Cutubka

4^{aad}

SHAXANNADA ISU-EG

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.

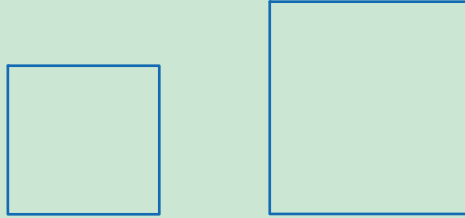Qaybtani marka ay dhammaato ka dib, waxa aad awood u yeelanaysaan:

- 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

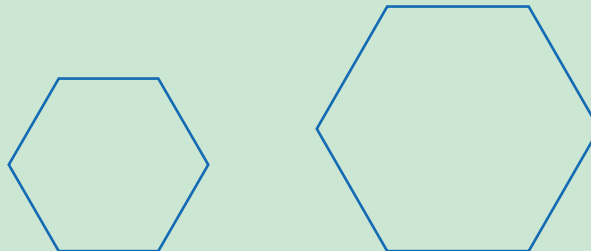**j**   Labadooduba waa saddexagallo xagal qummau.

Jaantuskan 4.3

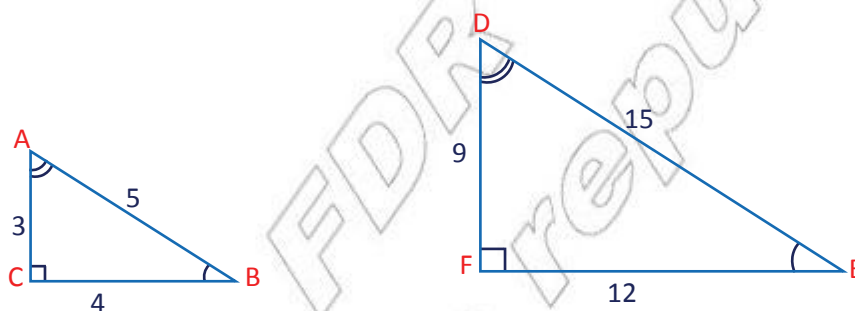**x**   Labadooduba waa laydiyo.

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.
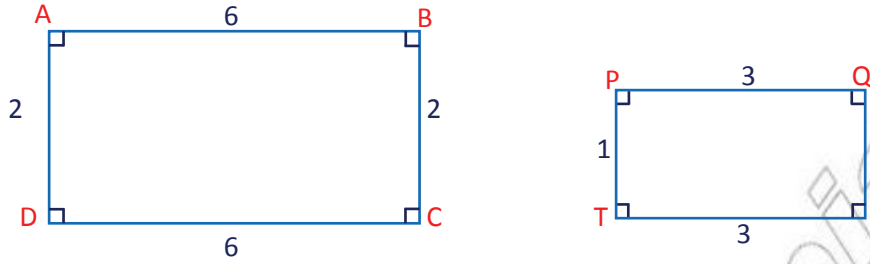

Jaantuskan 4.6

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 $\dfrac{AB}{DE} = \dfrac{BC}{EF} = \dfrac{AC}{DF} = \dfrac{1}{3}$

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. $\dfrac{AB}{RQ} = \dfrac{BC}{QS} = \dfrac{CD}{TS} = \dfrac{AD}{PT} = 2$

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:-

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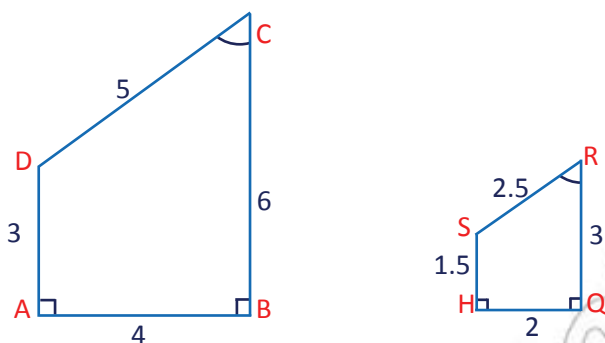**Qeexid 4.1** *Laba geesoole kasta oo tirada dhinacyadoodu ay isku mid tahay waxaa la oran karaa waa isu-eg yihiin haddii*

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:

$\triangle ABC \sim \triangle DEF$ 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.
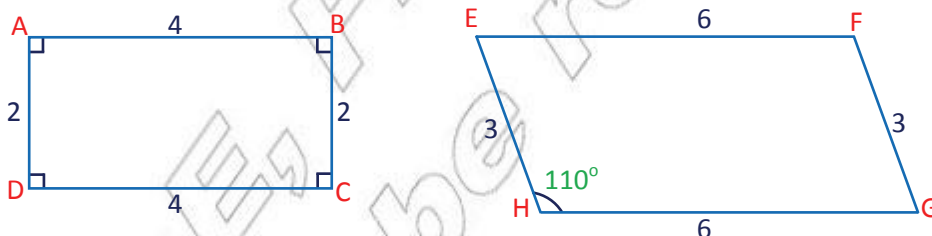

Jaantuskan 4.8

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 $\dfrac{AB}{HQ} = \dfrac{BC}{QR} = \dfrac{CD}{RS} = \dfrac{DA}{SH} = 2$

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

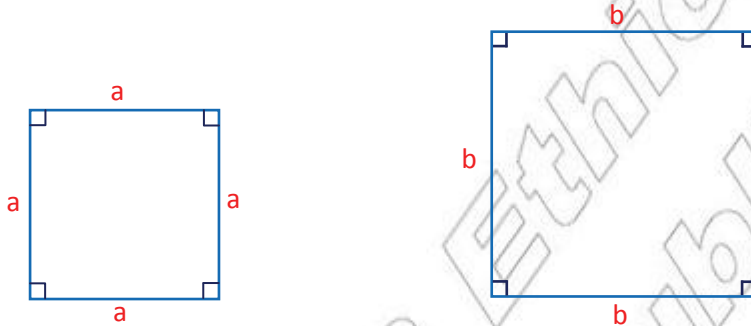**Furfuris:** Dhererrada dhinacyada afargeeslaha ABCD marka aynu barbardhigno dhererrada dhinacyada ku beegan ee afargeeslaha EFGH, waxaynu helaynaa in $\dfrac{AB}{EF} = \dfrac{BC}{FG} = \dfrac{CD}{GH} = \dfrac{AD}{EH} = \dfrac{2}{3}$

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.
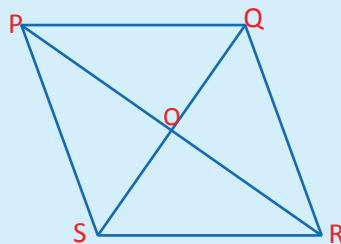
Haddaba saamiga dhererka dhinacyadooda gudboon waa $\dfrac{a}{b}$. xaglahooda gudboonna waa ay isku sargo'an yihiin, maadaama labajibbaarane kasta ay xaglihiisu yihiin xaglo qumman.

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?

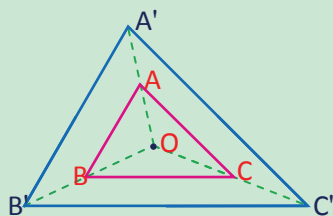## 4.1.2 Saamigalnimada iyo ma doorsoomaha (Isirka) saamigalnimada

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 tallaabooyinkan 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 ΔA'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 ΔA'B'C', waxa aad yaqiinsanaysaa in xaglaha gudboon ay isku sargo'an yihiin iyo in dhinacyada gudboon ay saamigal isu yihiin. Taas oo ah
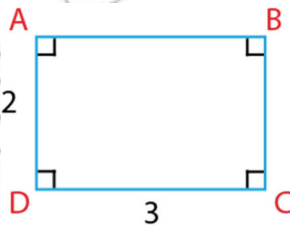
$$\angle A \cong \angle A' , \angle B \cong \angle B' \ \angle \hat{C} \cong \angle C' \quad \text{iyo} \quad \frac{A'B'}{AB} = \frac{B'C'}{BC} = \frac{A'C'}{AC} = 2 \ .$$

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 ΔA'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.
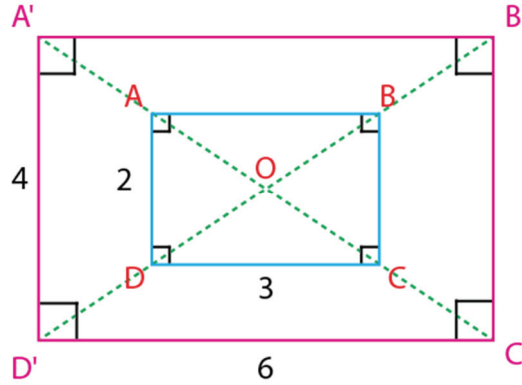

Jaantuskan 4.13

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),
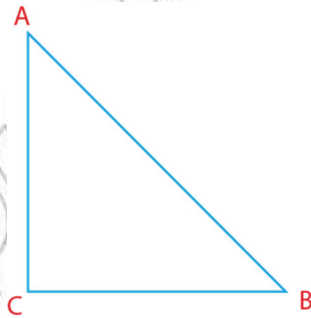
OC' = 3(OC) iyo OD' = 3(OD). Dabadeedna dhis laydiga A'B'C'D'. Hubi in laydiga A'B'C'D' uu yahay laydi raalligelinaya shuruuddani ah $\dfrac{A'B'}{AB} = \dfrac{B'C'}{BC} = \dfrac{C'D'}{CD} = \dfrac{A'D'}{AD} = 3$
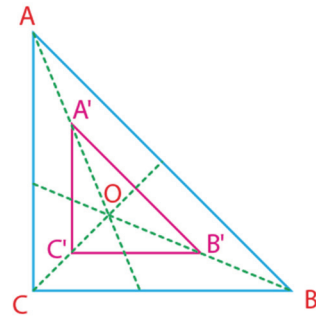

Jaantuskan 4.14

Tusaale 5: Yaree saddexagalka ABC ee hoos ka muuqda marka isirka saamigalnimadu uu yahay $\dfrac{1}{2}$.

Jaantuskan 4.15

Furfuris: Hal bar ka dooro gudaha saddexagalka ΔABC kuna magacow O. Ka dibna fallaaraha $\overline{OA}, \quad \overline{OB}$ iyo $\overline{OC}$ ku dul muuji baraha A,'B' iyo C' sida ay u kala horreeyaan, kuwaas oo ah OA'$= \dfrac{1}{2}$(OA), OB'$= \dfrac{1}{2}$(OB) iyo OC'$ = \dfrac{1}{2}$(OC). Dabadeedna isku xidh baraha A', B' iyo C' si ay u sameeyaan saddexagalka A'B'C' ee hoos ka muuqda
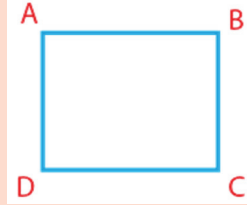

Jaantuskan 4.16

Adiga oo cabbiraya hubi in $\dfrac{A'B'}{AB} = \dfrac{B'C'}{BC} = \dfrac{A'C'}{AC} = \dfrac{1}{2}$

Xaaladdan waxaynu oranaynaa ΔA'B'C' waxaan ku helnay yareynta ΔABC inaga oo adeegsanayna isirka saamigalnimada oo ah $\dfrac{1}{2}$.

Shaqo-kooxeedka 4.1

Idinka oo raacaya tallaabooyinka ku xusan tusaalaha 4^{aad} ee kore, yaree laydiga ABCD ee hoos ka muuqda marka madoorsoomaha saamigalnimada ama (isirka yareyntu) uu yahay $\frac{1}{3}$.
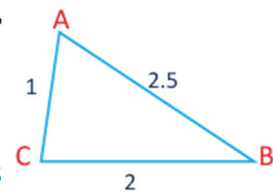

Jaantuskan 4.17

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.
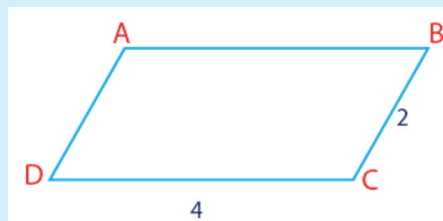
Layliska 4.2

1   Soo minguuri saddexagalka ABC ee hoos lagugu siiyey, isla markaana weynee ΔABC adiga oo madoorsoomaha saamigalnimada (Isirka weynaynta) u adeegsanaya 3.
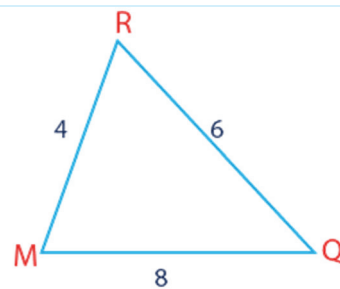

Jaantuskan 4.18

2   Soo minguuri barbaroolaha ABCD ee hoos ka muuqda, ka dibna weynee barbaroolahaas adiga oo isirka weynaynta u qaadanaya 2.
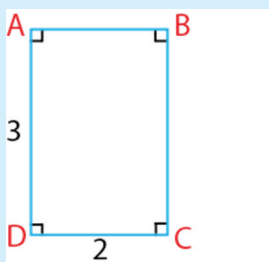

Jaantuskan 4.19

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 $\frac{1}{3}$.
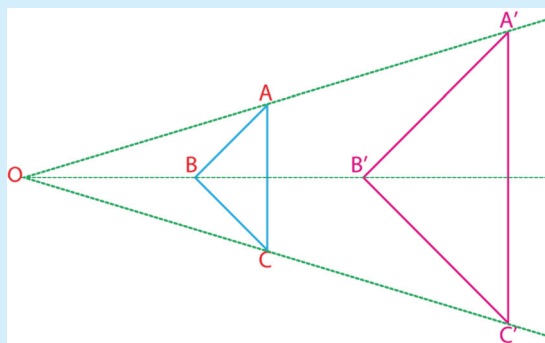

Jaantuskan 4.21

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 ΔA'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.
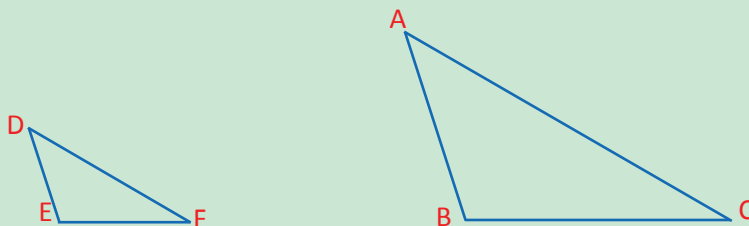
4.2.1　Muujinta saddexagallada isu-eg

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 ∆ABC iyo ∆DEF 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 1ᵃᵃᵈ 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 ∠A ≅ ∠D, ∠B ≅ ∠E and ∠C ≅ ∠F. Sidaas oo kale waxaad helaysaa in dhinacyadooda gudboon ay saamigal isu yihiin ama ay leeyihiin saami isku mid ah.

Taas oo ah $\dfrac{AB}{DE} = \dfrac{BC}{DE} = \dfrac{AC}{DF}$

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.
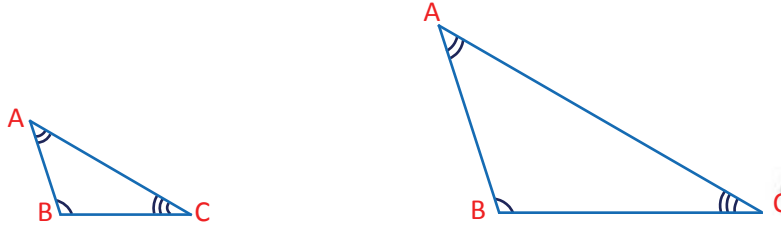
Qeexid 4.2 *Laba saddexagal waxaa la oran karaa waa isu-eg yihiin haddii xaglahooda gudboon ay isku sargo'an yihiin dhinacyadooda gudboonna ay saamigal isu yihiin. Waxaan u qoraynaa ΔABC ~ ΔDEF, waxaana aan u akhriyeynaa "ΔABC wuxuu u eg yahay ΔDEF".*

Sida ku cad qeexidda kore, marka aynu qorayno ΔABC ~ ΔDEF, waxaynu u jeednaa dhammaan kuwan soo socda:-

∠A ≅ ∠D

∠B ≅ ∠E

∠C ≅ ∠F iyo $\dfrac{AB}{DE} = \dfrac{BC}{DE} = \dfrac{AC}{DF}$ = k (Madoorsoome)
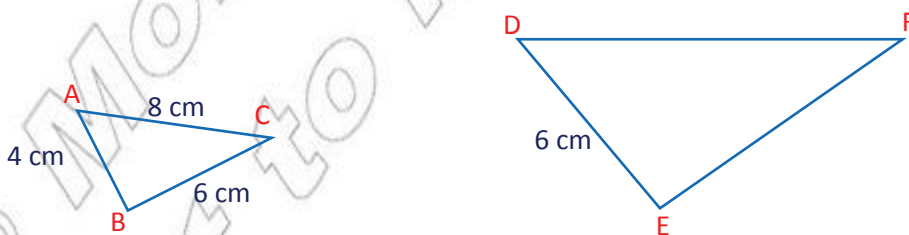
Jaantuskan 4.24

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 ΔABC ~ ΔDEF 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.

Tusaale 6:   Sida ku cad shaxankan hoos ka muuqda, haddii ΔABC ~ ΔDEF, 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** $\quad \frac{AB}{DE} = \frac{BC}{EF}$ $\qquad\qquad$ **ii** $\quad \frac{AB}{DE} = \frac{AC}{DF}$

$$\frac{4}{6} = \frac{6}{EF} \qquad\qquad\qquad \frac{4}{6} = \frac{8}{DF}$$

$$4(EF) = 6 \times 6 \qquad\qquad\qquad 4(DF) = 6 \times 8$$

$$EF = \frac{36}{4} = 9 \text{ cm} \qquad\qquad DF = \frac{6 \times 8}{4} = 12 \text{ cm}.$$

Tusaale 7: Shaxankan hoose wuxuu muujinayaa xaglaha gudboon ee isku sargo'an iyo dhinacyada gudboon ee saamigalka isu ah. Haddaba tus isu-ekaanshaha saddexagalladaas.
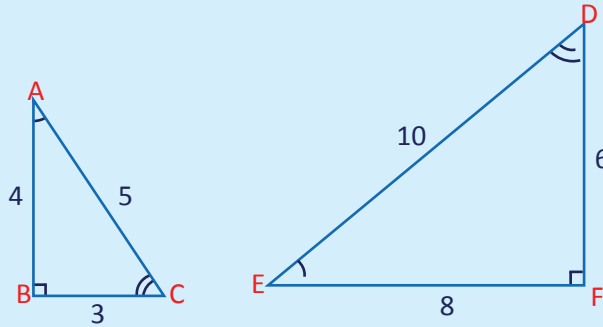

Jaantuskan 4.26

Furfuris: Sida aad ku aragto shaxankaas ∠A ≅ ∠D, ∠B ≅ ∠Q iyo ∠C ≅ ∠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 ΔABC ~ ΔDQR.

Layliska 4.3

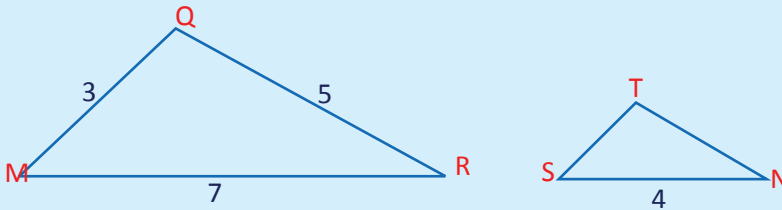**1** Tus in saddexagallada isku sargo'an ay yihiin saddexagallo isu-eg.

2 Haddii ΔABC ~ ΔDEF isla markaana ΔDEF ~ ΔMQR, markaa maxaad ka sheegi kartaa ΔABC iyo ΔMQR?

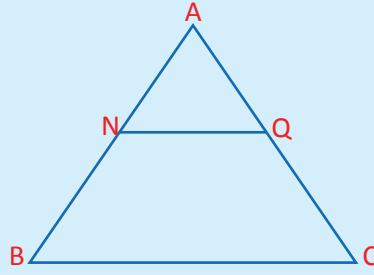**3** Faahfaahi in labada saddexagal ee hoos ka muuqda ay yihiin laba saddexagal oo isu-eg.

Jaantuskan 4.27

4 Sida ka muuqata shaxankan hoose, haddii ΔMQR ~ ΔSTN, markaa soo saar dhererrada $\overline{ST}$ iyo $\overline{TN}$.

Jaantuskan 4.28
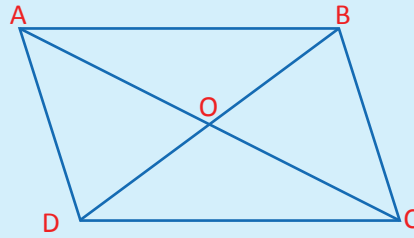
5 Haddii Δ ABC ~ Δ DEF oo BC = 18, DF = 15, EF = 12 iyo DE = 9, markaa soo saar dhererrada labada dhinac ee kale ee ΔABC.

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 ΔAOB ~ ΔCOD.

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.
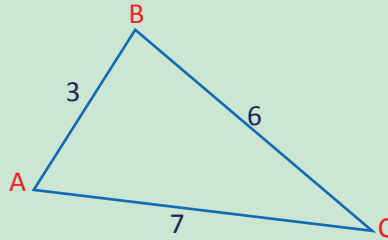
Hawl-galka 4.4

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.
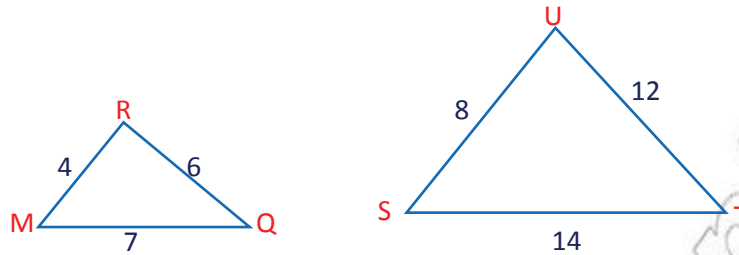
i Maxaad ka fahamtay saamiga dhinacyada gudboon ee labadaas saddexagal?

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 1[aad] hoosta uga xarriiq in weynaynta saddexagalku ay tahay sawiridda saddexagal ay dhinacyadiisu saamigal u yihiin dhinacyada saddexagalka lagu siiyey. Qodobka 2[aad] 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, ∆MQR ~ ∆STU ... (Hubinta dhinac-dhinac-dhinac = SSS)
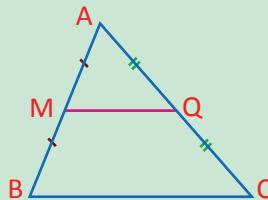
Hawl-galka 4.5

Qasdi (ujeeddada): Hubinta isu-ekaanshaha saddexagallada.

Saabaanka loo baahan yahay: Mastarad, qalin-qori goobo-beeg iyo xagal-beeg.

∆ABC ee hoose sida ka muuqata, ka soo qaad in barta M ay kalabadho $\overline{AB}$ barta Q-na ay kala badho $\overline{AC}$. Haddaba ∆ABC ku soo minguuri buuggaaga oo sawir xarriijinta $\overline{MQ}$.

Ka dibna u fiirso labada saddexagal ee kala ah ∆AMQ iyo ∆ABC.

Waxaa si cad u muuqata in ∠MAQ ≅ ∠BAC iyo $\dfrac{AM}{AB} = \dfrac{AQ}{AC} = \dfrac{1}{2}$.

Jaantuskan 4.33

i   Cabbir dhererrada $\overline{MQ}$ iyo $\overline{BC}$ oo soo saar $\dfrac{MQ}{BC}$.

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?
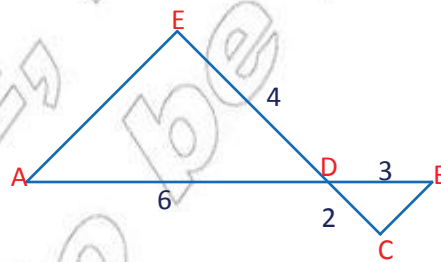
Haddii ay sax tahay cabbiraaddaada aad ku sameysay hawlgalka 4.5, waxa aad helaysaa in xaglaha gudboon ee ΔAMQ iyo ΔABC ay isku sargo'an yihiin, isla markaana dhinacyadooda gudboon ay saamigal isu yihiin. Labada saddexagal way isu-eg yihiin. Xaqiiqso in labada saddexagal ΔAMQ iyo ΔABC, $\dfrac{AM}{AB} = \dfrac{AQ}{AC}$ 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 $\angle ADE \cong \angle BDC$ (xaglo foodsaar ah)

ii $\quad \dfrac{AD}{BD} = \dfrac{6}{3} = 2$ iyo $\dfrac{DE}{DC} = \dfrac{4}{2} = 2$

$$\therefore \dfrac{AD}{BD} = \dfrac{DE}{DC} = 2$$

Sidaas awgeed, $\Delta ADE \sim \Delta BDC$ (Hubinta isu-ekaanshaha dhinac-xagal dhinac).
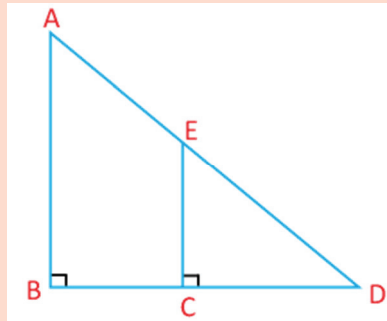
Shaqo-kooxeedka 4.2

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 $\quad$ U fiirso $\angle CED \cong \angle BAD$ (Waayo?)

ii $\quad$ Cabbir dhererrada dhammaan dhinacyada labada saddexagal oo isbarbardhig saamiga dhinacyada gudboon sidan $\dfrac{AB}{EC}, \dfrac{AD}{ED}$ iyo $\dfrac{BD}{CD}$

iii $\quad \Delta ABD$ ma u eg yahay ΔECD?

Jaantuskan 4.35

Haddii cabbiraadda xaaga dhererrada dhinacyada labada saddexagal ay sax yihiin waxa aad helaysaa in $\dfrac{AB}{EC} = \dfrac{AD}{ED} = \dfrac{BD}{CD}$. Taas oo macnaheedu yahay $\Delta ABD \sim \Delta ECD$ 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:-
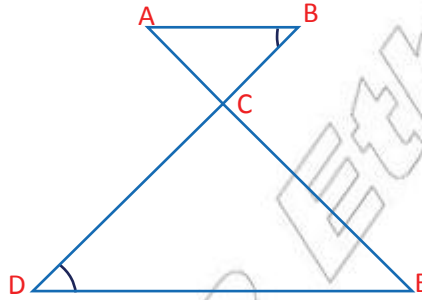
Aragtiin (Aragtiinka isu-ekaanshaha ee xagal-xagal (AA))

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:

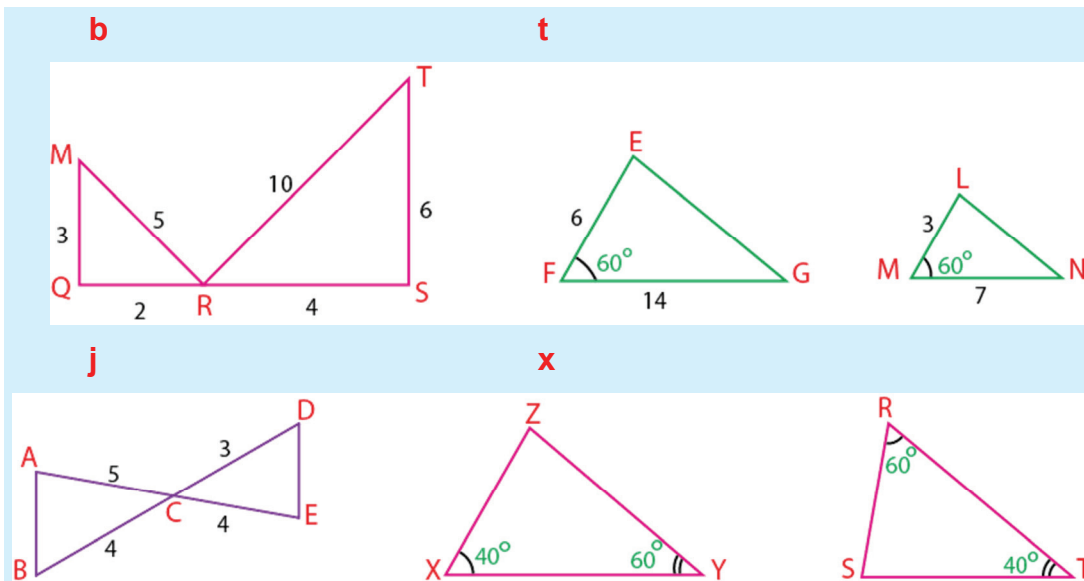i   ∠ABC ≅ ∠EDC (siin ama qaadaasho)

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.
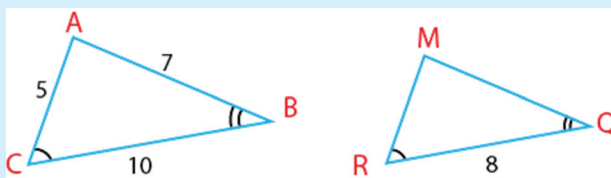
Layliska 4.4

1   Saddexagalladan lammaanaha ah ee soo socda kuwee baa ah saddexagallo isu-eg? Waayo? Halka halbeegyada dhererradu ay yihiin halbeegyo isku mid ah
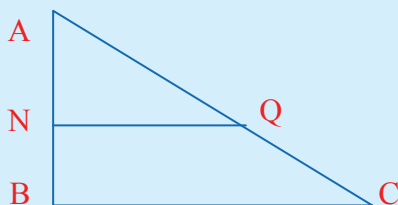
b   **t**

j   **x**

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.
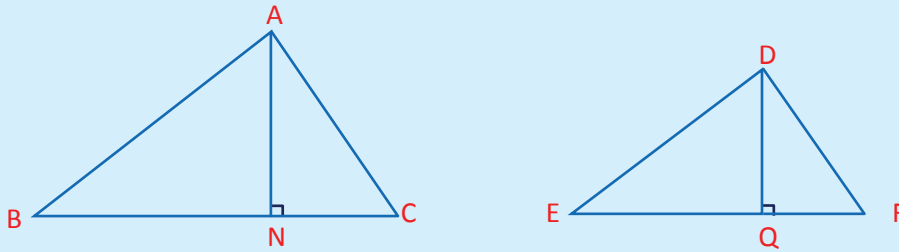

Jaantuskan 4.38

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

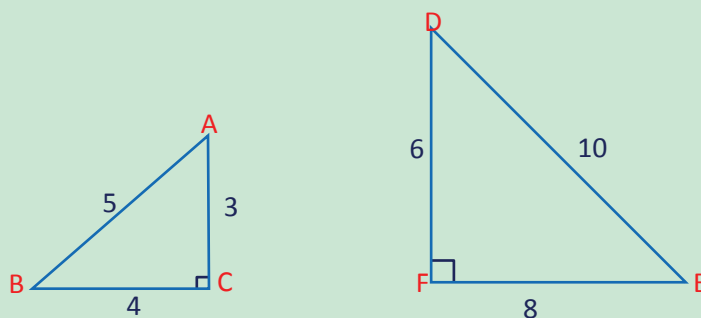## 4.2.3   Wareegga iyo Bedka Saddexagallada Isu,eg

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?
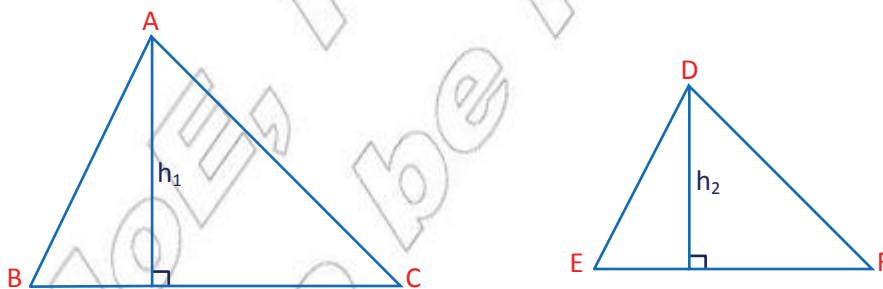

Jaantuskan 4.41

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 $\dfrac{AB}{DE} = \dfrac{AC}{DF} = \dfrac{BC}{EF} = k$ (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 $\dfrac{W_1}{W_2} = \dfrac{AB + BC + AC}{DE + EF + DF} = \dfrac{k(DE) + k(EF) + k(DF)}{DE + EF + DF}$

$$= \dfrac{k(DE + EF + DF)}{DE + EF + DF} = k$$

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 $\dfrac{1}{2}(BC)h_1$,   Bedka ΔDEF waa $\dfrac{1}{2}(EF)h_2$

Markaa, $\dfrac{\text{Bedka } \Delta ABC}{\text{Bedka } \Delta DEF} = \dfrac{\frac{1}{2}BC.h_1}{\frac{1}{2}EF.h_2} = \dfrac{BC}{EF}.\dfrac{h_1}{h_2} = k.\dfrac{h_1}{h_2} = k^2$

Dib u fiiri jawaabta su'aasha 7^{aad} ee layliska 4.4 ee kore oo ah $\dfrac{h_1}{h_2} = k$.

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 k².*

Tusaale 11: Waxaa lagu siiyey in $\Delta ABC \sim \Delta DEF$, 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 $\dfrac{AB}{DE} = \dfrac{4}{12} = \dfrac{1}{3}$, markaa waxaynu soo saaraynaa saamiga bededka labada saddexagal oo ah:

$$\dfrac{\text{Bedka } \Delta ABC}{\text{Bedka } \Delta DEF} = \left(\dfrac{1}{3}\right)^2 = \dfrac{1}{9}$$

ii Sida aragtiinka kore uu qeexayo, $\dfrac{\text{Wareegga } \Delta ABC}{\text{Wareegga } \Delta DEF} = \dfrac{AB}{DE} = \dfrac{1}{3}$

Tusaale 12: Haddii ΔNQR ~ ΔABC, oo QR = 40 sm, BC = 30sm isla markaana bedka ΔABC = 360 cm², markaa soo saar bedka ΔNQR.

Furfuris: $\dfrac{QR}{BC} = \dfrac{40\,sm}{30\,sm} = \dfrac{4}{3}$

Maadaama Δ NQR ~ ΔABC, sida uu qeexayo aragtiinka kore saamiga bededkoodu waa

$$\frac{\text{Bedka } \Delta\text{NQR}}{\text{Bedka } \Delta\text{ABC}} = \left(\frac{4}{3}\right)^2 = \frac{16}{9}$$

Laakiin Bedka ΔABC = 360 sm², $\dfrac{\text{Bedka } \Delta\text{NQR}}{360\,\text{sm}^2} = \dfrac{16}{9}$.

Bedka $\Delta\text{NQR} = \dfrac{16}{9}(360\,\text{sm}^2) = 640$ sm²

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 sm² bedka saddexagalka dambena uu yahay 64 sm², 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 ΔABC ~ ΔLMN. 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 sm² ayaa la weyneeyey iyada oo la adeegsanayo isirka weynaynta (Madoorsoomaha) oo ah 3. Haddaba soo saar bedka saddex-xagalka cusub.

7 ΔABC ~ ΔNQR, bedka ΔABC = 20 sm², bedka ΔNQR = 80sm². 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 ΔABC~ΔDEF macnaheeduna waxaa weeye-:*

$$\angle A \cong \angle D, \ \angle B \cong \angle E, \ \angle C \cong \angle F \ iyo \ \frac{AB}{DE} = \frac{BC}{EF} = \frac{AC}{DF}.$$

✓ *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:-*

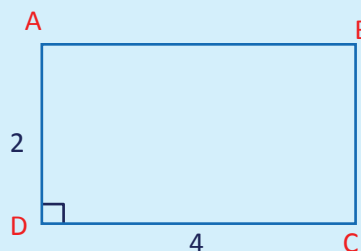| i | *Saamiga wareeg yadooda oo loo qaatay horsanaan isku mid ah waa k.* |
| ii | *Saamiga bededkooda oo loo qaatay horsanaan lsku mid ah waa k^2.* |

Layliska Guud ee Cutubkan 4^{aad}

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.
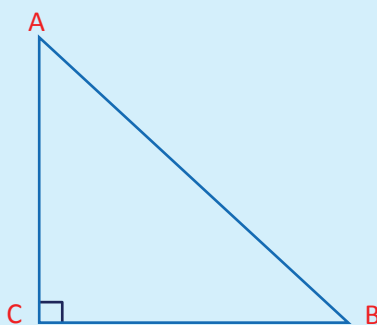
2 Labada saddexagal ee ABC iyo DEF waa isu-egyihiin. Dhererka hal dhinac oo ΔDEF ah waa shan-laabka dhererka dhinaca ku began ee ΔABC. Soo saar saamiga wareegyada iyo saamiga bededka ee labadaas saddexagal.

3 Weynee laydiga ABCD hoos ka muuqda adiga oo isirka weynaynta (madoorsoomaha saamigal nimada) u qaadanaya 1.5
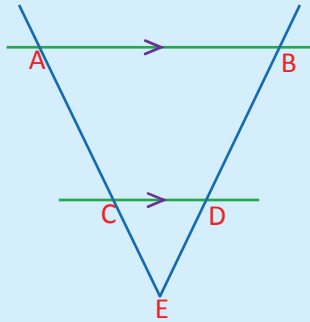

Jaantuskan 4.43

4 Yaree saddexagal ka ABC ee hoos ka muuqda, adiga oo isirka yareynta (madoorsoomaha saamigalnimada) u qaadanaya $\frac{1}{3}$.
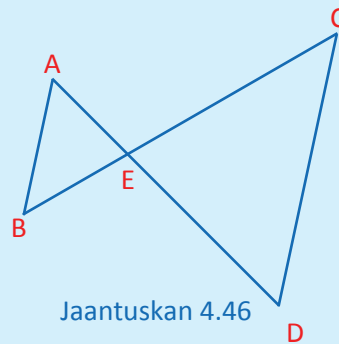

Jaantuskan 4.44

5 Sida ka muuqata shaxankan hoose, $\overleftrightarrow{AB} \parallel \overleftrightarrow{CD}$, haddii DE = 6sm, BE = 9 sm iyo AE = 15 sm, markaa soo saar dhererka $\overline{CE}$.
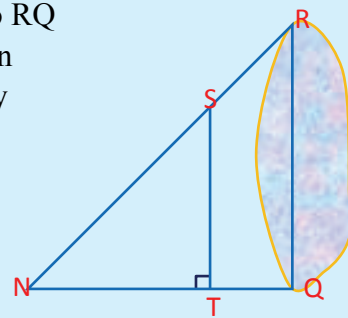
Jaantuskan 4.45

6 U fiirso shaxanka hoos ka muuqda, haddii $\overline{AB} \parallel \overline{CD}$, 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, Isaga 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 Isku 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?
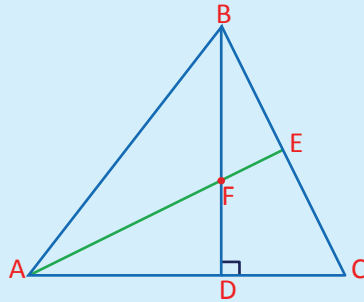
Jaantuskan 4.47

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
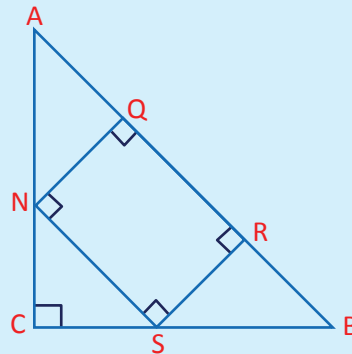
i Δ AEC ~ ΔBDC ⠀⠀⠀⠀⠀⠀ **ii** ΔBFE ~ ΔAFD

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:
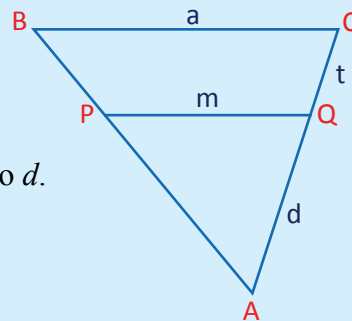
i $\dfrac{AB}{AN} = \dfrac{BC}{NQ}$

ii $\dfrac{AQ}{NC} = \dfrac{QN}{CS}$

iii $\dfrac{NC}{SR} = \dfrac{NS}{SB}$

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