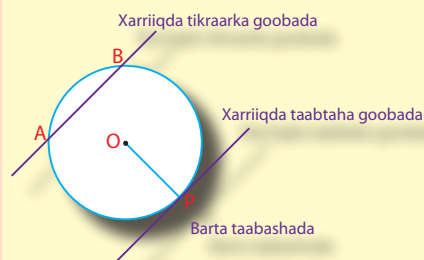


Cutubka 5aad



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 cabbiradooda.

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 dhexroordeeda 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.

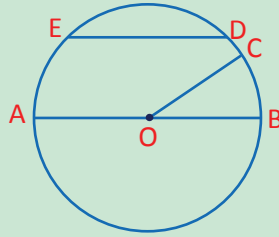
Marka xigana, waxa aad ku baran doontaa xidhiidhka ka dhexeeya xarriiqaha iyo goobada ku dul-dhaca sallax isku mid ah, ugu dambayntana waxa aad ku baran doontaa sida loo meeleyo xuddunta goobada adiga oo adeegsanaya boqonnada goobada.

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}

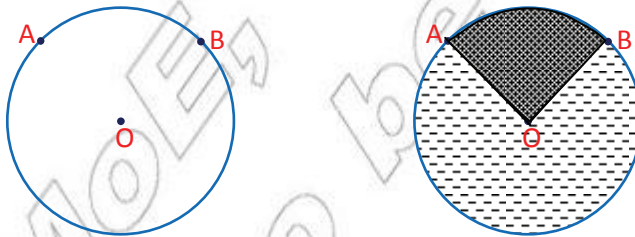


Jaantuska 5.1

- 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 firso 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.

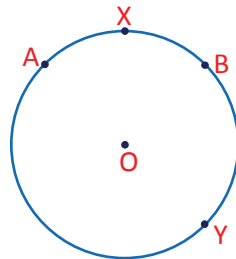


Jaantuska 5.2

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 \widehat{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 lagu 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, \widehat{AXB} waa qaansada yar ee AB, \widehat{AYB} waa qaansada weyn ee AB. *Fiiri [Jaantuska 5.3.](#)*

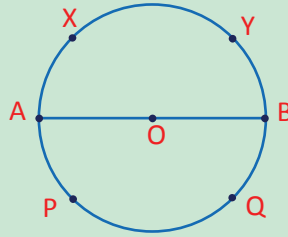
Hawl-galka 5.2

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

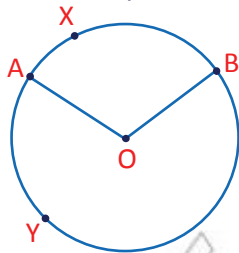
Qeexidda qaansada yar iyo Qaansada weyn ee goobadu waa sidan soo socota:-

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

Qaansada yar ee AB



Qaansada weyn ee AB

Jaantuska 5.5

Barta O waa xuddunta goobada

\widehat{AXB} waa qaansada yar ee AB

\widehat{AYB} waa qaansada weyn ee AB

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.

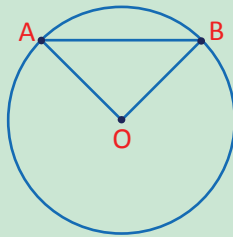
Hawl-galka 5.3

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:-

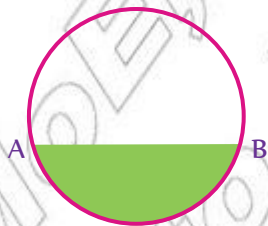
- 1 Qaansada yar ee AB iyo gacannada \overline{OA} iyo \overline{OB} .
- 2 Qaansada weyn ee AB iyo gacannada \overline{OA} iyo \overline{OB} .
- 3 Qaansada yar ee AB iyo boqonka \overline{AB}
- 4 Qaansada weyn ee AB iyo Boqonka \overline{AB}



Jaantuska 5.6

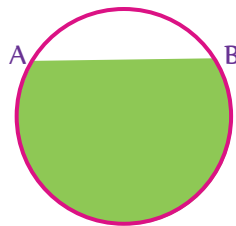
Shaxannada joomateriyeed ee aad ku midabbaysay su'aasha 1^{aad} iyo su'aasha 2^{aad} waxaa la yiraahdaa faquuqa yar iyo faquuqa weyn ee goobada (sida ay u kala horreeyaan).

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.

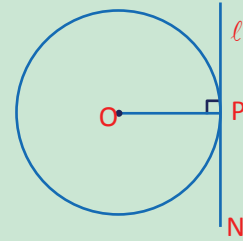
Hawl-galka 5.4

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

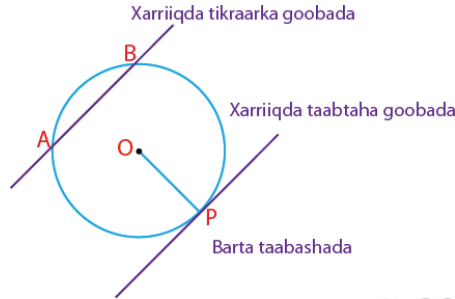


Jaantuska 5.9

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

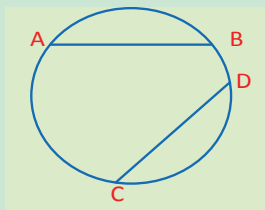
Joomateriga fasalka 5^{aad} waxa aad ku soo baratay dhisidda kala-badhaha ku qotoma xarriijinta. Haddana kala-badheyaasha ku qotoma boqonnada ayaa waxaynu u adeegsanaynaa dhisidda xuddunta goobada inaga oo adeegsanayna laba boqon oo aan barbarro ahayn.

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} .



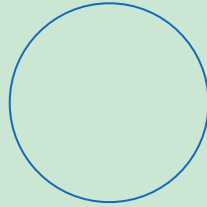
Jaantuska 5.11

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'aalahaan soo socda.

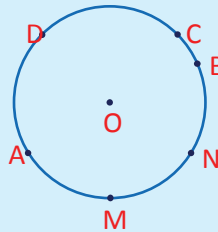
i Magacow baraha iyo xarriijimaha hoos ku qoran.

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 \widehat{MNC}

x Qaansada weyn ee AC

d Qaansada weyn ee CN

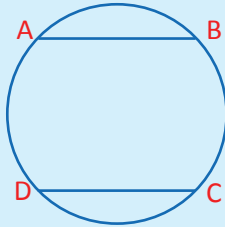
t \widehat{ANB}

kh Qaansada yar ee MN

j \widehat{ANM}

- 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 meele (sawir) xuddunta goobada.



Jaantuska 5.14

Ma sawiri (muujin) kartaa xuddunta goobadaas haddii $\overline{AB} // \overline{CD}$ laakiin $AB \neq CD$?

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.

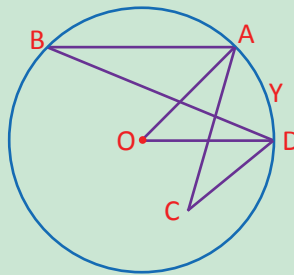
5.2.1 XagalXudduneedka iyo XagalGeeska

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 lagu siiyey, kana jawaab su'aalahaan soo socda. Halka O ay tahay xuddunta goobada.

- i** Waa maxay xidhiidhka ka dhexeeya goobada iyo $\angle AOD$?
- ii** Waa maxay xidhiidhka ka dhexeeya goobada iyo $\angle ABD$?
- iii** Waa maxay xidhiidhka ka dhexeeya goobada iyo $\angle ACD$?
- iv** Sidee baad u tibaaxi kartaa xidhiidhka ka dhexeeya saddexdaas xaglood ee kor ku xusan iyo qaansada AYD?

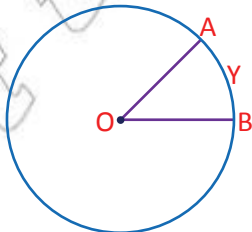


Jaantuska 5.15

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, $\angle AOB$ waa xagal-xudduneed.

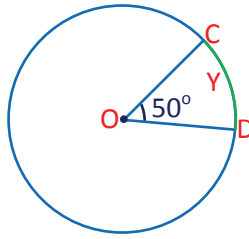


Jaantuska 5.16

Xaaladdan waxaynu oranaynaa $\angle AOB$ waxay ku afjaran tahay qaansada AYB ama waxaynu ugu yeedhaynaa qaansada AYB waa af-saarka xagasha $\angle AOB$ ee xuddunta goobada O .

Marka xagasha $\angle AOB$ ay tahay xagal-xuddunneed sida ka muuqata shaxanka 5.16 ee kore, sidaas oo kale cabbirka xagasha $\angle AOB$ wuxuu noqonayaa cabbirka qaansada AYB . Taas macnaheedu waa $m(\angle AOB) = m(\widehat{AYB})$.

Tusaale 2: Sida ka muuqata Jaantuska 5.17, haddii $m(\angle COD) = 50^\circ$, markaa $m(\widehat{CYD}) = 50^\circ$



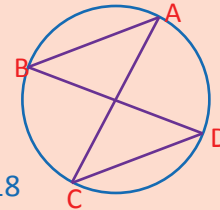
Jaantuska 5.17

Shaqo-kooxeedka 5.1

Soo minguuri shaxankan hoose, ka dibna

Cabbir xaglaha ABD iyo ACD .

Maxaa kuu soo baxay?

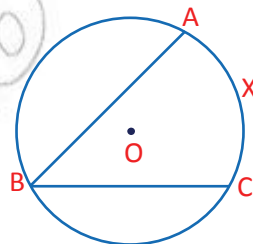


Jaantuska 5.18

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 $\angle ABC$

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 $\angle ABC$ waxaa soo afjaraysa qaansada AXC ee goobada O dusheeda.

Bal mar kale aan baadhitaan ku sameyno xidhiidhka ka dhexeeya cabbirka xagasha $\angle ABC$ iyo cabbirka qaansada afaarka u ah ee \widehat{AXC} .

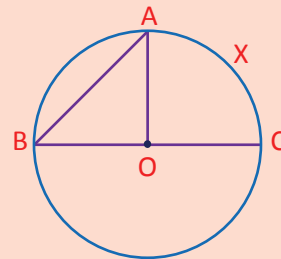
Shaqo-kooxeedka 5.2

Soo minguuri shaxanka hoos ka muuqda, ama sawir goobo,

xagal-xuddunneed iyo xagal-gees ay afaaar u wada tahay

qaansada AXC , isla markaana same kuwa soo socda, marka O tahay xuddunta.

- i Cabbir xagasha $\angle ABC$ adiga oo adeegsanaya xagal-beeggaaga.
- ii Cabbir xagasha $\angle AOC$ adiga oo adeegsanaya xagal-beeggaaga.
- iii Isbarbardhig cabbirrada labadaa xaglood $\angle ABC$ iyo $\angle AOC$ mmaxaa kaaga soo baxay?



Jaantuska 5.20

Sida ku cad shaqo-kooxeedka kore, haddii cabbiraaddaadu ay sax tahay, waxa aad helaysaa in cabbirka $\angle ABC$ uu le'eg yahay nuska (badhka) cabbirka $\angle AOC$.

$m(\angle ABC) = \frac{1}{2} m(\angle AOC)$. Sababta oo ah cabbirka $\angle AOC$ wuxuu le'eg yahay cabbirka qaansada AXC ee afaarka u ah. Haddaba u fiirso aragtiinkan soo socda.

Aragtiin: Cabbirka xagal-geeska goobo waa badhka (nuska) cabbirka qaansada afaarka u ah.

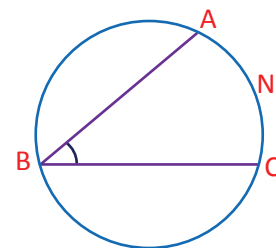
Tusaale 4: Sida ka muuqata Jaantuska 5.21

ee hoose, haddii $m(\widehat{ANC}) = 80^\circ$, markaa soo saar cabbirka $\angle ABC$.

Furfuris: $m(\widehat{ANC}) = 80^\circ$ (siin)

$$m\angle ABC = \frac{1}{2} m(\widehat{ANC}) \text{ (Aragtiinka kore)}$$

$$\therefore m\angle ABC = \frac{1}{2} (80^\circ) = 40^\circ.$$



Jaantuska 5.21

Tusaale 5: Sida ka muuqata Jaantuska 5.22 ee hoose, haddii

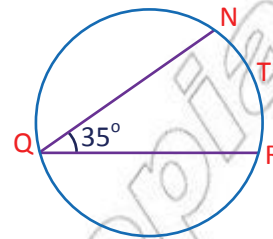
$m(\angle NQR) = 35^\circ$, markaa soo saar cabbirka qaansada NTR.

Furfuris: $m(\angle NQR) = 35^\circ$ (siin)

$$m(\angle NQR) = \frac{1}{2} m(\widehat{NTR}) \text{ (Aragtiinka kore)}$$

$$\therefore 35^\circ = \frac{1}{2} m(\widehat{NTR})$$

$$m(\widehat{NTR}) = 2(35^\circ) = 70^\circ.$$



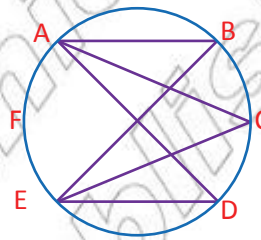
Jaantuska 5.22

Tusaale 6: Sida ka muuqata Jaantuska 5.23

$m(\angle ABE) = 60^\circ$,

markaa soo saar cabbirka xagasha

$\angle ADE$ iyo cabbirka xagasha $\angle ACE$?



Jaantuska 5.23

Furfuris: Siin: $m(\angle ABE) = 60^\circ$

$$m(\angle ADE) = \frac{1}{2} m(\widehat{EFA}) = 60^\circ = \frac{1}{2} m(\widehat{EFA})$$

$$\therefore m(\widehat{EFA}) = 2(60^\circ) = 120^\circ$$

i $m(\angle ADE) = \frac{1}{2} m(\widehat{EFA})$... Aragtiinka kore

$$m(\angle ADE) = \frac{1}{2} (120^\circ)$$

$$\therefore m(\angle ADE) = 60^\circ$$

ii $m(\angle ACE) = \frac{1}{2} m(\widehat{EFA})$... Aragtiinka kore

$$m(\angle ACE) = \frac{1}{2} (120^\circ)$$

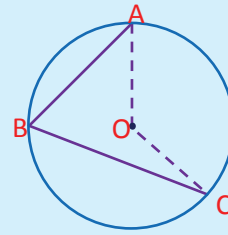
$$\therefore m(\angle ACE) = 60^\circ$$

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.

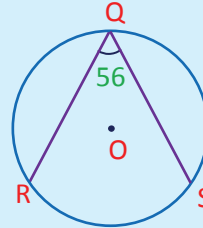
Layliska 5.2

- 1 Sida ka muuqata Jaantuska 5.24 O waa xuddunta goobada, haddii $m(\widehat{AC}) = 132^\circ$, Markaa soo saar $m(\angle AOC)$ iyo $m\angle ABC$,



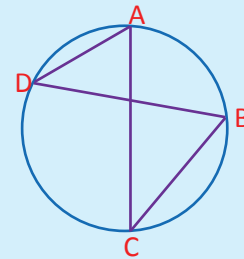
Jaantuska 5.24

- 2 Sida ka muuqata Jaantuska 5.25 O waa xuddunta goobada haddii, $m(\angle RQS) = 56^\circ$, markaa soo saar $m(\angle ROS)$ iyo $m(\widehat{RS})$.



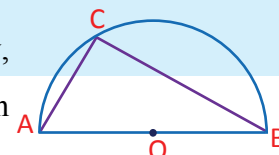
Jaantuska 5.25

- 3 U firso Jaantuska 5.26 ee hoose haddii $m(\angle ADB) = 40^\circ$, raadi $m(\angle ACB)$.



Jaantuska 5.26

- 4 Sida ka muuqata Jaantuska 5.27 ee lagu siiyey, haddii \overline{AB} ay tahay dhexroorka goobada, tus in xagasha $\angle BCA$ ay tahay xagal qumman.



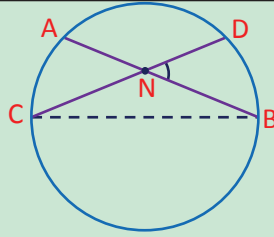
Jaantuska 5.27

5.2.2 Xaglahay 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 hawlahaan soo socda.



Jaantuska 5.28

- 1 Sawir \overline{CB} adiga oo adeegsanaya mastarad.
- 2 Cabbir xaglaha kala ah $\angle ABC$ iyo $\angle DCB$ 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 \widehat{DB} iyo \widehat{CA} .
- 4 Cabbir xagasha $\angle DNB$
- 5 Xidhiidhi oo $m(\angle DNB)$ barbardhig wadarta $m(\widehat{DB})$ iyo $m(\widehat{CA})$.

Sida ku cad [hawlgalka 5.7](#), haddii aad si sax ah uga shaqayso cabbiraaddaada, waxa aad helaysaa in cabbirka xagasha $\angle DNB$ ama $m(\angle DNB)$ uu yahay nuska (badhka) wadarta cabbirka qaansooyinka afsaarka u ah. Taas macnaheedu waxaa weeye:

$$m(\angle DNB) = \frac{1}{2} [m(\widehat{DB}) + m(\widehat{CA})].$$

Tusaale 7: Sida ka muuqata [Jaantuska 5.29](#) ee hoose, haddii $m(\widehat{AB}) = 90^\circ$ isla markaana $m(\widehat{CD}) = 80^\circ$, markaas soo saar $m(\angle AEB)$.

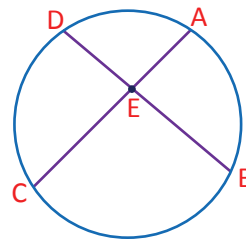
Furfuris: Marka laga duulo natiijadii [hawlgalka 5.7](#) ee kore, waxa aad ogtahay in

$$m(\angle AEB) = \frac{1}{2} [m(\widehat{AB}) + m(\widehat{CD})]$$

$$m(\angle AEB) = \frac{1}{2} (90^\circ + 80^\circ)$$

$$= \frac{1}{2} (170^\circ)$$

$$\therefore m(\angle AEB) = 85^\circ$$

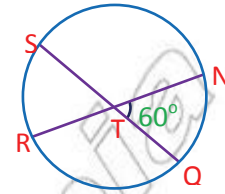


Jaantuska 5.29

Tusaale 8: Sida ku cad [Jaantuska 5.30](#) ee hoose haddii boqonnada \overline{RN} iyo \overline{SQ} ay iska gooyaan barta T isla markaana $m(\angle NTQ) = 60^\circ$ iyo $m(\widehat{RS}) = 70^\circ$, markaas raadi $m(\widehat{NQ})$.

Furfuris: Siin $m(\widehat{RS}) = 70^\circ$ iyo $m(\angle NTQ) = 60^\circ$, haddaba waxa aad ogtahay in

$$m(\angle NTQ) = \frac{1}{2} (m(\widehat{NQ}) + m(\widehat{RS}))$$



Jaantuska 5.30

Sidaas awgeed waxa aad helaysaa, $60^\circ = \frac{1}{2} [m(\widehat{NQ}) + 70^\circ]$

$$2(60^\circ) = m(\widehat{NQ}) + 70^\circ$$

$$120^\circ = m(\widehat{NQ}) + 70^\circ$$

$$120^\circ - 70^\circ = m(\widehat{NQ})$$

$$50^\circ = m(\widehat{NQ})$$

$$\therefore m(\widehat{NQ}) = 50^\circ.$$

Xusuusin: Hawlgalka 5.7 ee kore, haddii aad sawirto \overline{AC} , oo aad cabbirto $\angle CAB$, $\angle ACD$ iyo $\angle AND$ kadibna $m(\angle AND)$ aad barbardhigo $m(\widehat{BC}) + m(\widehat{AD})$, markaa waxaad helaysaa in

$$m(\angle AND) = \frac{1}{2} [m(\widehat{AD}) + m(\widehat{BC})].$$

Tusaale 9: Sida ku cad shaxanka Jaantuska 5.31 ee hoose, haddi $m(\widehat{AB}) = 50^\circ$ oo $m(\widehat{DFE}) = 110^\circ$, markaa soo saar $m(\angle ACB)$.

Furfuris: Waxaynu ognahay in

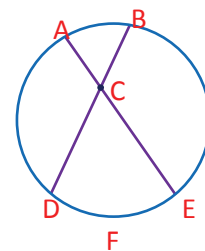
$$m(\angle ACB) = \frac{1}{2} [m(\widehat{AB}) + m(\widehat{DFE})],$$

$$= \frac{1}{2} (50^\circ + 110^\circ)$$

$$= \frac{1}{2} (160^\circ)$$

$$= 80^\circ$$

$$\therefore m(\angle ACB) = 80^\circ$$



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

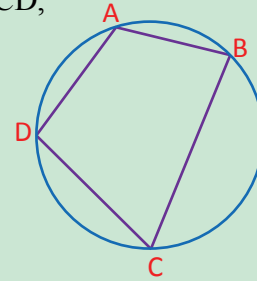
i Soo saar cabbirrada xaglaha kala ah $\angle ABC$, $\angle BCD$, $\angle CDA$ and $\angle DAB$.

ii Soo saar $m(\angle DAB) + m(\angle BCD)$

iii Soo saar $m(\angle CDA) + m(\angle ABC)$

iv Isbarbardhig labada wadarood ee aad ku heshay (ii) iyo (iii).

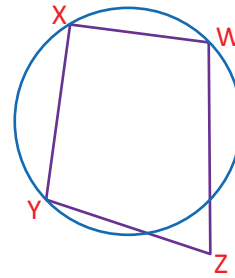
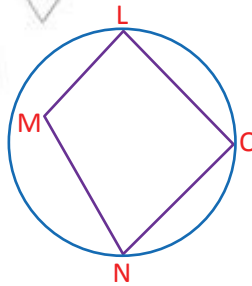
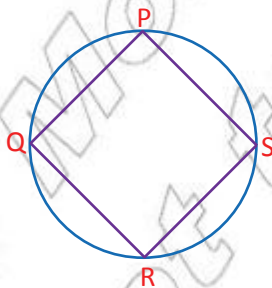
Maxaa kaaga soo baxay?



Jaantuska 5.32

Qeexid 5.3 Afargeesle kasta oo dhammaan geesihisu 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 afargeesleyaasha LMNO iyo WXYZ ma aha afargeesleyaal meersan.



Jaantuska 5.33

Haddii cabbiraaddaada **hawlgalka 5.8** qodobka 3^{aad} ee kore ay sax tahay, waxa aad helaysaa in $m(\angle DAB) + m(\angle BCD) = m(\angle ABC) + m(\angle CDA) = 180^\circ$. 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 afaaarka u ah.
- ii** Cabbirka goobada oo dhani waa 360° .

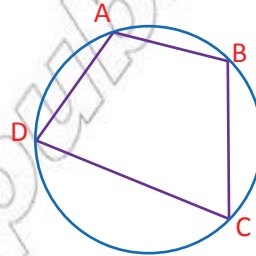
Haddaba, waxaa lagu siiyey afargeeslaha ABCD sida ka muuqata **Jaantuska 5.34** tus in $\angle ADC$ iyo $\angle ABC$ ay yihiin xaglo isdhamaystira.

Caddayn:

$$m(\angle ADC) = \frac{1}{2} m(\widehat{ABC}) \text{ iyo}$$

$$m(\angle ABC) = \frac{1}{2} m(\widehat{ADC}) \text{ markaa}$$

$$\begin{aligned} m(\angle ADC) + m(\angle ABC) &= \frac{1}{2} [m(\widehat{ABC}) + \frac{1}{2} (m(\widehat{ADC}))] \\ &= \frac{1}{2} (m(\widehat{ABC}) + m(\widehat{ADC})) = \frac{1}{2} (360^\circ) \text{ (waayo?)} \\ &= 180^\circ \end{aligned}$$



Jaantuska 5.34

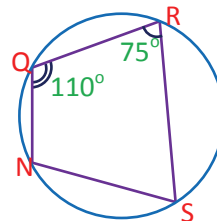
Sidaas awgeed $\angle ADC$ iyo $\angle ABC$ waa xaglo isdhamaystira.

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:

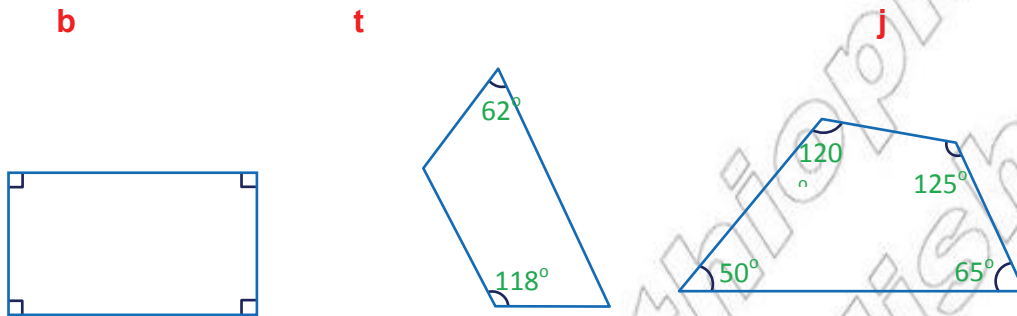
$$\begin{aligned} \text{i} \quad m(\angle QNS) + m(\angle QRS) &= 180^\circ \\ \Rightarrow m(\angle QNS) &= 180^\circ - m(\angle QRS) \\ &= 180^\circ - 75^\circ = 105^\circ \end{aligned}$$



Jaantuska 5.35

ii $m(\angle NQR) + m(\angle NSR) = 180^\circ$
 $\Rightarrow m(\angle NSR) = 180^\circ - m(\angle NQR)$
 $= 180^\circ - 110^\circ = 70^\circ$.

Tusaale 12: Afargeesleyaashan soo socda kee baa ah afargeesle meersan?

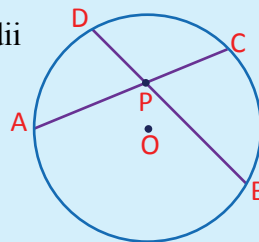


Furfuris: Afargeesleyaasha **b** iyo **t** waa afargeesleyaal meersan, sababtoo ah xaglahooda iska soo horjeeda waa xaglo isdhamaystira. Laakiin afargeeslaha **j** ma aha afargeesle meersan madaama $120^\circ + 65^\circ = 185^\circ$.

Layliska 5.3

1 Sida ku cad Jaantuska 5.36 hoose haddii

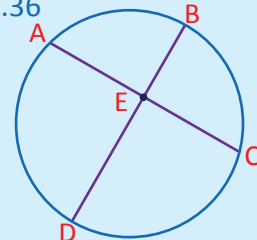
$m(\widehat{CB}) = 100^\circ$ oo $m(\widehat{AD}) = 70^\circ$,
 markaa soo saar $m(\angle APB)$.



Jaantuska 5.36

2 Sida ka muuqata shaxankan hoose, haddii

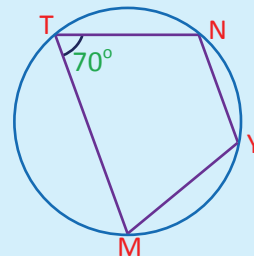
$m(\angle AED) = 95^\circ$ isla markaana $m(\widehat{BC}) = 83^\circ$,
 markaa raadi $m(\widehat{DA})$.



Jaantuska 5.37

3 Sida ka muuqata shaxankan hoose, haddii

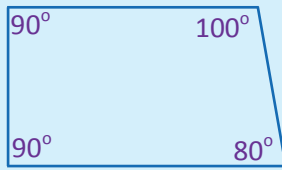
$m(\angle NTM) = 70^\circ$, raadi $m(\angle NYM)$.
 Maxaad ka sheegi kartaa cabbirka
 xaglahan kala ah $m(\angle TNY)$ iyo $m(\angle TMY)$?



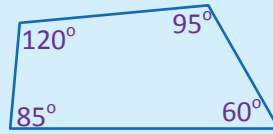
Jaantuska 5.38

4 Afargeesleyaashan soo socda kuwee baa ah afargeesleyaal meersan?

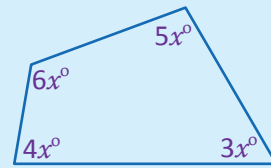
b



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.

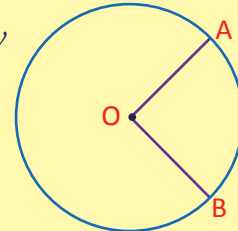
j Barbarroole kasta waa afargeesle meersan.

🔑 Furaha Tibxaha 🔑

- | | | |
|------------------------|-----------------------|------------------------|
| ⇒ Qaanso | ⇒ Gabal ka goobada | ⇒ Qaansada yar |
| ⇒ Boqon | ⇒ Xarriiqada taabtaha | ⇒ Faquuqa Goobada |
| ⇒ Xagal-gees | ⇒ Xagal-xudduneed | ⇒ Qaansada afsaarka ah |
| ⇒ Qaansada weyn | ⇒ Afargeesle meersan | |
| ⇒ Xarriiqada tikraarka | ⇒ Qaansada xaddaysan | |

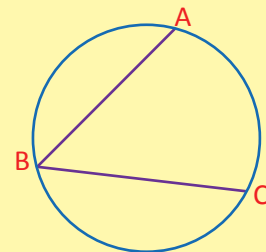
Sookoobida Cutubka

✓ Cabbirka xagal-xudduneedku wuxuu le'eg yahay cabbirka qaansada afsaarka u ah. Taas oo ah $m(\angle AOB) = m(\widehat{AB})$, Halka O tahay xuddunta goobada \widehat{AB} waa qaansada yar.



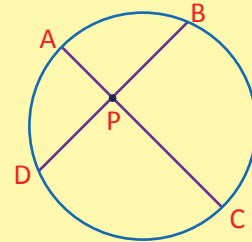
✓ Cabbirka xagal-geesku wuxuu le'eg yahay muska cabbirka qaansada afsaarka u ah

$$m(\angle ABC) = \frac{1}{2} m(\widehat{AC})$$

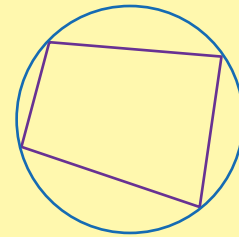


✓ Cabbirka xagasha ay sameeyaan laba boqon oo iska goynaya goobada gudaheeda wuxuu le'eg yahay nuska wadarta cabbirka qaansooyinka afsaarka u ah.

$$Taas oo ah m(\angle BPC) = \frac{1}{2} [m(\widehat{BC}) + m(\widehat{DA})]$$



✓ Afargeesle meersan waa afargeeslaha ay dhammaan geesihisu ku dul dhacaan goobo isku mid ah.

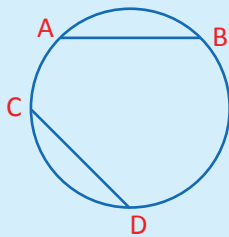


✓ Haddii afargeesluhu yahay afargeesle meersan, markaa xaglihiisa iska soo horjeeda waa xaglo isbuuxsha.

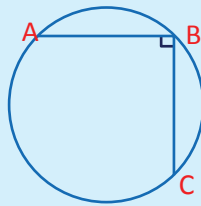
Naqtiinka layliska Cutubka 5aad

1 Minguuri jaantusyada hoose oo tilmaan xuddunta.

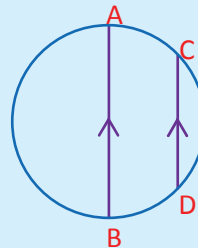
b



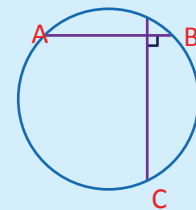
t



j

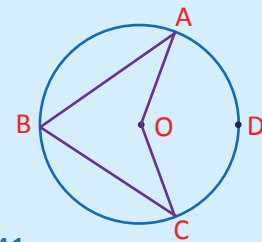


x



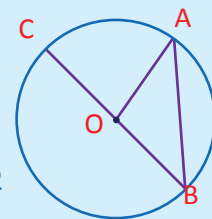
Jaantuska 5.40

2 Jaantuska hoos kamuuqda haddii O ay tahay xuddunta goobada isla markaana $m(\angle AOC) = 140^\circ$. Raadi $m(\angle ABC)$ iyo $m(\widehat{ADC})$



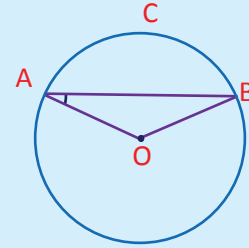
Jaantuska 5.41

3 Shaxanka hoos ka muuqda, haddii O aytahay xuddunta goobada isla markaasna $m(\angle AOC) = 80^\circ$ Raadi $m(\angle CBA)$



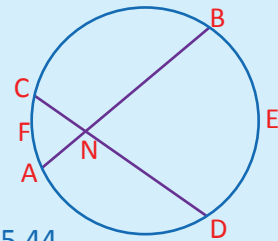
Jaantuska 5.42

- 4 Shaxanka hooska muuqda, haddii O ay tahay xuddunta goobada islamarkaana $m(\angle BAO) = 25^\circ$ Raadi $m(\widehat{ACB})$.



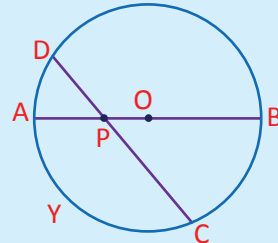
Jaantuska 5.43

- 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 $m(\angle BND) = 75^\circ$ isla markaana $m(\widehat{BED}) = 110^\circ$ markaas Raadi $m(\widehat{AFC})$.



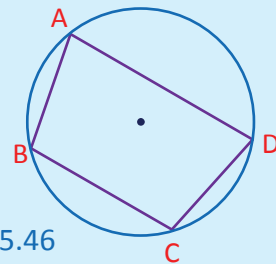
Jaantuska 5.44

- 6 Shaxanka hoos ka muuqda, haddii O ay tahay xuddunta goobada, oo $m(\widehat{AD}) = 40^\circ$ sidookale $m(\angle DPB) = 130^\circ$ Raadi $m(\widehat{CYA})$



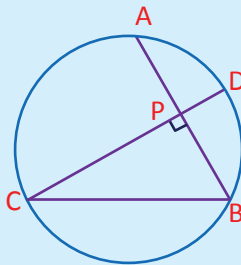
Jaantuska 5.45

- 7 Shaxanka hoos ka muuqda, haddii dhammaan geesaha afargeeslahani ay ku dhacaan goobada dusheeda oo $m(\angle A) = 80^\circ$, $m(\widehat{ABC}) = 140^\circ$, markaa raadi $m\angle D$, $m\angle C$ iyo $m\angle B$.



Jaantuska 5.46

- 8 Shaxanka hoos ka muuqda, haddii $\overline{AB} \perp \overline{CD}$ isla markaana $m(\widehat{DB}) = 60^\circ$ markaas raadi $m(\angle ABC)$



Jaantuska 5.47