynaya erayadaada

Tusaale 1: Laban laabka tiro oo loo geeyey saddex ayaa waxaay la mid tahay kow iyo toban, sheeg tiradaas?

Furfuris: Ka soo qaad tiro = x, markaa labanlaabkuna waa = 2x oo loo geeyey 3 = 2x + 3, haddaba waxaan isle'egtan u xalineynaa ama aan u furfuraynaa sida isle'egta toosan.

$2x + 3 = 11$ $\qquad$ $2x = 11 - 3$ $\qquad$ $\frac{2x}{2} = \frac{8}{2} = x = 4$

Tusaale 2: Waxaad ka soo qaadaa saamiga 1 kwh leydhka ah inuu yahay 40 senti. Haddaba leydhka aad bishii isticmaashid wuxuu ku xidhan yahay inta kwh ee aad isticmaashay oo loo geeyey 10 Birr oo kiradii saacada ah haddii degmadu kugu soo qorto leydh lacagtiisu dhan tahay 50 Birr bisha Oktoobar, hadaba imisa kwh ayaad isticmaashay bisha Oktoobar?

Furfuris: Ka soo qaad, x = tirada kwh ka leydhka ah ee aad isticmaashay bisha Oktoobar.

- Haaddii 1 kwh qiimihiisu yahay 40 senti. Markaa 0.4 birr, x kwh qiimihiisu waa $0.4x$ birr
- Sidaas darteed qiimaha aad bixineysid bisha Oktoobar. Wuxuu noqonayaa $0.4x$, oo loo geeyey 10 birr waana sidan. $0.4x + 10$ birr.

- Lacagta aad bixinaysaana, 50 Birr oo ah lacagtii lagugu soo qoray markaa isle'eegtu waxay noqonaysaa $0.4x + 10 = 50$ ama $\frac{4}{10}x + 10 = 50$ markaad furfurtid isle'egtan waxaad heleysaa $x = 100$, sidaas darteed leydhka aad shidatay bisha Oktoobar waa 100 kwh.

Tusaale 3: Tusaalahan waxaan ku eegeynaa su'aasha (3) saddexaad ee hawlgalka 3.4. waxaanan raadineynaa faa'iidadii todobaadka uu faa, iiday Maxamed.

Furfuris: Kasoo qaad x = qiimaha uu Maxamed ku iibiyay halkii buug.

- Hadaba wuxuu soo iibsadey $10 \times 12 = 120$ oo buugta qoraalka'ah, hal todobaad qiimaha ay 120 buug ku kacayaana waa $120x$ birr.
- Hadaba qiimaha dhabta ah ee uu Bakhaarka kaga soo iibsaday halkii darsin waa 36 Birr, wuxuna soo iibsaday 10 darsin qiimahooda guudna waa $36 \times 10 = 360$ Birr. Intaa waxaa u dheer 6 Birr oo nooli ah, $360 + 6 = 366$ Birr.

Sidaas darteed isle'egtu waxay noqonaysaa $120x = 366$ qiimaha x markaa waa $x = 3.05$. hadaba Maxamed halkii buugba wuxu ku soo ibsaday 3.05 Bir, isaguna wuxu dib ugu iibiyay 3.50 Bir markaa faa'iidadiisu waxay noqonaysaa $3.50 - 3.05 = 0.45$ sidaas darteed faa, iidadiisu waxay noqonaysaa 120×0.45 kaasoo la mid ah 54Bir. Taasina waa macaashkii todobaadka.

Layliska 3.3

1 Tiro sadex laabkeed oo loo geeyay laba iyo Toban ayaa lamida eber. Raadi tiradaas?

2 Saddex wadayaal cagaf ayaa qoday beer dhan 8.4 hektaar. Maalin gelinkii.

Dirawalka labaadna wuxuu qoday 0.8 hektaar in ka badan intuu qoday ka koowaad. Sidoo kale dirawalka 3aad wuxu qoday 0.5 hektaar in ka badan intuu ka labaad qoday.

Markaa waxaad raadisaa xaddiga uu beerta ka qoday dirawal kasta.

3 Nin ganacsade ah ayaa wuxuu soo iibsaday 50 Dalaayadood oo uu qiimahoodu ku kacay lacag dhan 3250 Bir. Wuxu nooli ahaan u bixiyay 25 Bir. Hadaba qiima intee dhan ayuu ku iibiyay halkii dalladba, haddii uu ganacsaduhu halkii dalladba ka faa'iiday 2.50 Bir?

4 Saddex xagal labaale dhinaca dhinacyadiisu isle'eg yihiin (Isosceles triangle) ayaa leh wareeg dhan 64 cm. mid kast oo ka mida dhinacyada isle'eg ee sadexagal waa 1.5cm oo lagu dhuftay inta uu yahay salkiisu.

Hadaba Raadi dhererka dhinac yadiisa?

5 Waxaa fasal ku wada jira 20 gabdhood iyo 18 wiil ardaydu waxay bixiyeen lacag is le'eg si fasalo kale loogu dhiso, foomistarkooduna wuxu bixiyay 100 Birr Hadaba hadii ay tahay lacagta la ururiyay 2000 Birr marka loo geeyo lacagta foomistarka, markaa waa intee xadiga lacagta ah ee gabdhuhu kaga qayb qaateen dhismahan?

6 Haddii sanduuqa aad lacagta ku kaydsato ay kuugu sii jireen 14 Birr, oo aad bil kasta aad ku ridid. 12 Bir, haddaba imisa bilood ayay lacagtaasi ku noqon 110 Bir?

3.2 FAAHFAAHINTA DHEELIYADA TOOSAN

Dheeliyadu waa masalooyin ku samaysma xaalado gaara oo ay tirooyinka qaarkood u baahan yihiin astaamaha kawayn ama kayar (>, <). Masalooyinka noocan ahna waxay laxidhiidhaan nolol-maalmeedkeena.

Tusaale ahaan waxan u soo qaadan karnaa masalooyinka hawl-galka soo socda ku jira, adoo raadinaya jawaabta mid kastoo ka mida.

Hawl-galka 3.5

1 Sawir xariiqda, tiro calaamadi barta ku beegan 3 ka soo qaad x inay u taagan tahay tiro, markaa tiro xariiqeedku waxay cadaynaysaa baraha ku beegan.

b $x > 2$ **t** $x \geq 2$ **j** $x < 2$ **x** $x \leq 2$.

2 Dhibcaha lagu gudbayo ee maadada xisaabtu ugu yaraan waa 50%, hadaba waxaad ka soo qaadaa in aad ka keentay 15 afartankiiba imtixaankii tijaabada ahaa ee xisaabta. Hadaba waa maxay qiimaha ugu yar ee aad uga baahan tahay Lixdanka si aad u gudubto.

3 Kawsar oo ay da'deedu tahay 9 Jir, ayaa aabeheed, waydiisay sababta aanay ugu codayn karaynin xildhibaanada? Aabaheedna wuxuu ugu jawaabay qofku wuxuu codayn karaa marka ay da'diisu gaadho labalaabka da'deeda. Hadaba marka loo eegoo jawaabta kawsar aabaheed, waa imisa da'da uu qofku ku codayn karo?

4 Ka soo qaad waxaad haysataa 50 Birr oo keliya, waxaanad rabtaa in aad iibsato buugta qoraalka, qiimaha halkii buugna waa 7 Birr, ugu badnaan imisa buug ayaad ku iibsan kartaa lacagtaas?

5 Mar labaad waxaad ka soo qaadaa inaad haysato 50 Bir oo uu qiimaha buugiina yahay 7 (todoba) Birr, Hadaba iminka waxaad u baahan tahay inaad iibsatid hal buug oo ka xusuus qorka ah, oo uu qiimihiisu yahay 12 Birr. Hadii hadaba ay lagama maarmaan tahay in aad buuggaa iibsato imisa buug ayaad iibsan kartaa?

Xusuusnaw in ay jiraan afar astaamood oo ay leeyihiin dheeliyadu kuwaasoo kala ah $<$, $\leq$, $>$, iyo $\geq$.

Isle'eg kasta oo toosan oo lagu siiyo, hadii aad calaamada lamid ka ah (=) aad ku bedeshid astaanta dheeliga, markaa waxaad helaysaa dheeliyada toosan, sidaas darteed dheeliyeda toosan waxay lamid yihiin qeexitaanada xisaabeed ee Isle'egyada toosan, marka astaanta lamidka lagu bedelo astaanta dheeliga.

Tusaale: $x > 4$, $x + 15 \geq 50$, $4x + 12 \leq 50$. Kuwani waa tusaaleyaal dheeliyo toosan ah.

Dheeliga leh doorsoome, waxaa lagu waydiin karaa inaad xallisid doorsoomaha ku jira dheeliga, taasoo macneheedu yahay in aad u baahan tahay in aad xalisid qiimaha doorsoomaha, taasoo isle'egta dheeliga run ka dhigaya.

Tusaale: $x > 5$, xalinta dheeligan waxa ka mid ah ama ku jira, tiro kasta oo ka wayn 5, sida 6, 7, 8, 9, iwm. Ka warran 5.5, ama 5.9, 5.01, iwm, dhamaantood way ka weyn yihiin 5.

Haddii uu horaadku qeexayo furfurista dheeliga lagu siiyay markaa waxaad fiirisaa furfurista horaadka.

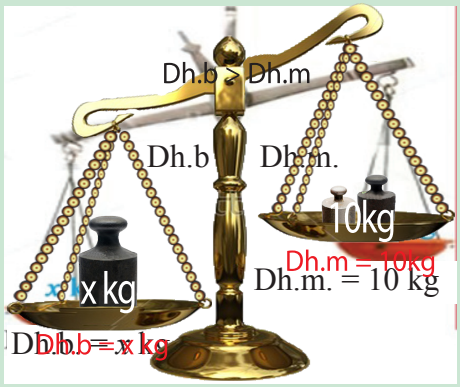
Tusaale: dheeliga aan kor kusoo marray ee ah $x > 5$ Hadii uu horaadka dheeligani yahay ururka tirooyinka idil, W = {0, 1, 2, 3, …} markaa urur-rumeedka dheeligani ee ku dhex jira horaad waa {6, 7, 8, …}.

Habka loo furfuro dheeliyada toosani waxay lamid tahay habka loo furfuro isle'egyada toosan. Tana waxaad si cad u arki kartaa marka aad ka shaqaysid hawlgalka soo socda Hadaba halkan waxad ku arki kartaa dheeligii oo lagu muujinayo miisaan garboole, marka uu hal kafad ahi dheeligeedu dhinac u bato waxaad u baahan tahay in aad dhinaca kalana culays saartid si ay isugu dheeli tirmaan.

Hawl-galka 3.6

Ka soo qaad culayska kafada midigta inuu yahay 10 kg, sidoo kale culayska walaxda saaran kafada bidixduna inuu yahay x kg.

Markaa waxaad ka soo qaadaa walaxda saaran kafada bidixdu inay ka culus tahay walaxda saaran kafada midigta, taasoo ah dheeligan $x > 10$



Ka dooda mid kasta oo ka mida kuwan soo socda oo hela jawaabtooda.

1 Ka soo qaad in aad ku dartay culays isku mida labada kafadood ee miisaanka.

Tani miyay wax isbedel ah ku samaynaysaa cabirka miisaanka? taasoo macnaheedu yahay dhinaceebaa culays badan? Isla sidoo kale haddii aad culays isku mid ah ka jartid labada kafadood ee miisaanka waa maxay isbedelka imanayaa?

2 Ka soo qaad walaxda kafada bidixda saarani in uu culayskeedu labalaabmay (dh.b = $2x$ kg), sidoo kale walaxda saaran kafada midigta culayskeedu in uu labalaabmay (dh.M= 20 kg). tani miyay bedelaysaa cabirka miisaanka? Taasoo ah dhineceebaa cuslaanaya? Ka warran haddii culayska walaxda dhinaca bidixda saaran la kala badho (dh.b = $\frac{x}{2}$kg), sidoo kale haddii culayska walaxda saran dhinaca midigta la kala badho (dh.m = 5 k)?

Wada falanqeynta kor ku xusan, waxay inagu hogaamin xeerarka soo socda

Xeerka 1: Astaanta isugeynta iyo kala goynta, ka sooqaad c inay tahay tiro kasta, haddii $a > b$ markaa.

i $a + c > b + c$ **ii** $a - c > b - c$

(*xeerkani waa run, haddii* $>$ *lagu badalo* $\geq$ *ama* $<$ *ama* $\leq$)

Xeerka 2: Astaanta iskudhufashada ama iskuqeybinta ee qiimaha toganaha ah.

Kasoo qaad c ineytahay tiro togan (c > 0) haddii a > b markaa

i $ac > bc$ **ii** $\frac{a}{c} > \frac{b}{c}$

(*xeerkani waa run marka* > *lagu badalo* $\geq$ *ama* < *ama* $\leq$)

Xusuus now marka c > 0, ee xeerka 2. Waynu fiirin doonaa xaaladaha kalana sida $c < 0$, sidoo kale xaaladan waxaan eegaynaa markale.

Hada waxaan isticmaalaynaa xeerka kor ku xusan si, aan ugu bedelo dheeliga toosan, dheeli fudud oo udhigma, adigoo talaabo talaabo uxalinaya doorsoomaha na raadinaya.

Tusaale 1: Furfur dheeliga $x + 3 \geq 4$

haddii horaadku yahay $\mathbb{W} = \{0, 1, 2, 3\}$

Furfuris: $x + 3 \geq 4$

$x + 3 - 3 \geq 4 - 3$ …. Kajar 3 labada dhinacba

Markaa $x \geq 1$

Hadaba furfurista (horaadka) dheeligani waa tiro kasta oo idil oo ka weyn ama le'eg 1. Markaas urur-rumeed ku = {1, 2, 3, 4 …}

Tusaale 2: Ka soo qaad inaad haysatid 30 Birr oo keliya, doonaysidna inaad ku soo iibsatid buuggaagta qoraalka iyo hal qalin. Qiimaha halkii bug waa 5 Birr, qiimaha qalinkuna waa 3 Birr. Waa imisa tirade buuggaagta ee aad iibsan kartaa?

Furfuris: U qaado x tirada buuggaagta qoraalka. Markii qiimaha halbuug yahay 5 Birr, qiimaha x bug waa $5x$ Birr. Waxa aad sidoo kale ku iibsatay hal qalin 3Birr. Sidaa awgeed x bug iyo hal qalin, waxaad ku bixin doontaa $5x + 3$ Birr. Tani waa inay noqotaa ku dhawaad 30 Birr. Taas oo ah $5x + 3 \leq 30$.

Xusuusnow inayna noqon Karin tirada buuggaagta ee aad soo iibsanaysid mid taban. Sidoo kalena ayna noqon Karin mid jajab ah. Sidaa darted, horaadka furfuristaada u qaado inuu yahay ururka tirooyinka idil = {0, 1, 2, 3, …}

Hadda u furfur dheeliga $\mathbb{W}$

$5x + 3 \leq 30$

$5x + 3 - 3 \leq 30 - 3$ …….. *ka jar 3 labada dhinacba*

$5x \le 27$

$\frac{5x}{5} \le \frac{27}{5}$ ..... *u qeybi 5 labada dhinacba 5*

$x \le 5.4$

sidaa darteed, horaadku wuxuu noqonayaa ururka tirooyinka idil, x waa tiro kasta oo idil oo ka yar ama le'eg 5.4, taas oo ah $x = 0, 1, 2, 3, 4, 5$. Sidaa darteed, urur-rumeedku = $\{0, 1, 2, 3, 4, 5\}$, Taas oo ka dhigan, waxaad 0 buug ku iibsan kartaa (waxba, hadii aad doontid) 1 buug ama 2 buug……5 buug, haddii aad rabtid laakiin kama badin kartid 5 buug.

Tusaale 3: furfur dheeligan $5(x + 1) \ge 2x + 11$.

Furfuris: halkan horaad ma aha mid cad sidaas darteed waxad u tixgelinaysaa in uu noqdo ururka tirooyinka lakabka ah.

$5(x + 1) \ge 2x + 11$ ..... *ka saar qawska*

$5x + 5 \ge 2x + 11$ ..... *Ka jar labada dhinacba 2x*

$5x - 2x \ge 11 - 5$

$\frac{3x}{3} \ge \frac{6}{3}$ ..... *U qaybi labada dhanba 3*

$x \ge 2$

sidaas darteed urur-rumeedku wuxuu la mid yahay $\{x \in \mathbb{Q} \setminus x \ge 2\}$.

Waxaynu fiirin haddii tiro tabane ah labada dhinac lagaga dhufto dheeliga.

U fiirso tusaalayawgan soo socda.

b $-2 < 1$, ku dhufo labada dhinac ee dheeliga -1.

Dh.b = $(-1)(-2) = 2$

Dh.m = $(-1)(1) = -1$.

Sidaas darteed dh.b > dh.m; taas waa $-2 < 1$. Iyo $(-1)(-2) > (-1)(1)$.

t $-6 < -4$. U qaybi labada dhinac ee dheeliga -2.

Dh.b = $\frac{-6}{-2} = 3$

Dh.m = $\frac{-4}{-2} = 2$

Sidaas darteed dh.b > dh.m isla markaana $-6 < -4$ iyo $\frac{-6}{-2} > \frac{-4}{-2}$.

j. $1 > 0$ … ku dhufo labada dhinacba -4

Dh.b = $(-4)(1) = -4$

Dh.m = $(-4)(0) = 0$.

Sidaas darteed dh.b < dh.m, isla markaana $1 > 0$ iyo $(-4)(1) < (-4)(0)$.

x. Dhis dhawr dheeli oo la mid ah a, b, c oo ku dhufo labada dhinac ee dheeliyada aad dhistay tiro tabane ah. U fiirso in ay isbedelayso calaamada dheeligu.

Tusaalayaashii aan kor ku soo marray waxay inoo sahlayaan in aan si fudud u fahano xeerarka dheeliga ee soo socda.

Xeerka 3aad: Astaanta iskudhufashada iyo isuqaybinta oo tiro tabane ah lagu dhufanayo dheeliga.

Ka soo qaad c in ay tahay tiro tabane ah ($c < 0$). Haddii $a > b$, markaa

i $ac < bc$ **ii** $\frac{a}{c} < \frac{b}{c}$

(xeerkani wuxu rumoobayaa haddii > lagu bedelo ≥ ama < ama ≤ isbedelka isku beegani wuxu ku samaysmaa dheeliyada, si kale haddaan u dhigno ku dhufashada ama u qaybinta labada dhinac ee dheeliga waxay bedeshaa calaamada dheeliga

Tusaale 4: Furfur $-2x < 4$

Furfuris: adigoo u eegaya qiimaha x labada dhinac ee dheeliga waxad u qaybisaa -2 tani waxay bedelaysaa calaamada dheeliga waxayna noqonaysaa sidan $-2x < 4$.

$\frac{-2x}{-2} > \frac{4}{-2}$ ..... u qaybi labada dhinacba -2

$x > -2$ sidaas darteed urur rumeedku wuxu noqonayaa tiro kasta oo ka wayn -2.

Tusaale 5: Furfur $-2x \geq x + 6$.

$-2x - x \geq x - x + 6$ ……. Ka jar x labada dhinacba $-3x \geq 6$

$\frac{-3x}{-3} \leq \frac{6}{-3}$ ……. u qaybi -3 labada dhinacba.

Sidaas darteed $x \leq -2$

Layliska 3.4

1 Furfur dheeliyadan soo socda adoo adeegsanaya Horaad lagu siiyay.

Haddii aanu horaadku ahayn mid qeexan uqaado in uu horaad la mid yahay ururka tirooyinka lakab

b $2x - 5 < 3, x \in$ **t** $3x + 1 \geq 9, x \in \mathbb{Z}$

j $-2x + 5 \leq 1, x \in$ **x** $x - 2 \leq 4 + 3x, x \in \mathbb{Z}$

kh $-3x - 2(1 - 4x) > 5$ **d** $2 - \frac{1}{2}x \leq \frac{1}{5} - \frac{5}{2}x$

r $\frac{1}{2}(x - 8) \leq x + \frac{1}{4}$ **s** $-2(3 - 4x) \geq 4 - 2x$

2 Caddee in mid kasta oo dheeliyadan soo socda ka mid ahi uu leeyahay urur-rumeed iyo in aanu lahayn. Haddii uu dheeligu leeyahay urur-rumeed, go'aami in uu urur-rumeedku yahay mid koobane ah ama mid ma koobane ah.

b $2x - 6 \leq -8, x \in$ **t** $x - 2(1 - x) \geq 3x, \ x \in \mathbb{Z}$

j $-2x + 1 < 4\left(\frac{1}{3} - \frac{1}{2}x\right), x \in \mathbb{Q}$ **x** $2x - 10 \leq -1, x \in$

kh $-3x + \frac{1}{2} \leq \frac{1}{4}x; \ x \in \mathbb{Z}$ **d** $3x - 2 \geq -3\ (2 - x), x \in$

3 Haddii labalaabka tiro idil oo loo geeyay 5 ay ka yar tahay 12, markaa waxaad raadisaa urur-rumeedka tiradan.

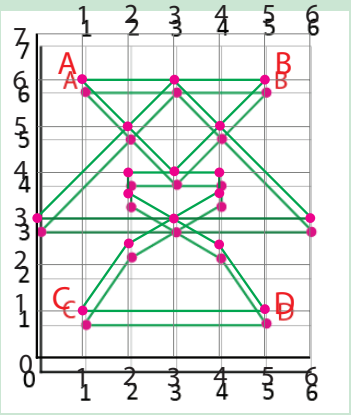
4 Ka soo qaad in aad haysato 300 Bir oo aad u baahan tahay in aad iibsato dhawr digaagadood iyo garan. Hadaba hadii qiimaha garanku yahay 82 Birr, qiimaha halkii digaagna yahay 35Birr. Hadaba hadii aad iibsatid garankaa, imisa digaagadood ayaad ku iibsan kartaa lacagta kuu soo hadhay?

3.3 KULANKA DHIDIBADA KAARTIS

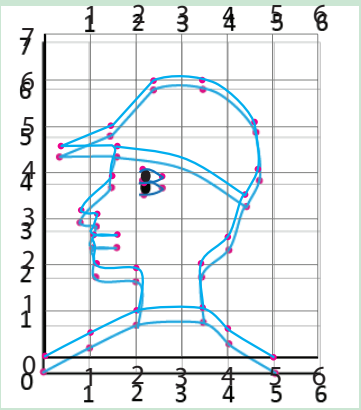
Qaybtan waxaan ku bilaabaynaa hawl-galka soo socda.

Hawl-galka 3.7

1 Laba jaantus ayaa lagugu siiyay garaafka laba jibbaarka soo socda. Fiiri barta ay dhacayso dhibic kastaaba (.) oo kamida garaafka laba jibbaaran, sidoo kale waxaad isku xidhaa xariiqaha toosan iyo ku wa xoodanba.



Jaantuska 3.4



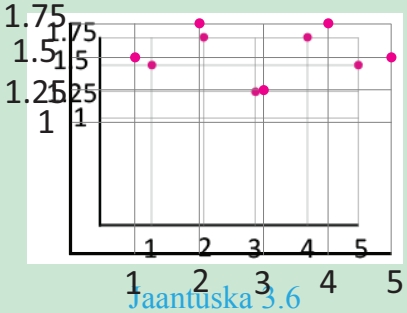
Jaantuska 3.5

Shaxda ku beegan jaantus kasta, waxaad ka sawirtaa garaaf labajibbaarane kaas oo tiradiisa iyo xajmigiisu ay lamidyihiin kuwa lagu siiyey. Si taxadar leh u sawir shaxamo la mida kuwa lagu siiyey oo isku xidh dhibcaha lagu siiyey, ee isku dhaw.

2 Adigoo tusaale uqaadanaya shan Arday oo lambaradoodu yihiin 1, 2, … 5.

Hadaba dhererka arday kasta waxaa qeexaya jaantuska hoos ku qoran.

Sidoo kale tirooyinka jiifka u qoran waxay cadaynayaa lambarada Ardayda, tirooyinka qotonku waxay cadaynayaan dhererka ardayda markaas raadi jooga arday kasta?

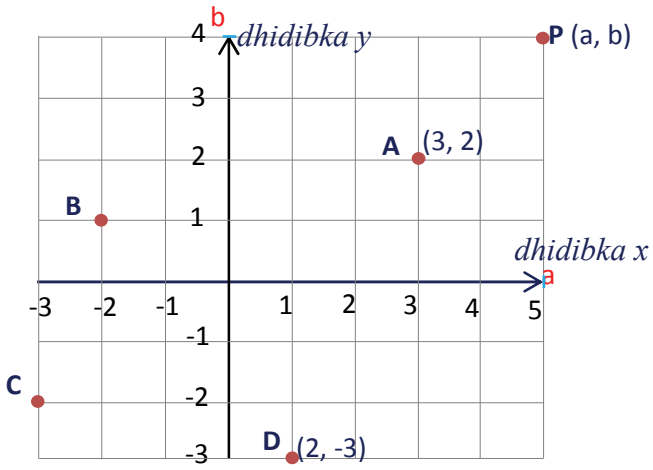


Jaantuska 3.6

Hawl-galka sare ku xusan waxaan ku soo aragnay barta ay dhacayso dhibicdu, taasoo lagu kala saari karo laba shaxan. Tusaale ahaan, jaantuska 1aad barta A waxay dhacaysaa hal cabbir oo uu dhinaca midig ka xigo eber (0) iyo 6 cabbir oo kor loo koco. Bartan waxa loo qeexi karaa lamaanahan (1, 6), adigoo adeegsanaya qaabkan gaaban. Waxaad u qori kartaa barta B sidan (5, 6), taasoo macnaheedu yahay bartani in ay ku began tahay shan (5) cabbir oo uu dhinaca mid ka xigo eber (0), iyo lix (6) cabbir oo kor loo koco, sidaa si lamida, bar kasta oo ka mida shaxanka laba jibbaaranaha waxa loo qeexi karaa tirooyin lamaaneyaal hoorsan ah. Adoo adeegsanaya xeer lamida waxaad caddayn kartaa baraha ku jira sallax.

Waxaad kaloo aad ku baraarugsanaataa barta ay dhacaan baraha tiro-xariiqeedka.

Si aad u mujisid bar kamida sallaxa waxaad u baahantahay laba xariiq-tiro oo qoton ah, oo loo yaqaano dhidibo, sida ka muuqata (jaantuska 3.7) ee hoos ku qoran.



Jaantuska 3.7

Dhidibadu waxay iska jaraan barta ku beegan eber (0) labada dhidiba taasoo loo yaqaano barta eber.

Labada dhidib iyagoo wada jira waxay dhacaan bar kamida sallaxa oo loo yaqaano dhidibada kaartis. (dhidibadan waxa loogu magac daray ninkii helay, Renee Discartees. 1596 – 16150 kaasoo lagu magacaabo **kaartis**).

Sidaas darteed, dhidibada kaartis waxay ka kooban yihiin laba tiro-xariiqeed, oo kala ah:-

1. Tiro-xariiqeedka jiifka ah waxa loo yaqaana *dhidibka x*
2. Tiro-xariiqeedka qotonka ahna waxa loo yaqaana *dhidibka y.*

- Barta eber (0) waa barta ay labada dhidib iska jaraan.
- Barta eber waa barta ay labada tiro-xariiq yihiin eber (0)

- Markaa barta ay labaduba eber ku yihiin waxaan ka ogaan karnaa qiima yaasha toganaha iyo tabanaha ah ee dhidibada.
- Inagoo ka bilaabayna barta eber waxaynu ogaanaynaa kuwan soo socda:- Toganaha *x* wuxuu u socdaa dhinaca midig, sidoo kale tabanaha *x* wuxuu u socda dhinaca bidix ee *dhidibka x*

Toganaha *y* wuxuu u kacaa kor, tabanaha *y* na wuxuu u kacaa hoos ee dhidibka *y*.

- Waxaad xusuusan tahay in aan u baahanahay laba tiro si aan u caddayno bar kamida sallaxa.
- Labadan Tirana waxa lagu heli karaa in la muujiyo barta kulanka ay dhidibadu iskaga qotomaan, haddii lagu siiyo bar *P* ah, haddii ay bartani muujinayso qotonka dhidibka *x* oo ay ku siiso tirada "a" isla sidoo kale haddii dhidibka *y* ay muujinayso tiro ah "b" markaa *P* waxay muujinaysaa lamaanaha hoorsan ee (*a*, *b*) waxana loo qori karaa *P* = (*a*, *b*).

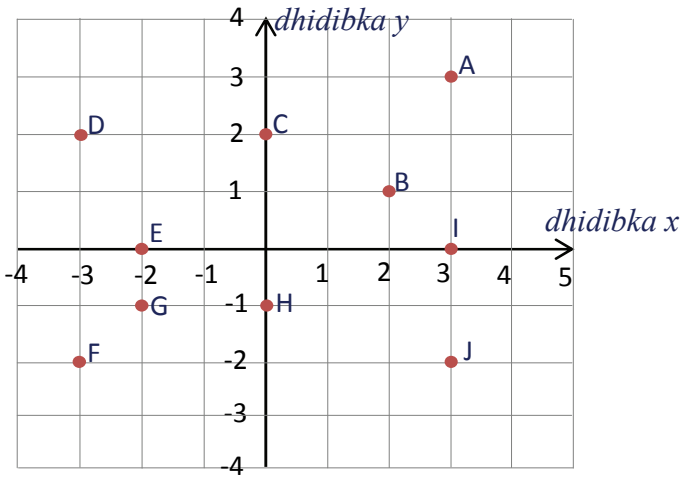
  Hadaba xaaladan "a" waxa loo yaqaanaa dhidibka *x*

  Halka "b" looga yaqaano dhidibka *y* ee *P*.

  Halkan lammaanaha horsani waa (*a*, *b*), sababtoo ah waxay u qoran yihiin lammaane, dhidibka *x* ayaa mar kasta lahor qorayaa.

Tusaale ahaan dhidibada kor ku xusan waxa kamida baraha, A, B, C iyo D, kuwaasoo u qoran lammaaneyaal hoorsan oo ah (3, 2), (– 2, 1) (–3, –2) iyo (2, –3), sida ay u kala horeeyaan.

Tusaale 1: Qor dhidibada lamaanayaasha horsan ee barahan A, B, … J ee lagugu siiyay, dhidibada sallaxa soo socda.



Jaantuska 3.8

Furfuris: Waxaad toos u akhrin kartaa dhidibada sallaxa waxaanad helaysaa

A = (3, 3), B = (2, 1), C = (0, 2), D = (–3, 2), E(–2, 0), F(–3, –2)

G = (–2, –1), H = (0, –1), I = (3, 0), J = (3, –2).

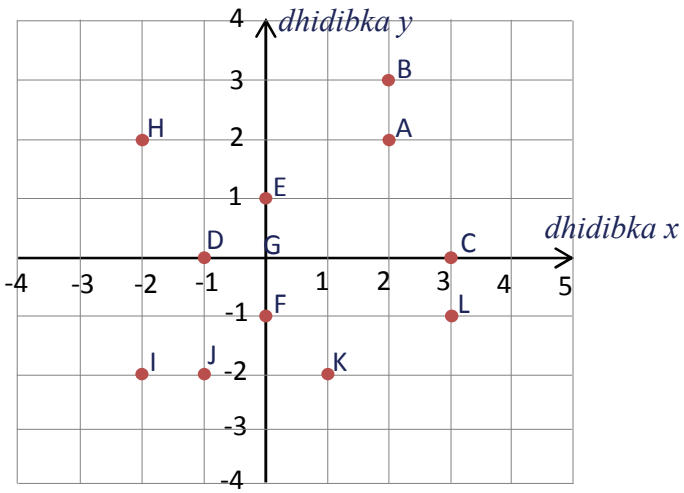
Xusuusnow: *haddii barta P ay muujineyso lammaane horsan markaa waxaana loo qoraa sidan p(a,b).*

Tusaale 2: muuji baraha dhidibada sallaxa ee soo socda.

A(2, 2), B(2, 3), C(3, 0), D(–1, 0), E(0, 1), F(0, –1), G(0, 0) H(–2, 2),

I(–2, –2), J (–1 –2) K(1, –2), L(3, –1).

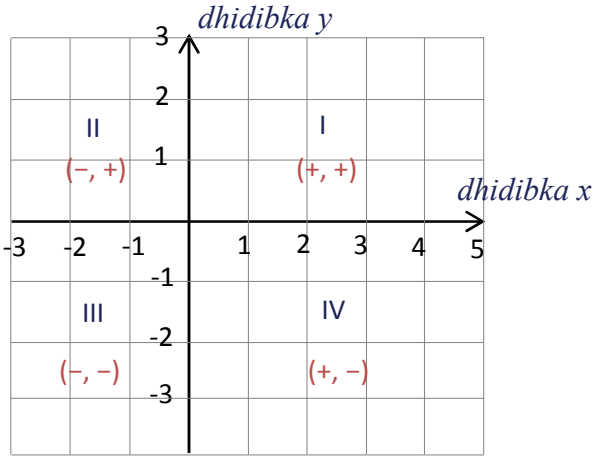
Furfuris: baraha aan muujineyno ee dhidibada sallaxa soo socda waa



Jaantuska 3.9

3.3.1 Afarta waaxood ee Dhidibada sallaxa kaartis

Labada dhidib ee dhidibada kaartis. Waxay sallaxa u qaybiyaan, afar waaxood, oo isle'eg, oo loo yaqaano: **waaxaha dhidibada** waxaana lagu calaamadiyaa tirooyinka roomanka, I, II, III iyo IV sida jaantuska, hoos ka muuqda, waxaana loo tiriyaa lidka tirinta saacada, tirintani waxay ka bilaabantaa waaxda sare ee midigta, ee ku be ee gan jihada waqooyi bari.



Jaantuska 3.10

Fiiri jaantuska sare ku xusan

- Haddii ay bartu ay tahay waaxda koowaad markaa labada dhidib ee dhidibka (x) iyo dhidibka (y) waa toganayaal.
- Haddii ay bartu tahay taalo waaxda labaad ee dhidibada, markaa dhidibka (x) waa tabane, dhidibka (y) na waa togane.

Sidaas darteed, waaxda dhidibadu waxay leeyihiin Astaamahan soo socda.

- Waaxda I: (+, +) labada dhidiba waa togane
- Waaxda II: (–, +) dhidibka (x) waa tabane dhidibka (y) na waa togane.
- Waaxda III: (–,–) labada dhidiba waa tabanayal
- Waaxda IV: (+,–) dhidibka (x) waa togane, dhidibka (y) waa tabane.

Tusaale ahaan: (1, 1) waa Waaxda I (koowaad), (–1, 1) waa Waaxda II (labaad), (–1, –1) waa Waaxda III (saddexaad), (1, –1) waa Waaxda IV (afraad).

Xusuusnow: *tiro kasta oo u qaran lammaane horsan.*

- ✓ *(x, 0) waa dhidibka (x) iyo dhidibka (y) oo eber*
- ✓ *(0, y) waa dhidibka (y) iyo dhidibka (x) oo eber*

Tusaale 3: kala sooc waaxyaha ay ka kooban yihiin, baraha soo socdaa:-

A(3, 5), B(–10, 4), C(5, 0), D(0, –5), E(–3, –5), F(6, –10), G(–6, 0).

Furfuris: barahan waaxyahooda waxaa loo kala sooci karaa sidan.

- (+, +) waa Waaxda koowaada I A (3, 5).
- (–, +) waa Waaxda labaad II B(–10, 4).
- (–,–) waa Waaxda sadexaal III E(–3, –5).
- (+,–) waa Waaxda afraad IV F(6, –10).

Hadaba haddii aynu eegno dhidibada.

(x) iyo (y) ay yihiin tirooyin.

- (x, 0) waa dhidibka (x).
- (0, y) waa dhidibka (y).

Sidaas darteed C(5, 0) iyo G(–6, 0) waa dhidibada (x).

- D(0, –5) waa dhidibka (y).

3.3.2 Dhidibada iyo xariiqaha toosan

Qaybtani waxay ku bilaabmaysaa Hawlgalkan soo socda.

Hawl-galka 3.8

1 **b** Baraha soo socda ee dhidibka y, mid kastaaba waxay lamid tahay 3.Hadaba waxaad dhistaa dhidibada salaxa ee kaartis.

t meel kastoo u dhaxaysa baraha aad ku soo dhistay su'aasha hore (b), waxaad caddaysaa baraha kale ee uu dhidibkooda (y) yahay 3, oo dhis dhidibada kartis ee sallaxa

j maxaad ku ogaanaysaa haddii aad isku daydid inaad dhistid dhamaan baraha dhidibkooda (y) yahay 3. Laakiin dhidibkooda (x) loo qaadan kara tiro kasta oo tiro lakab ah?

2 Tan waxa looga shaqaynayaa sidii su aashii hore, laakiin waxa isbedelaya dhidibka x iyo dhidibka y.

b Baraha soo socda ee dhidibka (x) mid kastoo kamid ahi waxa uu lamid yahay 3. Markaa waxad dhistaa dhidibada kaartis ee sallaxa.

(3, –3), (3, –2), (3, –1), (3, 0),(3, 0.5), (3,1), (3, 1.5), (3, 2), (3, 3)

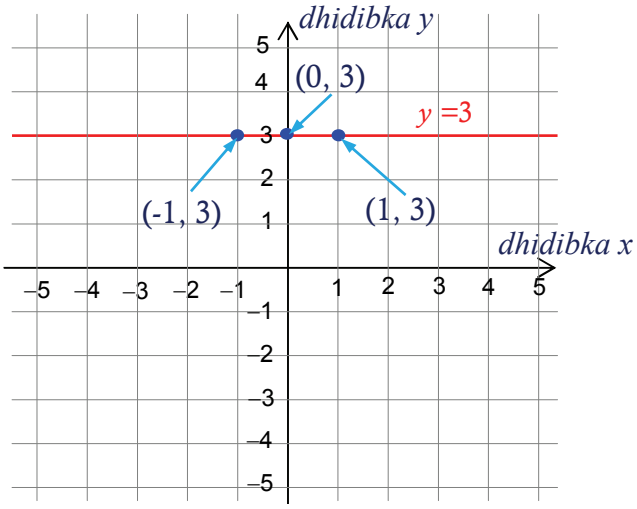
t Meel kastoo u dhexaysa baraha aad ku soo dhistay, su'aasha hore (b), waxad caddaysaa baraha kale ee uu dhidibkooda (x) yahay 3, oo dhis dhidibada kaartis ee sallaxa.

j Maxaad ka ogaanaysaa haddii aad isku daydid inaad dhistid dhamman baraha dhidibkooda (y) yahay 3, laakiin dhidibkooda (x) loo qaadan karo tiro kasta oo tiro lakab ah?

Hadaba Hawl-galkii aan kor ku soo qabanay wuxuu inoo sahlayaa xaqiiqooyinkan soo socda

Ururka dhamaan baraha dhidibkooda y waa 3, laakiin dhidibka x waxa loo qaadan karaa tiro kasta oo tiro lakab ah, taasoo u taagan xariiqda jiifta ee dhexmaraysa (–1, 3), (0, 3) iyo (1, 3), sida ka muuqata jaantuska hoose.

Xariiqdan waxaan u tixraacaynaa y inay lamid tahay 3 ($y = 3$) maadaama xariiqdu ay ka kooban tahay lammaane hoorsan (x, y). markaa $y = 3$, $x \in \mathbb{Q}$.



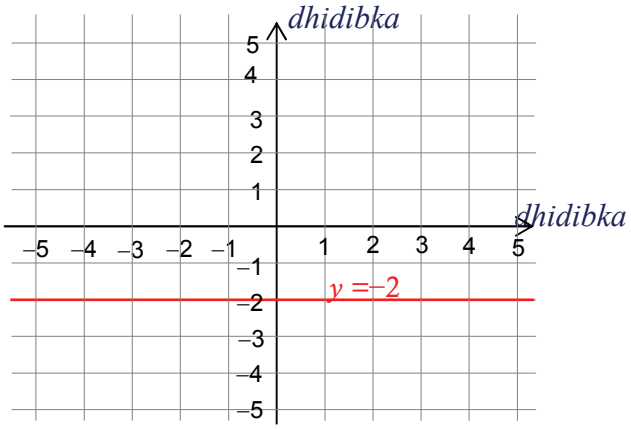
Jaantuska 3.11

Xusuusnow qeexitaanka $y = 3$, inayt ahay isleeg.

Sidoo kale waxaan odhan karnaa $y = 3$ waa isle? egta xariiqda jiifka'ah ee aan kor ku soo sheegney. Waxaa kalood xususnaataa xariiqda jiifka ahi iney bar-baro latahay dhidibaka (x).

Tusaale 1: sawir xariiqda isle'egteedu tahay $y = –2$.

Furfuris: xariiqda isle'egteedu y = –2, waxay ka kooban tahay ururka dhamaan baraha dhidibkooda y = –2, laakiin. Dhidibka x waxa loo qaadan karaa tiro kasta oo ah tiro lakab. Sidaas darteed baruhu waxay dhex marayaan (–1, –2), (0, –2), iyo (1, –2), sida ka muuqata Jaantuska 3.12.



Jaantuska 3.12

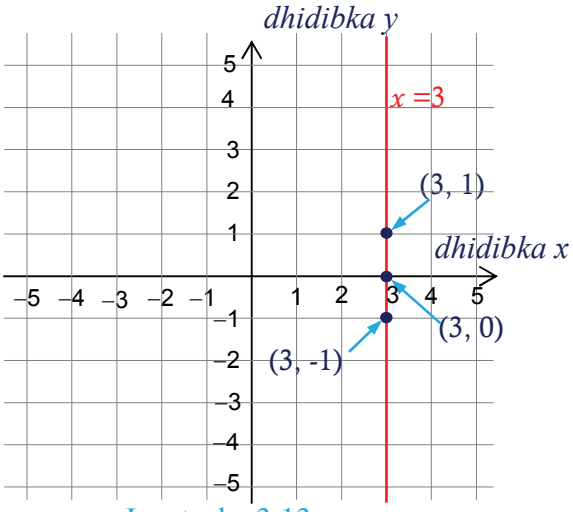
Hadda waxad qaadataa tiro madoorsoome ah oo ah C, haddii C = $\frac{1}{2}$ ama C = 2 markaa waxad sawirtaa

Xariiqda $y = c$, adigoo c uqaadanaya tirooyin kale sawir xariiqaha ka soo baxa, hadaba tani waxay inagu hogaaminaysaa gabagabada sidan soo socota.

Haddii C ∈ ℚ, oo ay tahay tiro madoorsoome, markaa y = c waa isle'egta jiifka ah ee xariiqda, ama waa xariiqda la barbarada ah dhidibka x taasoo dhex maraysa (–1, c), (0, c), iyo (1, c).

Waxaa intaa dheer hawshii aad ku soo qabatay hawl-galkii hore, oo inoo sahlaya dhacdadan soo socota, ururka dhamaan baraha dhidib kooda x waa 3, laakiin dhidib kooda y waxa loo qaadan karaa tiro kasta oo lakab ah, taasoo u taagan xariiqda qotonka ah ee dhex marta (3, –1), (3, 0) iyo (3, 1).

Sida ka muuqata jaantuska hoose, waxad xusuusnaataa xariiqdu inay kakoobantahay lammaane hoorsan (x, y) halka $x = 3, y \in \mathbb{Q}$.



Jaantuska 3.13

Sidaas darteed waxan odhan karnaa xariiqdu waxay ina siinaysaa isle'egta $x = 3$.

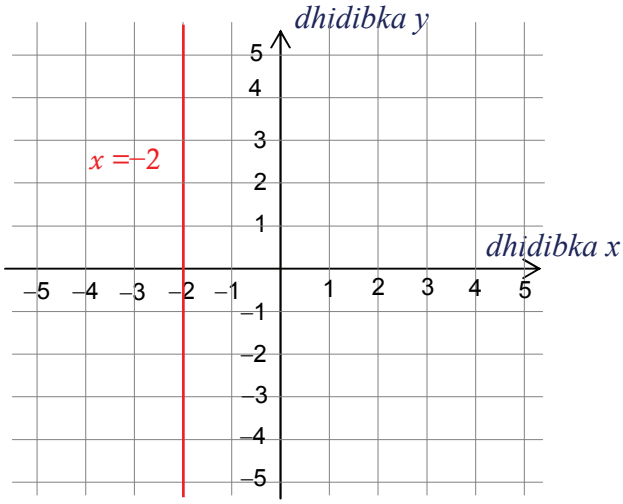
Tusaale 2: Sawir xariiqda isle'egteedu tahay $x = -2$

Furfuris: xariiqdani waxay ka kooban tahay dhamaan lamaanayaasha hoorsan ee dhidibkooda x yahay –2, laakiin dhidibka y waa tiro kasta oo tiro lakab ah.

Tusaale ahaan: (–2, –1), (–2, 0), (–2, 1), waa qaar kamida baraha. Sidaas darteed xariiqdu waxay dhexmaraysaa baraha xariiqda qotonka ah, ee Jaantuska hoos ku cad.

Hadda waxaad qaadataa tiro madoorsoome ah oo ah c. Waxaanad sawirtaa xariiqda $x = c$. tan waxaad qabataa adigoo c u qaadanaya tirooyin kala duwan, tanina waxay inagu hagaysaa gabagabadan soo socota.

Haddii C ∈ ℚ ay tahay tiro madoorsoome ah markaa $x = c$, waa isle'egta xariiqda qotonka ah ama waa xariiqda barbarada la ah dhidibka y, oo dhexmaraysa $(c, -1)$, $(c, 0)$ iyo $(c, 1)$.



Jaantuska 3.14

Intaa kadib waxaan tixgelinaynaa marka dhidibada x ama y ee baruhu ay u taagan yihiin xariiq u taagan tiro, gaar ahaan waxaynu tixgelinaynaa markuu midi midka kale saamigal quman u yahay. Sidaas darteed waa in aad xusuusnaataa qeexitaanadan soo socda. Ka soo qaad y iyo x in ay yihiin laba tiro. Y waxaan odhan karnaa waa saamigalka quman ee x, hadii ay jirto tiro madoorsoome ah oo m ah, sida $y = mx$. Xaaladan m waa madoorsoomaha saamiga.

Tusaale ahaan waxaan usoo qaadaneynaa shaxda soo socota, taas oo inoo cadaynaysa baabuur socday fogaan ah km iyo x, oo o ah amintii uu socday.

Aminta oo ah (x) minit	1	2	3	4	5
Fogaanta oo ah (y) km	2	4	6	8	10

Xusuusnow hubi in y, saamigal quman, u tahay x; hadaba waxaad ku hubin kartaa inay saami isu yihiin $\frac{y}{x} = m$, waxay uu helayaan madoorsoomaha m.

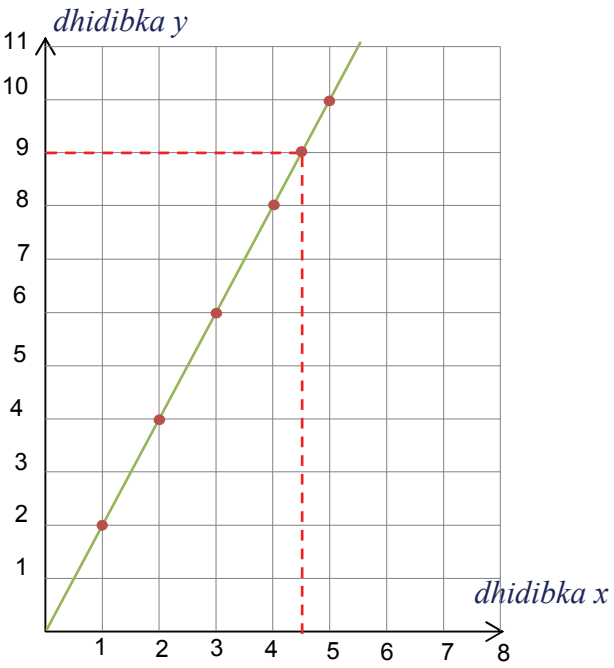
$$\frac{y}{x} = \frac{2}{1} = \frac{4}{2} = \frac{6}{3} = \frac{8}{4} = \frac{10}{5} = 2$$ (sidaas darteed m = 2).

Sidaas darteed y waa saamigal quman ee x, isle'egtu waa $y = 2x$.

Marka xigta, inaga oo isticmaaleyna lammanaha hoorsan ee ku astaysan (x, y), tan oo macneheedu yahay (y) km oo ah fogaanta iyo x oo ah aminta oo daqiiqad, ah. Xogta shaxda waxaan u qori karnaa sidan:-

(1, 2), (2, 4), (3, 6), (4, 8), (5, 10). Hadda haddii aad dhistid barahan oo aad isku xidhid, waxaad helaysaa xariiq toosan oo utaagan garaafka fogaanta iyo aminta. Uu socday baabuurku sida ku cad jaantuska hoos kuqoran. Xariiqdani waxay ina siineysaa isle'egtan $y = 2x$. sidaas darteed lamaane hoorsan oo kasta (x, y) oo xariiqdan ah waxaa ina siinaya $y = 2x$.

Waxaad xusuusnaataa xog farabadan inaan ka helney garaafka kor ku xusan, tusaale ahaan waxaan usoo qaadaneynaa Aminta ah 4.5 daqiiqo. Baabuurku wuxuu socday 9km.



Aminti uu socday oo ah (minit).

Jaantuska 3.15

Garaafka kor kuxusan waxaa ka muuqata xariiqda toosan ee dhexmarta barkulanka dhidibada x iyo y (0, 0). Tani sidoo kale waxay dhacaysaa marka (y), ay saamigal quman utahay (x). sidaas darteed $y = mx$.

Haddii garaafku yahay xariiq toosan oo dhexmarta barta xudunta (0, 0) markaa isle'egta xariqdu waa $y = mx$. Marka (m) ay tahay madoorsoomaha.

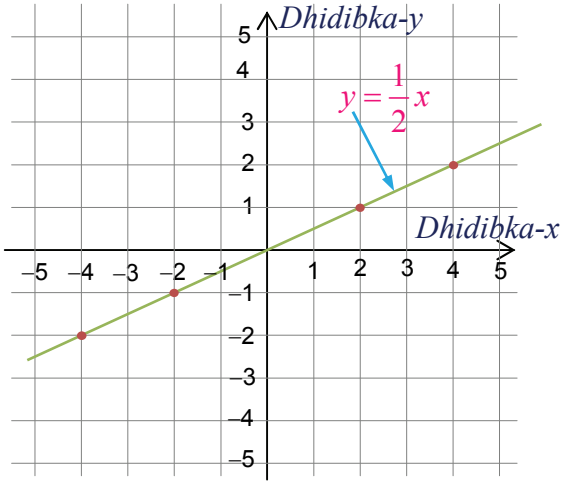
Tusaale 3: sawir xariiqda isle'egteedu tahay $y = \frac{1}{2}x$

Furfuris: xariiqda lagu weydiiyey waxay ka kooban tahay dhamaan lamaanayaasha hoorsan ee isle'egttoodu tahay $y = \frac{1}{2}x$.

Sidaas darteed waxaynu u qaadaneynaa qiimaha (x) iyo qiimaha (y) oo aynu helayno inagoo isticmaaleyna isle'egta soo socota.

x	–4	–2	0	2	4	$y = \frac{1}{2}x$
y	–2	–1	0	1	2	

Sidaas darteed dhis (–4, –2), (–2, –1), (0, 0), (2, 1), (4, 2) isla markaana sawir xariiqda toosan ee dhexmareysa barahan.

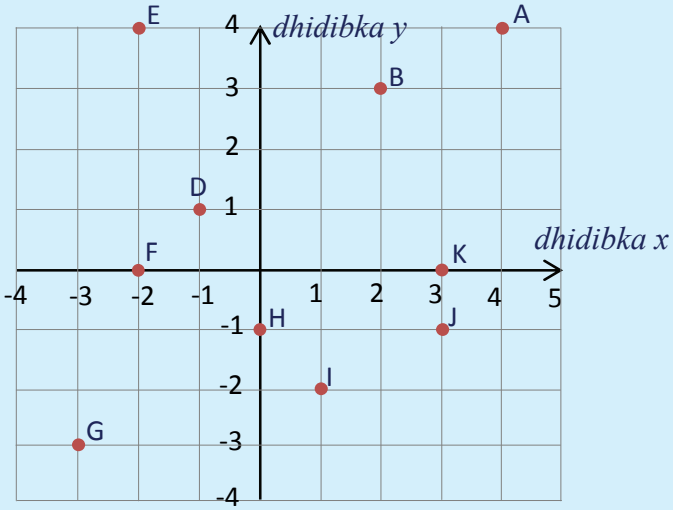


Jaantuska 3.16

Xusuusnow: *Laba barood oo isku xiga waxay ku filan yihiin in laga dhex raadiyo xariiq. Si kastaba ha, ahaatee tusaalaha kor ku xusan waxaan isticmaalay shan barood si aan u xaqiijino sawirka xariiqda.*

Layliska 3.5

1 Raadi dhidibada (Lamaanayasha horsan) ee A, B, … K. ee lagugu siiyey dhidibada sallaxa soo socda.



Jaantuska 3.17

2 Dhis dhidibada soo socda ee dhidibka sallaxa.

A(5, 2), B(3, 3), C(2, 3), D(−2, 2), E(−3, 1), F(−3, 0), G(−2, −3), H(−1, −2), I(0, −2), J(2, −2), K(4, −3), L(2, 0).

3 Raadi waaxaha iyo dhidibada lagugu siiyey su'aasha 2^{aad}.

4 Sawir xariiq kasta oo lagugu siiyey isleegyada soo socda:-

b $y = 4$ **t** $y = 0$ **j** $x = 0$ **x** $x = 2.5$

kh $y = \frac{3}{2}x$ **d** $y = -2x$ **r** $y - x = 0$ **s** $y + \frac{5}{3}x = 0$

5 Raadi isle'egta xariiqdan (–3, –1), (3, 1), (6, 2) iyo (9, 3). Sidoo kale sawir xariiqda.

Furaha Tibxaha

- Dhidibka(x)
- Dhidibka(y)
- Dhinaca bidix
- Fududaynta jajabyada
- Waaxo
- Isle'eg toosan
- Isle'egyada isu dhigma
- Doorsoome
- Lammaane horsan
- Rogaalka isu dhigma
- Habka dhidibada kaartis
- Barkulanka eber
- Dhufsane yaraha ay wadaagaan
- Kulanka dhidibada
- Dhanka midig
- Tibxaha isku midka ah
- Dheeliyada isu dhigma
- Dheeliyada toosan
- Astaanta dheeliga

Sookoobida Cutubka

- ✓ *Isle'egyada leh urur-rumeedyo iskumida ee horaadka lagu siiyay waxa lagu magacaabaa isle'egyo isku dhigma.*
- ✓ *Marka isle, egta loogeeyo ama laga jaro Tiro iskumida ama tibxo isku mida, isle, egtu waxay isu bedeshaa isle'egyo isudhigma.*
- ✓ *Sidoo kale, iskudhufashada ama isuqaybinta oo labada dhinac ee isle'egta lagu dhufto ama loo qeybiyo tiro iskumid ah isle'egta waxaynu bedeli isle'egyo yar-yar oo isle'egta udhigma.*
- ✓ *Isle'egta loo bedeli karo qaabkan $ax + b = 0$, marka $a, b \in \mathbb{Q}$, $a \neq 0$, waxaa lo oyaqaanaa* ***isle'eg toosan*** *taas oo urur-rumeedkeedu yahay* $\left\{\frac{-b}{a}\right\}$.
- ✓ *Qaabka dheeliga toosani wuxuu lamid yahay qaabka isle'egta toosan marka calaamadaha dheeliga oo ah ($<, \leq, >, \geq$) lagu badalo calaamada ($=$).*
- ✓ *Dheeliyada leh qiima rumeed isku mid ah waxa loo yaqaanaa dheeliyo isku dhigma.*
- ✓ *U gaynta ama ka goynta tiro ama tibxo labada dhinac ee dheeliga waxay u bedelaan dheeliyo u dhigma, sidoo kale kudhufasheda ama u qaybinta tiro*

togane ah waxay dheeligu u bedelmaa dheeliyo u dhigma. (iyadoo aanay calaamada dheeliga wax iska beddelayn).

✓ *Ku dhufashada ama u qaybinta labada dhinac ee dheeliga oo lagu dhufto ama loo qaybiyo tiro tabane ah, dheeligu wuxu isu bedelaa dheeliyo isu dhigma, iyadoo calaamada dheeligu isu bedelayso mid lidkeeda ah*

✓ *Tiro kasta oo madoorsoomaha C ah oo ay ($C \in \mathbb{Q}$). Markaa $y = c$ waa isle'egta xariiqda jiifka ah, ama waa xariiqda barbaraha la ah dhidibka x, taaso dhex marta (0, c) iyo (1, c). $x = c$ waa isle'egta xariiqda qotonka ah, ama waa xariiqda barbaraha la ah dhidibka y, taasoo dhex marta (c, 0), iyo (c, 1). Marka oo ay M ka mid tahay ururka tirooyinka lakab ($m \in \mathbb{Q}$), markaa $y = mx$ tani waa isle'egta xariiqda toosan dhexmarta barta eber (0, 0), sidoo kale (1, m), waa xariiq toosan oo kasta taasoo dhex marta barta eber, waxayna leedahay qaabka isle'egta kor ku xusan.*

Nakhtiinka layliska cutubka 3aad

1 Raadi urur-rumeedka mid kastoo ka mid isle'egyadan soo socda ah ee tirooyinka lakab

b $10 - 3x = 7$

t $2(x + 5) - 7 = 3(x - 2)$

j $\frac{5}{4}x + \frac{2}{2} = 2x - \frac{1}{2}$

x $4x - 1 = 4(x + 3)$

kh $9x - 4(1 + x) = 5(x - 1) + 1$

d $\frac{9}{5}(3 - x) = \frac{3}{4}(x - 3)$

r $x = 2 - 2[2x - 3(1 - x)]$

2 Heerkulka waxa lagu cabbiraa halbeegyada loo yaqaano dhigrii selisiyoos (C°) iyo dhigrii faaranhayt (F°).

- Xidhiidhka u dhexeeya labada halbeegna waxa ina siinaysa isle'egtan

  $F = \frac{9}{5}c + 32.$

- Haddii heerkulka hal maalin yahay 68F°, markaa waa imisa dhigrii selishiyoos?

3 Haddii ay fasal dhigtaan 35 arday oo ay ardaydaa si doonaan inay dalxiis u baxaan magaalo u dhow oo ay socdaalkaas ku baxayso lacag dhan 659 Bir, si ay lacagtan u bixiyaan ardaydoo dhani waa in ay qiima isku mida bixiyaan. Sidoo kale, haddii qaybta xisaabaadka ee dugsigu bixiso 250 Bir. Hadaba arday kasta imisuu bixinayaa?

4 Labaatan arday oo fasal ku jira iyo shantoodii bare ayaa waxay qorshaysteen, inay samaystaan xaflad si wadajir ah, si ay u bixiyaan lacagtan ardaydoo dhami waa in ay bixiyaan lacag isku mida, bare kastana waa inuu bixiyaa inta ardaydu bixiyaan oo lagu daray 10. Hadaba imisuu arday kasta iyo bare kastaa bixinayaa? Haddii lacagta xaflada tahay 350 Birr.

5 Ka soo qaad isticmaalka saamiga kwh ee korantada ahi inuu yahay 40Cent, hadaba korantada aad isticmaasho lacagta aad bixinayso waxay ku xidhan tahay wadarta kwh oo loo geeyay toban Birr oo adeega ah. Hadii aad dooneyso in aad yarayso xaddiga isticmaalka korantada oo aad bixisid ugu badnaan 40 Bir Bishii, hadaba waa imisa ugu badnaan kwh aad isticmaalaysid bishii?

6 Furfur mid kastoo kamida dheeliyada soo socda adigoo adeegsanaya horaadka lagu siiyay.

b $4 - 3x \leq -4(x-3), x\in$ **t** $-2x + 5 \leq x + 5\,(x-1), x\in\mathbb{Q}$

j $2x + 3 \leq 2, x\in$ **x** $2x + 3 \leq 2,\ x\in Q$

kh $3x - 5 \leq x + 2(x-1), x\in\mathbb{Q}$ **d** $\frac{1}{2}x \geq x - \frac{3}{4}(x+8),\ x\in\mathbb{Q}$

r $x + 5\,(1-x) \geq 1 - 2\,(x-9), x\in$

7 Ka soo qaad $x, y \in\mathbb{Q}$, islamarkaa $P(x, y)$ waa barta sallaxa dhidibada kaartis. Raadi waxxaha baruhu ku dhacayaan?

b $x > 0$ and $y > 0$ **t** $x < 0$ and $y < 0$ **j** $x > 0$ and $y < 0$

x $x < 0$ and $y > 0$ **kh** $x = 0$ **d** $y = 0$

8 sawir xariiqda isle'egteedu tahay:

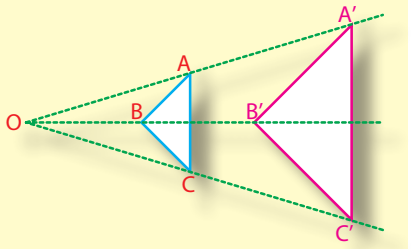
b $x = \frac{5}{2}$ **t** $y + 4 = 0$ **j** $y = \frac{-3}{2}x$

x $y - 3x = 0$ **kh** $y = \frac{2}{3}x$ **d** $y + x = 0$

9 raadi isle'egta xariiqda dhexmaraysa.

(–8, 6), (–4, 3), (4, –3), (8, –6) oo sawir ku muuji xariiqda.

Cutubka 4aad



SHAXANNADA ISU-EG

UJEEDDOOYINKA CUTUBKA

Cutubkani marka uu dhamaado ardaydu waxay awood u yeelan doonaan:

- Ogaanshaha Fikradda shaxannada isu-eg iyo erey-bixinta la xiriirta.
- Fahamka xaaladaha (shardiga) ay saddexagalladu ku noqon karaan kuwo isueg.
- Dabakhidda dariiqooyinka lagu hubiyo in laba saddexagal ay isu-eg yihiin iyo in kale

TUSMOOYINKA MUHIMKA AH

4.1 Shaxannada sallaxa ee isu-eg
4.2 Saddexagallada isu-eg
Furaha Tibxaha
Sookoobida Cutubka
Nakhtiinka layliska

HORDHAC

Nolol maalmeedkeena maalin kasta waxaynu la kulannaa walxo kala duwan oo ah qaabab isku mid ah, balse leh xajmi (cabbir) kala duwan. Waxaa laga yaabaa in aad Aragto masawir iyo weynayntiisa. Waxaa kale oo laga yaabaa in aad u fiirsato walxo muuqaal ahaan isku mid ah laakiin leh cabbiraad kala duwan. Tusaale ahaan meelaha alaabooyinka lagu soo bandhigo (Dukaanada dharka) waxaad ku arki kartaa funaanado ku kala duwan xajmiga (cabbirka) oo keliya. Waxaa kale oo aad fiirin kartaa laba geesoole oo leh xajmiyo kala duwan, laakiinse leh qaab isku mid ah ama isku qaab ah, Isla markaana waad sharaxi kartaa. Adiga oo oranayaa way isu eg yihiin. Fiirinta laba shaxan oo leh qaab isku mid ah iyo cabbir kala duwan way isu eg yihiin Aragti ahaan in la yiraahdo ma'aha dariiqad ku habboon. Sidaas awgeed cutubkan waxaad ku baran doontaa shuruuddo sahlan oo aad ku xaqiijinayso in laba shaxan sallaxeed ay isu eg yihiin iyo inkale.

4.1 SHAXANNADA SALLAXA EE ISU-EG

Cutub-hoosaadkan ama qaybtan waxa aad ku baran doontaa sidii aad u hubin lahayd Isu-ekaanshaha laba shaxan sallaxeed oo lagu siiyey, iyo sidii aad u sawiri lahayd weynaynta iyo yareynta shaxan lagu siiyey. Qaybtan bilowgeeda waxaa lagugu weydiinayaa in aad u fiirsato shaxannada sallaxa ee lammaanaha ah ee lagu siiyey, isla markaana aad go'aamiso in ay isu-eg yihiin iyo in kale. Adiga oo isbarbardhigaya xaglaha iyo dhinacyada gudboon (Isku beegan) ee laba shaxan sallaxeed oo kasta. Ugu dambayntana waxaad ku baran doontaa sawiridda weynaynta ama soo yareynta shaxanka oo ah mid ku salaysan isu-ekaanshaha shaxannada sallaxa.

Qaybtani marka ay dhammaato ka dib, waxa aad awood u yeelanaysaan:

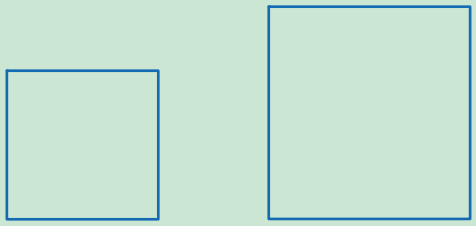
- Soo soocidda shaxannada ay isu-eg yihiin shaxan kasta.
- Sharraxidda macnaha shaxannada isu-eg.
- Sawiridda shaxanka la weyneeyey ee walax lagu siiyey, adiga oo adeegsanaya isirka weynaynta
- Sawiridda shaxanka la soo yareeyey ee walax lagu siiyey, adiga oo adeeg sanaya isirka yareynta.

4.1.1 Muujinta iyo Qeexidda shaxannada Isu-eg

Hawl-agalka 4.1

U fiirso mid kasta oo ka mid ah shaxannada lammaanaha ah ee soo socda, ka dibna go'aami in ay yihiin shaxanno isu-eg iyo in kale.

b Labadooduba waa laba jibbaaraneyaal.

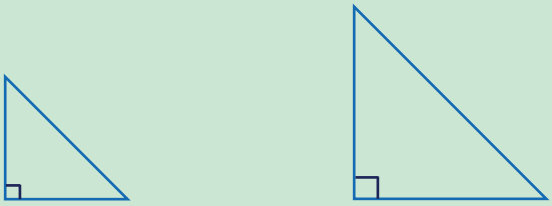


Jaantuskan 4.1

t Labadooduba waa saddexagallo siman.

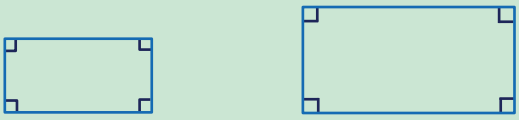
Jaantuskan 4.2

j Labadooduba waa saddexagallo xagal qummau.



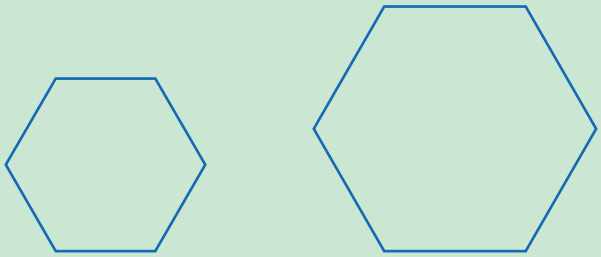
Jaantuskan 4.3

x Labadooduba waa laydiyo.



Jaantuskan 4.4

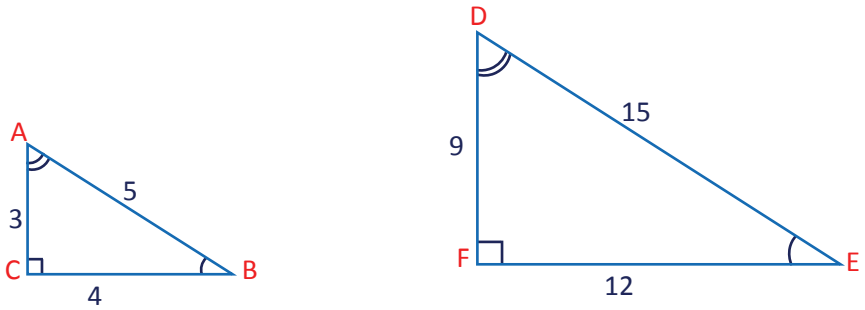
kh Labadooduba waa lix-geesle.



Jaantuskan 4.5

Marka aad isku daydo in aad ka shaqayso Hawlgalka 4.1 ee kor ku qoran, waxaa laga yaabaa in aad yaqiinsatay in shaxannada lammaan ee ku xusan b, t iyo kh ay yihiin kuwo si fudud la isubarbardhigi karo sida ay isu leeyihiin. Shaxan kasta oo ka mid ah shaxannada ku xusan saddexdaas qodob waxaa ku arkaysaa in dhammaan dhinacyada iyo xaglaha gudaha ee shaxan kasta ay isku sargo'an yihiin. Sidaas awgeed waxaa suurtagal ah in aad si shaki la'aan ah u go'aamiso in shaxannada lammaan ee ku qoran qodobbada b, t iyo kh ay yihiin shaxanno isu-eg.

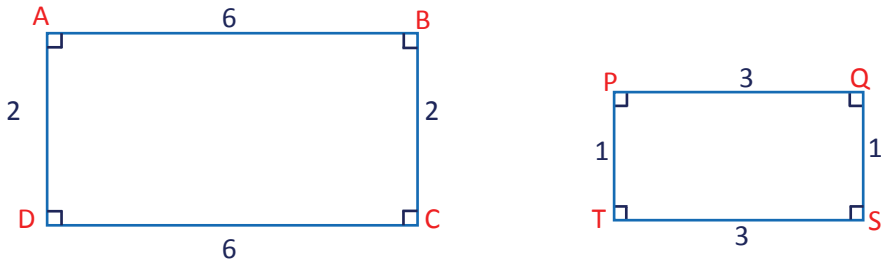
Marka aad u fiirsato saddexagallada lammaan ee ku qoran qodobka'j, ma jirto xog dhammaystiran oo ku saabsan cabbirka xaglahooda iyo dhererka dhinacyadooda marka laga reebo in labada saddexagalba ay yihiin saddexagallo qumman oo leh xaglo qumman. Sidaas oo kale laydiyada lammaan ee ku qoran qodobka x ma jirto xog dhammaystiran oo laga bixiyey dhererka dhinacyadooda. Sidaas awgeed waxaa laga yaabaa in ay kugu adkaato in aad markaba go'aamiso in shaxannada lammaan ee noocaas ahi ay yihiin shaxanno isu-eg iyo in kale. Dhinaca kale bal u fiirso saddexagalladan qumman ee lammaanaha ah dhererka dhinacyadoodu iyo cabbirka xaglahoodu ay yihiin sida ka muuqata labada saddexagalba.



Jaantuskan 4.6

U fiirso labada saddexagalba waa saddexagallo qumman ama waxay leeyihiin qaab isku mid ah oo xaglahooda gudboon ay isku sargo'an yihiin laakiin xajmigoodu uu kala duwan yahay. Sidaas awgeed ma filaysid in ay isku sargo'an yihiin dhinacyada isku beegani. Waxaa kale oo si fudud u yaqiinsan kartaa in dhererrada dhinacyada ΔABC marka la barbardhigo dhererrada dhinacyada ku beegan ee ΔDEF ay ku siinayaan saami isku mid ah. Taas oo ah $\frac{AB}{DE}=\frac{BC}{EF}=\frac{AC}{DF}=\frac{1}{3}$

Xaaladda noocaas ah waxaynu oranaynaa dhinacyada gudboon ee labada saddexagal waa isu saamigal.



Jaantuskan 4.7

Xaqiiqo ahaan labadan laydi waxay leeyihiin qaab isku mid ah, laakiin dhererrada dhinacyadoodu (xajmigoodu) wuu kala duwan yahay. Sidaas darteed ma noqon karaan kuwo isku sargo'an. Balse haddii dhererrada dhinacyada laydiga ABCD aynu barbardhigno dhererrada dhinacyada ku beegan ee laydiga RQTS waxaynu helaynaa saami isku mid ah kaas oo ah. $\frac{AB}{RQ}=\frac{BC}{QS}=\frac{CD}{TS}=\frac{AD}{PT}=2$

Mar kale waxaynu arkaynaa in dhinacyada gudboon ee labadaas laydi, ay saamigal isu yihiin.

Laba geesoole oo tirada dhinacyadoodu ay isku mid tahay, xaglahooda gudboonna ay isku sargo'an yihiin, isla markaana dhinacyadooda gudboon ay saamigal isu yihiin ayaa waxa loo yaqaan geesooleyaal isu eg. Haddaba labada saddexagal ee qumman iyo labada laydi ee aynu kor ku soo falanqaynay waxay tusaaleyaal u yihiin geesooleyaasha isu-eg. Sidaas awgeed qeexidda geesooleyaasha isu-eg waxaynu u qoraynaa sidan soo socota:-

Qeexid 4.1 *Laba geesoole kasta oo tirada dhinacyadoodu ay isku mid tahay waxaa la oran karaa waa isu-eg yihiin haddii*

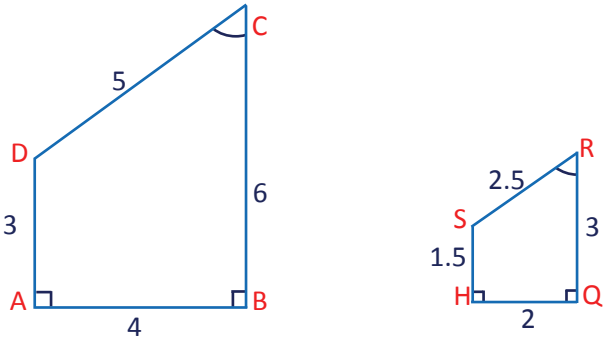
i *xaglahooda gudbooni ay isku sargo'an yihiin.*
ii *dhinacyadooda gudboonna ay saamigal isu yihiin.*

Marka geesooleyaasha G_1 iyo G_2 ay isu-eg yihiin, waxaynu, u qoraynaa $G_1 \sim G_2$ waxaynuna, u akhriyeynaa "G_1, wuxuu u eg yahay G_2"

Sidaas darteed, saddexagallada qumman ee lammaanaha ah iyo laydiyada lammaanaha ee ka muuqda Jaantuskan 4.6 iyo Jaantuskan 4.7 ee kore waxaynu u qori karnaa:

$\Delta ABC \sim \Delta DEF$ iyo $\square ABCD \sim \square RQTS$ sida ay u kala horeeyaan.

Tusaale 1: Labadan geesoole ee hoos lagugu siiyey tus in ay isu-eg yihiin.



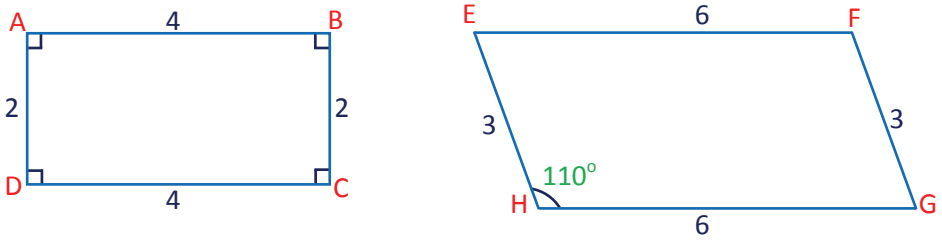
Jaantuskan 4.8

Furfuris: Afargeeslaha ABCD marka aynu barbardhigno afargeeslaha HQRS, xaglahooda gudboon waa ay isku sargo'an yihiin (Ma muujin kartaa sababta $\angle D \cong \angle S$?)

Waxaa kale oo aynu arkaynaa in $\frac{AB}{HQ}=\frac{BC}{QR}=\frac{CD}{RS}=\frac{DA}{SH}=2$

Sidaas awgeed, marka aynu dib u jaleecno qeexidda kor ku qoran waxaa xaqiiqo ah in ABCD ~ HQRS.

Tusaale 2: Hubi in afargeesleyaasha lammaan ee soo socda ay isu-eg yihiin iyo in kale.



Jaantuskan 4.9

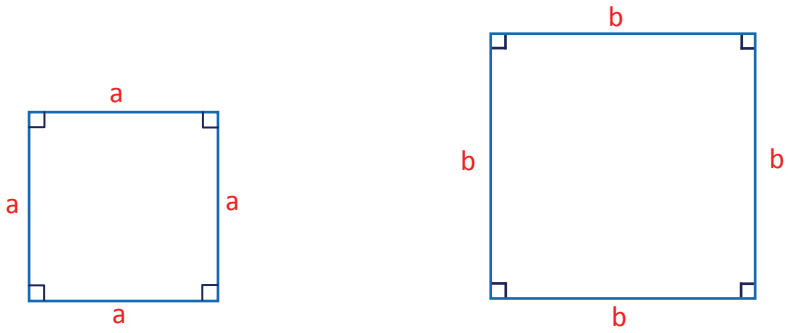
Furfuris: Dhererrada dhinacyada afargeeslaha ABCD marka aynu barbardhigno dhererrada dhinacyada ku beegan ee afargeeslaha EFGH, waxaynu helaynaa in $\frac{AB}{EF}=\frac{BC}{FG}=\frac{CD}{GH}=\frac{AD}{EH}=\frac{2}{3}$

Haseyeeshee, xaglahooda gudboon ma aha xaglo isku sargo'an. Sidaas awgeed, afargeeslaha ABCD iyo afargeesleha EFGH ma aha geesooleyaal isu-eg.

Tusaale 3: Tus in ay isu-eg yihiin laba laba jibbaarane oo kasta.

Furfuris: Ka soo qaad in dhererka dhinacyada labajibbaaranaha hore ay yihiin a, dhererka dhinacyada labajibbaaranaha dambena ay yihiin b sida ka muuqata jaantuskan hoose.

Haddaba saamiga dhererka dhinacyadooda gudboon waa $\frac{a}{b}$. xaglahooda gudboonna waa ay isku sargo'an yihiin, maadaama labajibbaarane kasta ay xaglihiisu yihiin xaglo qumman.



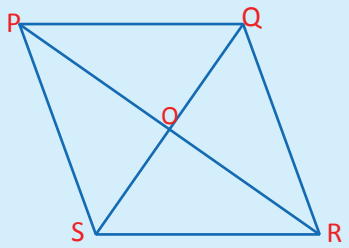
Jaantuskan 4.10

Layliska 4.1

1 Tus in laba saddexagal oo kasta oo isku sargo'an ay isu-eg yihiin.

2 Tus in laba saddexagal oo kasta oo saddexagallo siman ah ay yihiin saddexagallo isu-eg.

3 Haddii shaxankan hoose uu yahay barbarroole isla markaana ay xaglogooyeyaashiisu ku kulmaan barta O, markaa raadi saddex saddexagallo lammaaneyaal ah oo isu-eg. adiga oo sababaynaya jawaabataada.



Jaantuskan 4.11

4 **b** Laba saddexagal labaale oo kasta ma isu-eg yihiin? Waayo?

t Laba laydi oo kasta miyey isu-eg yihiin? Waayo?

5 Afargeesle ayaa dhererka dhinacyadiisu kala yihiin 3, 5, 7 iyo 9 sm. Haddii Afargeesle kale oo ay isu-egyihiin uu dhererka dhinaciisa ugu dheer yahay 12 sm. Markaa raadi dhererrada dhinacyada kale ee afargeeslahaas.

6 Waxaa lagu siiyey saddexagal kasta oo ABC ah, Haddaba sidee baad u sawiraysaa saddexagal u eg saddexagalkaas lagu siiyey oo

i Xajmigiisu ka weyn yahay? **ii** Xajmigiisu ka yar yahay?

7 Waxaa lagu siiyey laydi. Kasta oo ABCD ah, Haddaba sidee baad u sawiraysaa laydi kale oo ay isu egyihiin laydigaas ABCD oo

i Xajmigiisu ka weyn yahay? **ii** Xajmigiisu ka yar yahay?

8 Waxaa lagu siiyey laydi ay dhererka dhinacyadiisa deriska ah kala yihiin 4 iyo 6 halbeeg. Haddii la sawiray laydi kale oo dhererka dhinacyadiisu yihiin dhererka dhinac kasta ee laydigaas lagu siiyey oo lagu kordhiyey 2 halbeeg. Markaa laydiga cusub ma u eg yahay laydigaas lagu siiyey? Waayo?

4.1.2 Saamigalnimada iyo ma doorsoomaha (Isirka) saamigalnimada

Hawl-galka 4.2

(Saabaanka loo baahan yahay: Mastarad, qalin qori, goobo-beeg iyo xagal-beeg).

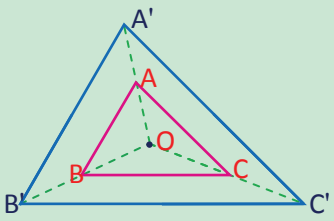
Qasdi(ujeeddada): In aad sawirto saddexagal u eg saddexagalka lagu siiyey. (Sida loo weyneeyo saddexagalka)

Ka soo qaad ΔABC in uu yahay saddexagalka lagu siiyey, kana soo qaad in barta O ay tahay bar kasta oo ku dhextaal saddexagalka. Haddaba saddexagalkan ku soo minguuri warqad, ka dibna samee tallabooyinkan soo socda.

i Fallaarta $\overrightarrow{OA}$ ku dul muuji barta A' taas oo OA' = 2 (OA)

ii Fallaarta $\overrightarrow{OB}$ ku dul muuji barta B' taas oo OB' = 2 (OB)

iii Fallaarta $\overrightarrow{OC}$ ku dul muuji barta C' taas oo OC' = 2 (OC) ka dibna sawir xarriijimaha $\overline{A'B'}$, $\overline{B'C'}$ iyo $\overline{A'C'}$



Jaantuskan 4.12

Hadda, bal cabbir dhererrada saddexda dhinac ee ΔABC, sidaas oo kale cabbir dhererrada saddexda dhinac ee $\Delta A'B'C'$. Haddana cabbir saddexda xaglood ee labadaas saddexagal ka dibna

i Maxaad ka aragtay saamiyada dhinacyada gudboon ee labadaas saddexagal?

ii maxaad ka aragtay cabbirada xaglaha gudboon ee labadaas saddexagal?

Haddii aad si sax ah u cabbirtay dhererrada dhinacyada iyo cabbirka xaglaha ee labadaas saddexagal ΔABC iyo $\Delta A'B'C'$, waxa aad yaqiinsanaysaa in xaglaha gudboon ay isku sargo'an yihiin iyo in dhinacyada gudboon ay saamigal isu yihiin. Taas oo ah

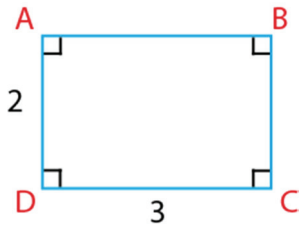
$$\angle A \cong \angle A',\ \angle B \cong \angle B'\ \angle \hat{C} \cong \angle C' \quad \text{iyo} \quad \frac{A'B'}{AB} = \frac{B'C'}{BC} = \frac{A'C'}{AC} = 2.$$

Taas oo macnaheedu yahay labada saddexagal waa isu-eg yihiin, sida ku cad qeexidda geesooleyaasha isu-eg ee aan horay u soo baranay saamiga dhinacyada gudboon ee labada saddexagal waxaa kale oo loo yaqaan "Madoorsoomaha saamigalnimada" ama "Isirka saamigalnimada". Haddaba sida ku cad shaqada ardayga ee kore (shaqa arday 4.2) dhinacyada saddexagalka A'B'C' waxay saamigal u yihiin dhinacyada saddexagalka ΔABC madoorsoomaha saamigalnimaduna wuxuu le'eg yahay 2.

Waxaa kale oo aynu oran karnaa $\Delta A'B'C'$ waxaynu ku helnay weynaynta ΔABC ee madoorsoomaha saamigalnimadiisu tahay 2.

Habka aan ku soo adeegsanay shaqo-arday 4.2 ee kore waxaa loo adeegsan karaa weynaynta ama yareynta geesoole kasta sida aan ku arki doono tusaaleyaasha soo socda.

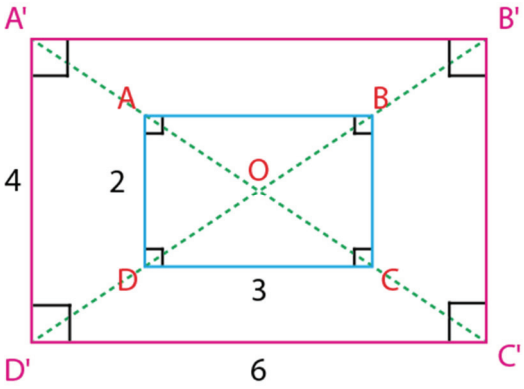
Tusaale 4: Weynee laydiga ABCD ee hoos ka muuqda adiga oo adeegsanaya isirka saamigalnimada (isirka weynaynta) uu yahay 2.



Jaantuskan 4.13

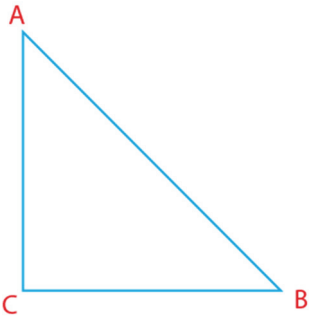
Furfuris: Hal bar ka dooro gudaha laydiga ABCD kuna magacow O, ka dibna fallaaraha $\overrightarrow{OA}, \overrightarrow{OB}, \overrightarrow{OC}$ iyo $\overrightarrow{OD}$ ku dul muuji baraha A', B', C' iyo D' sida ay u kala horreeyaan, isla markaana OA' = 3(OA), OB' = 3(OB),

OC' = 3(OC) iyo OD' = 3(OD). Dabadeedna dhis laydiga A'B'C'D'. Hubi in laydiga A'B'C'D' uu yahay laydi raalligelinaya shuruuddani ah $\frac{A'B'}{AB}=\frac{B'C'}{BC}=\frac{C'D'}{CD}=\frac{A'D'}{AD}=3$



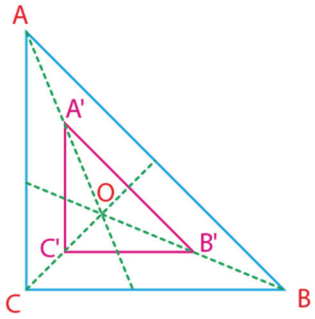
Jaantuskan 4.14

Tusaale 5: Yaree saddexagalka ABC ee hoos ka muuqda marka isirka saamigalnimadu uu yahay $\frac{1}{2}$.



Jaantuskan 4.15

Furfuris: Hal bar ka dooro gudaha saddexagalka ΔABC kuna magacow O. Ka dibna fallaaraha $\overline{OA}$, $\overline{OB}$ iyo $\overline{OC}$ ku dul muuji baraha A,'B' iyo C' sida ay u kala horreeyaan, kuwaas oo ah $OA'=\frac{1}{2}(OA)$, $OB'=\frac{1}{2}(OB)$ iyo $OC'=\frac{1}{2}(OC)$. Dabadeedna isku xidh baraha A', B' iyo C' si ay u sameeyaan saddexagalka A'B'C' ee hoos ka muuqda



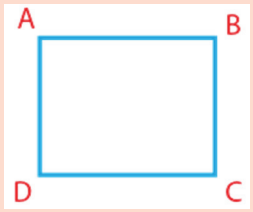
Jaantuskan 4.16

Adiga oo cabbiraya hubi in $\frac{A'B'}{AB}=\frac{B'C'}{BC}=\frac{A'C'}{AC}=\frac{1}{2}$

Xaaladdan waxaynu oranaynaa ΔA'B'C' waxaan ku helnay yareynta ΔABC inaga oo adeegsanayna isirka saamigalnimada oo ah $\frac{1}{2}$.

Shaqo-kooxeedka 4.1

Idinka oo raacaya tallaabooyinka ku xusan tusaalaha 4aad ee kore, yaree laydiga ABCD ee hoos ka muuqda marka madoorsoomaha saamigalnimada ama (isirka yareyntu) uu yahay $\frac{1}{3}$.



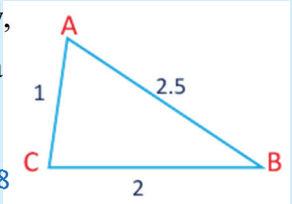
Jaantuskan 4.17

Xusuusin: *Haddii aad doonayso in aad laydiga ku soo yareyso xudunta laydiga lagu siiyey, waxa aad u qaadanaysaa barta O oo ay noqonaysaa barta ay iska gooyaan labada xagal-gooye ee laydiga ABCD. Haddii kale barta O waxay noqon kartaa bar kasta oo ku taalla guddaha laydiga ABCD.*

U fiirso sida ku cad dhammaan tusaaleyaasha aynu kor kaga soo shaqaynay, shaxanka la weneeyey ama la soo yareeyey wuxuu u eg yahay shaxankii asalka ahaa, isla markaana isirka weynayntu ama yareyntu (madoorsoomaha saamigalnimada) waa saamiga dhinacyadooda gudboon sida ay u kala horreegaan.

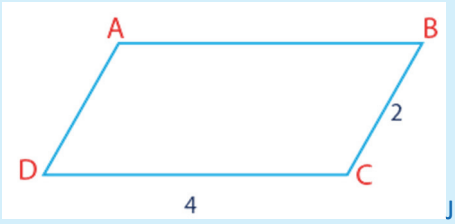
Layliska 4.2

1 Soo minguuri saddexagalka ABC ee hoos lagugu siiyey, isla markaana weynee ΔABC adiga oo madoorsoomaha saamigalnimada (Isirka weynaynta) u adeegsanaya 3.



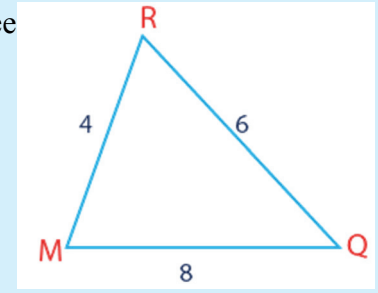
Jaantuskan 4.18

2 Soo minguuri barbaroolaha ABCD ee hoos ka muuqda, ka dibna weynee barbaroolahaas adiga oo isirka weynaynta u qaadanaya 2.



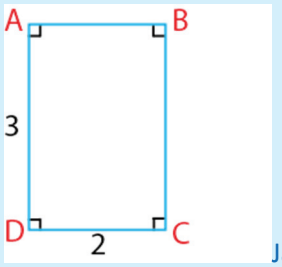
Jaantuskan 4.19

3 Soo minguuri saddexagalka MQR, ka dibna yaree saddexagalkaas, adiga oo madoorsoomaha saamigalnimada u qaadanaya $\frac{1}{4}$.



Jaantuskan 4.20

4 Soo minguuri labajibbaaranaha ABCD ee hoos ka muuqda, ka dibna yaree, adigo oo madoorsoomaha saamigalnimada u qaadanaya $\frac{1}{3}$.



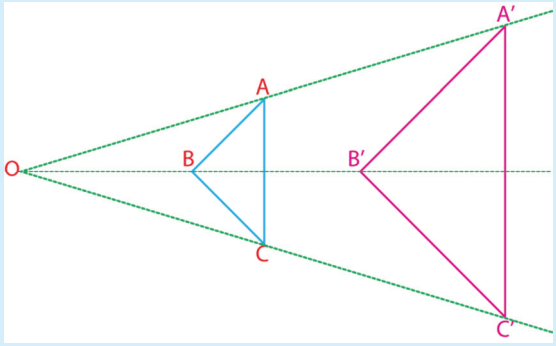
Jaantuskan 4.21

5 Su'aalaha 1^{aad} ilaa 4^{aad} ee kor ku qoran, u fiirso saamiyada dhererrada dhinacyada ee shaxanka lagu siiyey iyo dhererrada dhinacyada ku beegan ee shaxanka cusub ee aad ku heshay weynaynta ama yareynta. Maxaad ka fahamtay?

6 U fiirso shaxanka hoos ka muuqda, ka soo qaad barta O in ay tahay bar kasta oo ku taal gudaha ΔABC. Fallaaraha $\overrightarrow{OA}$, $\overrightarrow{OB}$ iyo $\overrightarrow{OC}$ ku dul muuji baraha A', B' iyo C' sida ay u kala horreeyaan. Kuwaas oo ah OA' = 2 (OA), OB' = 2(OB) iyo OC' = 2(OC) ka dibna sawir $\Delta A'B'C'$.

i Maxaad ka sheegi kartaa xaglaha gudboon ee labadaas saddexagal ABC iyo A'B'C'? (Isbarbardhig cabbirradooda)

ii Maxaad ka sheegi kartaa saamiyada dhinacyada gudboon ee labadaas saddexagal ABC iyo A'B'C'? (Isbarbardhig dhererkooda).



Jaantuskan 4.22

4.2 SADDEXGALLADA ISU-EG

Qaybtani marka ay dhammaato ka dib, waxa aad awood u yeelanaysaa:-

- Sharaxidda xaqiiqooyinka ku saabsan isu-ekaanshaha laba saddexagal.
- Dabbakhidda qeexidda isu-ekaanshaha laba saddexagal ee xallinta mas'alooyinka la xidhiidha
- Dabbakhidda dariiqooyinka isu-ekaanshaha saddexagallada ee ah Dh. Dh. Dh (SSS), Dh.x. Dh (SAS), iyo X.Dh.X (ASA) ee lagu xaqiijiyo isu-ekaanshaha laba saddexagal.
- Sharraxidda sida ay u xidhiidhsan yihiin wareegga iyo bedka saddexagallada isu-eg.

4.2.1 Muujinta saddexagallada isu-eg

Qaybtii hore waxa aad ku soo baratay shaxannada sallaxa ee isu-eg, waxaadna ku soo aragtay qeexidda shaxannada sallaxa ee isu-eg. Qaybtanna waxaa si khaas ah loogu qaadaa dhigayaa isu-ekaanshaha saddexagallada (saddexagallada isu-eg), maadaama saddexagalladu yihiin nooca ugu fudud shaxannada sallaxa. In wax badan laga ogaado isu-ekaanshaha saddexagallada waxaa kale oo ay caawimaad u tahay fahamka isu-ekaanshaha geesooleyaasha, sababta oo ah geesoole kasta waxaa loo qaybin karaa saddexagallo, iyada oo la sawirayo xagal-gooyeyaasha suurtagalka ah ee geesaha geesoolaha.

Hawl-galka 4.3

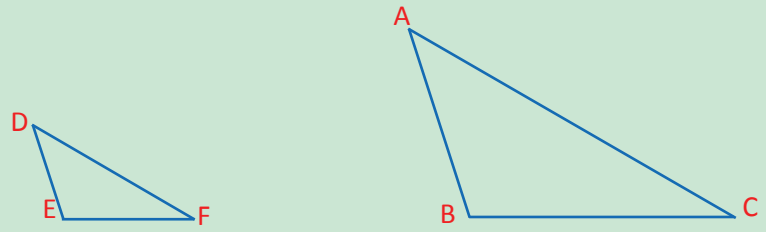
Qasdi (ujeeddada): Hubinta isu-ekaanshaha saddexagallada

Saabaanka loo baahan yahay: Mastarad, qalin-qori, goobo-beeg

1 Labada saddexagal ee kala ah ΔABC iyo ΔDEF ee hoos ka muuqda, cabbir dhererrada dhinacyadooda iyo xag lahooda.

b Raadi oo soo saar saamiga dhererrada dhinacyada gudboon.

t Maxaad ka fahamtay cabbirrada xaglaha gudboon? (Halkan ka soo qaad in gudboonaantu ama isku-beegnaantu ay tahay sida loo muujiyey isku-xigidda xarfaha lagu magacaabay labada saddexagal)



Jaantuskan 4.23

j maxaa dhacaya haddii aad bedesho gudboonaanta ama iskubeegnaanta, sida haddii ΔABC aad barbardhigto ΔEFD? Dhinacyada gudboon ma yeelanayaan saami la mid ah sidii kii hore? Waa sidee cabbirrada la xidhiidha xaglaha gudboon?

2 Adiga oo ka duulaya su'aasha 1^{aad} ee kor ku xusan qor qeexidda isu-ekaanshaha laba saddexagal.

Hawlgalka 4.3, haddii cabbiraaddaadu tahay mid sax ah waxaad helaysaa in:-

Xaglaha gudboon ee saddexagallada ABC iyo DEF, ay isku sargo'an yihiin, sida $\angle A \cong \angle D$, $\angle B \cong \angle E$ and $\angle C \cong \angle F$. Sidaas oo kale waxaad helaysaa in dhinacyadooda gudboon ay saamigal isu yihiin ama ay leeyihiin saami isku mid ah.

Taas oo ah $\frac{AB}{DE} = \frac{BC}{DE} = \frac{AC}{DF}$

Sidaas awgeed, labada saddexagal ee noocaas ah waxaa la oran karaa waa saddexagallo isu-eg.

Hadda waxaynu qeexaynaa saddexagallo isu-eg si la mid ah dhab ahaan sidii aynu qaybtii hore ugu soo qeexnay geesooleyaasha isu-eg.

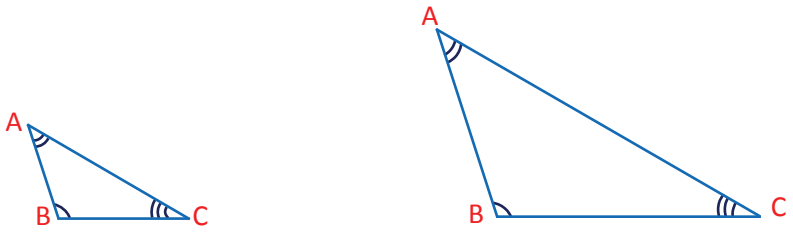
Qeexid 4.2 *Laba saddexagal waxaa la oran karaa waa isu-eg yihiin haddii xaglahooda gudboon ay isku sargo'an yihiin dhinacyadooda gudboonna ay saamigal isu yihiin. Waxaan u qoraynaa ΔABC ~ ΔDEF, waxaana aan u akhriyeynaa "ΔABC wuxuu u eg yahay ΔDEF".*

Sida ku cad qeexidda kore, marka aynu qorayno ΔABC ~ ΔDEF, waxaynu u jeednaa dhammaan kuwan soo socda:-

$\angle A \cong \angle D$

$\angle B \cong \angle E$

$\angle C \cong \angle F$ iyo $\frac{AB}{DE} = \frac{BC}{DE} = \frac{AC}{DF} =$ k (Madoorsoome)



Jaantuskan 4.24

Dhinaca kale, mid ka mid ah tabaha loo muujiyo isu-ekaanshaha laba saddexagal oo lagu siiyey waa muujinta in ay run yihiin dhammaan afarta hawraarood ee kor ku qoran. Taas oo ah shaqo waqti dheer qaadanaysa. Si kastaba ha ahaatee waxa aad si dhakhso leh u baran doontaa habab ka fudud oo lagu xaqiijiyo ama lagu hubiyo in laba saddexagal ay isu-eg yihiin iyo in kale. Inta aynaan u gudagelin hababkaas ka hor waxaa lagama maarmaan ah in aan hoosta ka xariiqno in qormada ah $\Delta ABC \sim \Delta DEF$ aanay muujinayn isu-ekaanshaha laba saddexagal oo keliya balse, ay muujinayso gudboonaanta ama iskubeegnaanta xaglaha iyo dhinacyada labada saddexagal. Taas macnaheedu waxaa weeye isku beegnaantu waxay muujisaa ama raacdaa horsanaanta xarfaha lagu magacaabay labada saddexagal, isla markaana aan ka fahmi karno sida ku cad jaantuskan soo socda.

$\Delta ABC \sim \Delta DEF$

Tusaale 6: Sida ku cad shaxankan hoos ka muuqda, haddii $\Delta ABC \sim \Delta DEF$, markaa:

i Raadi dhererka $\overline{EF}$

ii Raadi dhererka $\overline{DF}$

Jaantuskan 4.25

Furfuris: Maadaama labada saddexagal ee lagu siiyey ay yihiin saddexagallo isu-eg. Markaa sida aynu ku soo baranay qeexidda isu-ekaashaha saddexagallada waxaynu ognahay in

$$\frac{AB}{DE}=\frac{BC}{EF}=\frac{AC}{DF}=k \text{ (madoorsoome)}$$

Sidaas awgeed, **i** $\frac{AB}{DE}=\frac{BC}{EF}$

$$\frac{4}{6}=\frac{6}{EF}$$

$$4(EF)=6\times 6$$

$$EF=\frac{36}{4}=9\,\text{cm}$$

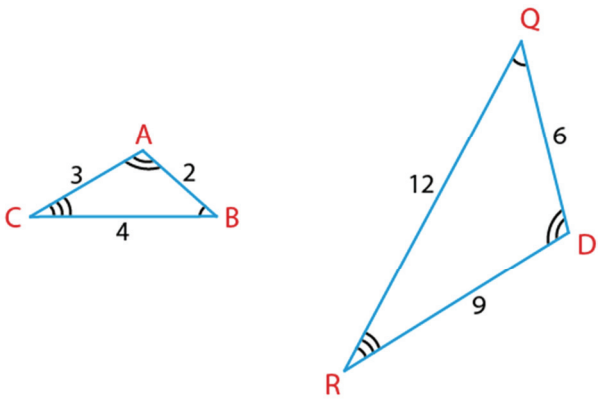
ii $\frac{AB}{DE}=\frac{AC}{DF}$

$$\frac{4}{6}=\frac{8}{DF}$$

$$4\,(DF)=6\times 8$$

$$DF=\frac{6\times 8}{4}=12\text{ cm.}$$

Tusaale 7: Shaxankan hoose wuxuu muujinayaa xaglaha gudboon ee isku sargo'an iyo dhinacyada gudboon ee saamigalka isu ah. Haddaba tus isu-ekaanshaha saddexagalladaas.



Jaantuskan 4.26

Furfuris: Sida aad ku aragto shaxankaas $\angle A \cong \angle D$, $\angle B \cong \angle Q$ iyo $\angle C \cong \angle R$ Marka la raaco isku-beegnaanta xaglaha saddexagalladaas, haddii aad isbarbardhigto dhinacyada gudboon ee labadaas saddexagal waxa aad helaysaa in:

$$\frac{AB}{DQ}=\frac{2}{6}=\frac{1}{3}\ ;\ \frac{BC}{QR}=\frac{4}{12}=\frac{1}{3}\ \text{iyo}\ \frac{AC}{DR}=\frac{3}{9}=\frac{1}{3}.\ \therefore\ \frac{AB}{DQ}=\frac{BC}{QR}=\frac{AC}{DR}=\frac{1}{3}$$

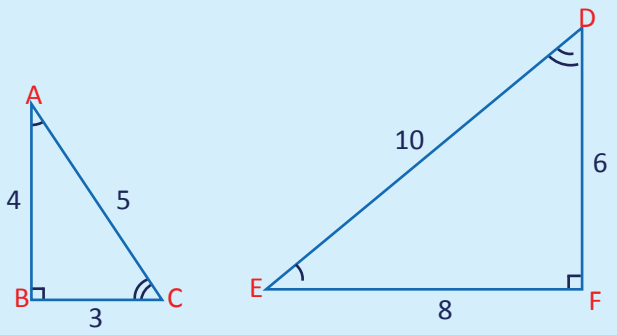
Taas macnaheedu waxaa weeye marka aan ΔABC barbardhigno ΔDQR, waxaynu soo saarnay in xaglahooda gudboon ay isku sargo'an yihiin, dhinacyadooda gudboonna ay saamigal isu yihiin. Sidaas awgeed $\Delta ABC \sim \Delta DQR$.

Layliska 4.3

1 Tus in saddexagallada isku sargo'an ay yihiin saddexagallo isu-eg.

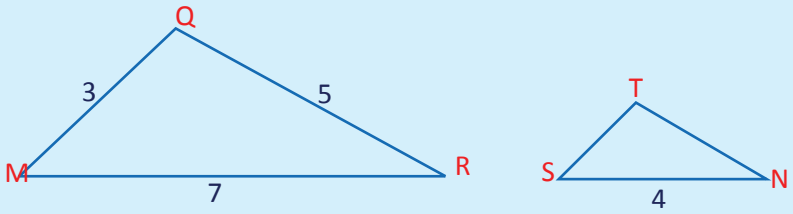
2 Haddii ΔABC ~ ΔDEF isla markaana ΔDEF ~ ΔMQR, markaa maxaad ka sheegi kartaa ΔABC iyo ΔMQR?

3 Faahfaahi in labada saddexagal ee hoos ka muuqda ay yihiin laba saddexagal oo isu-eg.



Jaantuskan 4.27

4 Sida ka muuqata shaxankan hoose, haddii ΔMQR ~ ΔSTN, markaa soo saar dhererrada $\overline{ST}$ iyo $\overline{TN}$.



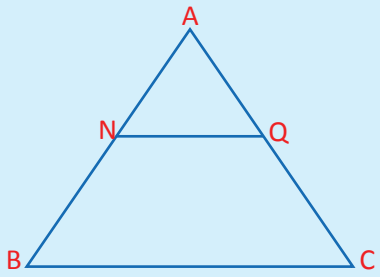
Jaantuskan 4.28

5 Haddii Δ ABC ~ Δ DEF oo BC = 18, DF = 15, EF = 12 iyo DE = 9, markaa soo saar dhererrada labada dhinac ee kale ee ΔABC.

6 Saddexagal ayaa dhererrada saddexdiisa dhinac kala yihiin 6 sm, ksm iyo 12sm. Dherernada dhinacyada ku beegan ee saddexagal u eg ayaa waxay kala yihiin t-sm, 12 sm iyo 16 sm sida ay u kala horreeyaan. Haddaba soo saar qiimaha ay u taagan yihiin "K" iyo "t" oo sentimitir, (sm) ah.

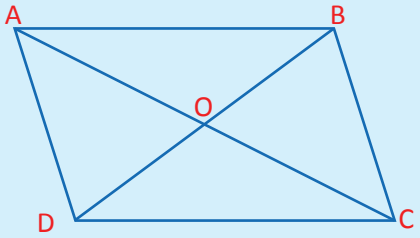
7 Sida ka muuqata shaxankan hoose ΔABC ~ ΔAQN, Haddii AN = 4, AQ = 3, CQ = 6 iyo BC = 12, markaa soo saar dhererada

i AB **ii** NQ



Jaantuskan 4.29

8 Haddii ABCD uu yahay barbarroole, isla markaana $\overline{AC}$ iyo $\overline{BD}$ ay yihiin xaglo-gooyeyaashiisa oo ku kulma ama iska gooya barta 0, sida ka muuqata shaxankan hoose, markaa tus in $\Delta AOB \sim \Delta COD$.



Jaantuskan 4.30

4.2.2 Hubinta Isu-e kanshaha Saddexagallada

Hubinta in laba saddexagal oo lagu siiyey ay isu-egyihiin iyo in kale, qeexid ahaan waxay u baahan tahay:

i In xaglaha gudboon ee labada saddexagal ay noqdaan kuwo isku sargo'an.

ii In Dhinacyada gudboon ee labada saddexagal ay noqdaan kuwo saamigal isu ah.

Laakiin qof kasta oo doonaya in uu hubiyo isu-ekaanshaha laba saddexagal tani waxay ku qaadanaysaa waqti dheer. Sidas darted waxa aad u baahan tahay hab gaaban oo aad ku hubiso isu-ekaanshaha laba saddexagal.

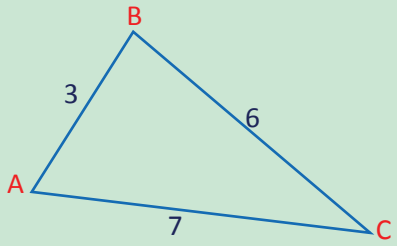
Casharkan waxa aad ku baran doontaa saddex hab oo talantaalli ah, kuwaas oo aad ku hubin karto in laba saddexagal oo lagu siiyey ay isu-egyihiin iyo in kale.

Hawl-galka 4.4

Qasdi(ujeeddada): Hubinta isu-ekaanshaha saddex-xagallada.

Saabaanka loo baahan yahay: Mastarad, qalin-qori, xagal-beeg iyo goobo-beeg.

Soo minguuri saddexagalka ABC ee hoos ka muuqda, kadibna weynee. saddexagalkaas si aad u hesho ΔA'B'C', adiga oo ma doorsoomaha saamigalnimada u qaadanaya 2, isla markaana raacaya habkii aad horey u soo baratay.



Jaantuskan 4.31

Cabbir dhammaan xaglaha iyo dhammaan dhinacyada labada saddexagal ee kala ah ΔABC iyo ΔA'B'C', kadibna isbarbardhig.

i Maxaad ka fahamtay saamiga dhinacyada gudboon ee labadaas saddexagal?

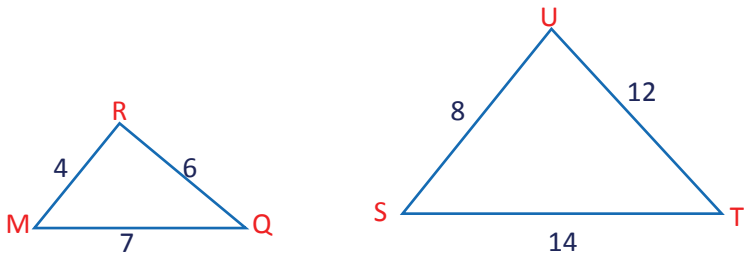
ii Maxaad ka fahamtay xaglaha gudboon ee labadaas saddexagal?

Haddii aad si sax ah u dhammays tirtay dhismahaaga hawlgalka kor ku xusan, isla markaana aad si sax ah u cabbirtay dhinacyada iyo xaglaha labadaas saddexagal, waxa aad yaqiinsanaysaa in labadaas saddexagal ay isu-egyihiin. Si khaas ah qodobka 1aad hoosta uga xarriiq in weynaynta saddexagalku ay tahay sawiridda saddexagal ay dhinacyadiisu saamigal u yihiin dhinacyada saddexagalka lagu siiyey. Qodobka 2aad xaglaha saddexagalka cusubna ay ku sargo'an yihiin xaglaha ku began ee saddexagalkii hore. Taasi waxay si fudud muujinaysaa in saamigalnimada saddexda dhinac ay ku filan tahay hubinta isu-ekaanshaha labada saddexagal. Shuruuddan ama hubinta isu-ekaanshaha laba saddexagal waxaa loo qeexay sidan soo socota:

Aragtiin: (Aragtiinka isu-ekaanshaha (SSS))

Haddii saddexda dhinac ee hal saddexagal ay saamigal u yihiin saddexda dhinac ee ku began ee saddexagal kale, markaa labadaas saddexagal waa ay isu-egyihiin.

Tusaale 8: Tus in labadan saddexagal ee soo socda ay isu-eg yihiin.



Jaantuskan 4.32

Furfuris: Si Taxadar leh ugu fiirso dhererrada dhinacyada labada saddexagal, waxa aad arkaysaa in:

$$\frac{MQ}{ST}=\frac{7}{14}=\frac{1}{2},\ \frac{QR}{TU}=\frac{6}{12}=\frac{1}{2}\ \text{iyo}\ \frac{RM}{US}=\frac{4}{8}=\frac{1}{2}$$

$$\therefore\ \frac{MQ}{ST}=\frac{QR}{TU}=\frac{RM}{US}$$

Sidaas awgeed, ΔMQR ~ ΔSTU ... (Hubinta dhinac-dhinac-dhinac = SSS)

Hawl-galka 4.5

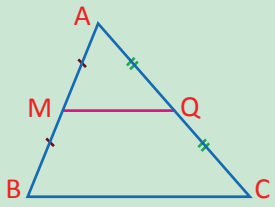
Qasdi (ujeeddada): Hubinta isu-ekaanshaha saddexagallada.

Saabaanka loo baahan yahay: Mastarad, qalin-qori goobo-beeg iyo xagal-beeg.

ΔABC ee hoose sida ka muuqata, ka soo qaad in barta M ay kalabadho $\overline{AB}$ barta Q-na ay kala badho $\overline{AC}$. Haddaba ΔABC ku soo minguuri buuggaaga oo sawir xarriijinta $\overline{MQ}$.

Ka dibna u fiirso labada saddexagal ee kala ah ΔAMQ iyo ΔABC.

Waxaa si cad u muuqata in $\angle MAQ \cong \angle BAC$ iyo $\frac{AM}{AB}=\frac{AQ}{AC}=\frac{1}{2}$.



Jaantuskan 4.33

i Cabbir dhererrada $\overline{MQ}$ iyo $\overline{BC}$ oo soo saar $\frac{MQ}{BC}$.

ii Cabbir xaglaha $\angle AMQ$ iyo $\angle ABC$ kadibna isbarbardhig natiijada kuu soo baxday.

iii Cabbir xaglaha $\angle AQM$ iyo $\angle ACB$ kadibna isbarbardhig natiijada kuu soo baxday. Maxaad ka fahamtay?

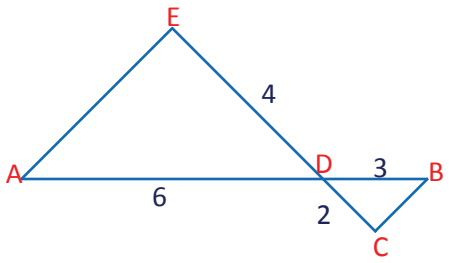
Haddii ay sax tahay cabbiraaddaada aad ku sameysay hawlgalka 4.5, waxa aad helaysaa in xaglaha gudboon ee ΔAMQ iyo ΔABC ay isku sargo'an yihiin, isla markaana dhinacyadooda gudboon ay saamigal isu yihiin. Labada saddexagal way isu-eg yihiin. Xaqiiqso in labada saddexagal ΔAMQ iyo ΔABC, $\frac{AM}{AB}=\frac{AQ}{AC}$ iyo $\angle MAQ \cong \angle BAC$. Markaa cabbiriddaada waxaad ku xaqiijisay in ΔAMQ ~ ΔABC.

Natiijadani waxay daaha ka qaadaysaa shuruuddan (hubinta) loogu talagalay isu-ekaanshaha laba saddexagal ee soo socota:

Aragtiin (Aragtiinka isu-ekaanshaha SAS)

Haddii laba dhinac oo hal saddexagal ay saamigal u yihiin labada dhinac ee ku began saddexagal kale, isla markaana xaglaha u dhexeeya dhinacyadaas ay isku sargo'an yihiin, markaa labadaas saddexagal waa ay isu-egyihiin.

Tusaale 9: Shaxankan hoose, labadee saddexagal ayaa isu-eg?



Jaantuskan 4.34

Furfuris: Tixgeli ΔADE iyo ΔBDC

Kadibna u fiirso in

i ∠ADE ≅ ∠BDC (xaglo foodsaar ah)

ii $\frac{AD}{BD}=\frac{6}{3}=2$ iyo $\frac{DE}{DC}=\frac{4}{2}=2$

$\therefore \frac{AD}{BD}=\frac{DE}{DC}=2$

Sidaas awgeed, ΔADE ~ ΔBDC (Hubinta isu-ekaanshaha dhinac-xagal dhinac).

Shaqo-kooxeedka 4.2

Ujeeddada: Hubinta isu-ekaanshaha saddexagallada.

Saabaanka loo baahan yahay: Mastarad, qalin-qori, goobo-beeg iyo xagal-beeg.

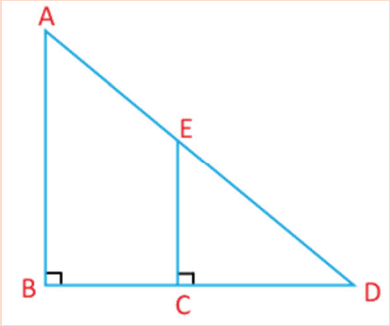
Tixgeli ΔABD iyo ΔECD ee ka muuqda shaxankan hoose, labada saddexagalba waa saddexagallo qumman, xagla hooda qummani kala yihiin B iyo C sida ay u kala horreeyaan. Waxayna wadaagaan hal xagal oo ah D.

Shaxankan ku soo minguuri buugaagga, kadibna

i U fiirso ∠CED ≅ ∠BAD (Waayo?)

ii Cabbir dhererrada dhammaan dhinacyada labada saddexagal oo isbarbardhig saamiga dhinacyada gudboon sidan $\frac{AB}{EC}, \frac{AD}{ED}$ iyo $\frac{BD}{CD}$

iii ΔABD ma u eg yahay ΔECD?



Jaantuskan 4.35

Haddii cabbiraadda xaaga dhererrada dhinacyada labada saddexagal ay sax yihiin waxa aad helaysaa in $\frac{AB}{EC}=\frac{AD}{ED}=\frac{BD}{CD}$. Taas oo macnaheedu yahay ΔABD ~ ΔECD Labada saddexagal ee ABD iyo ECD waxay leeyihiin laba lammaane oo xaglahooda ah oo isku sargo'an. Labadaas saddexagal oo kalena waxaa la yiraahdaa waa isu-egyihiin. Natiijada aan helnay waxaynu u qoraynaa aragtiin kan isu'ekaanshaha (hubinta) ee soo socda:-

Aragtiin (Aragtiinka isu-ekaanshaha ee xagal-xagal (AA))

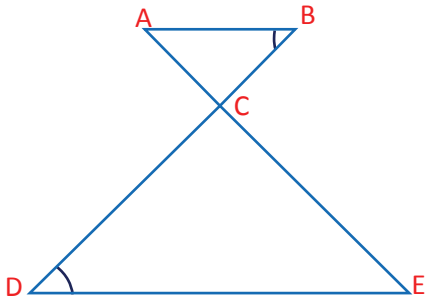
Haddii laba xaglood ee hal saddexagal ay ku sargo'an yihiin laba xaglood oo kasta ee saddexagal kale. Markaa labadaas saddexagal waa ay isu-egyihiin.

Tusaale 10: Haddii shaxankan hoose ay ∠ABC ≅ ∠CDE, markaa labadee saddexagal ayaa ah saddexagallo isu-eg? Waayo?

Furfuris:

i ∠ABC ≅ ∠EDC (siin ama qaadaasho)

ii ∠ACB ≅ ∠ECD (xaglo foodsaar ah)



Jaantuskan 4.36

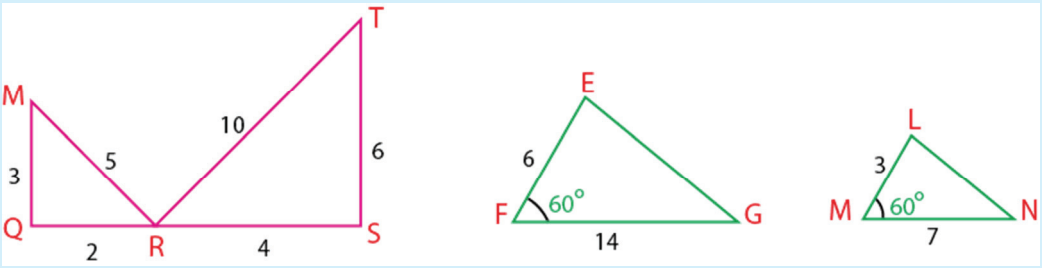
Sidaas awgeed, ΔABC ~ ΔEDC (Aragtiinka isu-ekaanshaha xagal-xagal)

Saddexda dariiqo ee hubinta isu-ekaanshaha saddexagallada ee lagu magacaabo dhinac-dhinac-dhinac (SSS), dhinac-xagal-dhinac (SAS) iyo xagal-xagal(AA) ee Aragtiinada isu-ekaanshaha waxay soo yareeyaan shaqada looga baahan yahay hubinta xaaladdaha looga baahan yahay isu-ekaanshaha labada saddexagal in ay yihiin kuwo waafaqsan qeexidda iyo in kale. Arinta lagama maarmaanka ah waxaa weeye in si taxadar leh daraasad loogu sameeyo saddexagallada lagu siiyay lana raadiyo ugu yaraan mid ka midah saddexdaas xaaladood ee talantaalliga ah. Laylisyadan soo socda waxay kaa caawin doonaan in aad si ficil ah u dabbakhdo dariiqooyinkaas hubinta isu-ekaanshaha saddexagallada.

Layliska 4.4

1 Saddexagalladan lammaanaha ah ee soo socda kuwee baa ah saddexagallo isu-eg? Waayo? Halka halbeegyada dhererradu ay yihiin halbeegyo isku mid ah

b **t**



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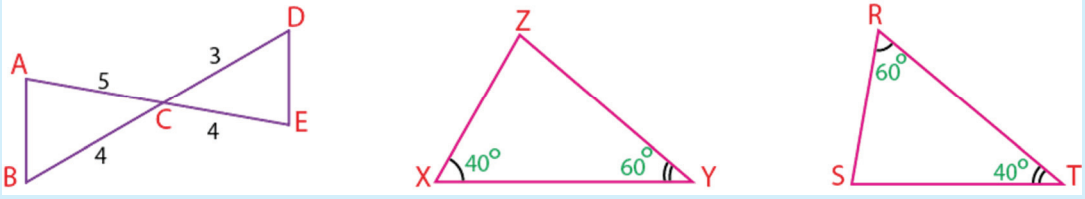
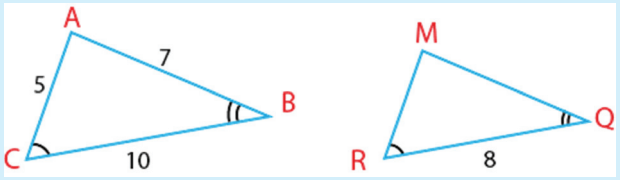


Jaantuskan 4.37

2 Tus in laba saddexagal oo kasta oo saddexagallo siman ah ay isu-eg yihiin.

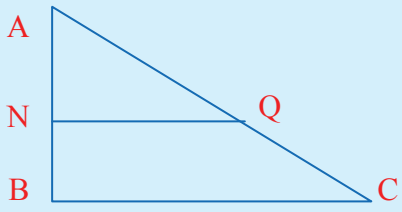
3 Waxaa lagu siiyey labada saddexagal ee kala al, ΔABC iyo ΔMQR, haddii AB = 16, AC = 20, MQ = 4, mR = 5 iyo m(∠A) = m(∠M), Markaa labadaas saddexagal ma yihiin saddexagallo isu-eg? Waayo?

4 Adiga oo tixgelinaya shaxankan hoose, soo saar dhererrada dhinacyada maqan ee ΔMQR.



Jaantuskan 4.38

5 Sida ka muuqata shaxankan hoose, haddii QC = 3, AQ = 7, BC = 11, isla markaana ∠AQN ≡∠ACB, markaa soo saar dhererrada $\overline{NQ}$, $\overline{AB}$, $\overline{AN}$, iyo $\overline{NB}$.



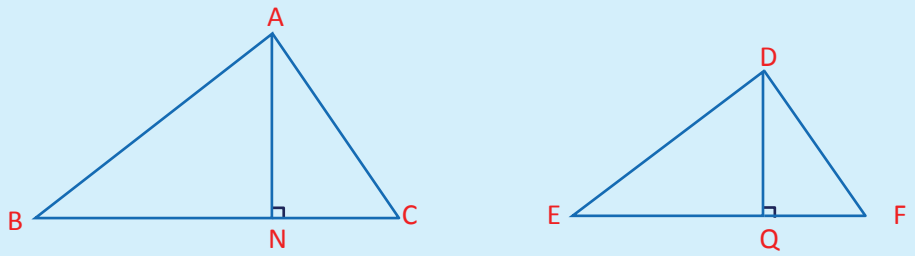
Jaantuskan 4.39

6 ΔNQR ayaa NR = 40, NQ = 32, QR = 48, Haddii S ay tahay bar ku dul taal NR, oo RS = 30, T-na ay tahay bar ku dul dhacda QR oo RT = 36, markaa

b Tus in ΔNQR ~ΔSTR

t Soo saar dhererka $\overline{ST}$

7 Haddii ΔABC ~ ΔDEF, Tus in joogagga gudboon ee ah $\overline{AN}$ iyo $\overline{DQ}$ sida ay u kala horreeyaan ee labadaas saddexagal ay saami isku mid ah ku sameeyaan dhinacyada gudboon ee labadaas saddexagal (Fiiri shaxanka hoose)



Jaantuskan 4.40

4.2.3 Wareegga iyo Bedka Saddexagallada Isu,eg

Qaybihii ka horreyey ee cutubkan waxa aad ku soo baranaysay isu-ekaanshaha geesooleyaasha, isu-ekaanshaha saddexagallada iyo dariiqooyinka hubinta isu-ekaanshaha saddexagallada. Waxaa kale oo fasalladii hore ku soo baratay sida loo soo saaro (loo xisaabiyo) bededka iyo wareegyada geesooleyaal kala duwan. Casharkan waxa aad ku baran doontaa xidhiidhka ka dhexeeya wareegga iyo bedka saddexagallada isu-eg.

Hawl-galka 4.6

Waxaa hoos lagugu siiyey laba saddexagal oo isu-eg oo kala ah ΔABC iyo ΔDEF

i Soo saar wareegga labada saddexagalba.

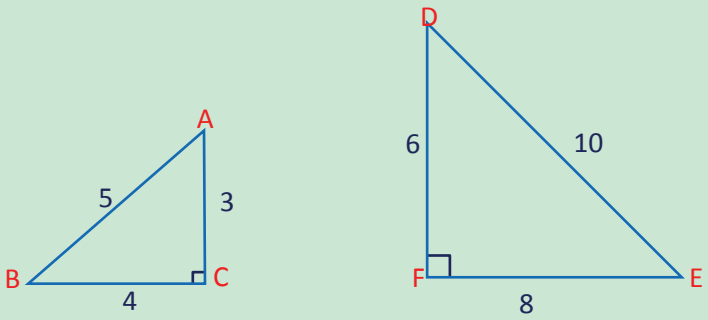
ii Soo saar saamiga wareegyada ΔABC iyo ΔDEF.

iii Saamiga dhinacyadooda gudboon barbardhig saamiga wareeg yadooda. Maxaa kaaga soo baxay?

iv Soo saar bededka labada saddexagalba.

v Soo saar saamiga bededka ΔABC iyo ΔDEF.

vi Saamiga bededkooda barbardhig saamiga dhinacyadooda gudboon. Maxaa kaaga soo baxay?



Jaantuskan 4.41

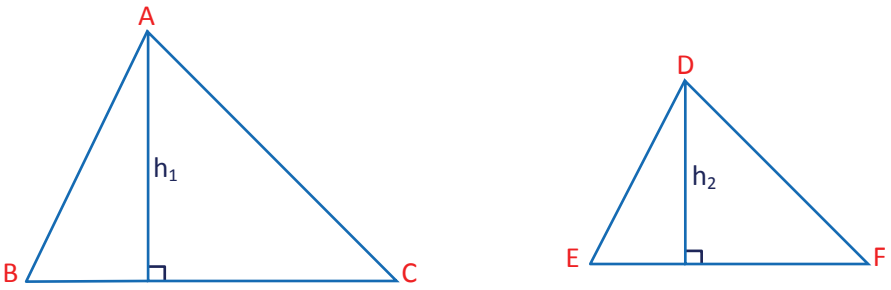
Haddii aad si sax ah uga shaqaysay Hawlgalka 4.6 waxa aad xaqiijin lahayd in:

i Saamiga dhinacyadooda gudboon uu le'eg yahay saamiga wareegyadooda marka loo qaato horsanaan isku mid ah.

ii Saamiga bededkoodu wuxuu le'eg yahay labajibbaarka saamiga dhinacyadooda gud-boon oo loo qaatay horsanaan isku mid ah.

Xaqiiqooyinkaas labada ah ee khuseeya laba saddexagal oo kasta oo isu-eg waxaa loo xaqiijin karaa sidan soo socota:

Ka soo qaad in ΔABC uu u egyahay ΔDEF, kana soo qaad in h_1 iyo h_2 ay yihiin joogagga ΔABC iyo ΔDEF oo laga soo kala sawiray geeska A ee ΔABC iyo geeska D ee ΔDEF.



Jaantuskan 4.42

Haddaba $\frac{AB}{DE} = \frac{AC}{DF} = \frac{BC}{EF} = k$ (madoorsoome).

Waxa aad haysataa in AB = k (DE), AC = k(DF) aiyo BC = k (EF)

i Si aad u soo saarto saamiga wareegyada ee ΔABC iiyo ΔDEF, ka soo qaad in Wareegga ΔABC uu yahay $W_1 = AB + BC + AC$

Wareegga ΔDEF uu yahay W_2 = DE + EF + DF.

Markaa $\frac{W_1}{W_2} = \frac{AB+BC+AC}{DE+EF+DF} = \frac{k(DE)+k(EF)+k(DF)}{DE+EF+DF}$

$$= \frac{k(DE+EF+DF)}{DE+EF+DF} = k$$

ii Si aad u soo saarto saamiga bededka labada saddexagal marka soo saar bedka ΔABC iyo bedka ΔDEF. Kuwaas oo noqonaya sidan:-

Bedka ΔABC waa $\frac{1}{2}(BC)h_1$, Bedka ΔDEF waa $\frac{1}{2}(EF)h_2$

Markaa, $\frac{\text{Bedka }\Delta ABC}{\text{Bedka }\Delta DEF} = \frac{\frac{1}{2}BC.h_1}{\frac{1}{2}EF.h_2} = \frac{BC}{EF}.\frac{h_1}{h_2} = k.\frac{h_1}{h_2} = k^2$

Dib u fiiri jawaabta su'aasha 7aad ee layliska 4.4 ee kore oo ah $\frac{h_1}{h_2} = k$.

Haddaba, xaqiiqooyinkaas waxaynu ku soo gunaanadaynaa aragtiinkan soo socda.

Aragtiin:

Haddii saamiga dhinacyada gudboon ee laba saddexagal oo isu-eg uu yahay k, markaa saamiga wareegyadooda oo loo qaatay horsanaan isku mid ah waa k isla markaana saamiga bededkooda oo loo qaatay horsanaan isku mid ah waa k^2.

Tusaale 11: Waxaa lagu siiyey in ΔABC ~ ΔDEF, AB = 4 sm iyo DE = 12 sm haddaba

i Waa maxay saamiga bededka ΔABC iyo ΔDEF?

ii Waa maxay saamiga wareegyada ΔABC iyo ΔDEF?

Furfuris:

i Sida aragtiinka kore qeexayo $\frac{AB}{DE} = \frac{4}{12} = \frac{1}{3}$, markaa waxaynu soo saaraynaa saamiga bededka labada saddexagal oo ah:

$$\frac{\text{Bedka }\Delta ABC}{\text{Bedka }\Delta DEF} = \left(\frac{1}{3}\right)^2 = \frac{1}{9}$$

ii Sida aragtiinka kore uu qeexayo, $\frac{\text{Wareegga }\Delta ABC}{\text{Wareegga }\Delta DEF} = \frac{AB}{DE} = \frac{1}{3}$

Tusaale 12: Haddii $\Delta NQR \sim \Delta ABC$, oo QR = 40 sm, BC = 30sm isla markaana bedka $\Delta ABC = 360\ cm^2$, markaa soo saar bedka ΔNQR.

Furfuris: $\frac{QR}{BC} = \frac{40\,sm}{30\,sm} = \frac{4}{3}$

Maadaama $\Delta NQR \sim \Delta ABC$, sida uu qeexayo aragtiinka kore saamiga bededkoodu waa

$$\frac{\text{Bedka } \Delta NQR}{\text{Bedka } \Delta ABC} = \left(\frac{4}{3}\right)^2 = \frac{16}{9}$$

Laakiin Bedka $\Delta ABC = 360\ sm^2$, $\frac{\text{Bedka } \Delta NQR}{360\,sm^2} = \frac{16}{9}$.

$$\text{Bedka } \Delta NQR = \frac{16}{9}(360\,sm^2) = 640\ sm^2$$

Layliska 4.5

1 Ka soo qaad in laba saddexagal ay isu-egyihiin, haddii dhererrada labada dhinac ee gudboon ay kala yihiin 10sm iyo 15 sm markaa soo saar saamiga wareegyadooda iyo saamiga bededkooda.

2 Waxaa lagu siiyey laba saddexagal oo isu-eg. Haddii bedka saddexagalka hore uu yahay 36 sm^2 bedka saddexagalka dambena uu yahay 64 sm^2, markaa raadi saamiga dhinacyada gudboon ee labadaas saddexagaol.

3 Ka soo qaad in laba saddexagal ay isu-egyihiin, dhererka hal dhinac ee hal saddexagal ayaa ah shan laabke dhererka dhinaca ku began ee saddexagalka kale. Haddaba soo saar saamiga wareegyada iyo saamiga bededka ee labadaas saddexagal.

4 $\Delta ABC \sim \Delta LMN$. Haddii AC = 11 sm, LN = 15 sm, wareegga ΔABC uu yahay 44sm, markaa soo saar wareegga ΔLMN.

5 Dhererada saddexada dhinac ee hal saddexagol ayaa kala ah 7 sm, 11 sm iyo 6 sm wareegga saddexagal kale oo u eg saddexagal kaas hore ayaa ah 72 sm haddaba soo saar dhererada saddexada dhinac ee saddexagalka weyn.

6 Saddexagal uu bedkiisu yahay 12 sm^2 ayaa la weyneeyey iyada oo la adeegsanayo isirka weynaynta (Madoorsoomaha) oo ah 3. Haddaba soo saar bedka saddex-xagalka cusub.

7 $\Delta ABC \sim \Delta NQR$, bedka ΔABC = 20 sm^2, bedka ΔNQR = 80sm^2. Haddii AB = 6 sm markaa soo saar dhererka $\overline{NQ}$.

Furaha Tibxaha

- Weynaynta shaxanka
- Saamigalnimada
- Yareynta shaxanka
- Madoorsoo maha saamigalnimada (isirka saamigalnimada)
- Saddexagallo isu-eg
- Saamiga dhinacyada
- Isu-ekaanshaha shaxannada sallaxa
- Hubinta isu- ekaanshaha ee SSS, SAS iyo AA

  SSS = dhinac-dhinac-dhinac

  SAS = dhinac-xagal-dhinac

  AA = xagal-xagal
- Wareegga iyo bedka saddexagallada
- Dariiqooyinka hubinta isu-ekaanshaha

Sookoobida Cutubka

- ✓ *Laba geesoole waxaa la oran karaa waa isu-egyihiin, haddii xaglahooda gudboon ay isku sargo; an yihiin, dhinacya dooda gudboonna ay saamigal isu yihiin.*
- ✓ *Marka shaxan sallaxeed la weyneeyo ama la yareeyo iyada oo la adeegsanayo madoorsoomaha saamigalnimada (Isirka saamigalnimada), shaxanka cusub wuxuu u egyahay shaxankii hore isirka weynaynta ama yareyntuna waa madoorsoomaha saamigalnimada..*
- ✓ *Laba saddexagal waxaa la oran karaa waa isu-eg yihiin, haddii xaglahooda gudboon ay lsku sargo'an yihiin, dhinacyadooda gudboonna ay saamigal isu yihiin.*
- ✓ *Isu-ekaanshaha ΔABC iyo ΔDEF waxaa loo qoraa $\Delta ABC \sim \Delta DEF$ macnaheeduna waxaa weeye-:*

  $$\angle A \cong \angle D,\ \angle B \cong \angle E,\ \angle C \cong \angle F \text{ iyo } \frac{AB}{DE} = \frac{BC}{EF} = \frac{AC}{DF}.$$
- ✓ *Isu-ekaanshaha laba saddexagal waxaa lagu hubin karaa iyada oo la adeegsado mid ka mid ah saddexda hab (dariiqo) ee ah SSS, SAS iyo AA, kuwaas oo ah*

  i *Haddii saddexda dhinac ee hal saddexagal ay saamigal u yihiin saddexda dhinac ee ku beegan ee saddexagalka kale, mar kaa labadaas saddexagal waa isu-egyihiin (SSS).*

  ii *Haddii labada dhinac ee hal saddexagal ay saamigal u yihiin labada dhinac ee ku began ee saddexagal kale, isla markaana xagasha u dhaxaysa labadaas dhinac ee saddexagalkaas hore ay ku sargo'an tahay xagasha ku beegan ee u dhexaysa labada dhinac ee saddexagalka kale, markaa labadaas saddexagal waa ay isu-eg yihiin (SAS).*

iii *Haddii labada xaglood ee hal saddexagal ay ku sargo'an yihiin laba xaglood oo kasta oo ka mid ah xaglaha saddexagal kale, markaa labadaas saddexagal waa ay isu-eg yihiin (AA).*

✓ *Haddii laba saddexagal ay isu-eg yihiin isla markaana saamiga dhinacyadooda gudboon uu yahay k markaa:-*

i *Saamiga wareeg yadooda oo loo qaatay horsanaan isku mid ah waa k.*

ii *Saamiga bededkooda oo loo qaatay horsanaan lsku mid ah waa k^2.*

Layliska Guud ee Cutubkan 4aad

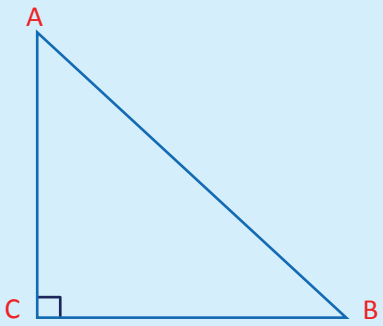
1 Shan-geesle ayaa dhererada dhinacyadiisu kala yihiin 4, 5, 6, 8, iyo 10 sm. Haddii shan-geesle kale oo ay isu-eg yihiin dhererka dhinaciisa ugu gaaban uu yahay 6 sm markaa soo saar dhererada dhinacyada hadhsan ee shangeesoolaha labaad.

2 Labada saddexagal ee ABC iyo DEF waa isu-egyihiin. Dhererka hal dhinac oo ΔDEF ah waa shan-laabka dhererka dhinaca ku began ee ΔABC. Soo saar saamiga wareegyada iyo saamiga bededka ee labadaas saddexagal.

3 Weynee laydiga ABCD hoos ka muuqda adiga oo isirka weynaynta (madoorsoomaha saamigal nimada) u qaadanaya 1.5

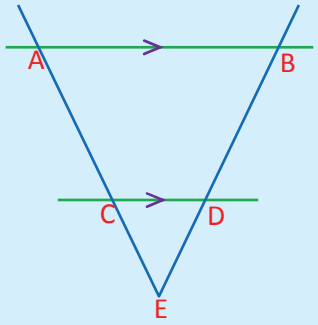
Jaantuskan 4.43

4 Yaree saddexagal ka ABC ee hoos ka muuqda, adiga oo isirka yareynta (madoorsoomaha saamigalnimada) u qaadanaya $\frac{1}{3}$.



Jaantuskan 4.44

5 Sida ka muuqata shaxankan hoose, $\overleftrightarrow{AB} // \overleftrightarrow{CD}$, haddii DE = 6sm, BE = 9 sm iyo AE = 15 sm, markaa soo saar dhererka $\overline{CE}$.



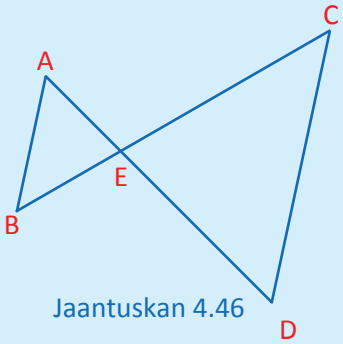
Jaantuskan 4.45

6 U fiirso shaxanka hoos ka muuqda, haddii $\overline{AB} // \overline{CD}$, oo AE = 2 sm, CD = 7 sm iyo DE = 4 sm markaa

i Labadee saddexagal ayaa isu-eg?

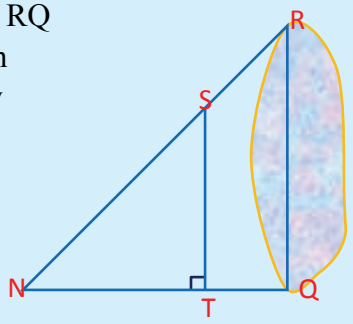
Waayo?

ii Waa maxay dhererka $\overline{AB}$?



Jaantuskan 4.46

7 Qof ayaa doonaya in uu soo saaro dhererka har oo RQ ah, lsaga oo adeegsanaya cabbiraad aan toos ahayn sidan oo kale. Wuxuu dhulka dushisa ku muujiyey barta N, si $\overline{NQ}$ iyo $\overline{RQ}$ ay u noqdaan kuwo lsku qotoma $\overline{NQ} \perp \overline{RQ}$ kadibna wuxuu cabbiray oo uu helay in NQ = 13 km iyo TQ = 4 km. Haddii $\overline{TS} \perp \overline{NQ}$ oo dhererka $\overline{TS}$ yahay 5 km, markaa waa maxay dhererka RQ ee hartaas?



Jaantuskan 4.47

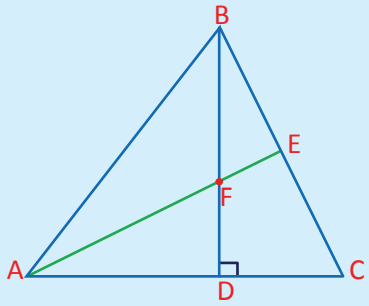
8 Waqti maalin ah aya acabdi dhererka. Hadhkiisu wuxuu ahaa 2.5 m, Halka dhererka hadhka (hooska) tiirka telefoonku uu ahaa 9 m. Haddii cabdi uu dhererkiisu ahaa 1.66 m, muxuu ahaa dhererka tiirka telefoonku?

9 Laba saddexagal ayaa isu-eg. Dhererka hal dhinac ee mid ka mid ah saddexagalladaas ayaa ah saddex-laabka dhererka dhinaca ku began ee saddexagalka kale. Haddii bedka saddexagal ka weyn uu yahay 216 sm^2, markaa soo saar bedka saddexagalka yar.

10 Laba saddexagal oo labaale ah ayaa leh xaglo gees isku sargoan. Tus in labada saddexagal ee noocaas ah ay isu-eg yihiin?

11 U fiirso shaxanka hoos ka muuqda, kadiibna tus in

i $\Delta AEC \sim \Delta BDC$ **ii** $\Delta BFE \sim \Delta AFD$



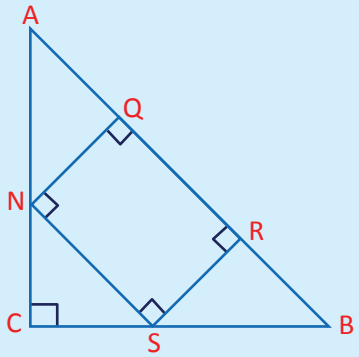
Jaantuskan 4.48

12 U fiirso shaxankan hoose, Haddii ΔABC uu yahay saddexagal qumman oo xagashiisa qummani tahay C, isla markaana NQRS uu yahay labajibbaarane, markaa tus in:

i $\frac{AB}{AN} = \frac{BC}{NQ}$

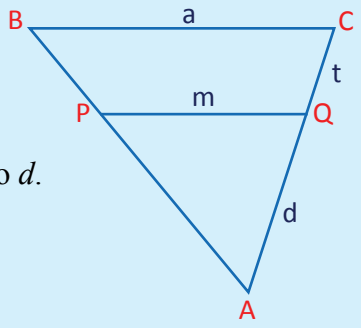
ii $\frac{AQ}{NC} = \frac{QN}{CS}$

iii $\frac{NC}{SR} = \frac{NS}{SB}$



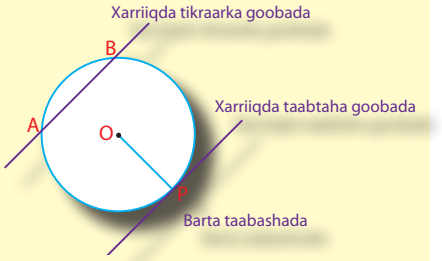
Jaantuskan 4.49

13 U fiirso shaxankan hoose, haddii $\overline{NQ}$ ay la barbarro tahay $\overline{BC}$, isla markaana dhererka $\overline{NQ} = m$, dhererka $\overline{BC} = a$, dhererka $\overline{CQ} = t$ iyo dhererka $\overline{AQ} = d$, markaa m, u tibaax a, t iyo d.



Jaantuskan 4.50

Cutubka 5aad



GOOBOOYINKA

UJEEDDOOYINKA CUTUBKA

Cutubkani marka uu dhamaado ardaydu waxay awoodi doonaan iney:

- Fahmaan goobooyinka si ka sii fiican sidii hore
- Xaqiiqsadaan xidhiidhka ka dhexeeya xarriiqaha iyo goobooyinka
- Kudabakhaan (adeegsadaan) xaqiiqooyinka ku saabsan xagal-xuddumeedka iyo xagal-geeska ay sameeyaan boqonnada isgoynaya si aad u raadiso cabbirradooda.

TUSMOOYINKA MUHIMKA AH

5.1 Sii wadidda Goobooyinka
5.2 Xaglaha Goobada Dhexdeeda
Furaha Tibxaha
Sookoobida Cutubka
Nakhtiinka layliska

HORDHAC

Waxa aad soo baratay in goobadu tahay xood ku dul-dhaca sallax oo bar kasta oo ka mida xoodkaas ay fogaan isle'eg u jirto bar maguuraan ah oo loo yaqaano xuddunka. Fogaanta u dhexeysa xuddunta goobada iyo bar kasta oo ku taal goobada dusheeda waxaa la yiraahdaa gacan.

Waxaa kale oo aad xusuusataa in marka aad goobo-beegga ku sawirayso goobada, barta aad ku mudayso waa xudduntii goobada, xoodka uu sawirayo qalin-qoriguna waa goobadii. Dunidan aynu ku nool nahay, goobadu waxay ku leedahay astaamo fara badan oo aan astaan u ahayn shaxannada joomateriga ee kale. Tusaale ahaan ku wanqarnaanta xuddunteeda iyo ku wanqarnaanta dha mmaan dhexrooradeeda oo aad u sarraysa walxaha leh qaabka goobeed waxay ahmiyad weyn u leedahay walxaha qaarkood.

Sidaas oo kale walxaha leh qaabka goobada badankoodu waxay iskaga mid yihiin naqshadda sida dhismaha. Cutubkan waxa aad ku baranaysaa xaqiiqooyinka ku saabsan goobada.

5.1 SII WADIDDA BARASHADA GOOBOOYINKA

Fasalka 7^{aad} waxa aad ku soo baratay maaraynta iyo dhisidda goobooyinka, boqonnada iyo kala-badheyaasha xarriijimaha isku qotoma. Qaybtan (cutub-hoosaadkan) marka hore waxa aad naqtiimeysaa qaar ka mid ah sifooyinka iyo fikraddaha (macneyaasha) goobada sida boqonka goobada, dhexroorka goobada, meeriska (wareegga) goobada, qaansooyinka goobada, faquuqyada iyo xariijinta goobada.

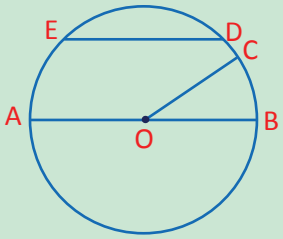
Marka xigana, waxa aad ku baran doontaa xidhiidhka ka dhexeeya xarriiqaha iyo goobada ku dul-dhaca sallax isku mid ah, ugu dambayntana waxa aad ku baran doontaa sida loo meeleeyo xuddunta goobada adiga oo adeegsanaya boqonnada goobada.

Hawl-galka 5.1

Ujeeddada: Sawiridda goobada iyo soo soocidda xuddunta, gacanka, boqonka iyo dhexroorka goobadaas.

Saabaanka loo baahan yahay: mastarad, goobo-beeg

1 Soo minguuri Jaantuska 5.1 ka dibna magacow mid kasta oo ka mid ah xarriijimahan $\overline{OC}$, $\overline{AB}$ iyo $\overline{ED}$



Jaantuska 5.1

2 Sawir goobo gacankeedu yahay 5 sm, ka dibna sawir kuwan soo socda

b Gacanka goobadaas **t** Dhexroorka goobadaas

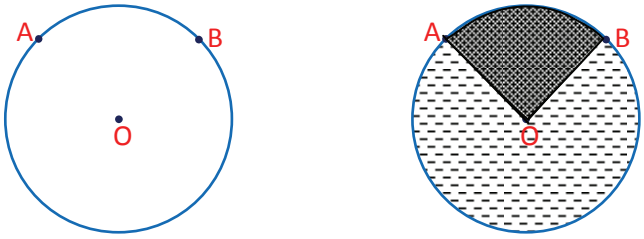
j Boqonka dhererkiisu yahay 8 sm ee goobadaas

3 Dib u xaqiiji in dhererka meeriska ama wareegga (W) goobada gacankeedu yahay r uu yahay $2\pi r$ halka $\pi \approx \frac{22}{7}$ ama $\pi = 3.14$, dabadeedna soo saar wareegga mid kasta oo ka mid ah goobooyinka gacannadoodu yihiin sidan soo socota

b 1 sm **t** 2.5 sm **j** $\frac{7}{22}$ sm **x** $\frac{1}{\pi}$ sm

Qaansada yar iyo Qaansada weyn ee Goobada

U fiirso goobada gacankeedu yahay r xuddunteeduna tahay O ka soo qaad in barta A iyo barta B ay yihiin laba barood oo ku yaalla goobada dusheeda oo aan ahayn bar-dhammaadyada dhexroorka goobadaas sida ka muuqata Jaantuska 5.2.

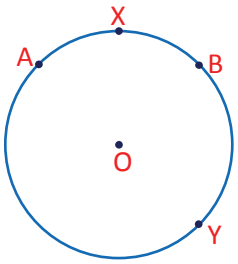


Jaantuska 5.2

Baraha A iyo B waxay goobada u qaybiyaan laba qaybood oo loo yaqaanno qaansooyin. Qaansada aad loo madoobeeyey waa ay ka yar tahay qaansada kale ee aan aad loo madoobayn, waxaana la kala yiraahdaa qaansada yar ee AB iyo qaansada weyn ee AB sida ay u kala horreeyaan.

Qaansada AB waxaa lagu asteeyaa $\overset{\frown}{AB}$

Haddii aad si fudud u tiraahdo qaansada AB, markaa taasi sharrax kama bixinayso qaansada loo baahan yahay. Wayna kugu adag tahay qaansada aad ujeeddo in ay tahay qaansada yar ee AB ama qaansada weyn ee AB sababtan darteed waxaa laguu soo jeedinayaa in aad adeegsato baro kale oo u dhexeeya barta A iyo barta B fiiri. Jaantuska 5.3.



Jaantuska 5.3

Hadda waad kala sooci kartaa, waxaadna u qori kartaa qaansada AXB oo macnaheedu yahay qaansada yar ee AB iyo qaansada AYB oo macnaheedu yahay qaansada weyn ee AB. Si kale haddii loo yiraahdo, $\overset{\frown}{AXB}$ waa qaansada yar ee AB, $\overset{\frown}{AYB}$ waa qaansada weyn ee AB. *Fiiri* Jaantuska 5.3.

Hawl-galka 5.2

***Ujeeddada*:** Kala soocidda (kala qeexidda) qaansooyinka yar-yar iyo qaansooyinka waaweyn ee goobada.

Saabaanka loo baahan yahay: Mastarad, Goobo-beeg iyo xagal-beeg.

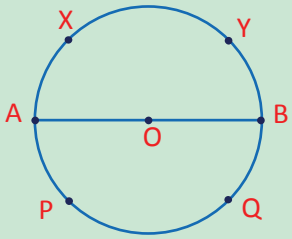
1 Sawir mid kasta oo ka mid ah qaansooyinkan goobada ee soo socda:-

b goobo-nuskeed (goobo badhkeed) **t** Rubuca goobo

j Afar meelood-saddex $\left(\frac{3}{4}\right)$ka mid ah goobo

2 Qor hawraarta qeexaysa digriiga cabbirka qaansada yar, qaansada weyn iyo goobada-nuskeed.

3 Tax ugu yaraan saddex qaanso oo yar-yar iyo saddex qaanso oo waa weyn oo ku yaala goobadan hoose ee Jaantuska 5.4 Halka $\overline{AB}$ uu yahay dhexroorka goobada.



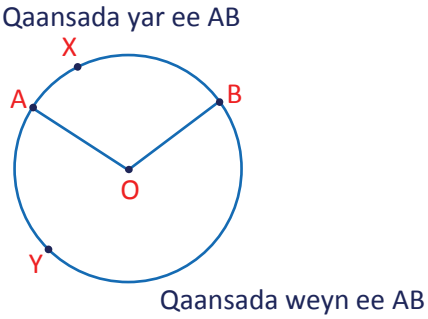
Jaantuska 5.4

Qeexidda qaansada yar iyo Qaansada weyn ee goobadu waa sidan soo socota:-

Ka soo qaad in O tahay xuddunta goobada, isla markaana A iyo B ay yihiin laba barood oo ku yaalla goobada dusheeda oo aan ahayn bar-dhammaadyada dhexroorka goobada.

i *Isutagga baraha A iyo B iyo dhammaan baraha ku yaal goobada dusheeda ee ku jira gudaha xagasha $\angle AOB$ waxaa la yiraahdaa qaansada yar ee AB.*

ii *Isutagga baraha A iyo B iyo dhammaan baraha ku yaal goobada dusheeda ee debadda ka ah xagasha $\angle AOB$ waxaa la yiraahdaa qaansada weyn ee AB. Fiiri* Jaantuska 5.5



Barta O waa xuddunta goobada

$\overset{\frown}{AXB}$ waa qaansada yar ee AB

$\overset{\frown}{AYB}$ waa qaansada weyn ee AB

Jaantuska 5.5

Faquuqyada iyo Gaballada Goobada

Waxa aad soo falanqaysay si ficil ahna u muujisay gacannada, boqonnada iyo qaansooyinka goobada.

Waxa ku xiga, oo aad baranaysaa shaxannada joomateriyeed ee ay sameeyaan laba gacan iyo qaansooyinka goobada ee isgoynaya iyo weliba boqonka iyo qaansooyinka iyaguna isgoynaya.

Hawl-galka 5.3

Ujeeddada: Soo saarista iyo magacaabista faquuqyada iyo gaballada goobada.

Saabaanka loo baahan yahay: Mastarad iyo goobo-beeg.

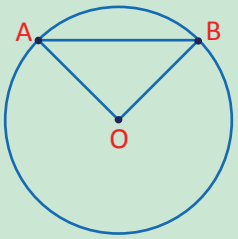
Soo minguuri laba jeer Jaantuska 5.6 dabadeedna midabee mid kasta oo ka mid ah shaxannada joomateriyeed ee ay sameeyeen kuwan soo socda:-

1 Qaansada yar ee AB iyo gacannada $\overline{OA}$ iyo $\overline{OB}$.

2 Qaansada weyn ee AB iyo gacannada $\overline{OA}$ iyo $\overline{OB}$.

3 Qaansada yar ee AB iyo boqonka $\overline{AB}$

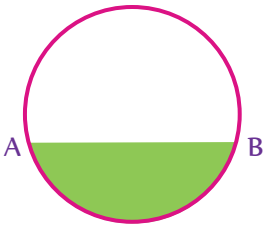
4 Qaansada weyn ee AB iyo Boqonka $\overline{AB}$



Jaantuska 5.6

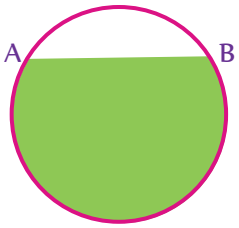
Shaxannada joomateriyeed ee aad ku midabbaysay su'aasha 1^{aad} iyo su'aasha 2^{aad} waxaa la yiraahdaa faquuqa yar iyo faquuqa weyn ee goobada (sida ay u kala horreeyaan).

Shaxannada aad ku midabbaysay su'aasha 3^{aad} iyo su'aasha 4^{aad} waxaa la yiraahdaa gabalka yar (segmentiga yar) iyo gabalka weyn (segmentiga weyn ee goobada) sida ay u kala horreeyaan. Fiiri Jaantuska 5.7 iyo Jaantuska 5.8



Gabalka yar ee AB

Jaantuska 5.7



Gabalka weyn ee AB

Jaantuska 5.8

Tikraarka iyo Taabtaha Goobada

Waxa aad ogsoon tahay in haddii hal xarriiq iyo hal goobo ay ku yaallaan sallax isku mid ah, markaa waxay noqon karaan laba midkood oo ah in ay noqdaan kuwo isgoynaya ama in ay noqdaan kuwo aan marna isgoynayn. Haddaba casharkan waxa aad ku baranaysaa sida loo xaqiijiyo tirada baraha ay iska goynayaan xarriiqda iyo goobadu.

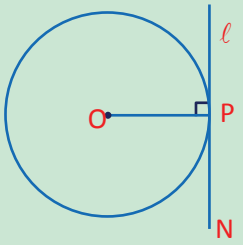
Hawl-galka 5.4

Ujeeddada: Xaqiijinta (soo saarista) tirada baraha isgoyska ah ee ay iska goyaan xarriiqda iyo goobada.

Saabaanka loo baahan yahay: Mastarad, goobo-beeg iyo xagal-beeg.

Warqadda dusheeda (sallaxa dushiisa) ku sawir goobo iyo xarriiqo. Ka dibna:

1. Falanqee in ay suurtagal tahay iyo in aanay suurtagal ahayn sawiridda xarriiqo goynaya goobada.
2. Haddii hal xarriiq ay goynayso goobada, markaa soo saar tirada baraha ay iska goynayaan ee ugu badan.
3. Natiijada kaaga soo baxday su'aasha 2^{aad} ee kore u qor hawraar guud oo qeexaysa tirada baraha isgoyska suurtagalka ah ee ugu badan
4. Sawir goobo xuddunteedu tahay barta O, kana soo qaad in barta P ay tahay bar kasta oo ku taal goobada dusheeda. Sawir xarriiqda ℓ oo ka dusha barta N kuna qotonta $\overline{OP}$. Falanqee in xarriiqda ℓ iyo goobadaasi ay iska goyn karaan bar kale oo aan taas ahayn



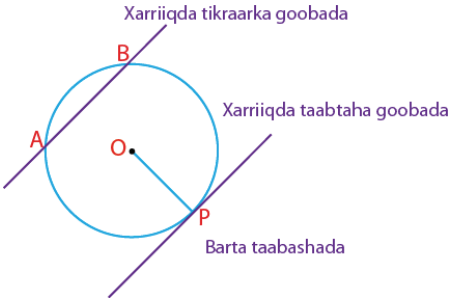
Jaantuska 5.9

Xarriiqaha gooya goobo waxay leeyihiin magacyo khaas ah waxaana la yiraahdaa xarriiqaha tikraarka iyo taabtaha goobada. Hawlgalka 5.4 ee kore waxa aad ku soo aragtay in ay jiraan saddex xidhiidh oo kala duwan oo ka dhexeeya xarriiqda iyo goobada ku wada yaalla sallax isku mid ah. Kuwaas oo kala ah:-

i. Xarriiqda iyo goobada oo aan marna kulmin.

ii. xarriiqda iyo goobada oo ku kulma ama iska gooya laba barood. Haddii xarriiqda iyo goobadu ay iska gooyaan laba barood, markaa xarriiqdaas waxaa la yiraahdaa tikraarka goobada.

iii Xarriiqda iyo goobada oo ku kulma hal bar oo keliya. Haddii xarriiqda iyo goobadu ay iska gooyaan hal bar oo keliya, markaa xarriiqdaas waxaa la yiraahdaa taabtaha goobada. Barta ay ku kul maan xarriiqda iyo goobaduna waxaa la yiraahdaa barta taabashada. Fiiri Jaantuska 5.10.



Jaantuska 5.10

Xusuusin: *Xarriiq kasta oo tikraarka goobada ah waa boqonka goobadaas. Xarriiq kasta oo taabtaha goobada ah waxay ku qotontaa gacanka goobadaas, waxayna kaga qotontaa barta taabashada.*

Sidee loo dhisaa Xuddunta Goobada

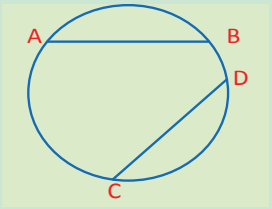
Joomateriga fasalka 5^{aad} waxa aad ku soo baratay dhisidda kala-badhaha ku qotoma xarriijinta. Haddana kala-badheyaasha ku qotoma boqonnada ayaa waxaynu u adeegsanaynaa dhisidda xuddunta goobada inaga oo adeegsanayna laba boqon oo aan barbarro ahayn.

Hawl-galka 5.5

Ujeeddada: Dhisidda xuddunta goobada adiga oo adeegsanaya laba boqon.

Saabaanka loo baahan yahay: Mastarad iyo goobo-beeg.

1 Buuggaaga ku sawir goobo gacankeedu yahay 5 sm Sida ka muuqata Jaantuska 5.11 ka dibna sawir kala badhaha ku qotoma $\overline{AB}$.



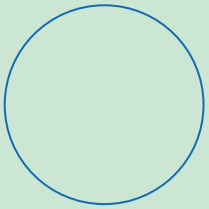
Jaantuska 5.11

Dib u xasuuso, si aad u sawirto kala-badhaha ku qotoma $\overline{AB}$, sawir laba qaanso oo isle'eg oo xudduntoodu kala tahay A iyo B gacankooduna ka weyn yahay nuska AB. Baraha ay iska gooyaan labada qaanso ku magacow barta N iyo barta Q dabadeedna adiga oo adeegsanaya mastarad sawir $\overline{NQ}$ *fiiri* Jaantuska 5.11.

2 Sawir kala-badhaha ku qotoma $\overline{CD}$ adiga oo raacaya tallaabooyinka su'aasha 1^{aad} ee kor ku xusan.

Ka soo qaad $\overline{RS}$ in ay tahay kala badhaha ku qotoma $\overline{CD}$

Ka soo qaad barta O inay tahay barta ay iska gooyaan $\overline{NQ}$ iyo $\overline{RS}$.



Jaantuska 5.12

3 Cabbir mid kasta oo ka mid ah xarriijimahan kala ah

$\overline{OA}, \overline{OB}, \overline{OC}$ iyo $\overline{OD}$.

4 Adiga oo adeegsanaya natiijada kaaga soo baxday su'aasha 3^{aad} ee kore, tus in barta O ay tahay xuddunta goobadaas. Sababee jawaabtaada in ay xaqiiq tahay in xuddunta goobadaasi ay ku dul-dhacdo kala-badhaha kuqotoma boqonka goobada.

Layliska 5.1

1 U fiirso Jaantuska 5.13 ee hoose, ka dibna ka jawaab su'aalahan soo socda.

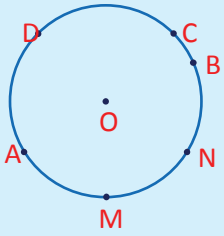
i Magacow baraha iyo xarriijimaha hoos ku qoran.

b O

t AO

j AB

x BD



Jaantuska 5.13

ii Calaamadee mid kasta oo ka mid ah qaansooyinkan soo socda, adiga oo adeegsanaya midabbo kala duwan. Kuwaas oo kala ah

b $\overset{\frown}{MNC}$ **t** $\overset{\frown}{ANB}$ **j** $\overset{\frown}{ANM}$

x Qaansada weyn ee AC **kh** Qaansada yar ee MN

d Qaansada weyn ee CN

iii Midabbee mid kasta oo ka mid ah faquuqyada iyo gaballada (segmentiyada) goobadaas ee soo socda:-

b Faquuqyada waaweyn ee BOM, AOM iyo COA.

t Faquuqyada yar-yar ee BOM, AOM iyo COA adeegso midabbo kala duwan.

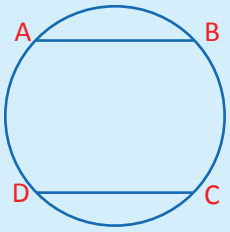
j Gabalka (segmentiga) weyn iyo gabalka yar ee AM, MN, AN, AD iyo NC.

iv Sawir xarriiqda tikraarka goobadaas ee ka dusha baraha M iyo C.

v Sawir xarriiqda taabtaha goobadaas ee ka dusha barta C.

2 Sida ka muuqata Jaantuska 5.14 $\overline{AB} \,//\, \overline{CD}$, $\overline{AB} \,//\, \overline{CD}$.

Haddaba meelee (sawir) xuddunta goobada.



Jaantuska 5.14

Ma sawiri (muujin) kartaa xuddunta goobadaas haddii $\overline{AB} \,//\, \overline{CD}$ laakiin AB ≠ CD?

5.2 XAGLAHA GOOBADA DHEXDEEDA AH

Qaybtii hore waxa aad ku soo baratay xaqiiqooyinka boqonka goobada. Qaybtanna waxa aad ku baran doontaa xidhiidhka ka dhexeeya cabbirka xagasha iyo cabbirka qaansada afsaarka u ah, gaar ahaan marka geeska xagashu uu ku yaallo xuddunta goobada ama marka geeska xagashu uu ku yaallo goobada dusheeda, isla markaana dhinacyadeedu ay ku dhereran yihiin boqonnada goobada. Waxaa kale oo aad ku baran doontaa xidhiidhka ka dhexeeya cabbirka xagasha ay sameeyaan laba boqon oo isku gooya goobada gudaheeda iyo qaansooyinka goobadaas. Intaas waxaa si dheer oo aad ku baran doontaa afargeesle yaasha meersan (afargeesleyaasha ku dhex jira goobada) iyo astaamahooda.

5.2.1 XagalXudduneedka iyo XagalGeeska

Dabcan, waad taqaanaa xagashu waxa ay tahay oo horey baad u soo baratay macnaha xagal. Isla markaana qaybtii hore ee cutubkan waxa aad naqtiin ku soo samaysay waxa ay tahay qaansada goobadu, sidaas oo kale waxa aad soo aragtay xidhiidhka suurtagalka ah ee ka dhexayn kara xarriiqda iyo goobada. Casharkan waxa aad ku baran doontaa qaar ka mid ah xidhiidhada suurtagalka ah ee ka dhexeeya xagasha iyo goobada.

Hawl-galka 5.6

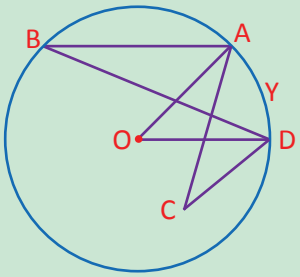
U fiirso shaxankan hoos lagugu siiyey, kana jawaab su'aalahan soo socda. Halka O ay tahay xuddunta goobada.

i Waa maxay xidhiidhka ka dhexeeya goobada iyo ∠AOD?

ii Waa maxay xidhiidhka ka dhexeeya goobada iyo ∠ABD?

iii Waa maxay xidhiidhka ka dhexeeya goobada iyo ∠ACD?

iv Sidee baad u tibaaxi kartaa xidhiidhka ka dhexeeya saddexdaas xaglood ee kor ku xusan iyo qaansada AYD?

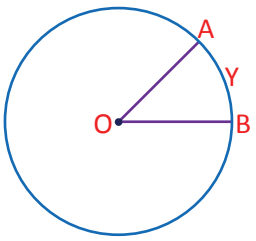


Jaantuska 5.15

Waxaynu xoogga saari doonaa nooca xidhiidhada goobada iyo xagasha ee aynu ku soo sheegnay su'aalaha i iyo ii ee hawlgalkan kore, waxaynu ka bixinaynaa macnayn toos ah sidan soo socota.

Qeexid 5.3 *Xagal-xudduneed waa xagasha uu geeskeedu yahay xuddunta goobada.*

Tusaale 1: Sida ka muuqata Jaantuska 5.16 haddii O ay tahay xuddunta goobada, markaa, ∠AOB waa xagal-xudduneed.

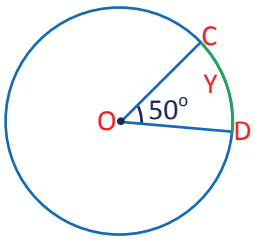


Jaantuska 5.16

Xaaladdan waxaynu oranaynaa ∠AOB waxay ku afjaran tahay qaansada AYB ama waxaynu ugu yeedhaynaa qaansada AYB waa af-saarka xagasha ∠AOB ee xuddunta goobada O.

Marka xagasha ∠AOB ay tahay xagal-xuddunneed sida ka muuqata shaxanka 5.16 ee kore, sidaas oo kale cabbirka xagasha ∠AOB wuxuu noqonayaa cabbirka qaansada AYB. Taas macnaheedu waa m (∠AOB) = m ($\overset{\frown}{AYB}$).

Tusaale 2: Sida ka muuqata Jaantuska 5.17, haddii m (∠ COD)= 50°, markaa $m\left(\overset{\frown}{CYD}\right) = 50°$



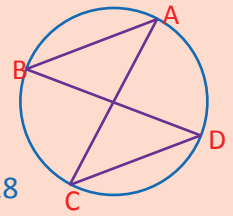
Jaantuska 5.17

Shaqo-kooxeedka 5.1

Soo minguuri shaxankan hoose, ka dibna

Cabbir xaglaha ABD iyo ACD.

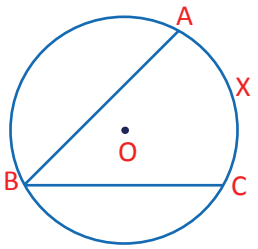
Maxaa kuu soo baxay?



Jaantuska 5.18

Qeexid 5.2 *Xagal-geesku waa xagasha uu geeskeedu yahay goobada dusheeda dhinacyadeeduna ay yihiin labada boqon ee goobadaas.*

Tusaale 3: Sida ka muuqata Jaantuska 5.19 ee hoose ∠ABC waa xagal-gees, waayo geeskeeda oo ah barta B waxay ku taallaa goobada dusheeda. Dhinacyadeeduna waa dhererka boqonnada $\overline{BA}$ iyo $\overline{BC}$.



Jaantuska 5.19

Xaaladdan waxaa kale oo aynu odhanaynaa gaansada AXC waxay af-saar u tahay xagasha ABC ee goobada O dusheeda ama waxaynu ugu yeedhaynaa xagal-geeska ∠ABC waxaa soo afjaraysa qaansada AXC ee goobada O dusheeda.

Bal mar kale aan baadhitaan ku sameyno xidhiidhka ka dhexeeya cabbirka xagasha ∠ABC iyo cabbirka qaansada afsaarka u ah ee $\overset{\frown}{AXC}$.

Shaqo-kooxeedka 5.2

Soo minguuri shaxanka hoos ka muuqda, ama sawir goobo,

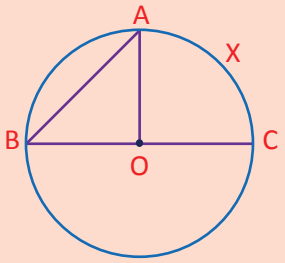
xagal-xuddunneed iyo xagal-gees ay afsaar u wada tahay

qaansada AXC, isla markaana same kuwa soo socda, marka O tahay xuddunta.

i Cabbir xagasha ∠ABC adiga oo adeegsanaya xagal-beeggaaga.

ii Cabbir xagasha ∠AOC adiga oo adeegsanaya xagal-beeggaaga.

iii Isbarbardhig cabbirrada labadaa xaglood ∠ABC iyo ∠AOC mmxaa kaaga soo baxay?



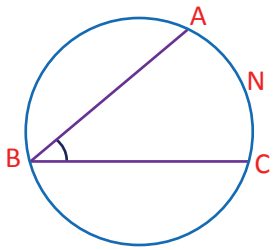
Jaantuska 5.20

Sida ku cad shaqo-kooxeedka kore, haddii cabbiraaddaadu ay sax tahay, waxa aad helaysaa in cabbirka ∠ABC uu le'eg yahay nuska (badhka) cabbirka ∠AOC.

m(∠ABC) = $\frac{1}{2}$ m (∠AOC). Sababta oo ah cabbirka ∠AOC wuxuu le'eg yahay cabbirka qaansada AXC ee afsaarka u ah. Haddaba u fiirso aragtiinkan soo socda.

Aragtiin: *Cabbirka xagal-geeska goobo waa badhka (nuska) cabbirka qaansada afsaarka u ah.*

Tusaale 4: Sida ka muuqata Jaantuska 5.21 ee hoose, haddii m ($\overset{\frown}{ANC}$) = 80°, markaa soo saar cabbirka ∠ABC.



Jaantuska 5.21

Furfuris: m($\overset{\frown}{ANC}$) = 80° (siin)

m∠ABC = $\frac{1}{2}$ m($\overset{\frown}{ANC}$) (Aragtiinka kore)

$\therefore$ m∠ABC = $\frac{1}{2}$(80°) = 40°.

Tusaale 5: Sida ka muuqata Jaantuska 5.22 ee hoose, haddii

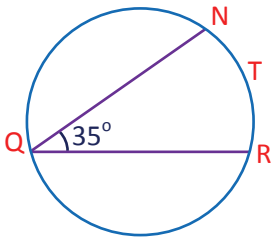
$m(\angle NQR) = 35°$, markaa soo saar cabbirka qaansada NTR.

Furfuris: $m(\angle NQR) = 35°$ (siin)

$m(\angle NQR) = \frac{1}{2} m(\overset{\frown}{NTR})$ (Aragtiinka kore)

$\therefore 35° = \frac{1}{2} m(\overset{\frown}{NTR})$

$m(\overset{\frown}{NTR}) = 2(35°) = 70°.$



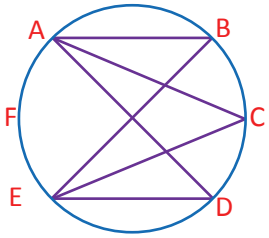
Jaantuska 5.22

Tusaale 6: Sida ka muuqata Jaantuska 5.23

$m(\angle ABE) = 60°$,

markaa soo saar cabbirka xagasha

$\angle ADE$ iyo cabbirka xagasha $\angle ACE$?



Jaantuska 5.23

Furfuris: Siin: $m(\angle ABE) = 60°$

$m(\angle ADE) = \frac{1}{2} m(\overset{\frown}{EFA}) = 60° = \frac{1}{2} m(\overset{\frown}{EFA})$

$\therefore m(\overset{\frown}{EFA}) = 2\,(60°) = 120°$

i $m(\angle ADE) = \frac{1}{2} m\,(\overset{\frown}{EFA})$... Aragtiinka kore

$m(\angle ADE) = \frac{1}{2}\,(120°)$

$\therefore m(\angle ADE) = 60°$

ii $m(\angle ACE) = \frac{1}{2} m(\overset{\frown}{EFA})$... Aragtiinka kore

$m(\angle ACE) = \frac{1}{2}(120°)$

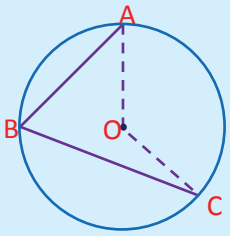
$\therefore m(\angle ACE) = 60°$

Xagal-geesyada kuwada yaal hal goobo oo ay afsaarka u tahay qaanso isku mid ah waa xaglo isku sargo'an.

Xusuusin: *Xagal-geesyada ku yaalla goobo isku mid ah oo qaansada afsaarka u ah ay isku mid tahay waa xaglo isku sargo'an.*

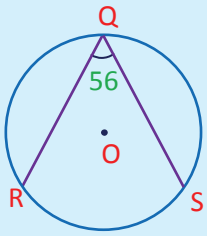
Layliska 5.2

1 Sida ka muuqata Jaantuska 5.24 O waa xuddunta goobada, haddii m($\overset{\frown}{AC}$) = 132°, Markaa soo saar m(∠AOC) iyo m∠ABC,



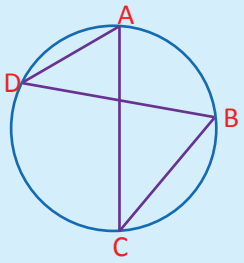
Jaantuska 5.24

2 Sida ka muuqata Jaantuska 5.25 O waa xuddunta goobada haddii, m(∠RQS) = 56°, markaa soo saar m(∠ROS) iyo m($\overset{\frown}{RS}$).



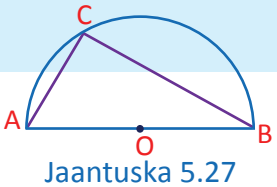
Jaantuska 5.25

3 U fiirso Jaantuska 5.26 ee hoose haddii m(∠ADB) = 40°, raadi m(∠ACB).



Jaantuska 5.26

4 Sida ka muuqata Jaantuska 5.27 ee lagu siiyey, haddii $\overline{AB}$ ay tahay dhexroorka goobada, tus in xagasha ∠BCA ay tahay xagal qumman.



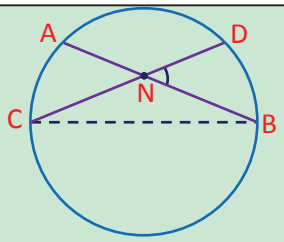
Jaantuska 5.27

5.2.2 Xaglaha ay sameeyaan laba Boqon oo Isgoynaya

Casharkan waxa aad ku baran doontaa xidhiidhka ka dhexeeya cabbirka xagasha ay sameeyaan laba boqon oo isgoynaya iyo cabbirka qaansooyinka ay xaddeeyaan boqonnadaasi in aad si taxadar leh uga shaqayso hawlgalkan soo socda aad ayey muhiim u tahay casharkan.

Hawl-galka 5.7

Waxaa lagu siiyey goobada hoos ka muuqata, ka soo qaad boqonnadeeda $\overline{AB}$ iyo $\overline{CD}$ waxay iska gooyaan barta N, halka N tahay bar kasta oo ku taal goobada gudaheeda. Soo minguuri goobadan ama buugaaga ku sawir goobo u eg goobadan, ka dibna fuli hawlahan soo socda.



Jaantuska 5.28

1 Sawir $\overline{CB}$ adiga oo adeegsanaya mastarad.

2 Cabbir xaglaha kala ah ∠ABC iyo ∠DCB adiga oo adeegsanaya xagal-beeg.

3 Adiga oo adeegsanaya natiijada kaaga soo baxday tallaabada 2^{aad} ee kore soo saar cabbirka qaansooyinka yar-yar ee kala ah $\overset{\frown}{DB}$ iyo $\overset{\frown}{CA}$.

4 Cabbir xagasha ∠DNB

5 Xidhiidhi oo m(∠DNB) barbardhig wadarta m($\overset{\frown}{DB}$) iyo m($\overset{\frown}{CA}$).

Sida ku cad hawlgalka 5.7, haddii aad si sax ah uga shaqayso cabbiraaddaada, waxa aad helaysaa in cabbirka xagasha ∠DNB ama m(∠DNB) uu yahay nuska (badhka) wadarta cabbirka qaansooyinka afsaarka u ah. Taas macnaheedu waxaa weeye:

$$m(\angle DNB) = \frac{1}{2}[m(\overset{\frown}{DB}) + m(\overset{\frown}{CA})].$$

Tusaale 7: Sida ka muuqata Jaantuska 5.29 ee hoose, haddii $m(\overset{\frown}{AB}) = 90°$ isla markaana $m(\overset{\frown}{CD}) = 80°$, markaa soo saar m(∠AEB).

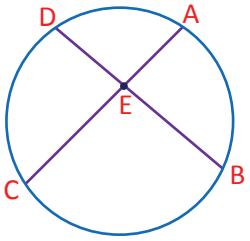
Furfuris: Marka laga duulo natiijadii hawlgalka 5.7 ee kore, waxa aad ogtahay in

$$m(\angle AEB) = \frac{1}{2}[m(\overset{\frown}{AB}) + m(\overset{\frown}{CD})]$$

$$m(\angle AEB) = \frac{1}{2}(90° + 80°)$$

$$= \frac{1}{2}(170°)$$

$$\therefore m(\angle AEB) = 85°$$

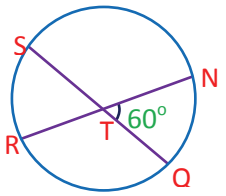


Jaantuska 5.29

Tusaale 8: Sida ku cad Jaantuska 5.30 ee hoose haddii boqonnada $\overline{RN}$ iyo $\overline{SQ}$ ay iska gooyaan barta T isla markaana m (∠NTQ) = 60° iyo $m(\overset{\frown}{RS}) = 70°$, markaas raadi $m(\overset{\frown}{NQ})$.

Furfuris: Siin m ($\overset{\frown}{RS}$) = 70° iyo m (∠NTQ) = 60°, haddaba waxa aad ogtahay in

$$m(\angle NTQ) = \frac{1}{2}(m(\overset{\frown}{NQ}) + m(\overset{\frown}{RS}))$$



Jaantuska 5.30

Sidaas awgeed waxa aad helaysaa, $60° = \frac{1}{2}[m(\overset{\frown}{NQ}) + 70°]$

$$2(60°) = m(\overset{\frown}{NQ}) + 70°$$

$$120° = m(\overset{\frown}{NQ}) + 70°$$

$$120° - 70° = m(\overset{\frown}{NQ})$$

$$50° = m(\overset{\frown}{NQ})$$

$$\therefore m(\overset{\frown}{NQ}) = 50°.$$

Xusuusin: *Hawlgalka 5.7 ee kore, haddii aad sawirto $\overline{AC}$, oo aad cabbirto ∠CAB, ∠ACD iyo ∠AND kadibna m(∠AND) aad barbardhigto $m(\overset{\frown}{BC}) + m(\overset{\frown}{AD})$, markaa waxaad helaysaa in*

$$m(\angle AND) = \frac{1}{2}[m(\overset{\frown}{AD}) + m(\overset{\frown}{BC})].$$

Tusaale 9: Sida ku cad shaxanka Jaantuska 5.31 ee hoose, haddi $m(\overset{\frown}{AB}) = 50°$ oo $m(\overset{\frown}{DFE}) = 110°$, markaa soo saar m(∠ACB).

Furfuris: Waxaynu ognahay in

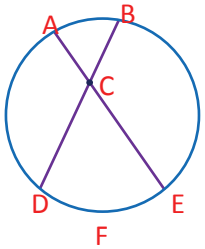
$$m(\angle ACB) = \frac{1}{2}[m(\overset{\frown}{AB}) + m(\overset{\frown}{DFE})],$$

$$= \frac{1}{2}(50° + 110°)$$

$$= \frac{1}{2}(160°)$$

$$= 80°$$

$$\therefore m(\angle ACB) = 80°$$



Jaantuska 5.31

5.2.3 Afargeesleyaasha Meersan

Waxa aad ogsoon tahay in afargeesleyaashu ay leeyihiin afar gees. Waxaa laga yaabaa in aad doonayso in aad sawirto goobo dusha ka marta gees kasta oo ka mid ah afarta gees ee afargeesle lagu siiyey. Tani suurtagal ma tahay mar kasta? Marka aad dhammaystirto casharkan ayaad heli doontaa jawaabta su'aasha.

Hawl-galka 5.8

1 Waa maxay wadarta cabbirka saddexda xaglood ee saddexagal kasta?

2 Waa maxay wadarta cabbirka afarta xaglood ee afargeesle kasta?

3 Sida ka muuqata Jaantuska 5.32 ee hoose, haddii goobo lagu meeriyo ama lagu gedfo afargeeslaha ABCD ama haddii goobadu ay dusha ka marto gees kasta oo ka mid ah afarta gees ee afargeeslahaas, markaa ka shaqee kuwan soo socda

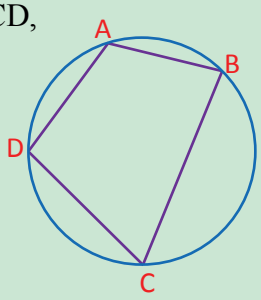
i Soo saar cabbirrada xaglaha kala ah ∠ABC, ∠BCD, ∠CDA and ∠DAB.

ii Soo saar m(∠DAB) + m(∠BCD)

iii Soo saar m(∠CDA) + m(∠ABC)

iv Isbarbardhig labada wadarood ee aad ku heshay (ii) iyo (iii).

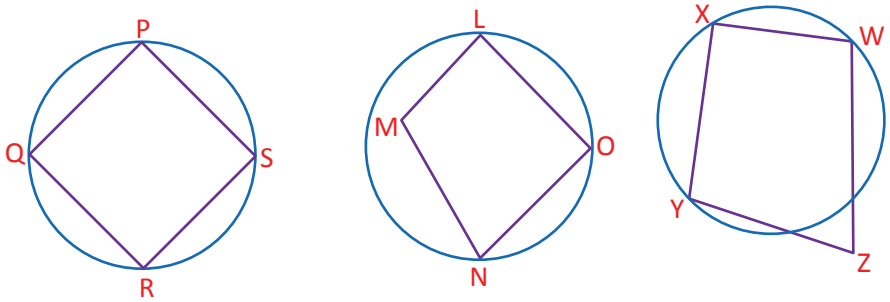
Maxaa kaaga soo baxay?



Jaantuska 5.32

Qeexid 5.3 *Afargeesle kasta oo dhammaan geesihiisu ay ku dul dhacaan goobada dusheeda, waxaa la yiraahdaa afargeesle meersan.*

Tusaale 10: Sida ka muuqata Jaantuska 5.33 ee hoose, afargeeslaha PQRS waa afargeesle meersan, laakiin afargee sleyaasha LMNO iyoWXYZ ma aha afargeesleyaal meersan.



Jaantuska 5.33

Haddii cabbiraaddaada hawlgalka 5.8 qodobka 3aad ee kore ay sax tahay, waxa aad helaysaa in $m(\angle DAB) + m(\angle BCD) = m(\angle ABC) + m(\angle CDA) = 180°$. Xaqiiqadan waxaynu u qeexi karnaa sidan.

Aragtiin:

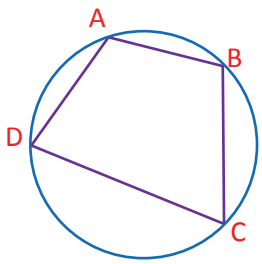
Haddii afargeesluhu yahay afargeesle meersan, markaa xaglihiisa iska soo horjeeda waa xaglo isdhamaystira.

Si aad u caddayso aragtiinkan, waxa aad u baahan tahay xaqiiqooyin ka kooban laba xaqiiqo oo keliya, kuwaas oo kala ah:-

i Cabbirka xagal-geesku waa nuska cabbirka qaansada afsaarka u ah.
ii Cabbirka goobada oo dhani waa 360°.

Haddaba, waxaa lagu siiyey afargeeslaha ABCD sida ka muuqata Jaantuska 5.34 tus in $\angle ADC$ iyo $\angle ABC$ ay yihiin xaglo isdhamaystira.

Caddayn:



Jaantuska 5.34

$m(\angle ADC) = \frac{1}{2} m(\overset{\frown}{ABC})$ iyo

$m(\angle ABC) = \frac{1}{2} m(\overset{\frown}{ADC})$ markaa

$$m(\angle ADC) + m(\angle ABC) = \frac{1}{2}[m(\overset{\frown}{ABC}) + \frac{1}{2}(m(\overset{\frown}{ADC})]$$

$$= \frac{1}{2}(m(\overset{\frown}{ABC}) + m(\overset{\frown}{ADC})) = \frac{1}{2}(360°) \text{ (waayo?)}$$

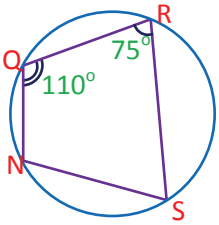
$$= 180°$$

Sidaas awgeed $\angle ADC$ iyo $\angle ABC$ waa xaglo isdhamaystira.

Dooddaas mid la mid ah waxay muujinaysaa in $\angle DAB$ iyo$\angle DCB$ ay yihiin xaglo isdhamaystira. Tus in tani ay sax tahay.

Tusaale 11: Sida ka muuqata Jaantuska 5.35 ee hoose, haddii afargeeslaha NQRS uu yahay afargeesle meersan, markaas raadi $m(\angle QNS)$ and $m(\angle NSR)$.

Furfuris:



Jaantuska 5.35

i $m(\angle QNS) + m(\angle QRS) = 180°$

$\Rightarrow m(\angle QNS) = 180° - m(\angle QRS)$

$= 180° - 75° = 105°$

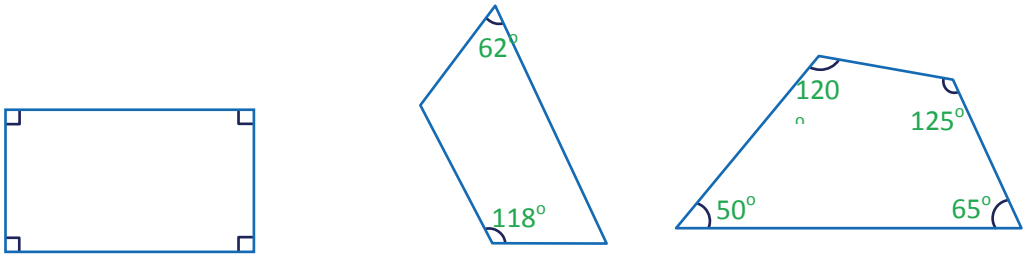
ii $m(\angle NQR) + m(\angle NSR) = 180°$

$\Rightarrow m(\angle NSR) = 180° - m(\angle NQR)$

$= 180° - 110° = 70°.$

Tusaale 12: Afargeesleyaashan soo socda kee baa ah afargeesle meersan?

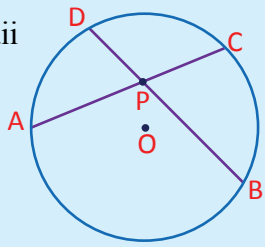
b **t** **j**



Furfuris: Afargeesleyaasha b iyo t waa afargeesleyaal meersan, sababtoo ah xaglahooda iska soo horjeeda waa xaglo isdhamaystira. Laakiin afargeeslaha j ma aha afargeesle meersan madaama $120° + 65° = 185°$.

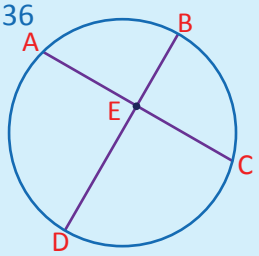
Layliska 5.3

1 Sida ku cad Jaantuska 5.36 hoose haddii $m(\overset{\frown}{CB}) = 100°$ oo $m(\overset{\frown}{AD}) = 70°$, markaa soo saar $m(\angle APB)$.



Jaantuska 5.36

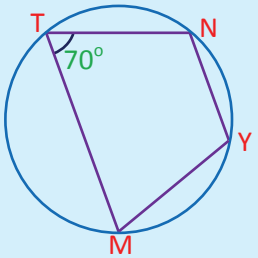
2 Sida ka muuqata shaxankan hoose, haddii $m(\angle AED) = 95°$ isla markaana $m(\overset{\frown}{BC}) = 83°$, markaa raadi $m(\overset{\frown}{DA})$.



Jaantuska 5.37

3 Sida ka muuqata shaxankan hoose, haddii $m(\angle NTM) = 70°$, raadi $m(\angle NYM)$.

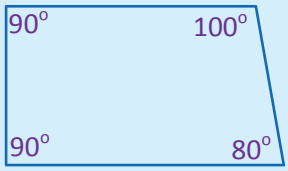
Maxaad ka sheegi kartaa cabbirka xaglahan kala ah $m(\angle TNY)$ iyo $m(\angle TMY)$?



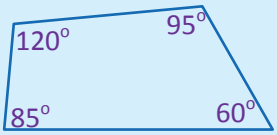
Jaantuska 5.38

4 Afargeesleyaashan soo socda kuwee baa ah afargeesleyaal meersan?

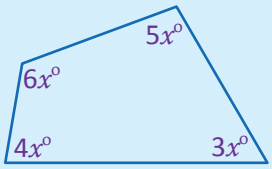
b



t



j



Jaantuska 5.39

5 Kuwan soo socda tee baa been ah? Waayo?

b Labajibbaarane kasta waa afargeesle meersan.

t Laydi kasta waa afargeesle meersan.

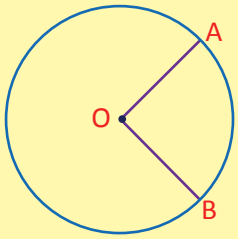
j Barbarroole kasta waa afargeesle meersan.

Furaha Tibxaha

- Qaanso
- Boqon
- Xagal-gees
- Qaansada weyn
- Xarriiqda tikraarka
- Gabal ka goobada
- Xarriiqada taabtaha
- Xagal-xudduneed
- Afargeesle meersan
- Qaansada xaddaysan
- Qaansada yar
- Faquuqa Goobada
- Qaansada afsaarka ah

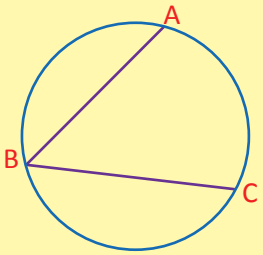
Sookoobida Cutubka

✓ *Cabbirka xagal-xudduneedku wuxuu le'eg yahay cabbirka qaansada afsaarka u ah. Taas oo ah* $m(\angle AOB) = m(\overset{\frown}{AB})$, *Halka O tahay xuddunta goobada* $\overset{\frown}{AB}$ *waa qaansada yar.*



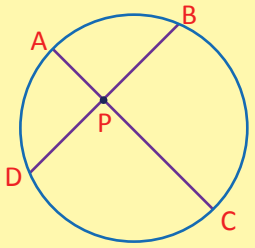
✓ *Cabbirka xagal-geesku wuxuu le'eg yahay nuska cabbirka qaansada afsaarka u ah*

$$m(\angle ABC) = \frac{1}{2} m(\overset{\frown}{AC})$$

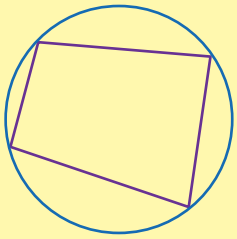


✓ *Cabbirka xagasha ay sameeyaan laba boqon oo iska gooynaya goobada gudaheeda wuxuu le'eg yahay nuska wadarta cabbirka qaansooyinka afsaarka u ah.*

Taas oo ah $m(\angle BPC) = \frac{1}{2}\left[m(\overset{\frown}{BC}) + m(\overset{\frown}{DA}) \right]$



✓ *Afargeesle meersan waa afargeeslaha ay dhammaan geesihiisu ku dul dhacaan goobo isku mid ah.*

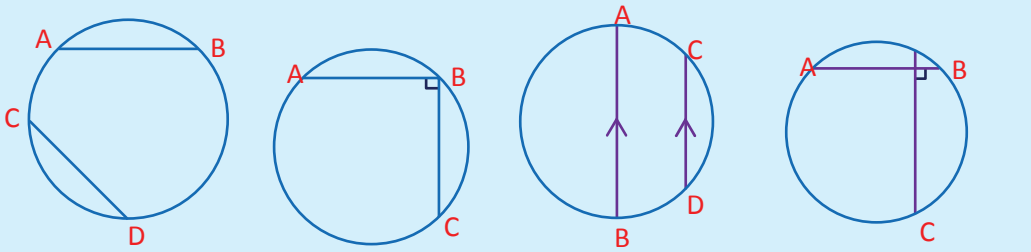


✓ *Haddii afargeesluhu yahay afargeesle meersan,markaa xaglihiisa iska soo horjeeda waa xaglo isbuuxsha.*

Naqtiinka layliska Cutubka 5aad

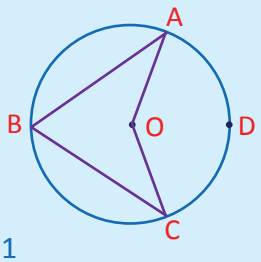
1 Minguuri jaantusyada hoose oo tilmaan xuddunta.

b **t** **j** **x**



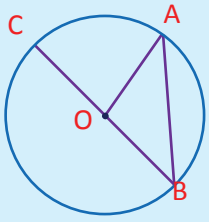
Jaantuska 5.40

2 Jaantuska hoos kamuuqda haddii O ay tahay xuddunta goobada isla markaana m(∠AOC) = 140°. Raadi m(∠ ABC) iyo $m\left(\overset{\frown}{ADC}\right)$



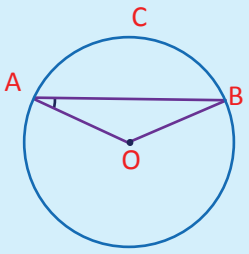
Jaantuska 5.41

3 Shaxanka hoos ka muuqda, haddii O aytahay xuddunta goobada isla marksaasna m(∠AOC) = 80° Raadi m(∠CBA)



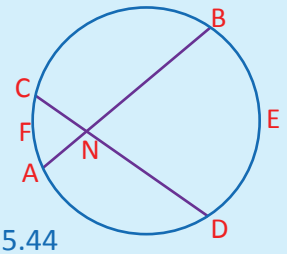
Jaantuska 5.42

4 Shaxanka hooska muuqda, haddii O ay tahay xuddunta goobada islamarkaana m(∠BAO) = 25^o Raadi $m\left(\overset{\frown}{ACB}\right)$.



Jaantuska 5.43

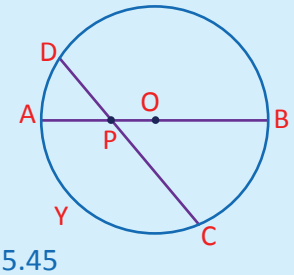
5 Shaxanka hoos ka muuqda haddii labala boqon ee $\overline{AB}$ *iyo* $\overline{CD}$ ay iska gooyaan barta N, oo ku taala goobada gudaheeda, oo m(∠BND) = 75^0 isla markaana $m(\overset{\frown}{BED}) = 110^0$ markaas Raadi $m(\overset{\frown}{AFC})$.



Jaantuska 5.44

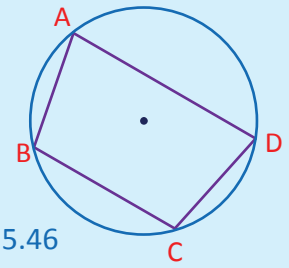
6 Shaxanka hoos ka muuqda, haddii O ay tahay xuddunta goobada, oo $m(\overset{\frown}{AD}) = 40^0$ *sidookale* $m(\angle DPB) = 130^0$

Raadi $m(\overset{\frown}{CYA})$



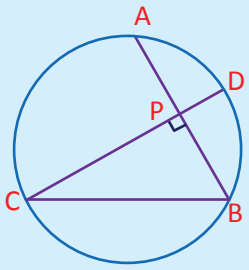
Jaantuska 5.45

7 Shaxanka hoos ka muuqda, haddii dhammaan geesaha afargeeslahani ay ku dhacaan goobada dusheeda oo m(∠A) = 80^0, $m(\overset{\frown}{ABC}) = 140^0$, markaa raadi m ∢D, m∢C iyo m ∢ B.



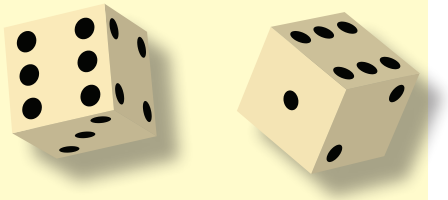
Jaantuska 5.46

8 Shaxanka hoos ka muuqda, haddii $\overline{AB} \perp \overline{CD}$ isla markaana $m(\overset{\frown}{DB}) = 60^0$ markaas raadi m(∢ABC)



Jaantuska 5.47

Cutubka 6aad



HORDHACA, ITMAALKA

UJEEDDOOYINKA CUTUBKA

Cutubkani marka uu dhamaado ardaydu waxay awoodi doonaan in aad:

- caddeysaan natiijooyinka hubaalka ah iyo kuwa aan macquulka ahayn.
- caddeysaan tijaabooyinka, dhacdooyinka hubaal ah iyo ururada itmaalka.
- go'aamisaan itmaalka waqdhaha Fudud.
- cabirtaan itmaalka, idinkoo adeegsanaya jajabyada, Jajabtobanlaha iyo boqoleyda

TUSMOOYINKA MUHIMKA AH

6.1 Fikradaha itmaal

6.2 Itmaalka waqdhacaha fudud.

Furaha Tibxaha

Sookoobida Cutubka

Nakhtiinka layliska

HORDHAC

Erayga Itmaal waa fursad lama filaan ah. Isla markaana qaybaha aragtiinnada itmaalku nabarayaa xeerar koobaya fursadaha dhacdooyinka ee dabiici ahaan u dhaca. Asalka gtida itmaalka jiritaankeeda wakaa dib loo raad raaci karaa ilaa qarnigii toddobo iyo tabnaad, isla markaana waxay si dhakhso ah (deg-deg) ugu kobocday ku adeegsiga laamaha kala duwan ee cilmiga sida. Fisikiska, kimisteriga, Bayolojiga, Saykolojiga, Waxbarashada, Dhagaalaha, Ganacsiga, Warshadaha iyo Injineeriyadda (Handasada).

Waxaa jirtoo in nolol maalmeedkeenu aanu adeegsana Itmaal. Aan ka soo qaadno, aqoonyahannada saadaasha hawada, marka saadaaliyaha hawada uu saadaalinayo (odorosayo) cimilo-gooreedka maalin waxaa uu adeegsadaa Itmaal; sidoo kale, marku ay shirkada caymiska ahi ay go'aansato in ay qorato ama dajisato xeerar iyo xeer-kaabyo waxay adeegsataa Itmaal, waxaa kale oo la mid ah, marka aan samaymayno maalgelin waxaynu adeegsan itmaal,…..

Masalo Furan

Qoys jaarkaaga ah ayaa leh 6 carruur ah. Ka soo qaad in aadan kala garanaynin jinsiga carruurta. Waa intee suurtagalnimada ee ay 3:3 gabadh-wiil uu qoysku ugu qaybsami?

Inta badan waxaad maqashaa oo iyada la sheegayo waxyaalahan oo kale.

- Axmed waxaa uu ku guulaystay bakhtiyaa nasiib.
- Fursadda in uu berri roob ku da'o waa 75%.
- Waxay u dhawdahay in ay dhammaystiri doonto.
- Dammaanadda caymintu waa ku qaali qof in ka badan 50.
- Xayle Gebreselasse wuu ku guulaysan doonaa Maaratoonka soo socda ee (London) Landan.

6.1 FIKRADAHA ITMAAL

Maxsuullada Dhabta ah iyo Maxsuullada aan suurtagalka ahayn.

Qaybtani, waxaad ku dhigan doontaa

- Dhacdooyin aad ka baratay waayo-aragnimaada maalmeed in ay dhici doonaan ay dhab tahay.
- Dhacdooyin aad hubto dhab ahaan inaysan dhici Karin

Ka bilaaba idinka oo u fiirsanaya tusaalaha soo socda isla markaana shaqo-kooxeed raaciya.

Tusaale 1:

Kaga warceliya mid kasta weydiimaha soo socda run ama been, isla markaana sababeeya warcelintiina.

1. Isniinta maalinta ka dambaysa waa Talaada.
2. Laba xarriiqood oo isgooynaya waxay iska gooyaan saddex barood.
3. Marka ay biyuhu karkaraan waxay isu beddelaan caano.
4. Qorraxdu waxay ka soo baxdaa bari.
5. Qofkastaa wuu dhiman.
6. Ugaandha waa waddan ku yaalla Qaaradda Yurub.

Warcelin:

1. Waayo-aragnimaada maalinle, waxaad hubtaa Isniinta maalinta ka damaysa in ay tahay Talaado. Sida hawraartu sheegtay waa “run”.
2. Aqoontaada Joomateri, waxaad taqaanaa laba xarriiqood oo is gooya ugu badnaan in ay iska gooyaan hal bar. Sidaas darteed, waa waxaan suurtagal ahayn in laba xarriiqood iska gooyaan saddex barood, kolkaa, sida hawraartu sheegtay waa “been.”
3. A qoontaada kimisteri, marka biyuhu karaan waxay isu beddelaan neef. Kolkaa waa waxaan suurtagal ahayn marka biyuhu karaan in ay isu beddelaan caano. Sidaas awgeed, sida hawraartu sheegtay waa “been”
4. Waayo-aragnimaada maalin kasta, waxaad garanaysaa in qorraxdu ay ka soo baxdo bari. Kolkaa, hawraartu waa “run”
5. Waayo-aragnima dada maalin kasta, waxaad garanaysaa in uu qof kasta dhimanaayo. Sidaas awgeed, hawraartu waa “run”
6. Aqoontaada juqraafi, waxaad og tahay Ugaandha in ay tahay dal ku yaalla Qaaradda Afrika ee uusan ku oolin Qaaradda Yurub. Sidaas awgeed, warcelinta hawraartu waa “been”

Jaantuska 5.1

Hawl-galka 6.1

1 Dhacdooyinka ku xusan tusaalaha hore dhacdooyinkee ayaan suurtagal ahayn (dhacdooyinka leh itmaal 0).

2 Dhacdooyinka kor ku xusan tusaalaha hore dhacdooyinkee dhab ah (dhacdooyinkee leh itmaal 1)

Shaqo-kooxeedka 6.1

1 Kor u tuur shilin 5 jeer isla markaana qor maxsuullada

- **b** Maxaad heshay tuurmadii kowaad
- **t** Miyuu ka muuqan karaa daabac tuurmadii labaad?
- **j** Miyey ka muuqan kartaa tirada 4 tuurmooyinkaaga?

2 Isu habeeya kooxo isla markaana koox waliba waa in ay soo diyaarsataa laf-laadhuu u gaar ah. Ku qora tirooyinka 1- 6 dhammaan wajiyada laf-laadhuugiina. Dabadeena kor u tuura laf-laadhuugiina 5 jeer, xubin kasta. Kalkaa ka dib qora tirada ka muuqata wajiga sare ee laf – laadhuuda tuuritaan walba.

- **b** Maxay tahay tirada ka muuqanaysa tuuritaankiina kowaad?
- **t** Maxay tahay tirada ka muuqanaysa tuuritaankiina ugu dambeeya?
- **j** miyey ka muuqan kartaa tirada 8 wajiga (dhinaca) sare ee laf-laadhuugiina? Waa maxay sababtu?
- **x** Miyey ka muuqan kartaa tiro ka mid ah abyooneyaasha u dhexeeya 1-6 wajiga sare ee laf-laadhuugiina? Waa maxay sababtu?
- **kh** Miyey ka muuqan kartaa tirada 3 wajiga sare ee laf-laadhuugiina? Waa maxay sababtu?

Shaqo kooxeedka 6.1 iyo Tusaalaha (1) ee sare waxaa dhici kara in aad ku soo aragtay in dhacdooyinka qaar ka mid ahi ay maxsuulladu yihiin dhab, kolkaa waxaa jirta in maxsuullada dhacdooyinka qaarkood ay suurtagal tahay iyo dhacdooyinka qaar ka mid ahi aysan suurtagal ahayn maxsuullada. Dhammaan maxsuulladaasi waxaa loo qeexay sida soo socota.

Qeexid 6.1

1 *Haddii dhacdadu qaar ka mid ah maxsuulladu ay tahay dhab, kolkaa maxsuulkaa waxaa lagu magacaabaa maxsuul dhab ah. Markaana Itmaalku waa 1.*

2 *Haddii ay jirto suurtagalnimo in maxsuulka dhacdadu ay tahay dhab, kolkaa maxsuulkaa waxaa lagu magacaabaa maxsuul suurtagal ah.*

3 *Haddii maxsuulka dhacdadu uu yahay mid aan suurtagal ahayn, kolkaa maxsuulkaa waxaa lagu magcaabaa maxsuul aan suurtagal ahayn. Markaa Itmaalku waa 0.*

Layliska 6.1

1 Ka jawaab su'aalaha soo socda adigoo u kala saaraya "run", "been" iyo labada midnaba ka dibna sababee Jawaabahaaga.

b Raxma wey ka weyn tahay hooyadeed.

t Taranta laba tiro oo laba Jibbaaraneyaal qumman ah waa laba jibbaaraneyaal qumman.

j Itoobiya waxay ku guuleysan doontaa 2018 koobka adduunka ee FIFA.

x Geelu waa naasley

2 Haddii caantayn iyo laf-laadhu hal mar la wada tuuro. Qor maxsuul kasta oo soo socda in uu yahay iyo in kale, Dhab, suurtogal, ama ahayn.

b dur iyo tirada 5

t daabac iyo dur.

j dur ama daabac iyo tiro ka yar 7

3 Daawe wareega ayaa leh 5 waaxood oo isleeg oo ku midabaysan cadaan, hurdi, buluug, cagaar iyo casaan isla markaana ay ku qoran yihiin tirooyinka 1 ilaa 5 waax kasta sida ay u kala horeeyaan. Qor maxsuullada soo socda mid kasta oo ka mid ah in ay tahay iyo in kale, maxsuul dhab ah, maxsuul suurtagal ah ama maxsuul aan suurtagal ahayn.

b Winiinka daawaha ka dib, maxsuulku ku noqon karo buluug.

t Winiinka daawaha ka dib, maxsuulku ku noqon karo casaan.

j Winiinka daawaha ka dib, maxsuulku ku noqon karo casaan

x Winiinka daawaha ka dib maxsuulku ku noqon karo midkood midabbadan, cadaan, hurdi, buluug, cagaar iyo casaan.

kh Winiinka daawaha ka dib maxsuulku ku noqon karo 5 iyo buluug.

d Winiinka daawaha ka dib maxsuulku ku noqon karo 1 iyo cadaan.

r Winiinka daawaha ka dib maxsuulku ku noqon karo mid ka mid ah tirooyinka ka 1 ilaa 5.

4 Laf-laadhuu ayaa 4 jeer kor loo tuuray u kala saar mid kasta oo ka mid ah maxsuullada soo socda sida: dhab ah, aan suurtagal ahayn ama midkoodna.

b Tirooyin ay wadartu tahay 25.

t Dhammaan tirooyinku way u qaybsami karaan 5.

j Dhammaan wadarta tirooyinka waa ay ka weyn yihiin am le'eg yihiin 3.

6.2 ITMAALKA WAQDHACAHA FUDUD

Qaybtii hore waxaad ku soo barateen in maxsuullada qaar ka mid ahi ay dhacdadu tahay dhab, maxsuullada qaarkoodna dhacdadu aanay suurtagal ahayn iyo in ay jirto in dhacdooyinka qaar maxsuulladoodu suurtagal noqon karto.

Tusaale 1: haddii aad tuurtid caanteyn, waxaa kamuuqankara, daabac ama dur, haddii daabacu muuqdo waxaa jira wax aan hubaal aheyn sabab too ah marka aad tuurtid caanteynka dur ama daabaca ayunbaa kamuuqan kara.

Tusaale 2: haddii aad tuurtid laadhu halmar waxaa kamuuqan kara hal tiro oo ah inta udhexeysa 1ilaa 6 haddaba haddi ay muuqato hal tiro oo ah inta udhexeysa 1 ilaa 6, oo ka muuqda dhinaca sare ee laadhuda hadaba waxaa jira tirooyin aan muuqanin. (aan hubaal aheyn)

Qaybtani ayaad ku baran doontaa fikradahan la xidhiidho xisaabta darista xaaladahaasna waxaa lagu magacaabaa aragtida itmaalka. Itmaalkana waxaa la xidhiidha tijaabooyin, taas oo aan dib ku qeexi doono, marka maxsuulku yahay mid aan la garanaynin ama aan la saadaalin Karin.

Tijaabo, ururka itmaalka iyo dhacdo

Shaqo-kooxeedka 6.2

Ka shaqee su'aalaha soo socda.

1 Tuur caantayn 10 Jeer, kadibna qor natiijada

b imisa jeer ayuu daabacu muuqanayaa?

t imisa jeer ayuu durku muuqanayaa?

2 Dilandili laadhu 6jeer kadibna qor natiijada inta jeer ee ay tirada muuqanayso

b 1 muuqasho? **t** 2 muuqasho **j** 3 muuqasho

x 4 muuqasho? **kh** 5 muunqasho **d** 6 muunqasho?

3 Tuur laba caanteyn 10 jeer ka dibna qor maxsuullada, inta jeer ee ay

b daabac, daabac muuqanayaan. **t** daabac, dur muuqanayaan.

j dur, daabac muuqanayaan **x** dur, dur muuqanayaan

Shaqo kooxeedkii 6.2 waxaad ku soo samaysay tijaabooyin, haddaba tijaabooyinka iyo fikradaha la xidhiidhaba waxaan u qeexaynaa sidan:-

Qeexid 6.2

1 *Tijaab waa wax-qabad taas oo aan maxsuulada la saadaalin Karin dhabnimadeeda.*

2 *Nasiibinta tijaabo waa tijaabo ku soo noqnoqota xaalado isku mid ah isla markaana aanu garanayno dhammaan maxsuullada dhici kara, laakiinse aan la saadaalin Karin maxsuullada tijaabada mid kasta oo gaar ahaan loo doorbido. Erayga "nasiibin" tixraac u tahay xaqiijinta maxsuulka lijaabadu ahayn dhab (aan hubaal ahayn). Aragtida itmaalka waxaanu ku darsaynaa :is-rogga nasiibita tijaabo".*

3 *Wax-qabad kastoo gaar ahaaned oo la nidhiidha nasiibinta tijaabo waxaa lagu magacaabaa"iskuday".*

Tusaale 3 Kuwan soo socdaa waa tusaalooyin tijaabo.

1 Tuur caanteyn 20 jeer isla markaana qor maxsuullada.

2 Dilindili laf-laadhuu 13jeer ka dibna qor maxsuullada.

3 Tuur caanteyn hal mar, sidoo kale dilaandili laf-laadhuu hal mar.

4 Ka soo saar kaar, kaararka sida fiican loo baandheeyey

5 Ka dooradshada fataatiir, dhalo ay, fataatiiro badani ku jiraan.

Hawl-galka 6.2

Qora oo ka shaqeeya kuwan soo socda idinkoo wada falan qaynaya maxsuullada.

1 Tuur caanteyn 5 jeer, 10 jeer, 15 jeer, iyo 20 jeer ka dibna ku qor shaxda hoose, adigoo ka jawaabaya su'aalaha la socda.

	Tirada tuuritaanada				Wadarta
Inta jeer ee caanteynka la tuurey	5	10	15	20	
Inta jeer ee uu daabacu muqanayo					
Inta jeer ee uu durku muuqanayo					

b Raadi saamiga inta jeer ee uu daabacu muuqanayo

t Raadi saamiga inta jeer ee uu durku muuqanayo

2 Dilandili laf-laadhuu 5 jeer, 10jeer, 15jeer, 20jeer ka dibna ku qor natiijada shaxda soosocota adigoo ka jawaabaya su'aalaha la socda

	Tirada dilindilinta				Wadarta
Inta jeer ee laf-laadhuuda la tuurey	5	10	15	20	
Inta jeer ee ay tirada 1 muuqanayso					
Inta jeer ee ay tirada 2 muuqanayso					
Inta jeer ee ay tirada 3 muuqanayso					
Inta jeer ee ay tirada 4 muuqanayso					
Inta jeer ee ay tirada 5 muuqanayso					
Inta jeer ee ay tirada 6 muuqanayso					

Raadi saamiga inta jeer ee ay tiradu muuqaneyso

b 1 muuqanayo **t** 2 muuqanayo **j** 3 muuqanayo

x 4 muuqanayo **kh** 5 muuqanayo **d** 6 muuqanayo

3 Qor dhacdooyinka suurtagalka ah ee ku xusan su'aasha 1 iyo 2, ee kor ku qoran.

Hawl-galka 6.1 waxaad ku soo aragtay

1 Dhammaan ururka maxsuullada suurtagalka ah ee tuuritaanka caanteyn waa:- {daabac, dur}

2 Dhamaan ururka maxsuullada suurtogalka ah ee la heli karo marka la tuuro laf-laadhuu waa {1, 2, 3, 4, 5, 6}

Qeexid 6.3 *Tijaabo kasta oo nasiibin ah dhammaan maxsuullada suurogalka ah waxaa lagu calaamadiyaa "S" waxaana loo yaqaana ururka itmaal waxaana lagu ururiyaa tijaabo.*

Tusaale 4:

1 Raadi ururka itmaalka la helayo marka la tuuro caanteyn hal mar.

2 Raadi ururka itmaalka la helayo marka la tuuro laf-laadhuu hal mar.

3 Raadi ururka itmaalka la helayo marka la tuuro laba caanteyn hal mar.

Furfurs:

1 Marka aad tuurto caanteyn hal mar maxsuullada suurtogalka ahi waa daabac iyo dur, waxaa loo qori karaa {Da, Du} sidaas darteed ururka itmaalka "S" ee tijaabadu waa S={Da, Du}

Xusuus: *Tijaabada tuurida caanteynka maxsuulka ka soo baxaya waa daabac, oo loo calaamadiyo Da iyo dur, oo loo calaamadiyo du .*

2 Marka aad dilaandilisid laf-laadhuu hal mar, dhammaan maxsuullada suurtagalka ahi waa tirooyinka u dhexeeya 1 ilaa 6. Sidaas darteed ururka timaalka "S" ee Tijaabadaadu waa S = {1, 2, 3,4, 5, 6}

Laf-laadhuu

3 Tijaabo haddii aynu tuurno laba caanteyn hal mar. Dhammaan maxsuullada suurtagalka ah ee ka soo baxaya tijaabadu waa:- dada, da du, du da, du du. Sidaas darteed ururka itmaalka ee tijaabadu waa S={dada, dadu, duda, du du}

Hawl-galka 6.3

1 Adigoo samaynaya tijaabada caanteyn ee la tuuray hal mar.

b Raadi ururka maxsuullada suurtagalka, ah

t Raadi dhammaan hormo ururada qumman aan madhnayn ee ururka itmaalka.

2 Adigoo fiirinaya tijaabada laf-laadhuuda la dilaandiliyo hal mar, Raadi dhammaan ururka.

b maxsuullada suurtagalka ah

t Tirooyinka dhabanka ee ka muuqan kara laf-laadhuudaada

j Tirooyinka mutaxan ee ka muuqan kara laf-ladhuudaada

x Tirooyinka laf-laadhuudaada ee u qaybsama 7

3 Sheeg waxa aad ku soo aragtay su'aalaha 1 iyo 2, ururka itmaalka iyo hormo ururkeeda?

Qeexid 6.4 *Waqdhac "E" tijaabo waa hormo ururka ururka itmaalka tijaabada.*

Tusaale 5: Ka soo qaad inaad caanteyn tuurtay, islamarkaana laf-laadhuu aad dilaandilisay hal mar. Haddaba waxaad raadisaa waqdhacda, aad ku helaysid

b Daabac iyo tiro dhaban ah.

t dur iyo tiro mutaxan.

Furfuris: Marka aad tuurtid caanteyn ama aad dilandiliso laf-laadhuu isku mar, urur itmaalka "S" ee tijaabadaadu waa

S = {da 1, da 2, da 3, da 4, da 5, da 6, du 1, du 2, du 3, du 4, du 5, du 6}

b Waqdhacda E lagu helayo daabac iyo tiro dhaban ah waa:

E = {da 2, da 4, da 6}

t Waqdhacda E lagu helayo dur iyo tiro mutaxan waa:

E = {du 2, du 3, du 5}

Tusaale 6: Ka soo qaad inaad haysatid 6 kaar, oo isla baaxad le'eg oo isku midab ah iyo hal weedh oo ah erayga MATTER oo ku qoran hal kaar, Haddaba haddii aad doonaysid inaad samaysid tijaabo aad kaga soo saaraysid hal kaar ka dib marka aad si fiican u baandhaysid.

Raadi waqdhacda aad kaaga soo saaraysid kaar.

b Shaqal ah

t Shibbane ah

j xaraf T

x Sheeg saamiga:

i Waqdhacda shaqallada iyo wadarta xarfaha?

ii Waqdhacda shibbane iyo wadarta xarfaha?

iii Waqdhacda xarafka T.iyo wadarta xarfaha?

Furfuris:

b laba shaqal ayaa ku jira erayga MATTER, waana A iyo E, sidaas darteed waqdhacda "E" ee tijaabada, waa E = {A, E}

t 4 shibbane ayaa ku jira erayga MATTER, waana M.T.T.R sidaas darteed waqdhacda "E" ee tijaabadu waa E = {M, T, T, R}

j Laba "T" ayaa ku jira erayga MATTER, sidaas darteed waqdhacda E = {T, T}

x saamiga ee

i waa $\frac{2}{6}$ **ii** waa $\frac{4}{6}$ **iii** waa $\frac{2}{6}$

Waxaad arkaysaa in maxsuullada tijaabadu ay leeyihiin fursado isle'eg.

Haddii aad isbarbar-dhigtiin tirada maxsuulkda waqdhac iyo tirada suurtagalka ah ee ururka itmaalka, Waxaad isbarbardhigi kartiin maxsuullada suurtogalnimada ama itmaalka, ay waqdhacdu ku dhicidoonto. Middani waxay ku qeexan tahay hoos.

Qeexid 6.5 *Haddii ururka itmaalka ka kooban yahay maxsuullo isku mid ah oo la tirin karo markaa itmaalka waqdhacdu waxaa ay dhacaysaa p(E),waana.*

Saamiga tirada maxsuullada waqdhacdu n(E), iyo tirada suurtagalka ah ee ururka itmaalka n(S).

$$P(E)=\frac{Tirada\ \max suullada\ ee\ waqdhac}{Tirada\ wadarta\ \max suallada\ ururka\ itmaalka}=\frac{n(E)}{n(S)}$$

Middani waxaa loo tibaaxi kara sida waqdhacda itmaal $=\frac{Tirada\ laga\ doorbiday\ \max suullada}{Tirada\ Guud\ ee\ \max suullada}$

Tusaale 7:

1 Tuur caanteyn hal mar, ka dibna raadi itmaal aad helaysid.

b daabac **t** dur

2 Dilandili laf-laadhuu hal mar, Raadi itmaalka aad helaysid

b tirada 3 **t** tiro mutuxan

j tiro dhaban **x** tiro ka weyn ama le'eg 5.

Furfuris:

1 Tijaabadan tuurida caanteynka la tuuray hal mar, ururka itmaalku waa S = {Da, Du}

b Waqdhacda aad ku helaysid daabaca waa E={Da} sidaas darteed itmaalka aad helaysid ee daabacu waa sidan $P(Da)=\frac{n(E)}{n(S)}=\frac{1}{2}$

t Waqdhacda aad ku helaysid durku waa E = {Du} sidaas darteed ixtimaalka aad helaysid ee durka waa $P(Du)=\frac{n(E)}{n(S)}=\frac{1}{2}$

2 Tijaabadaadii ahayd dilaandilinta laf-laadhuu hal mar, ururka itmaalku waa S = {1, 2, 3, 4, 5, 6} markaa:-

b Waqdhacda aad ku helaysid tirada 3 waa E = {3} sidaas darteed itmaalka aad ku helaysid 3 waa:- $P(E)=\frac{n(E)}{n(S)}=\frac{1}{6}$

t Waqdhacda aad ku helaysid tirada mutuxan waa E = {2, 3, 5} sidaas darteed itmaalka tirada mutuxan waa:-

$$P(E)=\frac{n(E)}{n(S)}=\frac{3}{6}=\frac{1}{2}$$

j Waqdhacda aad ku helaysid tiro dhaban ah waa E = {2, 4, 6}, sidaas darteed itmaalka tirada dhabanka ah waa

$$P(E)=\frac{n(E)}{n(S)}=\frac{3}{6}=\frac{1}{2}$$

x Waqdhacda aad ku helaysid tirada ka weyn ama le'eg 5 waa: E = {5, 6} sadaas darteed itmaalka aad ku helaysid tiro ka weyn ama le'eg 5 waa $P(E)=\frac{n(E)}{n(S)}=\frac{2}{6}=\frac{1}{3}$.

Tusaale 8: Dhalo quruurad ka sameysan ayaa waxaa ku jira fataatiiro midabadeedu kala yihiin sidan:- 6 casaan ah, 5 cagaar ah, 8 buluug ah, iyo 3 huruud ah. Haddii aad si bakhtiyaanasiib ah uga dooratid dhalada hal fataatiir ah, markaa waxaad raadisaa itmaalka aad ku dooraneysid.

b Fataatiir cas

t Fataatiir cagaaran

j Fataatiir buluug

x Fataatiir huruud.

Furfuris: Maxsuullada suurogalka ah ee ka soo bxixi kara tijaabadan waa:- casaan, Cagaar, buluug, iyo huruud.

b $$p(casaan)=\frac{\text{Tirada aad ka doorbiday casaan}}{\text{tirada wadarta Faataatiirta}}=\frac{6}{22}=0.27$$

t $p(cagaa) = \dfrac{\text{Tirada aad ka dooraneysid cagaar}}{\text{tirada wadarta Faataatiirta}} = \dfrac{5}{22} = 0.22$

j $p(buluug) = \dfrac{\text{Tirada aad ka dooranaysid buluug}}{\text{tirada wadarta Faataatiirta}} = \dfrac{8}{22} = 0.36$

x $p(huruud) = \dfrac{\text{Tirada aad ka dooranaysid huruud}}{\text{tirada wadarta Faataatiirta}} = \dfrac{3}{22} = 0.13$

Xusuus: *Tusaalooyinka kor ku xusan itmaalka waqdhac waxaa loo tibaaxi jabjab iyo jajab tobanle. Haddii aad P(E) ku dhufatid 100%, waxaad markaa helaysaa boqolleyda.*

Itmaalka ee waqdhacda. Fiiri tusaalaha 4 ee kor ku xusan.

i *Boqolleyda itmaalka ee aad kaga helaysid shaqal ku jira erayga MATTER waa p(shaqalo) = 0.333 × 100% = 33.33%*

ii *Boqolleyda itmaalka ee aad kaga helaysid shiibbane ku jira erayga MATTER waa*

$$p(\text{shibbane}) = 0.4 \times 100\% = 40\% = 0.666 \times 100\% = 66.66\%$$

iii *Boqolleyda itmaalka ee aad kaga helaysid xarafka T ee ku jira erayga MATTER, waa p(xarafka T) = 0.33 ×100% = 33.33%.*

Hawl-galka 6.4

Adiga oo fiirinaya tijaabada tuuridda laf-laadhuu waxaad ka jawaabtaa su'aalaha soo socda

1 Sheeg urur-itmaalka ee tijaabada?

2 Ururka itmaalku miyuu yahay waqdhac? Haddii uu yahay raadi itmaalkeeda?

3 Sheeg waqdhacda aad ku helaysid tiro ka weyn 7? Sidoo kale raadi itmaalkeeda?

4 Raadi waqdhacda aad ku helaysid tiro dhaban ah.

5 Qor hawraarta qeexaysa xidhiidhka ka dhexeeya waqdhacahaa iyo itmaalkooda ee su'aalaha 1 – 4

Hawlgalka 6.4 waxaad ku soo aragtay in itmaalka waqdhac kasta ay had iyo jeer tahay 0 iyo 1.

Xusuus:

1 *Itmaalka ay waqdhacdu tahay dhab waxay u dhacdaa 1.*

2 *Itmaalka ay waqdhacdu aan dhici Karina waa 0.*

3 *Tirada ku tirsaneyaasha waqdhacda "E" had & jeer wey ka yar taha ama le'eg tahay tirada ururka itmaalka "S" taas oo ah $0 \leq p(E) \leq 1$...sidaas darteed $0 \leq P(E) \leq 1$ waqdhac kasta.*

Layliska 6.2

1 Caanteyn ayaa la tuuray 4 jeer, markaa raadi itmaalka waqdhacaha soo socda

b si sax ah loogu helayo laba daabac.

t ugu yaraan hal mar daabacu soo baxayo

j Saddex dur ay u soo baxayaan.

2 Lammaane laf-laadhuu ah ayaa la dilaadiliyey wadarta tirooyinka dhinaca sarena waa la qoray markaa waxaad raadisaa itmaalka waqdhac kasta oo soo socta.

b wadarta labada tiro waa 3 t wadarta labada tiro waa 12.

3 Ka soo qaad inay hooyadaa xubin ka tahay ururka "Equb" oo ka kooban 40 xubnood.

Haddii 15 xubnood oo ka mid ah ururka "Equb" ay guuleysteen markaa waa intee itmaalka ay ku guuleysaneyso hooyadaa?

4 Haddii kartoon ka lagu toogbarto uu ka kooban yahay afar (4) qaybood oo isle'eg oo afarta qayboodna lagu rinjiyeeyo huruud, buluug, cagaar, iyo casaan sida hoos ka muuqata markaa

b Waa intee fursada uu ku soo degayo buluugu?

t Waa intee fursada uu ku soo degayo casaanku?

Furaha Tibxaha

- Maxsuullo dhab ah
- Maxsuullo aan suurtagal ahayn
- Itmaalka boqolkiiba
- Waqdhac
- Itmaal
- Itmaalka waqdhac
- Ururka itmaal
- Tijaabo Itmaalka oo jabjab ah

Sookoobida Cutubka

- ✓ *Haddii maxsuulka dhacdadu tahay dhab, markaa maxsuulka waxaa loo yaqaan maxsuuldhab, ah.*
- ✓ *Haddii maxsuulka dhacdadu tahay mid aan suurtagal ahayn markaa maxsuulka waxa loo yaqaanaa maxsuul aan suurtagu ahayn.*
- ✓ *Hawl-galka aan natiijadiisa la saadaalin karayn xaqiiqo ahaan ayaa loo yaqaanaa tijaabo*
- ✓ *Tijaabada bakhtiyaanasiibka ahi waa tijaabada u soo noqnoqota xaalado isku mid ah kuwaas oo aqoonta aan u leenahay natiijooyinka dhammaan suurogalanimadoodu tahay mid dhici karta,*
- ✓ $\text{Itmaalka waqdhac} = \dfrac{\text{Tirada maxsullada waqdhacda}}{\text{Tirada maxsuullada ee ururka itmaalka}}$

Nakhtiinka layliska cutubka 6aad

1 Guleed ayaa tuuray caanteyn laba jeer raadi itmaalka uu helayo.

b Daabac iyo daabac ee labada tuuryo

t Daabac iyo dur ee labada tuuryo.

j Dur iyo Dur ee labada tuuryo

2 Haddii aad laf-laadhuu tuurtid. Raadi itmaalka aad ku helaysid

b tiro kisi **t** tiro mutuxan **j** tiro ka yar 6

3 Tijaabada aan maxsuulkeeda la saadaalin Karin ayaa loo yaqaanaa _____

4 Itmaalka waqdhac wuxuu dhacaa inta u dhexeysa _____ iyo _____

5 Kuwan soo socda keebaa ah waqdhac aan suutagal ahayn

b Helida tiro ka wayn 6 ee tijaabada laf-daadhuu la tuuray.

t helida daabac marka caanteyn la tuuro

j helida daabac ama dur ee caanteyn la tuuray.

6 Diyaari 11 kaar oo isle'eg oo isku midab ah ku qor hal xaraf oo ka mid ah eragya MATHEMATICS adigoo ku qoraya hal kaar. Haddaba waxaad rabtaa inaad sameysid tijaabo ah inaad ka soo saarto hal kaar hal mar. Raadi itmaalka aad ku helaysid.

b Shaqallada **t** shibbaneyaasha **j** xarafka M.

7 Baakidh ay ku jiraan 52 oo kaararka lagu ciyaaro ah oo kala ah afar nooc oo kala ah karaawil, isbik, dheeman, hadhiin, nooc kastana waxaa uu ka kooban yahay 13 kaar kuwaas oo 2, 3, 4, 5, 6, 7, 8, 9, 10, qulaan, raani, baashe iyo yeeke. karaawil iyo isbik, waa madaw halka dheemanta iyo hadhiinku casaana yihiin. Sidaas darteed 26 kaar waa casaan. 26 kaarna waa madaw.

Haddaba waxaad raadisaa itmaalka lagaga soo saari karo baakidhka kaararka ee la baandheeyey ka dib.

b kaar madaw **t** baasha dheeman **j** qulaan

8 keebaa tirooyinka aan noqon karin itmaal?

b −0.01 **t** 0.5 **j** 1.001

x 0 **kh** 1 **d** 20%

9 laf-laadhuu ayaa la dilaandiliyey, caanteynna waa la tuuray. Raadi itmaalka ay laf-laadhuudu inagu tusayso tiro kisi ah iyo itmaalka uu caanteynku inagu tusayo daabac.

10 laba laf-laadhuu ayaa la tuuray hal mar Raadi itmaalka ay wadartu.

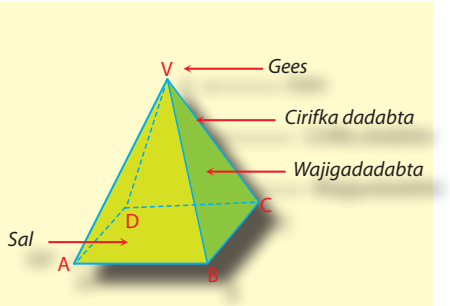
b le'eg tahay 1 **t** le'eg tahay 4 **j** ka yar tahay 13

11 Haddii dad tiradoodu dhan tahay 200 loo kala saaro noocyada dhiiggooda sidan. 50 nooc dhiigga A, 65 nooca dhiigga B, 70 nooc dhiigga "0" iyo 15 nooca dhiiga AB, haddii hal qof oo kooxaha ka mid loo doorto si bakhtiyaanasiib ah, waa intee itmaalka qofkaasi ku noqonayo nooc dhiigga 0.

12 Sanduuq ayey ku jiraan kubbado, tirad aha kubbadda cagaarka ahi waa $\frac{1}{3}$ ee ka tirada kubbadaha cas.

Haddii kubbad si bakhtiyaanasiib ah looga qaado sanduuqa, waa intee itmaal ay kubbaddaasi ku noqonaysaa casaan?

Cutubka 7aad



JOOMATTARIGA IYO CABBIRAADA

UJEEDDOOYINKA CUTUBKA

Cutubkani marka uu dhamaado ardaydu waxay awoodi doonaan iney:

- fahmaan fikradaha aasaasiga ee ku saabsaan saddexagallada xaglaha quman.
- adeegsadaan kamidah aragtiyada muhimka ah ee saddexagalada xagalah quman.
- gartaan xeerarka aasaasiga ee saamiyada tirignomatariga
- gartaan noocyada kala duwan ee Bayraamidyada iyo qaybaha ay wadaagaan.

TUSMOOYINKA MUHIMKA AH

7.1 Aragtiinada ku saabsan saddexagalada xaglaha quman

7.2 Hordhaca tirigonomatariga

7.3 Shaxannada adkaha ah

Furaha Tibxaha

Sookoobida Cutubka

Nakhtiinka layliska

HORDHAC

Cutubkni wuxuu leeyahay saddex cutub hoosaad. Labada cutub-hoosaad ee ugu horeeya waa fikradaha iyo natiijooyinka laxiriira dhinacyadaiyo xagal aha saddexagal qummaan.Gaar ahaan, cutubhoosaadka ugu horeeya wuxuu leeyahay laba aragtiino oo caan ah "Aragtiinka Euclid iyo aragtiinka baytagoras". Kan labaadna wuxuu leeyahay saamiyaada tirigonometeriga ee saddexda ah: Sayn, Kosayn iyo taanjat ee xagasha fiiqan ee saddexagalka xagasha quman kuwaas oo ah barta ugu muhimsan ee nuxurka. Cutub-hoosaadka saddexaad waxa ku jira labo shaxanada adkaha ah Bayraamid yada iyo toobinada.Cutub-hoosaad kasta wuxuu u habaysan yahay isaga oo la raaciyay soo bandhigidda taariikhdiisa.

7.1 ARAGTIINADA SADEXAGALLADA XAGLAHA QUMAN

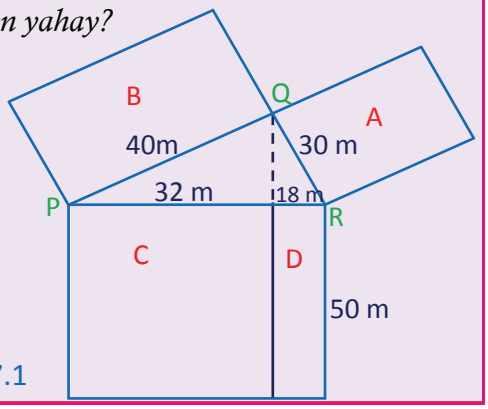
Masalo Furan:

Jaantuska7.1*wuxuu muujinaya gobolo dhul ah ooleh saansaan saddexagal iyo saddex laba jibbaarane dhulkaas oo ay leeyihiin afar beeralay A, B , C iyo D.*

1 *midkoodee baa leh dhulka bedkiisu ugu weyn yahay?*

2 *ma jiraan kuwa leh dhulbedkoodu is le'eg yahay?*

3 *haddii la isku daro beerta A iyo B iyo beeraha C iyo D lammaanahee baa yeelanaya bedka wayn?*



Jaantuska7.1

Masaladaa kore waxaa loo dhigayaa inay kaacaawiso inaad xusuusato baytagoraskii caanka ahaa "waa aragtiin loo isticmaalo adeegsiyo badan". Sidoo kale waxay gundhig u tahay natiijooyinka kala duwan ee la xiriira tirigonomatariga iyo bedadka.

7.1.1 Aragtiinka yuklidh iyo Weydaarkeeda

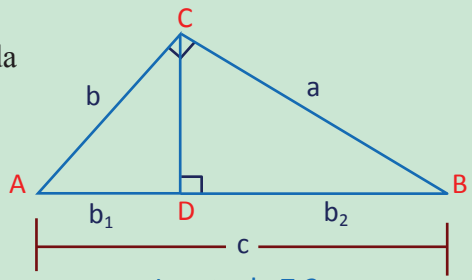
Xusuus taarikheed:

Euclid 350 B.C wuxuu ahaa xisaabiyahan Giriigah. Wuxuu qoray aasaasyo, ah 13–xidhmood oo ku saabsan xeerarka joomatariga iyo astaamaha tirooyinka.

Euclid

Hawl-galka 7.1

Sawir saddexagal xagal qumman ABC, in jeex joogga saddexagalkadhinaca shakaalkaAB sida ka muuqata Jaantuska7.2 ka dibna ka jawaab mid kasta oo kamidah su'aalaha soo socda.



Jaantuska7.2

1 Imisasaddexagal xagal qumman oo cusub ayaa samaysmay?

2 Tax saddexagallada xagal qumman?

3 Caddee xaglaha mid kasta oo kamidah saddexagallada cusub kuwaas oo isku sargo'an.

b $\angle A$ **t** $\angle B$

4 Falanqeeya isku sargona antooda

b $\Delta ACD \sim \Delta ABC$ **t** $\Delta CBD \sim \Delta ABC$

5 Isticmaal natiijada falanqayntii su'aasha 4 si aad u muujiso

b $\frac{CB}{BD} = \frac{AB}{BC}$ iyo waliba$a^2 = cb_2$

t $\frac{AC}{AD} = \frac{AB}{AC}$ iyo waliba$b^2 = cb_1$

Falanqayntii aad ku samayseenhawlgalka7.1waxay caddayn u ahayd aragtiinka Euclid. Waxayna odhanaysaa sida soo socota:

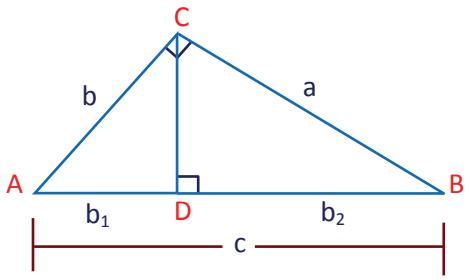
Aragtiinka 7.1 (Aragtiinka yuklidh):

Haddii joogga loo jiido dhinaca shakaalka saddexaglka xagasha qumman, markaa labajibbaarka lug kasta wuxuu le'eg yahay taranta shakaalka iyo lugta saddexagalka taas ooaan ahayn joogga sadexagalka lagu siiyay.

Sikale udhigid: ka soo qaadΔABC inuu yahay saddaxagal xagalqumman oo $\overline{CD}$ ay tahay joogga ku qotoma shakaalka AB. *Fiiri*Jaantuska 7.3.

Marka **i** $a^2 = cb_2$

ii $b^2 = cb_1$



Jaantuska 7.3

Xusuusnaw: *Marka laga eego dhinaca isu ekaanshaha ee ΔACD iyo ΔCBD. Waxaa raacaya taa: $CD^2 = b_1b_2$ tan waxaa loo yaqaana "Aragtiinka joogga".*

Tusaale 1: Ka soo qaad ΔABC inuu yahay saddaxagal xagal qumman, shakaalkiisuna yahay $\overline{AB}$ jooggiisuna $\overline{CD}$ kaas oo ku qotoma shakaalka $\overline{AB}$. Haddii AD = 3sm, BD = 12sm, Raadi dhererka mid kasta oo kamida dhinacyadan soosocda.

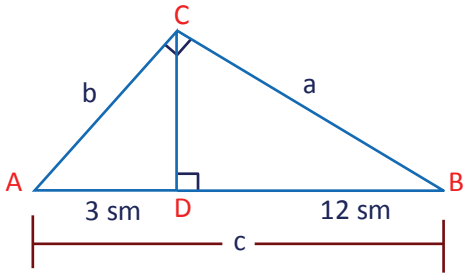
b $\overline{AC}$ **t** $\overline{BC}$ **j** $\overline{DC}$

Furfuris: Talaabada ugu horaysa waa in lasawiro ΔABC. Fiiri Jaantuska 7.4

AB = 3sm + 12sm = 15sm.

b = AC, a = BC, b_1 = 3sm, b_2 = 12sm iyo$c$= 15sm.

Adeegsiga aragtinka Euclid wuxuu ina siinayaa,



Jaantuska 7.4

b $b^2 = cb_1 = 3\text{sm} \times 15\text{sm} = 45\text{sm}^2$

$b = \sqrt{45}\ \text{sm} = \sqrt{9\times5}\ \text{sm} = 3\sqrt{5}$ m s

t $a^2 = cb_2$

$= 12\ \text{sm} \times 15\ \text{sm} = 180\ \text{sm}^2$

$a = \sqrt{180}\ \text{cm} = \sqrt{4\times9\times5}\ \text{cm} = 2\times3\sqrt{5}\ \text{cm} = 6\sqrt{5}\ \text{cm}$

j $DC^2 = b_1b_2$

$= 3\text{sm} \times 12\ \text{sm} = 36\ \text{sm}^2$

$DC = \sqrt{36}\ \text{sm} = 6\ \text{sm}$

Tusaale 2: Joogg ku qotama shakaalka saddexagal xagal quman ayaa u kala qaybiyey shakaalka laba xaariijimood oo dhererkoodu yahay 1 sm iyo 8 sm. Raadi dhererada lugaha.

Furfuris: ka soo qaad $\overline{CD}$ inay tahay joogga ku qotoma shakaalka $\overline{AB}$ ee saddexaglka xagasha qumman.Fiiri Jaantuska 7.5

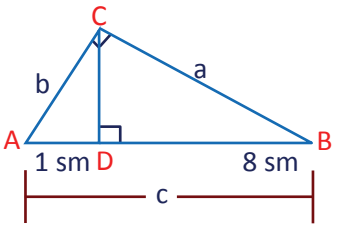
$AC^2 = AD \times AB = 1\ \text{sm} \times 9\ \text{sm} = 9\ \text{sm}^2$

$AC = 3\ \text{sm}$

$BC^2 = BD \times AB$

$= 8\ \text{sm} \times 9\ \text{sm} = 72\ \text{sm}^2$

$BC = \sqrt{72}\ \text{sm} = 2\times3\sqrt{2}\ \text{sm} = 6\sqrt{2}\ \text{sm}$



Jaantuska 7.5

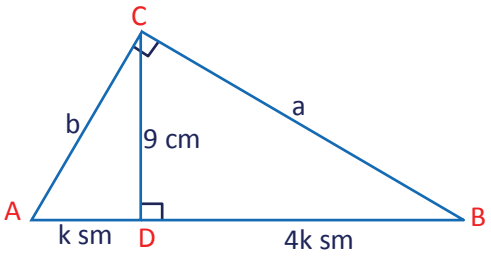
Tusaale 3: Saddexagal xagal qumman dhererka joogga loo jiiday dhinaca shakaalka ayaa ah 9sm. Haddii dhererada xariijimaha shakaalka ay yihiin k smiyo4 ksm, raadi dhererda lugaha saddexagalka.

Furfuris: fiiri Jaantuska 7.6 ka dibna adeegso aragtiinka joogga:

$9^2 = k \times 4k$

$81 = 4k^2$

$k^2 = \dfrac{81}{4}$



Jaantuska7.6

Sidaa darteed, $k = \sqrt{\frac{81}{4}} = \frac{9}{2} = 4.5$ sm

c = AB = $k$sm + 4k sm = 5k sm = 5 (4.5) sm = 22.5 sm

$a^2 = (4k) \times 5k = 4\ (4.5)\ (22.5)$ sm

$= 4\ (9 \times 0.5)\ (15 \times 15 \times 0.1)$ sm^2

$= 4 \times 9 \times 15^2 \times (0.05)$ sm^2

$a = \sqrt{4 \times 9 \times 15^2 \times 0.05}\ sm = 2 \times 3 \times 15\sqrt{0.05}\ sm = 90\sqrt{\frac{5}{100}}\ sm$

$= 9\sqrt{5}\ sm$

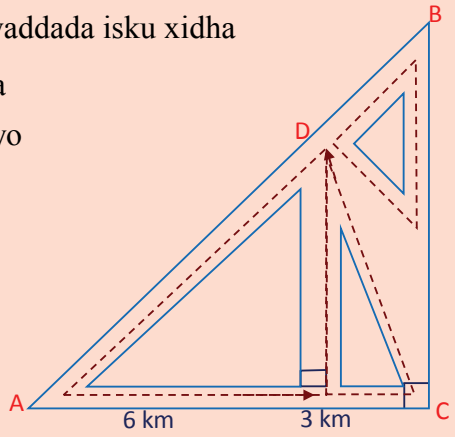
$b^2 = (k \times 5k)$ sm^2 = $5k^2$ sm = $(4.5)^2$ sm^2

$b = \sqrt{5 \times (4.5)^2}$ sm^2 = $4.5\sqrt{5}$ sm

Shaqo-kooxeedka7.1

Jaantuska7.7 Wuxuu muujinayaa khariidadda waddada isku xidha saldhigyada A, B, C, D iyo E. Lammaaneyaasha waddooyinka, $\overline{AC}$ iyo $\overline{BC}$, $\overline{CD}$ iyo $\overline{AB}, \overline{DE}$ iyo $\overline{AC}$ waa kuwo isku qotoma.

AE = 6 km iyo CE = 3 km, haddii bas uu ka dhaqaaqo C una dhaqaaqo dhinaca D, ka dibna uu u dhaqaaqo dhinaca B, C, D, E, A iyo E oo ah dhammaadka raadi wadarta fogaantaa uu socon karo basku.



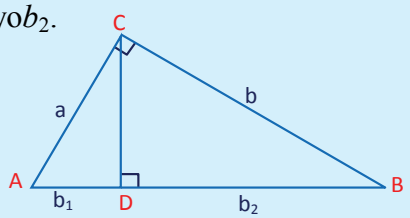
Jaantuska7.7

Layliska7.1

1 Jaantuska7.8, ΔABC waa saddexagal xagal qumman shakaalkiisuna yahay $\overline{AB}, \overline{CD}$ waa joogga ku qotoma shakaalka $\overline{AB}$. Raadi qiimayaasha a iyo b mid kasta oo kamida qiimayaasha soo socda ee b_1 iyo b_2.

b $b_1 = 2;\ \ b_2 = 6$

t $b_1 = 3\ ;\ b_2 = 6$

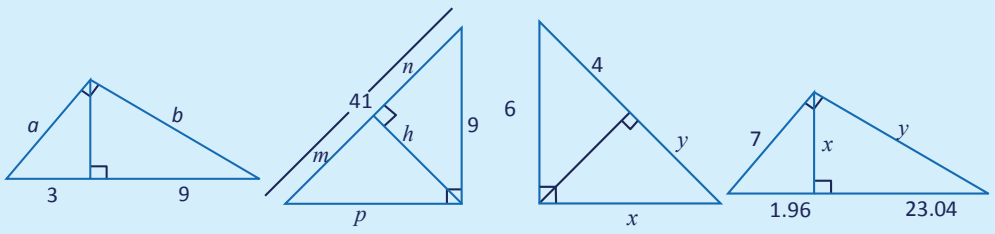


Jaantuska7.8

j $b_1 = 1.5\ ; b_2 = 2.5$

x $b_1 = \sqrt{2}\ ;\ b_2 = 2\sqrt{2}$

2 Raadi dhererka dhinaca maqan mid kasta oo kamida saddexagalada xagllaha qumman ee soo socda.



b **t** **j** **x**

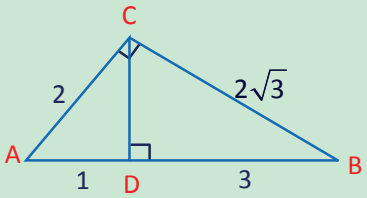
Jaantuska7.9

Weydaarka aragtiinka yuklidh

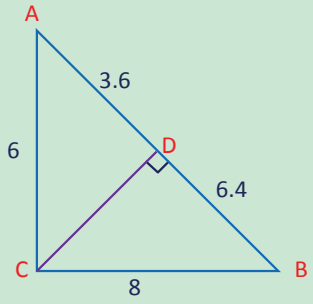
Hawl-galka 7.2

Jaantuska 7.10, $\overline{CD}$ waa joogga ku qotoma dhinaca $\overline{AB}$ ee ΔABC. Waxaad go'aamisaa ΔABC inuu yahay saddexagal xagal qumman iyo in uusan ahayn.

1



2



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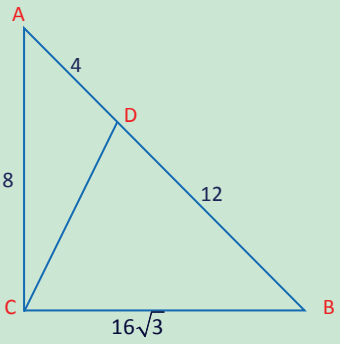

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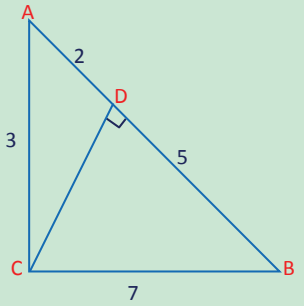
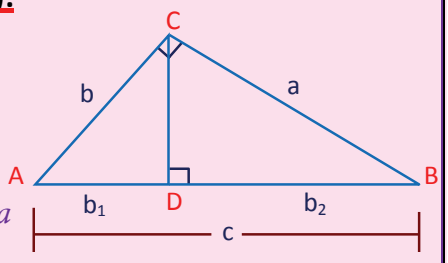


Jaantuska 7.10

Waxaad ku soo aragtay Hawlgalka 7.2 saddexagallada raali galiya aragtiinka Euclid inay yihiin saddexagallada xaglaha qumman. Saddexagallada aan raaligalinin aragtiinka yukliidh maaha saddexagallada xaglaha qumman iyada oo lagu salaynayo xaqiiqdan weydaarka aragtiinka Euclid waa sidan hoos ku qoran.

Aragtiinka 7.2 (weydaarka aragtiinka yuklidh):

$\overline{CD}$ inuu yahay joogga ku qotoma dhinaca $\overline{AB}$ ee ΔABC.
Fiiri Jaantuska7.11. Haddii $a^2 = cb_2$ iyo $b^2 = cb_1$, markaa ΔABC waa sadexagal xagasha qummani aytahay barta C.



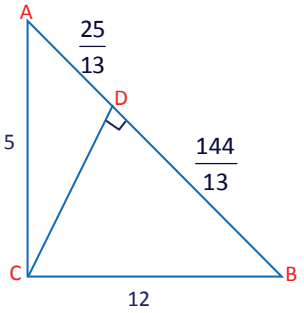
Jaantuska7.11

Tusaale5: Jaantuska7.12, wuxuu muujinayaa ΔABC inuu yahay saddexagal xagal qumman.

Furfuris: Sida cad $AB = \frac{25}{13} + \frac{144}{13} = 13$

$$AD \times AB = \frac{25}{13} \times 13 = 25 = 5^2 = AC^2$$

$$BD \times AB = \frac{144}{13} \times 13 = 144 = 12^2 = BC^2$$

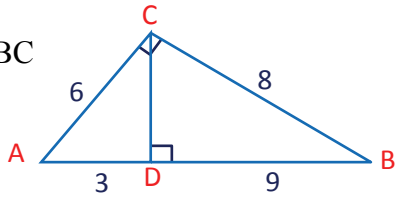


Jaantuska7.12

Tani waxay cadaynaysaa inΔABC uu yahay saddexagal xagal qumman, iyada oo loo maray weydaarkaaragtiinka Euclid.

Tusaale 6: Jaantuska7.13, wuxuu caddaynayaaΔABC

Inuusan ahayn saddexagal xagal qumman.



Jaantuska 7.13

Furfuris: AB = 12

$AD \times AB = 3 \times 12 = 36 = 6^2 = AC$

$BD \times AB = 9 \times 12 = 108$

Laakiin $BC^2 = 64$

Tani waxay caddaynaysaa $BC^2 \neq BD \times AB$

Waxaa raacayaa in ΔABC uusan ahayn saddexagal xagal qumman haddii ΔABC uu ahaan lahaa saddexagal xagal qumman, BC^2 waxay le'ekaan lahayd $BD \times AB$.

7.1.2 Aragtiinka Baytagoras iyo Weydaarkeeda

Qaybtii hore waxaad kusoo baratay aragtiinka Euclid ee saddexagal xagal qumman, Halkan waxaad isticmaali, doontaa xiriirkan si aad u baadhid aragtiinka caanka ah ee Pythagoras.

Xusuus taarikheed:

Pythagoras wuxuu ahaa xisaabyahan Giriig ah, wuxuuna noolaa qarnigii shanaad dhalashadii Ciise ka hor (B.C). Paytagorasiyo saaxiibbadii ayaa markii ugu horaysay aqoonsaday tirooyinka aan lakabka ahayn. Sidookale qarnigii shanaad dhalashadii Ciise ka hor (B.C). Paytagoras iyo ardaydii dhiganeysay iskuulkiisa ayaa waxay darseen 3-4-5saddexagal.

Pythagoras

Hawl-galka 7.3

Ujeeddada: Baadhista aragtiinka baytagorasiyada oo lacabbirayo lugaha iyo shakaalka saddexagal xagal qumman.

Saabaan: Warqad laba jibbaaran, mastarad mitir ku salaysan, iyo kalkuleetar.

Jidmarin:

1 **b** Cabbir dhererka (dh), ballaca (b) iyo xaglo-gooyaha d mid kasta oo ka mida walxaha laydiyeed ee soo socda adiga oo qaadanaya.

i Buuga xisaabta ardayga ee fasalka 8

ii Sagxadda dhulka ee fasalkaaga.

iii Sabuurada fasalkaaga.

t ku guuri Shaxda 7.1 kadibna gali natiijooyinka su'aasha 1b.

	Buuga xisaabta ardayga	Sagxadda qolka	sabuurada
ℓ			
w			
d			
$l^2 + w^2$			
d^2			

Shaxda 7.1

j Isticmaal natiijada Shaxda 7.1 waxaadna raadisaa xidhiidhka ka dhexeeya wadarta $\ell^2 + w^2$ iyo d^2. Qor hawraarta qeexaysa xidhiidhke ka dhexeeya.

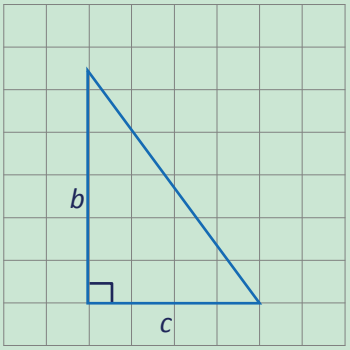
2 b Ku sawir saddexagallo xaglo qumman warqada labajibbaaran dusheeda oo leh dhererada lugahalagu siiyey sida uu muujinayo Jaantuska 7.14.

i $a = 3$cm ; $b = 4$ sm

ii $a = 5$cm ; $b = 12$ sm

iii $a = 2$cm ; $b = 3$ sm

iv $a = 1.5$cm ; $b = 14.75$ sm



Jaantuska 7.14

t Cabbir dhererkaJ ee shakaalka mid kasta oo kamida sadexagallada su'aasha 2b adiga oo qaadanaya cabbirka milimitir ee ugu dhow.

j Ku guuri Shaxda 7.2 waxaadna galisaa natiijooyinka su'aasha 2t.

	a	b	c	$a^2 + b^2$	c^2
i	3	4			
ii	5	12			
iii	2	3			
iv	1.5	14.75			

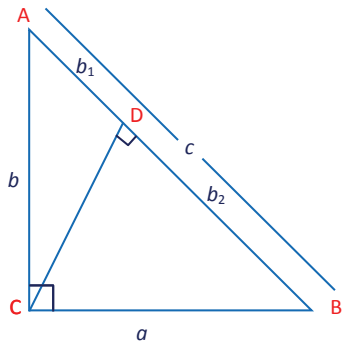
Shaxda 7.2

x Isticmaal natijada shaxda 7.2siaad u raadiso xiriirka ka dhexeeya wadarta $a^2 + b^2$iyo c^2.

kh Waxaad qortaa hawraarta sharxaysa xiriirkooda.

In badan waxaad soo baadhay aragtiinka pythagoras. Haddawaxaad baran doontaa caddaynta aragtiinka.

U fiirso saddexagalkan xagsha qumman ABC oo leh joogga ah $\overline{CD}$ kaas oo ku qotoma shakaalka $\overline{AB}$. (*Eeg* Jaantuska 7.15)



Jaantuska 7.15

Marka laga eego dhanka aragtiinka Euclid, waxaad taqaanaa $a^2 = cb_2$iyo $b^2 = cb_1$taas oo ah wadarta laba jibbaarrada,

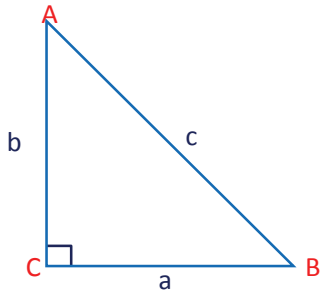
$$a^2 + b^2 = cb_2 + cb_1 = (b_2 + b_1)\, c = c \times c = c^2$$

Tani waa caddaynta aragtiinka baytagoras, taas oo odhanaysa sida hoos ku qoran.

Aragtiinka Baytagoras:

Wadarta labajibbaarada dhererada lugaha saddexagalka xagasha qumman waxay le'eg tahay laba jibbaarka dhererka shakaalka.

Aragtiinka Pythagoras wuxuu qabaa,
$a^2 + b^2 = c^2$



Jaantuska 7.16

Tusaale1: Raadi dhererka shakaalka saddexagalka xagasha qumman kaas oo dhererka lugahiisu ay yihin 3 sm iyo 4 sm.

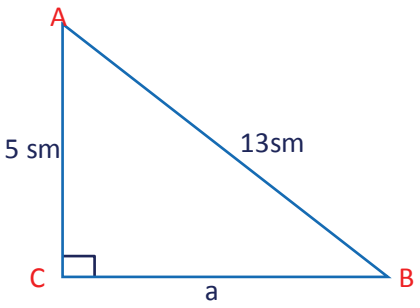
Furfuirs: iyada oo lagu badalayo a = 3 iyo b = 4 hilinka $a^2 + b^2 = c^2$waxaad helaysaa

$$c^2 = 3^2 + 4^2 = 25$$

Sidaa darted $c = 5$

Dhererka shakaalku waa 5 sm.

Tusaale 2: Haddii dhererka shakaalka saddexagal xagal qumman yahay 13 sm, isla markaana hal dhinac oo kamidah lugahiisu tahay 5 sm, raadi dhererka lugta kale.



Jaantuska 7.17

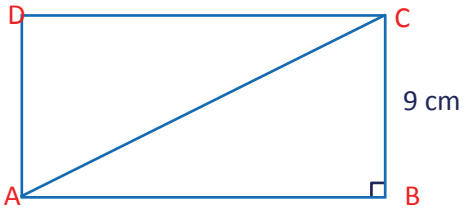
Furfuris: Fiiri Jaantuska 7.17.

Si cad, $a^2 + 5^2 = 13^2$

$a^2 = 169 - 25 = 144$

$a = \sqrt{144} = 12$

Tusaale 3: Raadi dhererka xaglo-gooyaha ee laydi addimihiisu kala yihiin 9sm iyo 40 sm.



Jaantuska 7.18

Solution: Ka soo qaad ABCD inuu yahay laydi dhererkiisuyahay AB = 40 sm ballaciisuna yahay BC = 9 sm. Markaa ΔABCwaa saddexagal xagal qumman.

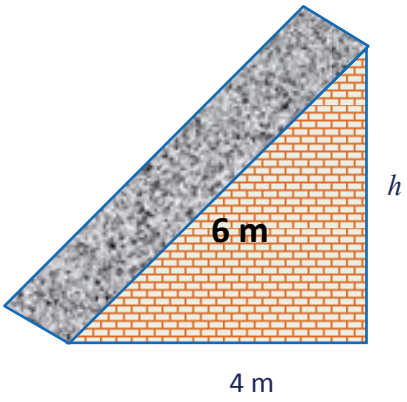
Fiiri jaantuska7.18

$AC^2 = AB^2 + BC^2 = 40^2 + 9^2 = 1681$

$AC = \sqrt{1681} = 41$

Dhererka xagla-gooyahu waa 41 sm.

Tusaale4: Salaan 6 m ah ayaa lagu tiiriyay darbi ku fadhiya dhul siman. Haddi cagta sallaanku 4sm ay ka fog tahay salka darbigaJoog intee dhan ayuu gaadhikaraa sallaanku?



Jaantuska 7.19

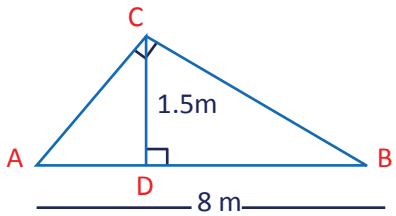
Furfuirs: u qaado h joogga darbiga ee sallanku gaadhay.

Fiiri Jaantuska 7.19 kadibna $h^2 + 4^2 = 6^2$

$h^2 = 20 \Rightarrow h = \sqrt{20}$

Sidaa darteed $h = 2\sqrt{5}$ m ≈ 4.47 m

Tusaale 5: Jaantuska 7.20 wuxuu muujinayaa saqafka guri. Dhererka tiirka jiifa waa 8m.Tiirasha AC iyo BC waa isle'eg yihiin.Haddii joogga saqafkuuu yahay 1.5m, maxay noqon karaan dhererka tiirasha AC iyo BC?



Jaantuska 7.20

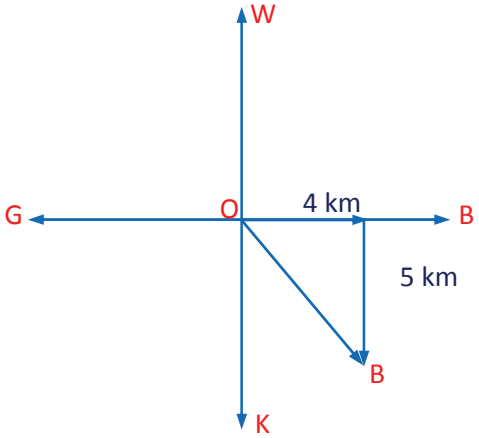
Furfuris: Sida aan ku naqaano astaamaha saddexagal labaale, CD waa kala badhe ku qotoma AB.

Sidaas darteed AD = BD = 4m

$BC^2 = DB^2 + DC^2 = (4^2 + 1.5^2)\ m^2 = 18.25m^2$

$BC = \sqrt{18.25}\ m \approx 4.272\ m$

Tusaale6: Qofayaa u lugeeyay 4km dhinaca bari, ka dibna 5km ayuu u lugeeyay dhinaca koonfu-Fogaan intee le'eg ayuu u jiraa bartii uu kadhaqaaqay?



Jaantuska 7.21

Furfuris: Fiiri Jaantuska 7.21.

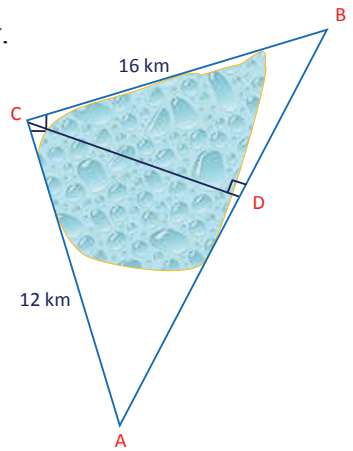
Adiga oo isticmaalaya aragtiinka Pythagoras waxaad helaysaa

$OB^2 = OA^2 + AB^2 = 4^2 + 5^2 = 41$

$OB = \sqrt{41} \approx 6.403$ km

OB = 6.403 km ayuu u jiraa bartii uu kadhaqaaqay.

Tusaale 7: Jaantuska 7.22 waxaa uu soo bandhigayaa xeelad lagu cabbiro ugu dhawaanshaha ballaca haro. Soo saar ugu dhawaan cabbirka ballaca harta?



Jaantuska 7.22

Furfuris: CD waxay tahay ugu dhawaan cabbirka ballaca harta.

Marka dib loo eego Aragtida joogga waa:-

$CD^2 = AD \times BD$

Maadaama $AB^2 = (12km)^2 + (16km)^2$

$= 144\ km^2 + 256km^2 = 400\ km^2$

$AB = 20\ km$

$(16\ km)^2 = BD \times (20\ km)$

$CB^2 = BD \times AB$

$(16\ km^2) = BD \times (20\ km)^2$

$256\ km^2 = BD^2 \times 400\ km^2$

$$BD = \sqrt{\frac{256 km^2}{400 km^2}}$$

$BD = 12.8\ km$

$AD = AB - BD$

$AD = 20\ km - 12.8\ km$

$AD = 7.2\ km$

$CD^2 = AD \times BD$

$CD = \sqrt{7.2\ km \times 12.8\ km}$

$CD = 9.6\ km$

Weydaarka Aragtiinka Baytagoras

Waxaad soo aragtay saddexagalka dhererka dhinacyadiisuay yihin 3, 4 iyo 5 halbeegyo inuu yahay saddexagal xagal qumman.Tirooyinkaana waxaa la yiraahdaa in ay yihiin saddexleyda Pythagorean.

Qaybtan waxaad ku arki doontaa haddii x, y iyo z ay yihiin dhererada dhinacyda saddexagal isla markaana $x^2 + y^2 = z^2$, kolkaa saddexagalku waa saddexagal xagal qumman.

Shaqo-kooxeedka 7.2

Ujeeddo: Si loo darsa weydaarkaaragtiinka Pythagoras iyada oo la sawirayo (ama la dhisayo) saddexagallo lana cabbirayo xaglaha.

Saabaan: mastarad mitir ah, ulo daraf toosan, jiheeye xagalbeeg.

Uidmarin:

1 Diyaari ulo dhereradoodu yihiin sida soo socota.

b 5sm, 12sm, 13sm **t** 30sm, 40sm, 50sm **j** 6sm, 8sm, 10sm

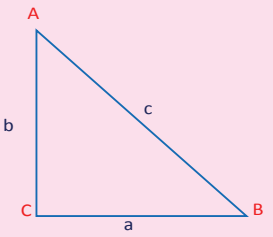
2 Dhis saddexagallo adiga oo isticmaalaya ulaha su'aasha, 1b, t, iyoj.

3 Cabbir xagasha ka soo horjeeda dhinaca ugu dheer ee saddexagal kasta.

4 Adigo oo isticmaalaya natiijooyinka aad ka heshay su'aasha 3, qor hawraar qeexaysa xidhiidhka ka dhexeeya saddexleyda Baytagoras iyo saddexagalka.

Aragtiinka 7.4 (Weydaarka Aragtiinka Baytagoras)

Haddii wadarta laba jibbaarada laba dhinac ee saddexagal ay le'ekaato laba jibbaarka dhinaca saddexaad, markaa saddexagalku waa saddexagal xagal qumman.



Jaantuska 7.23

Si kale u dhihid. Haddii $a^2 + b^2 = c^2$, *markaa m* $(\angle C) = 90^o$.

Tusaale 1: Go'aami mid kasta oo ka mid ah kuwa soo socda in uu yahay iyo in kale saddex layada Pythagorean.

b 2, 3, 4 **t** 10, 24, 26 **j** $2\sqrt{2}$, 1, 3

Furfuris:

b $2^2 + 3^2 = 13$ laakiin $4^2 = 16$
2, 3, 4 ma-ahasaddexleyda Pythagoras.

Saddexagalka dhererka dhinacyadiisu yihiin 2, 3 iyo 4 halbeegyo ma-aha saddexagal xagal qumman.

t $10^2 + 24^2 = 100 + 576 = 676$
sidoo kale, $26^2 = 676$. Middani waxay muujinaysaa 10, 24, 26 inay tahaysaddexleydabaytagoras.

j $(2\sqrt{2})^2 + 1^2 = 8 + 1 = 9$ sidoo kale $3^2 = 9$.
$2\sqrt{2}$, 1, 3 waa saddexleyda Pythagoras.

Tusaale 2: Haddii 3 sm, x sm iyo 4 sm ay yihiin dhererada dhinacyada saddexagal xagal qumman, raadi qiimaha x.

Furfuris: waxaa ku jira masaladan laba xaaladooda oo suurta gal ah. Shakaalku in uu yahay 4 sm ama x sm. Taasina waxay noqon kartaa $x > 4$ ama $x < 4$.

Haddii x ay le'eg tahay 3 ama 4 markaa ma noqonayo saddexagal xagal qumman.

Xaaladda koowaad,

$3^2 + x^2 = 4^2$

$x^2 = 16 - 9 = 7$

$x = \sqrt{7}$

xaaladda labaad.

$x^2 = 3^2 + 4^2 = 25$

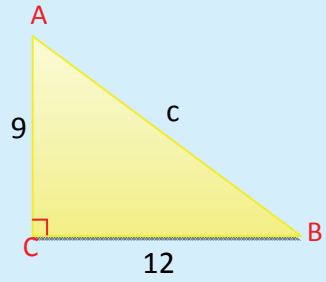
$x = 5$

Sidaas darteed, *x*waa $\sqrt{7}$ sm ama 5 sm.

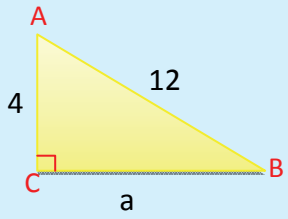
Layliska 7.2

1 Isticmaal aragtiinka Pythagoras si aad u hesho dhererka aan laaqoon ee midkasta oo ka mida saddexagallada xaglaha qumman ee soo socda.

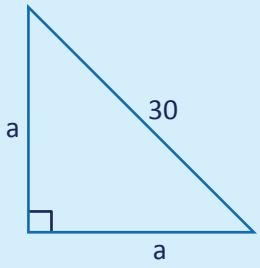
b



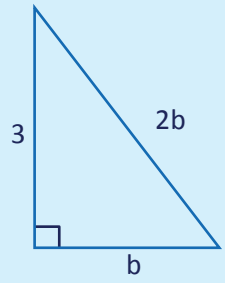
t



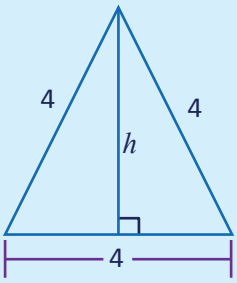
j



x



kh



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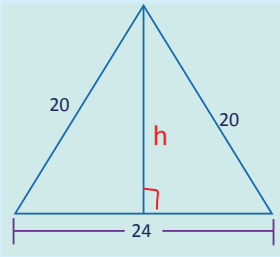

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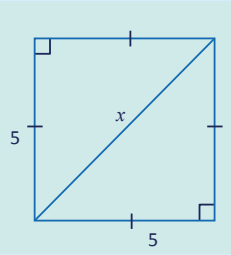

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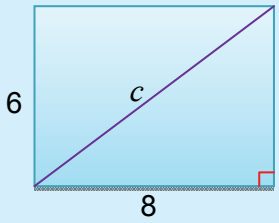

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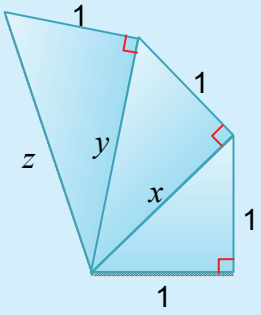


Jaantuska 7.24

2 Caddee saddexagallada soo socda ee dhererka dhinacyadooda lagu siiyay inay yihiin saddexagallo xaglo qumman iyo in kale.

b 8sm, 15sm, 17sm

t 6sm, 9sm, 12sm

j 14sm, 16sm, 18sm

x 3sm, $2\sqrt{10}$ sm, 7sm

kh 21 sm, 4sm, 25sm

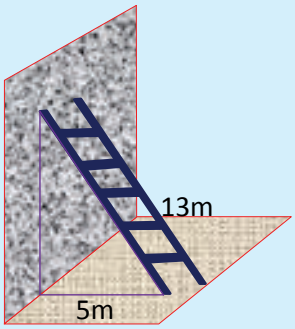
d 2sm, 3.75sm, 4.25sm

3 Raaddi dhererka loo baahanyahay.

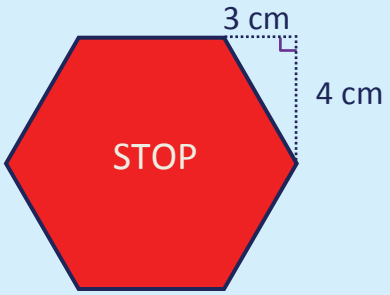
b Intee in le'eg ayuu gaadhayaa joogga sallaanka?

t Waa intee dhererka dhinac kasta?

b



t



Jaantuska 7.25

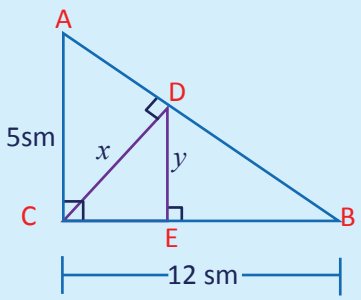
4 Raadi dhererka xaglo-gooyaha laydi dhererka dhinacyadiisu ay yihiin $\sqrt{7}$ sm iyo 3sm? Jantus 7.26?

5 ABCD waa koor labaale dhinacyadeeda barbarada ahina ay yihiin $\overline{AB}$ iyo $\overline{CD}$. Haddii AB = 16 sm, CD = 8 sm iyo AD = 5 sm.

Raadii joogga barbaroolaha.

6 Tiro kasta oo tirsiimo k, caddee in 3k, 4k, 5k ay tahey saddexleyda baytagoras.

7 Jaantuska 7.27 ΔABC waa saddexagal xagal qumman.Raadi qiimayaasha x iyo y.



Jaantuska 7.27

7.2 HORDHACA TIRIGONOMETERI

Waxaad ku soo baratay shaxanada isu.eg iyo xaglaha aragtiinka Pythagoras iyo xarrijimaha aan sitoosan loogu cabbiri karin fogaanada aan lahelikarin sida joogga fiinta dhagax-weyn, geedka weyn iwm iyada oo la isticmaalayo xaglaha iyo xariijimaha ayaa si toos ah loo cabbirikaraa.

Cutub-hoosaadkan, waxaad ku baran doontaa hab dheeraad ah oo lagu heli karo xaglaha iyo xarriijimaha si aan toos ahayn.

7.2.1 Saamiyada tirigonometeri

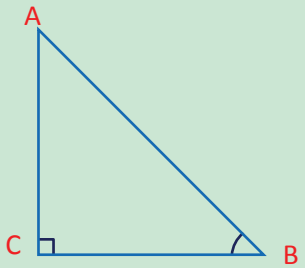
Hawl-galka 7.4

Tixaac Jaantuska 7.28 ka jawaab midkasta oo kamida su'aalaha ku saabsan ΔABC.

1 Dhinacee ayaa ah shakaal?

2 Dhinacee ayaa kasoo horjeeda∠B?

3 Dhinacee ayaa kasoo horjeeda∠A?



Jaantuska 7.28

Dhinaca dariska la ah xagasha fiiqan ee saddexagal xagal qumman waa dhinaca xagasha aan laxiriirin shakaalka.

4 Waa kee dhinaca dariska la ah∠B?

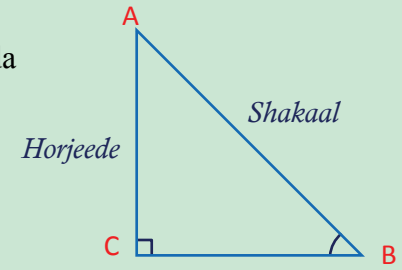
5 Waa kee dhinaca dariska laah∠A?

Hawlgalka 7.4 wuxuu kaa caawinayaa inaad kala cadayso dhinaca dariska iyo dhinaca kasoo horjeeda ∠B sidaku cad Jaantuska 7.29.

$\overline{AB}$ waa shakaal.

$\overline{AC}$ waa ka soo horjeedaha ∠B.

$\overline{BC}$ waa dhinaca dariska la ah ∠B.



Jaantuska 7.29

Halkan waxaad ku baran doontaa nidhiidhks ka dhexeeya dhinacyada lagu magacaabo shakaal, horjeeda iyo daris kuwaas oo la nidhiidha xagasha fiiqan ee saddexagal xagal qumman.

Xusuustaariikheed

Shaqo-kooxeedka7.3

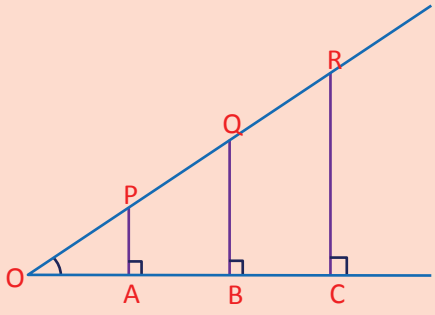
Ujeeddo: Si loo soo saarosayn, kosayn iyo taanjant kuwaas oo la xiriira xagasha fiiqan ee saddexagal xagal qumman iyada oo la cabbirayo dhererada dhinacyada.

Saabaan: Mastarad ku salaysanmitir, xaglo-beeg, jiheeye, kalkuleetar iyo warqad laba jibbaarane.

Jidmarin:

1 Ku guuriJaantuska 7.30warqada labajibbaaran kadibna koox ahaan uga shaqeeya.

2 Adiga oo isticmaalaya mastarad, cabbir dhererrada shakaalada, dhinacyada kasoo horjeeda iyo dhinacyadda dariska la ah ∠O eeΔAOP, ΔBOQiyoΔCOR adiga oo qaadanaya cabbirka ugu dhaw ee milimitirka.



Jaantuska 7.30

Ku guuri tusaha 7.3, isla markaana gali natijooyinka.

Dhinac	Dhererrada ΔAOP	Dhererrada ΔBOQ	Dhererrada ΔCOR
Shakaal			
Horjeede			
Daris			

Tusaha 7.3

3 Adiga oo isticmaalaya dhererada iyo kalkuleetar raadi mid kasta oo kamida saamiyada soo socda ee∠O. Ku guuri tusaha 7.4 kadibna gali natiijooyinka.

Saami	Kusaabsan ΔAOP	Kusaabsan ΔBOQ	Kusaabsan ΔCOR
$\frac{\text{Horjeeda}}{\text{Shakaal}}$			
$\frac{\text{Daris}}{\text{Shakaal}}$			
$\frac{\text{Horjeedo}}{\text{Daris}}$			

Tusaha 7.4

4 Waa maxay xiriirada ka dhexeeya natiijooyinka tusaha 7.4. Qor hawraarqeexaysa xiriiradaas.

5 Caddee adiga oo isticmalaya xaqiiqda inΔAOP, ΔBOQ iyo ΔCOR ay yihiin saddexagallo isku jaad ah (isu – eg).

Shaqo-kooxeedka 7.3 dhererka saamiyada ee $\frac{\text{Horjeede}}{\text{Shakaal}}$, saamiga dherer $\frac{\text{Daris}}{\text{Shakaal}}$ iyo saamiga dhere $\frac{\text{Horjeede}}{\text{Daris}}$ waxaaloo yaqaanaa saamiyada tirignomatariga ee saddexagal xagal qumman. heerkan, waxaad ku haysataa qeexida saamiyada tirigonomatariga ee saddexda ah kuwas oo kala ah: sayn, kosayn, iyo tangant kuwaas xagasha fiiqan ee saddexagal xagal qumman.

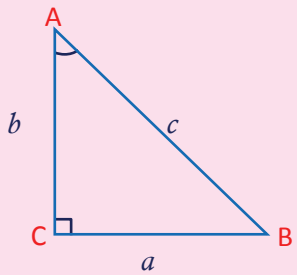
Qeexid 7.1 *U tixgali saddexagal xagal qumman ABC.Fiiri* Jaantuska 7.31.

i *Saynka ∠A, waxaa loosoo gaabiyaa "sin A" waxaana loo qeexaa sidan:*

$$\sin A = \frac{\text{dhererka dhinaca ka soo horjeeda } \angle A}{\text{dhererka shakaalka}} = \frac{a}{c}$$

ii *Kosaynka ∠A, waxaa loo soo gaabiyaa "kosayn A" waxaanaloo qeexaasidan:*

$$\cos A = \frac{\text{dhererka dhinaca dariska la ah} \angle A}{\text{dhererka shakaal ka}} = \frac{b}{c}$$



Jaantuska 7.31

iii *Taanjantiga ∠A, waxaa loo soo gaabiyaa "tan A" waxaa loo qeexaa sidan:*

$$\tan A = \frac{\text{dheerarka dhinaca ka soo horjeeda } \angle A}{\text{dherarka dhinaca dariska la ah } \angle A} = \frac{a}{b}$$

F.G 1 *Sin A, cosA iyo tan A, waxaa loola jeedaa cabbirka xagasha ∠A.*

2 *xagal kasta oo fiiqan θ, maadaama shakaalkuinuu yahay dhinaca ugudheer, $0 < \sin\theta < 1$ iyo $0 < \cos\theta < 1$.*

Qormo: *Dhererrada dhinacahorjeedaha, dhinaca dariska iyo shakkalka waxaa loo soo gaabiyaa lior, darj,shak.,sida ay u kala horeeyaan..Fiiri* Jaantuska 7.32.

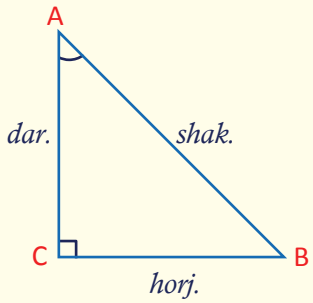
Saamiyada tirigonometariga seddexda ah la xiriira xagasha ∠A

Si fudud waxaa loo muujin karaa sidan:

$$\sin A = \frac{horj}{shak}$$

$$\cos A = \frac{dar}{shak}$$

$$\tan A = \frac{horj}{dar}$$

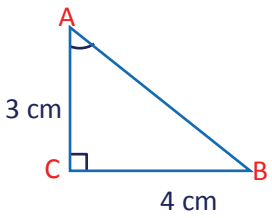


Jaantuska 7.32

Tusaalaha 1: Jaantuska 7.33, ΔABC waa saddexagal xagal qumman cabbirka xagashiisu (∠C) = 90°, AC = 4 sm iyo BC = 3 sm.

Raadi **b** sin A, cos Aiyo tan A.

t sin B, cos B iyo tan B



Jaantuska 7.33

Furfuris: Sicad oo badhax laAB = 5 sm

b $\sin A = \frac{4}{5}$, $\cos A = \frac{3}{5}$, $\tan A = \frac{4}{3}$

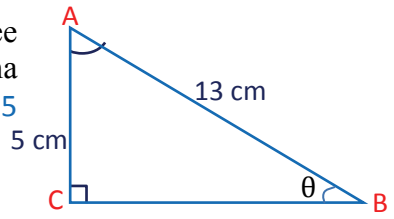
t $\sin B = \frac{3}{5}$, $\cos B = \frac{4}{5}$, $\tan B = \frac{3}{4}$

Tusaalaha 2: Haddii A iyo B ay yihiin xaglo is-dhammaystiro, ma runbaa $\sin A = \cos B$, $\cos A = \sin B$ iyo $\tan A = \frac{1}{\tan B}$?

Furfuris: Eeg ΔABC ee ka muuqda Jaantuska 7.34

$$\sin A = \frac{a}{c} = \cos B, \cos A = \frac{b}{c} = \sin A \text{ iyo } \tan A = \frac{a}{b} = \frac{1}{\left(\frac{b}{a}\right)} = \frac{1}{\tan B}$$

Tusaalaha 3: Raadi saamiyada tirigonomatarigaee saddexda ah ee laxiriira xagasha fiiqan θ sida ku cad Jaantuska 7.35 hoose



Jaantuska 7.35

Furfuris: BC = 12 marka loo eego aragtiinka Pythagoras

$$\text{sayn } \theta = \frac{5}{13}, \text{ kosayn } \theta = \frac{12}{13} \text{ iyo } \tan \theta = \frac{5}{12}.$$

Tusaalaha 4: SaddexagalkaΔABC, caabirka$(\angle C) = 90^o$ iyo $\sin A = \frac{40}{41}$. Raadi

a sayn B **b** kosayn B **c** taan B

Matahay suurtagal in la helo dherarka shakaalka? Sharax

Furfuris: Sawir saddexagalka ΔABC, cabbirka xagasha $m(\angle C)$ iyo $\frac{BC}{AB} = \frac{40}{41}$

Halka saddexagal ee suurtagalka ah waa midka kamuuqda Jaantuska 7.36. Adigo oo isticmaalaya aragtiinka Pythagoras waxaad helaysaa

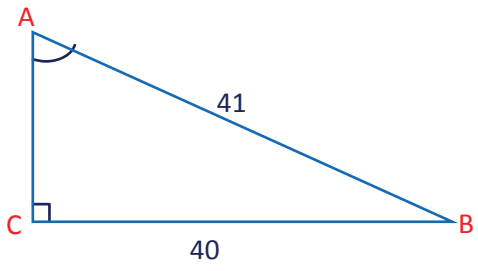
$AC^2 + 40^2 = 41^2$

$AC^2 = 41^2 - 40^2$

$AC^2 = 1681 - 1600$

$AC = \sqrt{81}$

$AC = 9$



Jaantuska 7.36

Tan waxaad ka helaysaa,

b sayn $B = \frac{9}{41}$ **t** kosayn $B = \frac{40}{41}$ **j** tan $B = \frac{9}{40}$

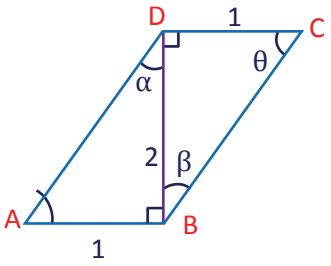
F.G: *Haddii aad ku dhufato dhererrada dhinac kata eeΔ ABC* Jaantuska 7.36*, tiro togan sida* 2× 9, 2 × 40, 2 × 41*mar labaad waxay ku siin saddexagal xagal qumman kaas oo dherarrada dhinacyadiisu yihiin*18, 80, 82.

Ama haddii aad ku dhufato $\frac{1}{2}$*, dherada dhinacyadu waxay noqonayaan*4.5, 20, 20.5*; saddexagalku wali waxaa uu ahaan saddexagal xagal qumman.*

Sidoo kale saamiyada tirigonomatariga isma bedelayaan.

Matalan, sin B = $\frac{18}{82}=\frac{9}{41}$, $\sin B=\frac{4.5}{20.5}=\frac{9}{41}$. Laakiin baaxadda saddexagalka ayaa is badelaysa. Sidaa darteed dherarka shakaalka way is badasha saddexagal ilaa saddaxagal.

Tusaalha 5: Jaantuskan 7.37 wuxuu muujinayaa in ay jiraan laba saddexagal xaglo qumman. Raadi sine, cosine iyo tangent ee xaglaha cabbirkoodu yahay α, β iyo θ sida muuqata.



Jaantuska 7.37

Furfuris: Marka ugu horraysa waxaad raadisaa dhererada AD iyo BC adiga oo isticmaalaya aragtiinka baytagoras.

$AD^2 = AB^2 + BD^2$ $\quad$ $BC^2 = BD^2 + DC^2$

$AD^2 = 1^2 + 2^2$ $\quad$ $BC^2 = 2^2 + 1^2$

$AD^2 = 5$ $\quad$ $BC^2 = 5$

$AD = \sqrt{5}$ $\quad$ $BC = \sqrt{5}$

i $\sin\alpha = \frac{AB}{AD}$ $\quad$ **ii** $\cos\alpha = \frac{BD}{AD}$

$\sin\alpha = \frac{1}{\sqrt{5}} = \frac{\sqrt{5}}{5}$ $\quad$ $\cos\alpha = \frac{2}{\sqrt{5}} = \frac{2\sqrt{5}}{5}$

$\sin\beta = \frac{DC}{BC}$ $\quad$ $\cos\beta = \frac{BD}{BC}$

$\sin\beta = \frac{1}{\sqrt{5}} = \frac{\sqrt{5}}{5}$ $\quad$ $\cos\beta = \frac{2}{\sqrt{5}} = \frac{2\sqrt{5}}{5}$

$\sin\theta = \frac{BD}{BC}$ $\cos\theta = \frac{DC}{BC}$

$\sin\theta = \frac{2}{\sqrt{5}} = \frac{2\sqrt{5}}{5}$ $\cos\theta = \frac{1}{\sqrt{5}} = \frac{\sqrt{5}}{5}$

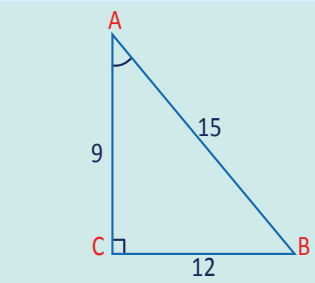
iii $\tan\alpha = \frac{AB}{BD}$ $\tan\beta = \frac{BC}{BD}$ $\tan\theta = \frac{BC}{DC}$

$\tan\alpha = \frac{1}{2}$ $\tan\beta = \frac{1}{2}$ $\tan\theta = 2$

Layliska 7.3

1 Raadi saynka, kosaynka, iyo tangantiga xagasha calaamadaysan ee Jaantuska 7.38.

b



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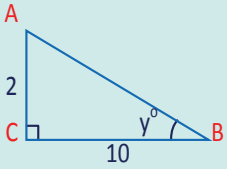

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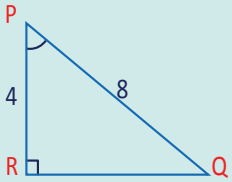
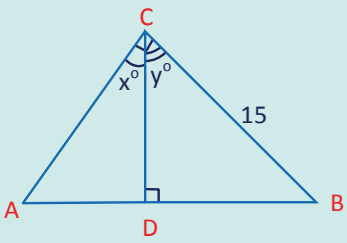


x



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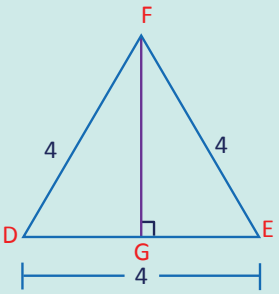


Jaantuska 7.38

2 Geed jooggiisu yahay 15m ayaa hadh 10m ah ku sameeyey dhulka. Raadi xagasha taanjentiga ee uu geedku kaga samaysay fallaadhaha cadceedda?

3 Raadi saynka xagasha ka samaysantay dhinaca labajibbaaran iyo xaglo-gooyaha.

4 Sallaan 9 mitirah ayaa lagu tiiriyay darbiqotoma. Haddii tanjantiga xagasha kasamaysantay sallanka iyo dhulka ay tahay 0.35, joog intee dhan ayuu sallanku ka gaarayaa darbiga?

7.2.2 Qiimayaasha saynka, kosaynka iyo taanjentiga ee xaglaha 45°, 30° iyo 60°

Xaglaha gaarka ah ee cabbirkoodu yahay 30°, 45° iyo 60° waxaa loo isticmaalaa adeegsiyada laxiriira tirigonomatariga. Sidaa darteed, saamiyada tirigonomatariga ee sadexda ah ee laxiriira xaglahaas waxaa lagu lafa guri qaybtan.

Hawl-galka7.5

Ujeedo: In lahelo saynka, kosaynka, iyo taanjantiga ee xagasha 45°

Saabaanka: Mastarad kusalaysan mitir iyo, xaglo-beeg.Sawir sadexgal, xagal qumman ΔABC kaa soo $m(\angle C) = 90^o$, AC = BC = 10 sm.

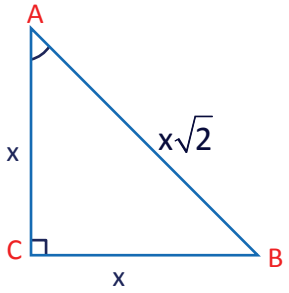
Jidmarin:

1. Raadi dhererka shakaalka.
2. Raadi cabbirka xaglaha∠A iyo ∠B.
3. Raadi qimeyaashe sayn kosayn iyo taanjenti ee xaglaha∠A iyo ∠B.
4. Qor bayaan qeexaya natiijooyinka su'aasha 3.

Hawlgalka 4, waxaad ku soo baratay saynka, kosaynka iyo taanjentiga xaglaha fiiqan ee sadexagal labaalaha, xagasha quman marka dhererka lugihiisa lagu sargooyo 10 sm.

Bal hadda aynu eegno sadexagal labaalaha xagasha qumman ΔABC kaas oo $m(\angle C) = 90^o$ iyo AC = BC = *x*halka*x*tahay tiro togan oo maangala. *Fiiri* Jaantuska 7.39.

$$AB^2 = AC^2 + BC^2$$
$$= x^2 + x^2$$
$$= 2x^2$$
$$AB = \sqrt{2x^2}$$
$$= x\sqrt{2}$$



Jaantuska 7.39

Sida muuqata $m(\angle A) = m(\angle B) = 45^o$.

Sidaas darteed qiimayaasha∠Aiyo∠B waa isku mid.

$$\sin A = \frac{BC}{AB} = \frac{x}{x\sqrt{2}} = \frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2}$$

Sidoo kale, $\cos A = \frac{AC}{AB} = \frac{x}{x\sqrt{2}} = \frac{\sqrt{2}}{2}$

$\tan A = \frac{BC}{AC} = \frac{x}{x} = 1$

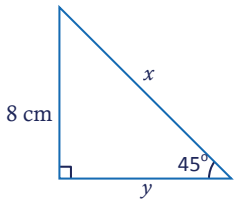
Si loo fududeeyo xisaabintan qaadox = 1, marka AB = $\sqrt{2}$.

Waxaana lagu soo koobay sidan:

i $\sin 45^o = \frac{\sqrt{2}}{2}$ **ii** $\cos 45^o = \frac{\sqrt{2}}{2}$ **iii** $\tan 45^o = 1$

Tusaalaha1: Raadi dhererada maqan ee Jaantuska 7.41 adiga oo isticmaalayasaamiyada tirigonometariga.

b



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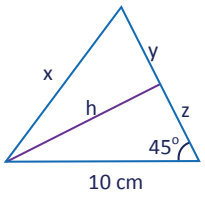


Jaantuska 7.40

Furfuris:

b $\tan 45^o = \frac{8\text{ cm}}{y}$

$1 = \frac{8\text{ cm}}{y}$

$y = 8\text{cm}$

$\sin 45^o = \frac{8\text{ cm}}{x}$

$\frac{1}{\sqrt{2}} = \frac{8\text{ cm}}{x}$

$x = 8\sqrt{2}\text{ cm}$

t $\sin 45^o = \frac{h}{10\text{ cm}}$

$\frac{\sqrt{2}}{2} = \frac{h}{10\text{ cm}}$

$h = 10\left(\frac{\sqrt{2}}{2}\right)\text{cm}$

$= 5\sqrt{2}\text{ cm}$

$\tan 45^o = \frac{h}{z} = 1 = \frac{5\sqrt{2}}{z}$

$z = 5\sqrt{2}\text{ cm}$

$\tan 45^o = \frac{x}{10\text{ cm}}$

$1 = \frac{x}{10\text{ cm}}$

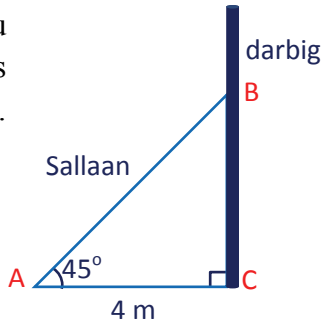
$x = 10\text{cm}$

Tusaalahe 2: Sallaan lagu tiiriyay darbi ayaa la sameeyay xagal 45° ah dhulka. Cagta sallaanka 4m ayay ka fogayd salka cirifka darbiga.Adiga oo isticmaalaya saamiyada tirigonomatariga ka jawaab mid kasta oo kamida su'aalaha soo socda.

b Joog intee dhan ayuu sallaanku ka gaadhi karaa darbiga:

t Raadi dhererka sallaanka?

Furfuris: Siloo furfuro meselada tallaabada ugu horraysa waa in la sawiro jaantus muujinaya sallaanka iyo cirifka darbiga. Fiiri Jaantuska 7.41.



Jaantuska 7.41

b $\tan 45^o = \frac{BC}{AC}$

$\frac{\sqrt{2}}{2} = \frac{BC}{4}$

$BC = 2\sqrt{2}$ m

t $\cos 45^o = \frac{AC}{AB}$

$\frac{\sqrt{2}}{2} = \frac{4}{AB}$

Sidoo kale, $\frac{1}{\sqrt{2}} = \frac{4}{AB}$

$AB = 4\sqrt{2}$ m

Qiimeyaasha sayn, kosayn iyo taanjentiga ee xaglaha 30° iyo 60°

Hawl-galka7.6

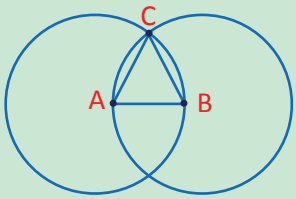
Ujeedo: Si loo helo sayn, kosayn iyo taanjantiga xaglaha 30° iyo 60°.

Saabaan: Mastarad ku salaysan mitir, jiheeye iyo xaglo-beeg.

Jidmarin:

1 **b** Sawir goobo gacankeedu yahay 4 sm xudunkeedu yahay barta A, islamarkaana u qaado "t" inay yihiin baro kasta oo ka midah goobada dusheeda.

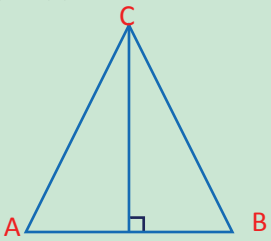
t Sawir goobo gacankeedu yahay 4 sm xudunkeeduna yahay barta Bku calaamadee barta ay iska gooynayaan goobooyinka in ay tahay c. Eeg Jaantuska 7.42.



Jaantuska 7.42

j Cabbir dhinacyada iyo xaglaha ΔABC. Waa noocee saddexagalka ΔABC?

2 Dib ugu sawirΔABC warqad gaar ah islamarkaana sawir joogga $\overline{CD}$ ee ku qotoma $\overline{AB}$ sida ka muuqata Jaantuska 7.43.



Jaantuska 7.43

b Raadi dhererka $\overline{CD}$.

t Waa maxay cabbirka xagasha∠ACD?

j Raadi qiimayaasha sayn, kosayn iyo taanjent ee cabbirada xaglaha∠A iyo∠ACD.

3 Qor hawraar qeexaysa sayn, kosayn iyo taanjent ee cabbirada xagalaha ∠B iyo ∠BCD.

Hawlgalka7.6 wuxuukaa caawinayaa inaad hesho qiimayaasha sayn, kosayn iyo taanjent ee xaglaha 30° iyo 60°.Soo qaado saddexagal labaalaha ABC iyo joogga AD ee ku qotoma BC. *Fiiri* Jaantuska 7.44.

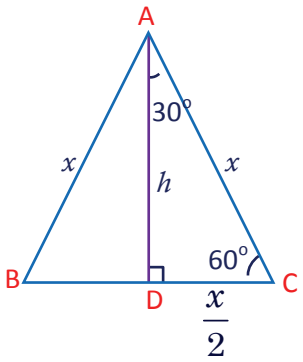
U qaado dhererka dhinac kasta eeΔABC x.

Markaa CD = $\frac{x}{2}$.

U qaado AD = h. Markaa $h^2 + \left(\frac{x}{2}\right)^2 = x^2$

$$h^2 = x^2 - \frac{x^2}{4} = \frac{3}{4}x^2$$

$$h = \sqrt{\frac{3}{4}x^2} = \frac{x\sqrt{3}}{2}$$



Jaantuska 7.44

Hadda $\sin C = \frac{h}{x} = \frac{\frac{x\sqrt{3}}{2}}{x} = \frac{x\sqrt{3}}{2x} = \frac{\sqrt{3}}{2}$,

$$\cos C = \frac{\left(\frac{x}{2}\right)}{x} = \frac{x}{2x} = \frac{1}{2}$$

$$\tan C = \frac{h}{\left(\frac{x}{2}\right)} = \frac{\left(\frac{x\sqrt{3}}{2}\right)}{\left(\frac{x}{2}\right)} = \frac{x\sqrt{3}}{2} \times \frac{2}{3} = \sqrt{3}$$

Si loo fududeeyo xisaabinta, u qaadox = 2. Markaa $\frac{x}{2} = 1$.

Natijooyinka sare waxaan ku soo koobaynaa sidan:

i

$\sin 60^o = \frac{\sqrt{3}}{2}$

$\cos 60^o = \frac{1}{2}$

$\tan 60^o = \sqrt{3}$

ii

$\sin 30^o = \frac{1}{2}$

$\cos 30^o = \frac{\sqrt{3}}{2}$

$\tan 30^o = \frac{1}{\sqrt{3}} = \frac{\sqrt{3}}{3}$

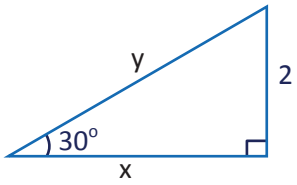
Xusuusnow xaglaha is-dhammaystira sida 60° iyo 30°, qimeyaasha taanjaantiyada waa rogaallada midba midka kaleQiimaha saynka ee xaglaha midkood wuxuu le'eg yahay qiimaha kosaynka ee xagasha kale.

Farsemada fudud:

Raadi qiimayeesha saynka, kosaynka iyo taanjaantahe xaglaha 30°, 45° iyo 60° adiga oo isticmaaleya kal kuleetar sayntifig.

Tusaale 3: Raadi qiimayaasha *x* iyo *y* ee saddexagalada xaglaha qumman ee Jaantuska 7.45.

b



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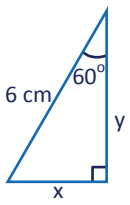


Jaantuska 7.45

Furfuris: Adeegsiga saamiyada tirigonomeetariga waxay ku siinaysaa sidan:

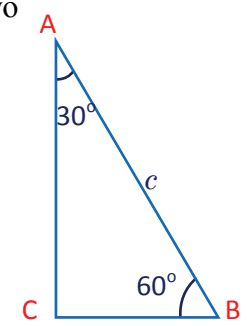
b $\sin 30^o = \frac{2\text{ cm}}{y}$ $\frac{1}{2} = \frac{2\text{cm}}{y}$ $y = 4\text{cm}$	$\tan 30^o = \frac{2}{x}$ $\frac{\sqrt{3}}{3} = \frac{2}{x}$ $x = \frac{6\sqrt{3}}{3} = 2\sqrt{3}\text{ cm}$
t $\sin 60^o = \frac{x}{6\text{ cm}}$ $\frac{\sqrt{3}}{2} = \frac{x}{6\text{cm}}$ $\frac{6\sqrt{3}}{2}\text{ cm} = x$ $x = 3\sqrt{3}\text{ cm}$	$\cos 60^o = \frac{y}{6\text{ cm}}$ $\frac{1}{2} = \frac{y}{6\text{cm}}$ $y = \frac{1}{2}(6\text{cm})$ $= 3\text{cm}$

Tusaale 4: ku qeex dhererada lugaha saddexagalka 30° iyo 60° adiga oo ku tibaaxaya dhererka shakaalka C.

Furfuris: U qaadoΔABC inuu yahay saddexagal xagal qumman cabbirka

$m(\angle A) = 30^o$, $m(\angle B) = 60^o$ iyo $AB = c$.

Fiiri Jaantuska 7.46



Jaantuska 7.46

$\sin 30^o = \frac{BC}{AB}$ $\frac{1}{2} = \frac{BC}{c}$ $BC = \frac{c}{2}$	$\sin 60^o = \frac{AC}{AB}$ $\frac{\sqrt{3}}{2} = \frac{AC}{c}$ $AC = \frac{c\sqrt{3}}{2}$

Sidaas darteed 30^o iyo 60° ee saddexagalka dhererada dhinacyadiisu waa $\frac{c}{2}$, $\frac{c\sqrt{3}}{2}$ iyo c.

Tusaale 5: Birta calanka ayaa bixisay hoos dhererkiisu yahay 4m dhulsiman dushiisa. Haddi xagasha ay ku sameeyeen dhamaadka hooska dhulka iyo iftiinka fallaaraha ka imanaya cadceeda ay tahay 30°, raadi joogga birta calanka adiga oo qaadanaya cabbirka sintimitirka ugu dhaw.

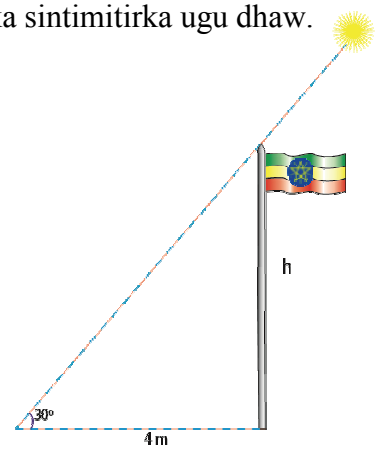
Furfuris: Fiiri Jaantuska 7.47.

$$\tan 30^o = \frac{h}{4m}$$

$$\frac{\sqrt{3}}{3} = \frac{h}{4m}$$

$$h = \frac{4\sqrt{3}}{3}\ m$$

$$h \approx 2.31\text{m}$$

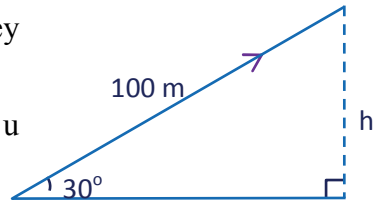


Jaantuska 7.47

Tusaale 6: ka soo qaad shimbir duulaysa ayaa degtay meel 100m ka fog xagal 30° ah marka loo eego sinaanta dhulka. Joog intee dhan ayey shimbirtu kasarraysaa dhulka

Furfuris: Uqaado h joogga ay shimbirtu kor u duushay sida kamuuqata Jaantuska 7.48

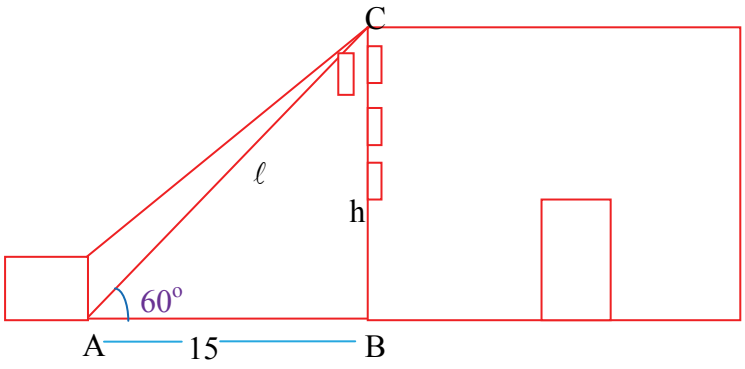
$$\sin 30^o = \frac{h}{100\ m} \Rightarrow \frac{1}{2} = \frac{h}{10\ m} \Rightarrow \quad h = 50\text{ m}$$



Jaantuska 7.48

Shimbirtu waxay ka sarraysaa dhulkc 50 m.

Tusaale 7: Wiish ayaa kor looga qaaday xagal 60° si uu ugaaro dhalada sare ee dhismaha dugsi. (Fiiri Jaantuska 7.49) Haddii salka wish ku uu 15m ka fogyahay cagta dhismaha dugsiga, raadi joogga dhismaha dugsiga iyo dhererka kor loo qaaday wiishka.



Jaantuska 7.49

Furfuris: Uqaado jooggadhismaha dugsiga, in u yahay halbeeg h ah iyo joogga uu wiishka sare u kacay tahay l mitir Jaantuska 7.49 waxaad kuatki kartaa in.

$$\tan 60^o = \frac{h}{15\,m} \qquad \cos 60^o = \frac{15m}{\ell}$$

$$\sqrt{3} = \frac{h}{15\,m} \qquad \frac{1}{2} = \frac{15m}{\ell}$$

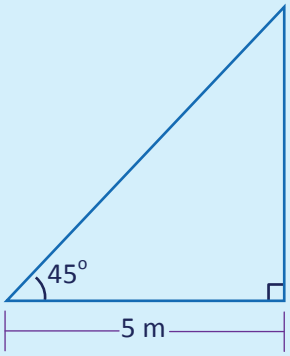
$$h = 15\sqrt{3}\,m \qquad \ell = 30m$$

Joogga dugsiga waa $15\sqrt{3}$ m. 30 m ayaa wiishka kor loo qaaday.

Layliska7.4

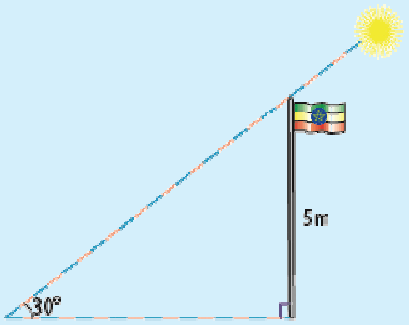
1 Ka jawaab mid kasta oo kamida su'aalaha soo socda ee ka muuqda Jaantuska 7.50 - 7.54.

b Waa intee dhererka geedku?



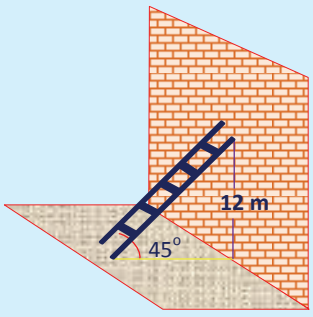
Jaantuska 7.50

t Waa intee dhererka hoosku?



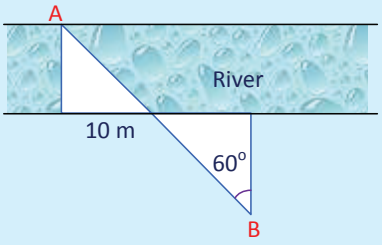
Jaantuska7.51

j Waa imisa dhererka sallaanka?



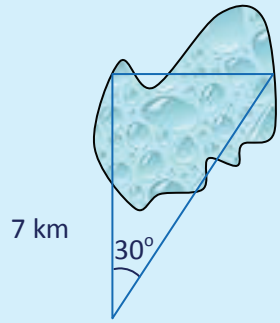
Jaantuska 7.52

x Wa intee ballaca wabiga?



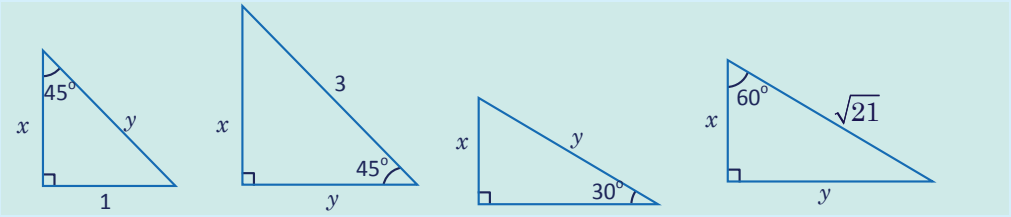
Jaantuska 7.53

kh Waa imisa ballaca Harta?



Jaantuska 7.54

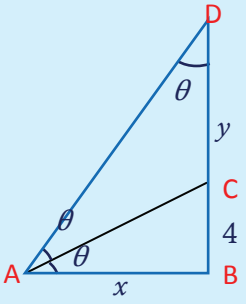
2 Jaantusyada 7.55, raadi dhererada lagu calaamadeeyay$x$ iyo$y$.



b **t** **j** **x**

Jaantuska 7.55

3 Jaantuska 7.56, m (∠B) = 90°, BC = 4cm, iyo ∠BAC ≅∠CAD ≅∠ADB. Raadi qiimayaasha$x$, y iyo θ.



Jaantuska 7.56

4 Waddo ayaa xagal janjeedha 30°samaysay marka loo eego xarriiq toosan. Raadi fogaanta ay tahay inaad waddada kor ugu lugayso siaad ugu kordhiso jooggaaga 100m.

5 Sallaan dhererkiisu yahay 12m ayaa lagu tiiriyay darbi wuxuuna gaadhay joog 6m ka sarreeya dhulka. Raadi xagasha uu sallaanku la sameeyay dhulka.

6 Haddii aad si toos ah u lugayso 173 m islamarkaanaaad gaadhid fikta sare ee buur dheererkeedu yahay 150 m. Raadi janjeedhka (xagasha) buurta (isticmaal shaxda qiimaha)

7.3 SHAXANNADA ADKAHA

Cutubka 5 ee xisaabta fasalka 7 waxaad ku soo baratay shaxannada adkaha sida gumburaha biriisim iyo dhululubooyinka.Cutub-hoosaadkan waxaad ku baran doontaa laba nooc oo kale oo ka mida shaxannada adkaha sida Gumburada bayramidhka iyo toobinada.Gumburada bayraamidhka iyo toobinadu waa adkayaasha caanka ka ah dunidan.Tusaale gumburada bayraamidhka ee masaarida, gumburada bayraamidh ka ee silsilada raashinka.

Waxaad kufalanqayn doontaan gumburada bayramidhka iyo toobinada laba qaybood ahaan.

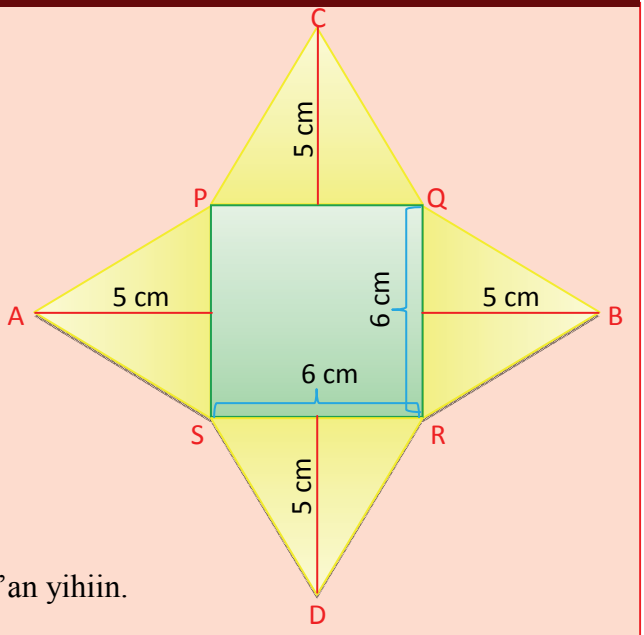
7.3.1 Gumburada bayraamidhka

Shaqo-kooxeedka7.4

Ujeedo: In laga sameeyo gunburada bayraamidha warqad la'laalaabay.

Saabaan: Mastarad ku salaysan mitir, manqasyo, iyo warqadadag. Guuri Jaantuska 7.57. Laalaab oo fidi saddex-xagalka adiga oo raacaya tilmaamaha geesaha A, B C iyo D. PQRS waa labajibbaarane dhererka dhinaciisu yahay 6 sm.

Saddexagalladu waa ay isku sargo'an yihiin.



Jaantuska7.57

Jidmarin:

1 Waa noocee jaantuska adkaha ah ee aad aragto?

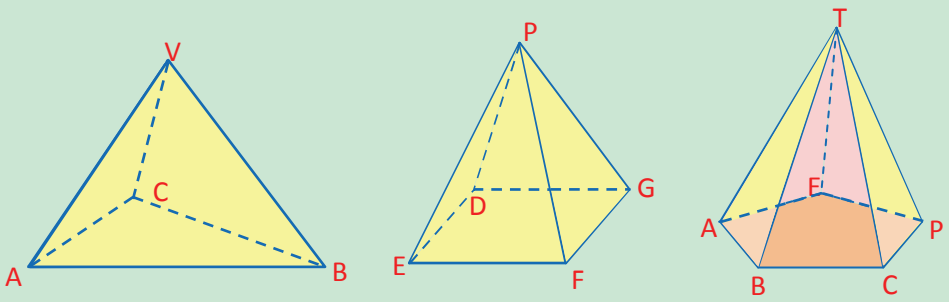
2 Sawir adkaha adiga oo ilaalinaya in uusan isbedel ku dhicin salka PQRS. Salku waa wajiga fidsan ee adkuhuuu ku fadhiyo.

Shaxanka adkaha ee hawlgal kooxeedka 7.4 wuxuu tusaale u yahay gumbur bayraamidh salkiisu yahay labajibbarane.Hawlgalkan soo socda waxaad ku arki doontaa gumbur bayraamidh salkiisu yahay geesoole.

Hawl-galka 7.7

Fiiri gunburada baraamidhyada ka muuqda Jaantuska 7.58.

b **t** **j**



Jaantuska 7.58

1 Qor tirada wajiyada ee gumbur kasta uu leeyahay.

2 muuji salka gumburkasta.

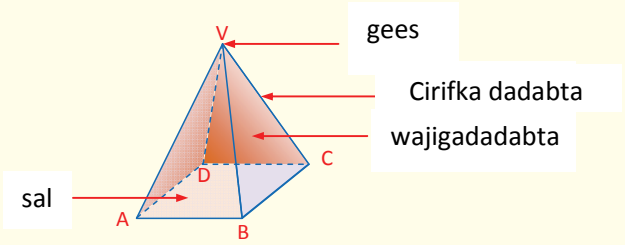
3 Qor hawraar qeexaysa geesaha V, P iyo T.

4 Fatanqee sida loo qeexo waxa uu yahay gumbur.

Hawlgalka7.7, waxaad ku soo aragtay gumbur inuu yahay adke salkiisu yahay geesoole wajiyadiisa kalena ay yihiin saddexagallo.

Guudahaan gumbur waxaa loo qeexaa sidan soo socota.

Qeexid 7.2 *Gumbur waa adke ka samaysma isku xiridda geesaha geesoole.Bedka geesoolaha waxaa loogu yeeraa salka gumburka.*

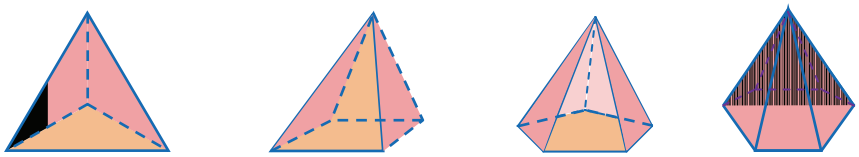


Jaantuska 7.59

- *ABCD waa salka gumburka.*
- *V waa gees.*
- *Wajiyada saddexagal ee gumburka sida ΔBVC, ΔCVD waxaa lagu magacaabaa wajiyada dadabta.*

- *Dhinacyada wajiyada dadabta kuwaas aan ahayn dhinacyada salalka sida VA, VB, VC, VD waxaa loo yaqaanaa cirifyada dadabta.*
- *Salka gumburtu waxaa noqon kara geesoole kasta laakiinse wajiyadeeda dadabta had iyo jeer waa saddexagalo sidaas awgeed, gumbur waxaa loogu magac bixiyaa hadba qabka (ama nooca) uu yahay salalkeeda.*

Gumbur, haddii ay salalkoodu yihiin, saddex xagal, afargeesle, shan geesle, lixgeesle, siddey u kale horeeyaan (Fiiri Jaantuska 7.61).



Gumbur Saddex xagaleed | *Gumbur Afar-geelse* | *Gumbur shangeesle* | *Gumbur lixgeesle*

Jaantuska 7.60

7.3.2 Toobin

Waxaa jira walxo dhabah oo leh qaabka toobinka, tusaale ahaan saqafka mundulka, geesaha lo'da, jallaatada, koofiyada lagashado maalinta dhalashada, la xusayo Kuwaas aan kor kusoo xusnay waa qaar kamida walxaha leh qaabka toobinka.Qaybtan waxaad kubaran doontaa qaybaha kala duwan ee toobinka.

Shaqo-kooxeedka7.5

Ujeedo: Samayntatoobin iyada oo la laalaabayo lana duubayo warqad.

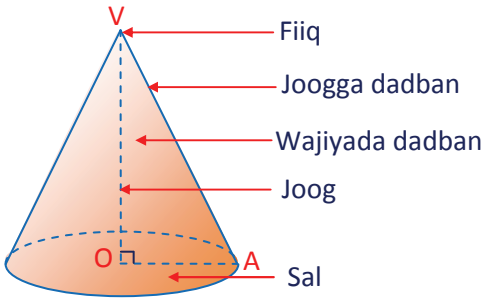
Qalabka loo baahan yahay: Mastarad cabbiran qalabka lagu cabbiro goobada, xagal beege manqas, warqad adag.

Habka laraacayo:

1. Falanqee noocajoomatariga ee ay walaxdu noqoto marka salka gumburku isubedelo qaab gabal goobeed.
2. Sawir 3 goobo oo gacankoodu yahay 10 sm oo u kala googoo
   - i Goobobadh
   - ii Rubuc goobo
   - iii Goobo gabal xagalshiisu tahay 120^o.
   - iv Goobo gabal xagashiisu tahay 270^o.
3. Kor duub gabalkasta oo su'aashaha 2 oo gacanada cabbir.
4. U soo bandhig fasalka muunadda aad ka soo samaysay weydiinta 3^{aad}.
5. Qor weedh qeexaysa muunadaasi.

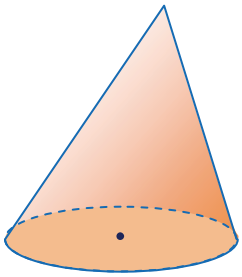
Muunadahaaad ku sameeysay Shaqo-kooxeedka 7.5 waa tusaaleyaasha adkeyaasha ee looyaqaano: toobino goobeedyo qumman.

Hadaba guud ahaan toobin goobeedka qumman (toobinka fudud) wuxuu inooga muuqdaa Jaantuska 7.61.



Toobin goobeed quman

Jaantuska 7.62



Toobin janjeedha

Jaantuska 7.63

Toobin goobeed qumman

Xusuus: *Toobin waa shaxan adke ah oo ka kooban sal, kaas oo ah gobal goobeed ee dusha sallaxah iyo fiiqa sallaxa kale,*

- *salku waa wajigo fidsan uu toobinku kufadhiyo salku waa gabal goobeed.*
- *wajiga dadbani waa wajigaxoodan ee toobinka*
- *jooggu waa xariijinta ku qotonta taasoo katimaada fiiqa ilaa xudunta (badhtanka) salka.*

Haddii VO aynaahayn qotonka OA markaa toobinka waxaa layidhaahdaa: toobinka janjeedha sida kamuuqatatoobinka (Jaantuska 7.64)

Layliska 7.5

1 Sawir toobin gacankiisu yahay 4 sm muuji salkiisa, wajiyada dadban, fiiqa, Joogga iyo joogga janjeedha.

2 Ku qor magacyada, salka,fiiqa, geftinada dadban iyo wajiyada dadban, ee gumburka, marka salkiisu yahay.

b qardhaas **t** 8 - geesoole

3 Waa imisa tirada ugu yare ee wajiyogumbur yeelan karo?

4 Waa noocee saddexaagallada ay noqonayaan wajiyada dadban ee gumburka caadiga ah?

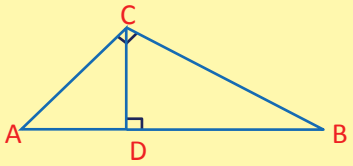
Furaha Tibxaha

- Fiiqa
- Gumburka
- Aragtinka yuklidh
- Geftinada dadban
- Addin (lug)
- Shaxan adke ah
- Barta ugu saraysa
- Salka
- Rogaalka
- Aragtiinka baytagoros
- Taabtaha
- Toobin
- Kosayn
- Shakaalka
- Wajiyada dadban
- Sayn
- Tirigonometri
- Taanjeentiga

Sookoobida Cutubka

1 Aragtiinka yuklidh

U qaado ΔABC yahay saddexagal xagal qummanoo ay $\overline{CD}$ tahay joogga ku qotoma fiiqa, C ilaa shakaalka $\overline{AB}$ marka.

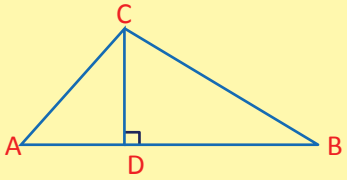


i $AC^2 = AD \times AB$

ii $BC^2 = BDAB$

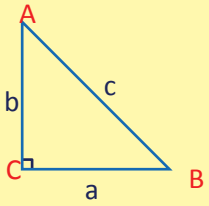
2 Rogaalka aragtiin yuklidh

Sida ΔABC haddii, $\overline{CD}$ ay tahay joogga C ilaa AB sidaas darteed $AC^2 = AD \times AB$ iyo $BC^2 = BD \times AB$, markaa ΔABC waa saddexagal xagal qumman oo lehm($<C$) = 90°.



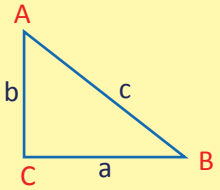
3 Aragtiinka baytagoras

Saddexagal xagalqumman, ay addimuhu le'eg yihiin laba jibaaka $a^2 + b^2 = c^2$ shakaalka.



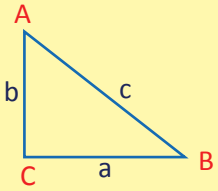
4 Rogaalka aragtiinka baytagoras

Hadii wadarta labajibaarka dhererada labada dhinac, le'egtahaylabajibaarkadhinaca saddexaad markaa saddexaglku waa saddexagalxagal qumman.



5 *Haddii ΔABC uu yahay saddexagal xagal qumman ee xagasha qumman ($<C$) = 90°,*

sayn $A = \frac{a}{c}$; kosayn $A = \frac{b}{c}$; $\tan A = \frac{a}{b}$



Haddii A iyo B ay yihiin xaglaha fiiqan ee saddexagalxagalqumman markaa A iyo B waa xaglo isbuuxsha isla markaana:

i *Sayn A = kosayn B*

ii *kos A = sayn B*

6 Saynka, koska, iyo tanjentiga ee xoglaha 30^o, 45^o iyo 60^o:

i $sayn\ 45^o = kosay45^o = \frac{\sqrt{2}}{2}$; $tan\ 45^o = 1$

ii $sayn30^o = \frac{1}{2}$; $kosay30^o = \frac{\sqrt{3}}{2}$; $tan\ 30^o = \frac{\sqrt{3}}{3}$

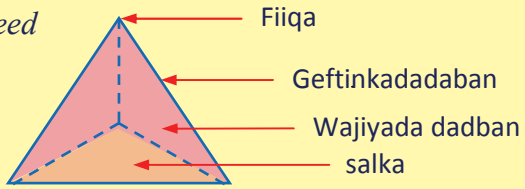
iii $sayn60^o = \frac{\sqrt{3}}{2}$; $kosay60^o = \frac{1}{2}$; $tan\ 60° = \sqrt{3}$

7 Shaxannada adkaha

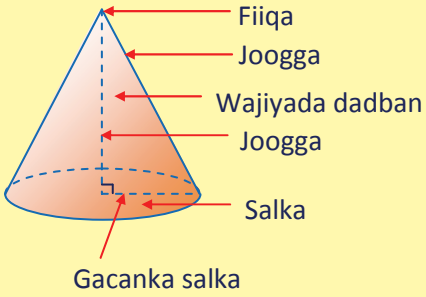
i *Gumburka*

Gumburka waxaa loogu magacdaraa qaabka salkiisa, sida::

- ✓ *gumbur sadex- xagaleed*
- ✓ *gumbur afar- geesle*
- ✓ *gumbur shan-geesle*
- ✓ *gumbur lix-geesle*



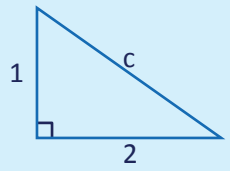
ii *Toobin*



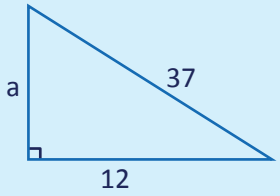
Nakhtiinka laylis cutubka 7aad

1 Raadi mid kasta dhererka dhinaca maqan ee saddexagal xagal qumman ee soo socda.

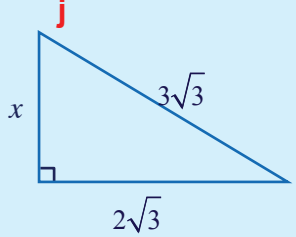
b



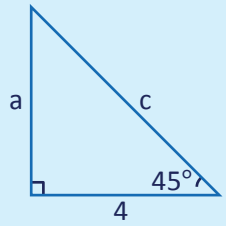
t



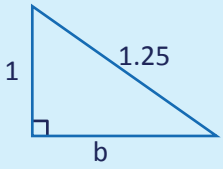
j



x



kh



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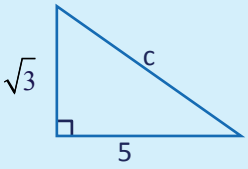

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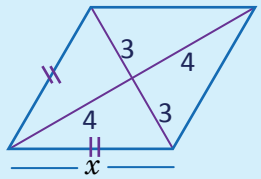
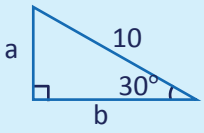


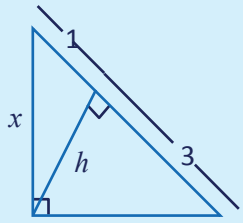
s



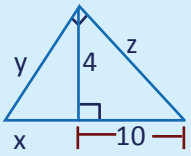
Jaantuska 7.65

2 Raadi dhererka dhinaca maqan ee saddexagal xagal qumman ee soo socda.

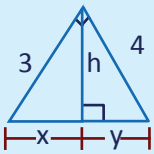
b



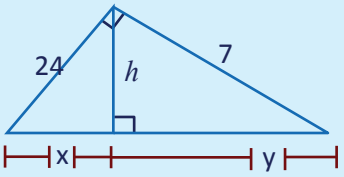
t



j



x



Jaantuska 7.66

3 Haddii dhererka dhinackasta oo laba jibaarane yahay 5 sm. Raadi dhererka xaglo gooye kasta.

4 Haddii xaglo gooyaha laba jibaarane yahay 12sm, raadi dhererka dhinac kasta.

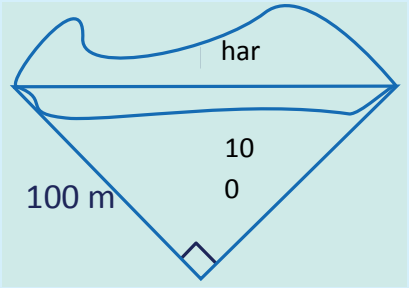
5 Haddii dhinacyada laydi ay kala yihiin 3 sm iyo 7 sm. Waa intee dhererka xaglo gooyaha mid ka mida ahi?

6 Sallaan dhererkiisu yahay 10 m, ayaa kutiirsan, gidaar ka soo horjeeda oo qoton ah. Haddii cagta sallaanka uu u jiro salku gidaarka ay tahay 3m, joog intee le'eg ayuu ku gaadhayaa gidaarka?

7 Dhererada xaglo-gooyayaasha qardhaas ayaa kala ah 8 sm iyo 6 sm. Raadi wareegga qardhaasta.

8 Haddii shakaalka saddex-agal xagal qumman uu dheer yahay 4 addinka ugu yar addinkiisa ugu weyna yahay 8 sm. Raadi wareegga saddexagalka.

9 Raadi dhererka harta (warta) soo socota.

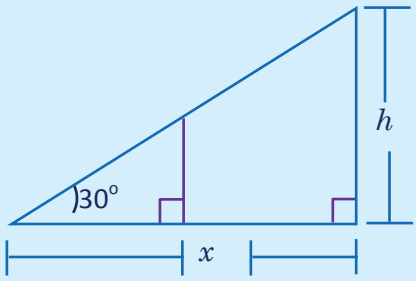


Jaantuska 7.67

Shaqo mashruuca:

10 Adigoo isticmaalaya cabbiraad aan toos aheyn. Raadi ballaca buuxa ee ballli ama har (warta) ee agagaarkiina kutaala.

11 Adigoo isticmaalaya 30^o – 60^oqalabka labajibbaaran iyo 45^o – 45^oee qalabka labajibbaaran cabbir joogga geedka, iyo cidhifyada dhismaha ee aad heli kartid adigoo iskaga beegaya meelku haboon sida ka muuqata (Jaantaska 7.68)



Jaantaska 7.68

12 Imisa waji dadban ayuu yeelan karaa gumburka haddii ay salalkiisu yihiin

b 9-dhinac **t** 20-dhinac **j** *n*-dhinacyo

13 Muuji wajiyada dadban ee gumburka caadiga'ah inayisku sargo'an yihiin saddexagal ka labaalahaah.

14 Haddii salka gumburka uu isubadalo gabal goobeed, markaa adke noocee ah baynu heleynaa?

Shaxada Xidid $y = \sqrt{x}$

	0	1	2	3	4	5	6	7	8	9
1.0	1.000	1.005	1.010	1.015	1.020	1.025	1.030	1.034	1.039	1.044
1.1	1.049	1.054	1.058	1.063	1.068	1.072	1.077	1.082	1.086	1.091
1.2	1.095	1.100	1.105	1.109	1.114	1.118	1.122	1.127	1.131	1.136
1.3	1.140	1.145	1.149	1.153	1.158	1.162	1.166	1.170	1.175	1.179
1.4	1.183	1.187	1.192	1.196	1.200	1.204	1.208	1.212	1.217	1.221
1.5	1.225	1.229	1.233	1.237	1.241	1.245	1.249	1.253	1.257	1.261
1.6	1.265	1.269	1.273	1.277	1.281	1.285	1.288	1.292	1.296	1.300
1.7	1.304	1.308	1.311	1.315	1.319	1.323	1.327	1.330	1.334	1.338
1.8	1.342	1.345	1.349	1.353	1.356	1.360	1.364	1.367	1.371	1.375
1.9	1.378	1.382	1.386	1.389	1.393	1.396	1.400	1.404	1.407	1.411
2.0	1.414	1.418	1.421	1.425	1.428	1.432	1.435	1.439	1.442	1.446
2.1	1.449	1.453	1.456	1.459	1.463	1.466	1.470	1.473	1.476	1.480
2.2	1.483	1.487	1.490	1.493	1.497	1.500	1.503	1.507	1.510	1.513
2.3	1.517	1.520	1.523	1.526	1.530	1.533	1.536	1.539	1.543	1.546
2.4	1.549	1.552	1.556	1.559	1.562	1.565	1.568	1.572	1.575	1.578
2.5	1.581	1.584	1.587	1.591	1.594	1.597	1.600	1.603	1.606	1.609
2.6	1.612	1.616	1.619	1.622	1.625	1.628	1.631	1.634	1.637	1.640
2.7	1.643	1.646	1.649	1.652	1.655	1.658	1.661	1.664	1.667	1.670
2.8	1.673	1.676	1.679	1.682	1.685	1.688	1.691	1.694	1.697	1.700
2.9	1.703	1.706	1.709	1.712	1.715	1.718	1.720	1.723	1.726	1.729
3.0	1.732	1.735	1.738	1.741	1.744	1.746	1.749	1.752	1.755	1.758
3.1	1.761	1.764	1.766	1.769	1.772	1.775	1.778	1.780	1.78	1.786
3.2	1.789	1.792	1.794	1.797	1.800	1.803	1.806	1.808	1.811	1.814
3.3	1.817	1.819	1.822	1.825	1.828	1.830	1.833	1.836	1.838	1.841
3.4	1.844	1.847	1.849	1.852	1.855	1.857	1.860	1.863	1.865	1.868
3.5	1.871	1.873	1.876	1.879	1.881	1.884	1.887	1.889	1.892	1.895
3.6	1.897	1.900	1.903	1.905	1.908	1.910	1.913	1.916	1.918	1.921
3.7	1.924	1.926	1.929	1.931	1.934	1.936	1.939	1.942	1.944	1.947
3.8	1.949	1.952	1.954	1.957	1.960	1.962	1.965	1.967	1.970	1.972
3.9	1.975	1.977	1.980	1.982	1.985	1.987	1.990	1.992	1.995	1.997
4.0	2.000	2.002	2.005	2.007	2.010	2.012	2.015	2.017	2.020	2.022
4.1	2.025	2.027	2.030	2.032	2.035	2.037	2.040	2.042	2.045	2.047
4.2	2.049	2.052	2.054	2.057	2.059	2.062	2.064	2.066	2.069	2.071
4.3	2.074	2.076	2.078	2.081	2.083	2.086	2.088	2.090	2.093	2.095
4.4	2.098	2.100	2.102	2.105	2.107	2.110	2.112	2.114	2.117	2.119
4.5	2.121	2.124	2.126	2.128	2.131	2.133	2.135	2.138	2.140	2.142
4.6	2.145	2.147	2.149	2.152	2.154	2.156	2.159	2.161	2.163	2.166
4.7	2.168	2.170	2.173	2.175	2.177	2.179	2.182	2.184	2.186	2.189
4.8	2.191	2.193	2.195	2.198	2.200	2.202	2.205	2.207	2.209	2.211
4.9	2.214	2.216	2.218	2.220	2.223	2.225	2.227	2.229	2.232	2.234
5.0	2.236	2.238	2.241	2.243	2.245	2.247	2.249	2.252	2.254	2.256
5.1	2.258	2.261	2.263	2.265	2.267	2.269	2.272	2.274	2.276	2.278
5.2	2.280	2.283	2.285	2.287	2.289	2.291	2.293	2.296	2.298	2.300
5.3	2.302	2.304	2.307	2.309	2.311	2.313	2.315	2.317	2.319	2.322
5.4	2.324	2.326	2.328	2.330	2.332	2.335	2.337	2.339	2.341	2.343

Shaxada Xidid Labajibaarka $y = \sqrt{x}$

	0	1	2	3	4	5	6	7	8	9
5.5	2.345	2.347	2.349	2.352	2.354	2.356	2.358	2.360	2.362	2.364
5.6	2.366	2.369	2.371	2.373	2.375	2.377	2.379	2.381	2.383	2.385
5.7	2.387	2.390	2.392	2.394	2.396	2.398	2.400	2.402	2.404	2.406
5.8	2.408	2.410	2.412	2.415	2.417	2.419	2.421	2.423	2.425	2.427
5.9	2.429	2.431	2.433	2.435	2.437	2.439	2.441	2.443	2.445	2.447
6.0	2.449	2.452	2.454	2.456	2.458	2.460	2.462	2.464	2.466	2.468
6.1	2.470	2.472	2.474	2.476	2.478	2.480	2.482	2.484	2.486	2.488
6.2	2.490	2.492	2.494	2.496	2.498	2.500	2.502	2.504	2.506	2.508
6.3	2.510	2.512	2.514	2.516	2.518	2.520	2.522	2.524	2.526	2.528
6.4	2.530	2.532	2.534	2.536	2.538	2.540	2.542	2.544	2.546	2.548
6.5	2.550	2.551	2.553	2.555	2.557	2.559	2.561	2.563	2.565	2.567
6.6	2.569	2.571	2.573	2.575	2.577	2.579	2.581	2.583	2.585	2.587
6.7	2.588	2.590	2.592	2.594	2.596	2.598	2.600	2.602	2.604	2.606
6.8	2.608	2.610	2.612	2.613	2.615	2.617	2.619	2.621	2.623	2.625
6.9	2.627	2.629	2.631	2.632	2.634	2.636	2.638	2.640	2.642	2.644
7.0	2.646	2.648	2.650	2.651	2.653	2.655	2.657	2.659	2.661	2.663
7.1	2.665	2.666	2.668	2.670	2.672	2.674	2.676	2.678	2.680	2.681
7.2	2.683	2.685	2.687	2.689	2.691	2.693	2.694	2.696	2.698	2.700
7.3	2.702	2.704	2.706	2.707	2.709	2.711	2.713	2.715	2.717	2.718
7.4	2.720	2.722	2.724	2.726	2.728	2.729	2.731	2.733	2.735	2.737
7.5	2.739	2.740	2.742	2.744	2.746	2.748	2.750	2.751	2.753	2.755
7.6	2.757	2.759	2.760	2.762	2.764	2.766	2.768	2.769	2.771	2.773
7.7	2.775	2.777	2.778	2.780	2.782	2.784	2.786	2.787	2.789	2.791
7.8	2.793	2.795	2.796	2.798	2.800	2.802	2.804	2.805	2.807	2.809
7.9	2.811	2.812	2.814	2.816	2.818	2.820	2.821	2.823	2.825	2.827
8.0	2.828	2.830	2.832	2.834	2.835	2.837	2.839	2.841	2.843	2.844
8.1	2.846	2.848	2.850	2.851	2.853	2.855	2.857	2.858	2.860	2.862
8.2	2.864	2.865	2.867	2.869	2.871	2.872	2.874	2.876	2.877	2.879
8.3	2.881	2.883	2.884	2.886	2.888	2.890	2.891	2.893	2.895	2.897
8.4	2.898	2.900	2.902	2.903	2.905	2.907	2.909	2.910	2.912	2.914
8.5	2.915	2.917	2.919	2.921	2.922	2.924	2.926	2.927	2.929	2.931
8.6	2.933	2.934	2.936	2.938	2.939	2.941	2.943	2.944	2.946	2.948
8.7	2.950	2.951	2.953	2.955	2.956	2.958	2.960	2.961	2.963	2.965
8.8	2.966	2.968	2.970	2.972	2.973	2.975	2.977	2.978	2.980	2.982
8.9	2.983	2.985	2.987	2.988	2.990	2.992	2.993	2.995	2.997	2.998
9.0	3.000	3.002	3.003	3.005	3.007	3.008	3.010	3.012	3.013	3.015
9.1	3.017	3.018	3.020	3.022	3.023	3.025	3.027	3.028	3.030	3.032
9.2	3.033	3.035	3.036	3.038	3.040	3.041	3.043	3.045	3.046	3.048
9.3	3.050	3.051	3.053	3.055	3.056	3.058	3.059	3.061	3.063	3.064
9.4	3.066	3.068	3.069	3.071	3.072	3.074	3.076	3.077	3.079	3.081
9.5	3.082	3.084	3.085	3.087	3.089	3.090	3.092	3.094	3.095	3.097
9.6	3.098	3.100	3.102	3.103	3.105	3.106	3.108	3.110	3.111	3.113
9.7	3.114	3.116	3.118	3.119	3.121	3.122	3.124	3.126	3.127	3.129
9.8	3.130	3.132	3.134	3.135	3.137	3.138	3.140	3.142	3.143	3.145
9.9	3.146	3.148	3.150	3.151	3.153	3.154	3.156	3.158	3.159	3.161

Shaxada Xidid Labajibaarka $y = x^2$

	1	2	3	4	5	6	7	8	9
1.0	1.020	1.040	1.061	1.082	1.103	1.124	1.145	1.166	1.188
1.1	1.232	1.254	1.277	1.300	1.323	1.346	1.369	1.392	1.416
1.2	1.464	1.488	1.513	1.538	1.563	1.588	1.613	1.638	1.664
1.3	1.716	1.742	1.769	1.796	1.823	1.850	1.877	1.904	1.932
1.4	1.988	2.016	2.045	2.074	2.103	2.132	2.161	2.190	2.220
1.5	2.280	2.310	2.341	2.372	2.403	2.434	2.465	2.496	2.528
1.6	2.592	2.624	2.657	2.690	2.723	2.756	2.789	2.822	2.856
1.7	2.924	2.958	2.993	3.028	3.063	3.098	3.133	3.168	3.204
1.8	3.276	3.312	3.349	3.386	3.423	3.460	3.497	3.534	3.572
1.9	3.648	3.686	3.725	3.764	3.803	3.842	3.881	3.920	3.960
2.0	4.040	4.080	4.121	4.162	4.203	4.244	4.285	4.326	4.368
2.1	4.452	4.494	4.537	4.580	4.623	4.666	4.709	4.752	4.796
2.2	4.884	4.928	4.973	5.018	5.063	5.108	5.153	5.198	5.244
2.3	5.336	5.382	5.429	5.476	5.523	5.570	5.617	5.664	5.712
2.4	5.808	5.856	5.905	5.954	6.003	6.052	6.101	6.150	6.200
2.5	6.300	6.350	6.401	6.452	6.503	6.554	6.605	6.656	6.708
2.6	6.812	6.864	6.917	6.970	7.023	7.076	7.129	7.182	7.236
2.7	7.344	7.398	7.453	7.508	7.563	7.618	7.673	7.728	7.784
2.8	7.896	7.952	8.009	8.066	8.123	8.180	8.237	8.294	8.352
2.9	8.468	8.526	8.585	8.644	8.703	8.762	8.821	8.880	8.940
3.0	9.060	9.120	9.181	9.242	9.303	9.364	9.425	9.486	9.548
3.1	9.672	9.734	9.797	9.860	9.923	9.986	10.049	10.112	10.176
3.2	10.304	10.368	10.433	10.498	10.563	10.628	10.693	10.758	10.824
3.3	10.956	11.022	11.089	11.156	11.223	11.290	11.357	11.424	11.492
3.4	11.628	11.696	11.765	11.834	11.903	11.972	12.041	12.110	12.180
3.5	12.320	12.390	12.461	12.532	12.603	12.674	12.745	12.816	12.888
3.6	13.032	13.104	13.177	13.250	13.323	13.396	13.469	13.542	13.616
3.7	13.764	13.838	13.913	13.988	14.063	14.138	14.213	14.288	14.364
3.8	14.516	14.592	14.669	14.746	14.823	14.900	14.977	15.054	15.132
3.9	15.288	15.366	15.445	15.524	15.603	15.682	15.761	15.840	15.920
4.0	16.080	16.160	16.241	16.322	16.403	16.484	16.565	16.646	16.728
4.1	16.892	16.974	17.057	17.140	17.223	17.306	17.389	17.472	17.556
4.2	17.724	17.808	17.893	17.978	18.063	18.148	18.233	18.318	18.404
4.3	18.576	18.662	18.749	18.836	18.923	19.010	19.097	19.184	19.272
4.4	19.448	19.536	19.625	19.714	19.803	19.892	19.981	20.070	20.160
4.5	20.340	20.430	20.521	20.612	20.703	20.794	20.885	20.976	21.068
4.6	21.252	21.344	21.437	21.530	21.623	21.716	21.809	21.902	21.996
4.7	22.184	22.278	22.373	22.468	22.563	22.658	22.753	22.848	22.944
4.8	23.136	23.232	23.329	23.426	23.523	23.620	23.717	23.814	23.912
4.9	24.108	24.206	24.305	24.404	24.503	24.602	24.701	24.800	24.900
5.0	25.100	25.200	25.301	25.402	25.503	25.604	25.705	25.806	25.908
5.1	26.112	26.214	26.317	26.420	26.523	26.626	26.729	26.832	26.936
5.2	27.144	27.248	27.353	27.458	27.563	27.668	27.773	27.878	27.984
5.3	28.196	28.302	28.409	28.516	28.623	28.730	28.837	28.944	29.052
5.4	29.268	29.376	29.485	29.594	29.703	29.812	29.921	30.030	30.140

Shaxada Xidid Labajibaarka $y = x^2$

	1	2	3	4	5	6	7	8	9
5.5	30.360	30.470	30.581	30.692	30.803	30.914	31.025	31.136	31.248
5.6	31.472	31.584	31.697	31.810	31.923	32.036	32.149	32.262	32.376
5.7	32.604	32.718	32.833	32.948	33.063	33.178	33.293	33.408	33.524
5.8	33.756	33.872	33.989	34.106	34.223	34.340	34.457	34.574	34.692
5.9	34.928	35.046	35.165	35.284	35.403	35.522	35.641	35.760	35.880
6.0	36.120	36.240	36.361	36.482	36.603	36.724	36.845	36.966	37.088
6.1	37.332	37.454	37.577	37.700	37.823	37.946	38.069	38.192	38.316
6.2	38.564	38.688	38.813	38.938	39.063	39.188	39.313	39.438	39.564
6.3	39.816	39.942	40.069	40.196	40.323	40.450	40.577	40.704	40.832
6.4	41.088	41.216	41.345	41.474	41.603	41.732	41.861	41.990	42.120
6.5	42.380	42.510	42.641	42.772	42.903	43.034	43.165	43.296	43.428
6.6	43.692	43.824	43.957	44.090	44.223	44.356	44.489	44.622	44.756
6.7	45.024	45.158	45.293	45.428	45.563	45.698	45.833	45.968	46.104
6.8	46.376	46.512	46.649	46.786	46.923	47.060	47.197	47.334	47.472
6.9	47.748	47.886	48.025	48.164	48.303	48.442	48.581	48.720	48.860
7.0	49.140	49.280	49.421	49.562	49.703	49.844	49.985	50.126	50.268
7.1	50.552	50.694	50.837	50.980	51.123	51.266	51.409	51.552	51.696
7.2	51.984	52.128	52.273	52.418	52.563	52.708	52.853	52.998	53.144
7.3	53.436	53.582	53.729	53.876	54.023	54.170	54.317	54.464	54.612
7.4	54.908	55.056	55.205	55.354	55.503	55.652	55.801	55.950	56.100
7.5	56.400	56.550	56.701	56.852	57.003	57.154	57.305	57.456	57.608
7.6	57.912	58.064	58.217	58.370	58.523	58.676	58.829	58.982	59.136
7.7	59.444	59.598	59.753	59.908	60.063	60.218	60.373	60.528	60.684
7.8	60.996	61.152	61.309	61.466	61.623	61.780	61.937	62.094	62.252
7.9	62.568	62.726	62.885	63.044	63.203	63.362	63.521	63.680	63.840
8.0	64.160	64.320	64.481	64.642	64.803	64.964	65.125	65.286	65.448
8.1	65.772	65.934	66.097	66.260	66.423	66.586	66.749	66.912	67.076
8.2	67.404	67.568	67.733	67.898	68.063	68.228	68.393	68.558	68.724
8.3	69.056	69.222	69.389	69.556	69.723	69.890	70.057	70.224	70.392
8.4	70.728	70.896	71.065	71.234	71.403	71.572	71.741	71.910	72.080
8.5	72.420	72.590	72.761	72.932	73.103	73.274	73.445	73.616	73.788
8.6	74.132	74.304	74.477	74.650	74.823	74.996	75.169	75.342	75.516
8.7	75.864	76.038	76.213	76.388	76.563	76.738	76.913	77.088	77.264
8.8	77.616	77.792	77.969	78.146	78.323	78.500	78.677	78.854	79.032
8.9	79.388	79.566	79.745	79.924	80.103	80.282	80.461	80.640	80.820
9.0	81.180	81.360	81.541	81.722	81.903	82.084	82.265	82.446	82.628
9.1	82.992	83.174	83.357	83.540	83.723	83.906	84.089	84.272	84.456
9.2	84.824	85.008	85.193	85.378	85.563	85.748	85.933	86.118	86.304
9.3	86.676	86.862	87.049	87.236	87.423	87.610	87.797	87.984	88.172
9.4	88.548	88.736	88.925	89.114	89.303	89.492	89.681	89.870	90.060
9.5	90.440	90.630	90.821	91.012	91.203	91.394	91.585	91.776	91.968
9.6	92.352	92.544	92.737	92.930	93.123	93.316	93.509	93.702	93.896
9.7	94.284	94.478	94.673	94.868	95.063	95.258	95.453	95.648	95.844
9.8	96.236	96.432	96.629	96.826	97.023	97.220	97.417	97.614	97.812
9.9	98.208	98.406	98.605	98.804	99.003	99.202	99.401	99.600	99.800