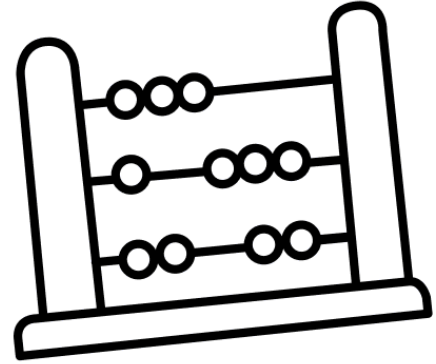


Hubinta fahamka isku ekaanshaha (similarity)



Maths

Cutub: Sifooyinka joomatari (geometrical properties) iyo aragtida Pythagoras (Pythagoras' theorem)

Natiijo

Waxaan weyneyn (enlarge) karaa qaab (shape) waxaana sheegi karaa waxa isbeddelaya iyo waxa aan isbeddelin (invariant).

Erayada muhiimka ah

Shayga (object) waa jaantuska bilowga ah ka hor inta aan la isbeddelin (transformation).

Sawirka (image) waa jaantuska ka soo baxa ka dib marka la isbeddelo (transformation).

Laba qaab (shape) waa isku mid (similar) haddii kala duwanaanshaha kaliya ee u dhexeeya ay tahay cabbirkooda. Dhererka dhinacyadoodu waa isku saami (proportions).

Qiyaasta weyneyn (scale factor) waa tirada lagu dhufto (multiplier) ee u dhaxaysa qaababka isku midka ah (similar shapes), oo qeexaysa sida uu u weyn yahay qaabka marka loo barbardhigo kan kale.

Sifo (property) ee qaabka waa mid aan isbeddelin (invariant) haddii sifadaas aan isbeddelin ka dib marka qaabka la isbeddelo.

Hubinta fahamka isku ekaanshaha (similarity)



Hubinta fahamka weyneyn (enlargement)



Hubinta fahamka isku ekaanshaha (similarity)

Shaygan (object) waxaa lagu weyneeyey (enlarged) qiyaasta weyneyn (scale factor) 3 si loo abuuro sawirka (image).

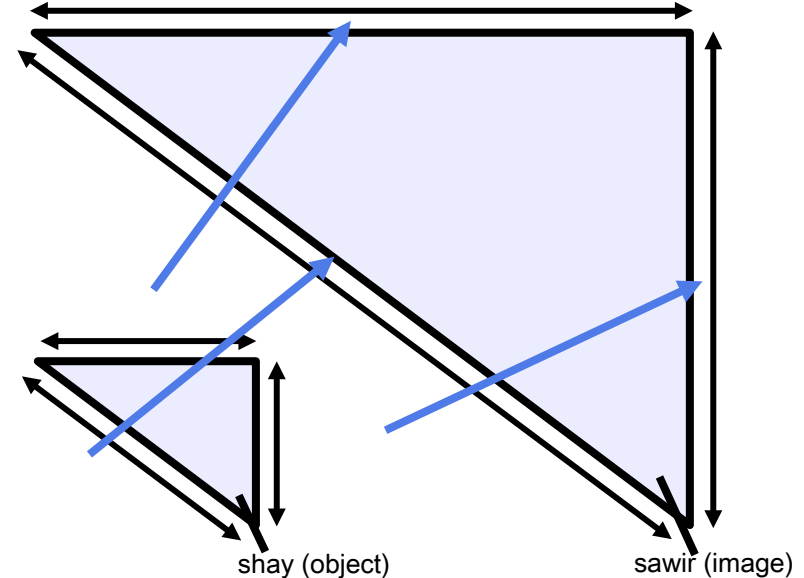
Axmed wuxuu cabbiraa dhererka shayga (object).

Wuxuu ku dhow yahay inuu cabbiro dhererka sawirka (image). Maxaa uu filan karaa?

Dherer kasta oo sawirka (image) ku yaal wuxuu noqon doonaa 3 jeer dhererkiisa u dhigma shayga (object).



Axmed



Shayga (object) waxaa lagu weyneeyey (enlarged) qodob cabbir (scale factor) 3 si loo abuuro sawirka (image).

Axmed wuxuu cabbiraa xaglaha (angles) shayga (object).

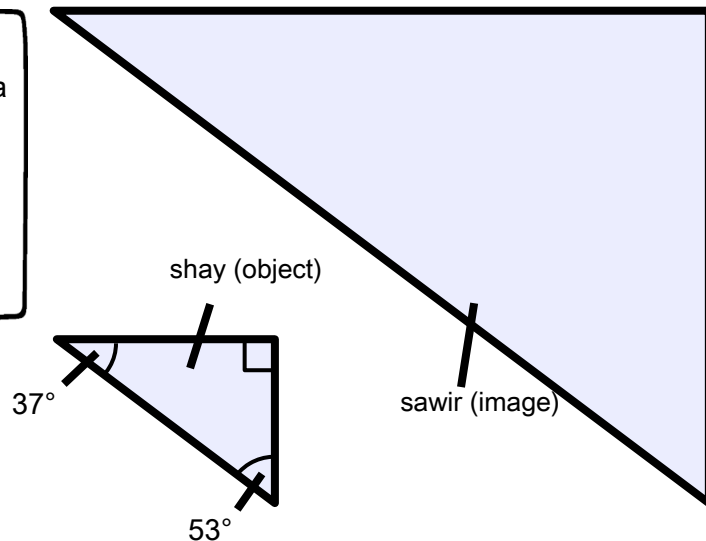
Wuxuu ku dhow yahay inuu cabbiro xaglaha (angles) sawirka (image). Maxay tahay inuu filo?

Xaglaha (angles) sawirka (image) mid kasta wuxuu noqon doonaa 3 jeer xaggiisa u dhigma shayga (object).



Axmed

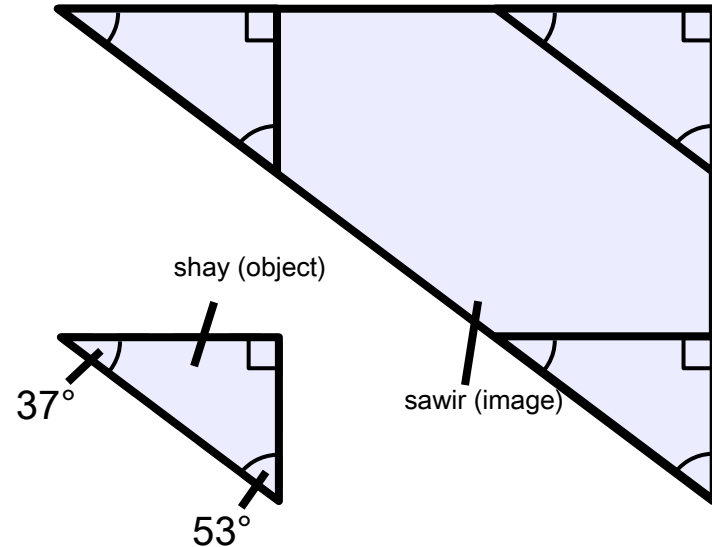
Laakiin taasi waxay ka dhigi doontaa xaglaha (angles) sawirka (image) inay isugeyn ka badan 180° . Taasi sax ma noqon karto.



Hubinta fahamka weyneyn (enlargement)

Marka qaab (shape) la weyneeyo (enlarged) dhererka (lengths) ayaa laga yaabaa inuu isbeddelo, laakiin xaglaha (angles) ma isbeddelaan.

- Saddexagalka (triangles) labaduba waa xagal-qumman (right-angled).
- Saddexagalka (triangles) labaduba waxay ka kooban yihiin laba xagal fiiqan (acute angles).
- Xaglaha (angles) saddexagal (triangle) kasta wuxuu isugeyn yahay 180° .



Hubinta fahamka weyneyn (enlargement)

Mid ka mid ah qaababka waa weyneyn (enlargement) kan kale.

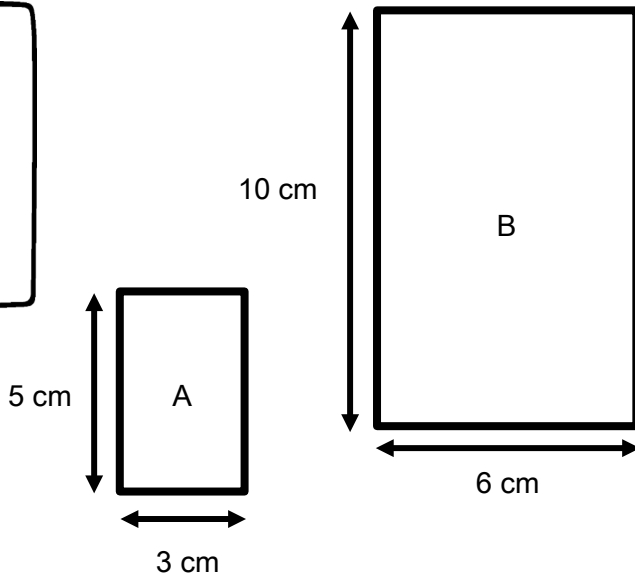
Sidee loo xisaabin karaa isku-dhufashada (scale factor)?

Waxaan xisaabin karnaa isku-dhufashada (scale factor) adoo u qaybinaya laba dherer oo isku mid ah.

Nidaamka qaybinta wuxuu ku xiran yahay qaabka uu yahay shayga (object) iyo kan uu yahay sawirka (image).



Cali



Isra

Hubinta fahamka weyneyn (enlargement)

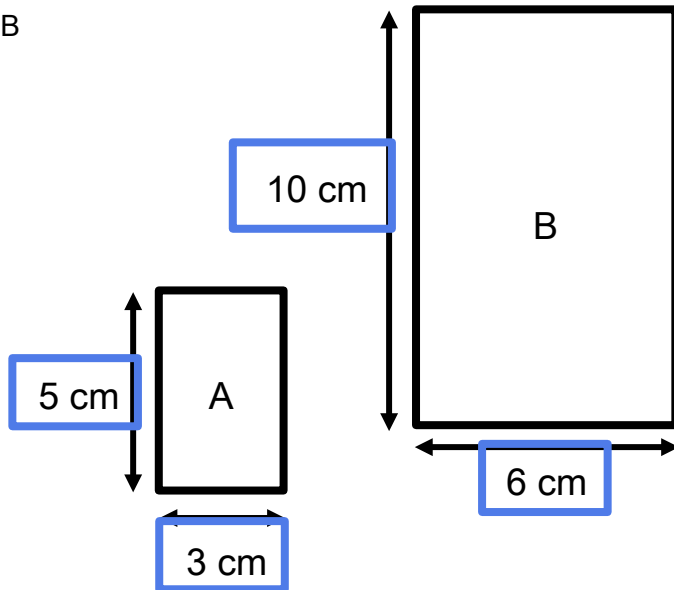
Mid ka mid ah qaababka waa weyneyn (enlargement) kan kale.

Sidee loo xisaabin karaa isku-dhufashada (scale factor)?

Haddii A uu yahay shayga (object) iyo B uu yahay sawirka (image):

$$10 \div 5 = 2$$

$$6 \div 3 = 2$$



Haddii B uu yahay shayga (object) iyo A uu yahay sawirka (image):

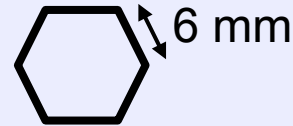
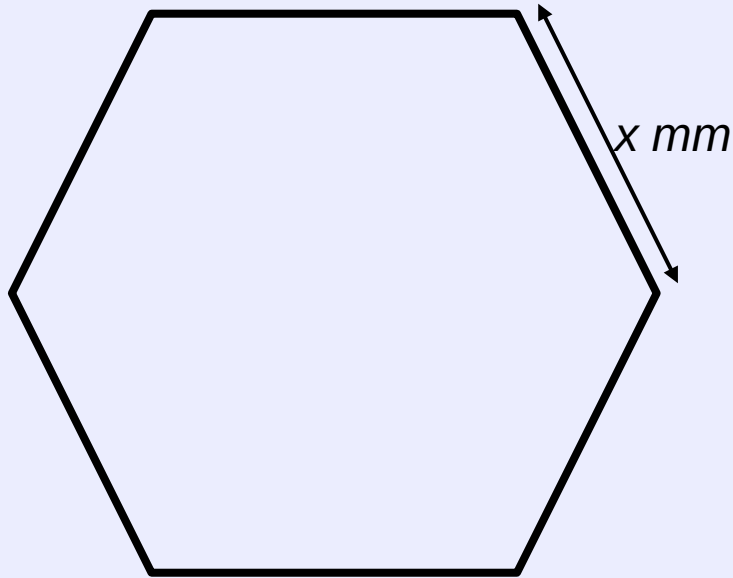
$$5 \div 10 = \frac{1}{2}$$

$$3 \div 6 = \frac{1}{2}$$

$$\frac{1}{2}$$

Hubinta fahamka weyneyn (enlargement)

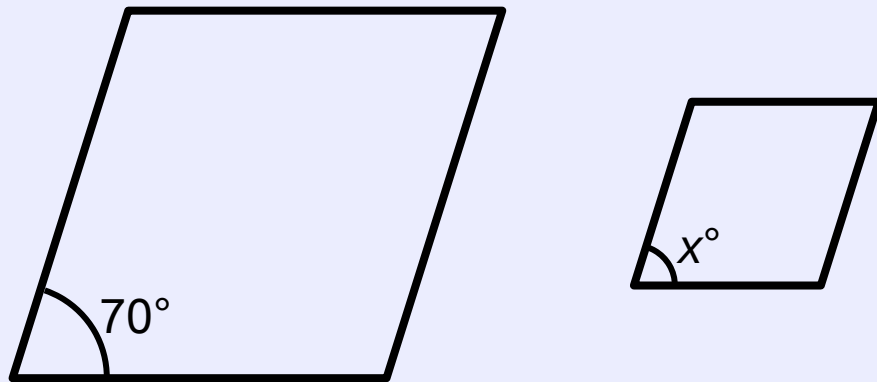
Shayga waxaa lagu weyneeyay (enlarged) iyadoo la adeegsaday cabbir (scale factor) 5 si loo abuuro sawirka. Waa maxay qiimaha (value) x ?



$$\begin{aligned} X &= 6 \times 5 \\ &= 30 \end{aligned}$$

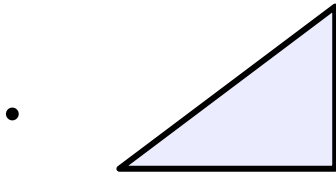
Hubinta fahamka weyneyn (enlargement)

Shayga waxaa lagu weyneeyay (enlarged) iyadoo la adeegsaday cabbir (scale factor) 0.5 si loo abuuro sawirka. Waa maxay qiimaha (value) x ?



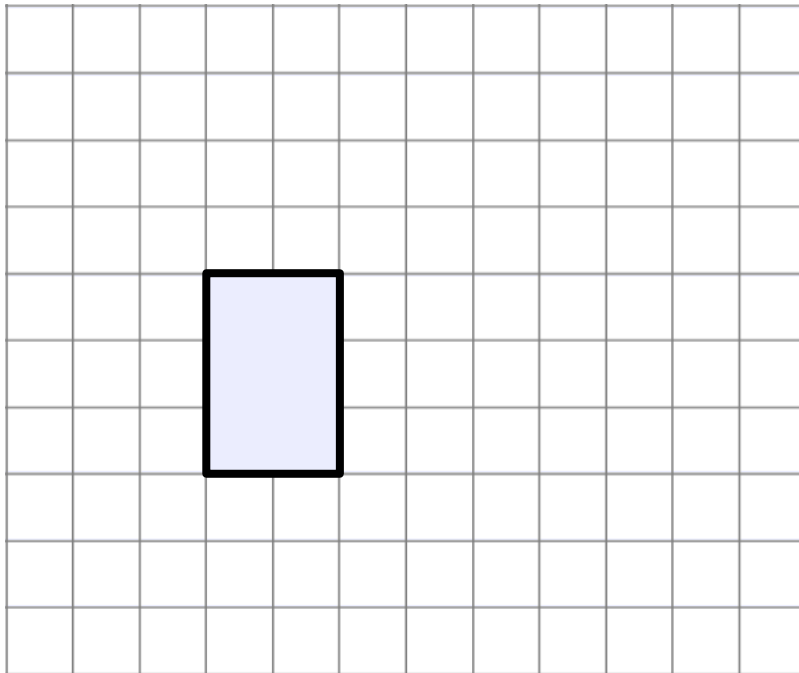
$x = 70$. Cabbirka xaglaha (angle sizes) waa la ilaaliyaa inta lagu jiro weyneynta (enlargement).

- 1) a) Weynee (enlarge) shayga iyadoo la adeegsado cabbir (scale factor) 3 oo laga bilaabo barta la calaamadeeyay.
- b) Isticmaal xisaabiyaha (ruler) si aad u qiyaasto dhammaan dhererka (lengths) ee qaab kasta, oo hubi in dherer kasta oo sawirka ku yaal uu yahay 3 jeer dhererkiisa u dhigma ee shayga.
- c) Isticmaal xagalbeere (protractor) si aad u qiyaasto dhammaan xaglaha (angles) ee qaab kasta, oo hubi in xagal kasta oo sawirka ku yaal uu la mid yahay xagalkiisa u dhigma ee shayga.



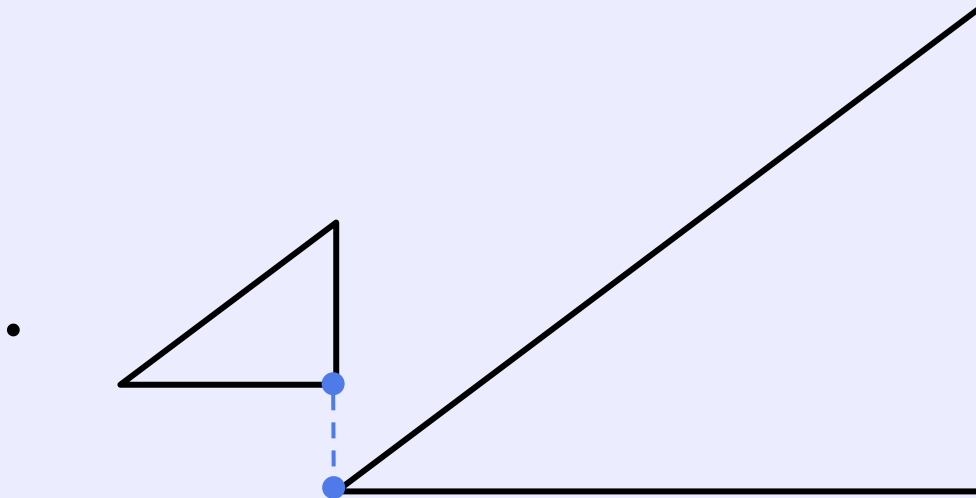
2) Nuur wuxuu rabaa inuu weyneeyo (enlarge) qaabka iyadoo la adeegsado cabbir (scale factor) 2. Wuxuu u baahan yahay inuu si taxaddar leh u doorto xarunta weyneynta (centre of enlargement) si dhammaan sawirka uu ugu sii jiro shabagga (grid).

Soo hel dhammaan dhibcaha (points) ee Nuur u isticmaali karo xarunta weyneynta (centre of enlargement).



1) a) Weynee (enlarge) shayga iyadoo la adeegsado cabbir (scale factor) 3 oo laga bilaabo barta la calaamadeeyay.

Hubi: geeska hoose ee bidix ee sawirka waa inuu si toos ah uga hooseeyaa geeska hoose ee midig ee shayga.



b) Isticmaal xisaabiyaha (ruler) si aad u qiyaasto dhammaan dhererka (lengths) ee qaab kasta, oo hubi in dherer kasta oo sawirka ku yaal uu yahay 3 jeer dhererkiisa u dhigma ee shayga.

Dhererku wuu kala duwanaan karaa iyadoo ku xiran daabacaadda.

Tusaale isku darka dhererka:

Hubi:

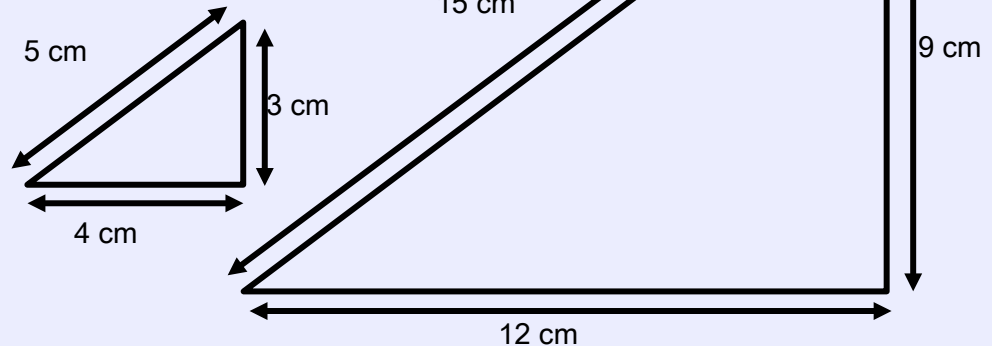
$$15 \div 5 = 3$$

$$12 \div 4 = 3$$

$$9 \div 3 = 3$$



•



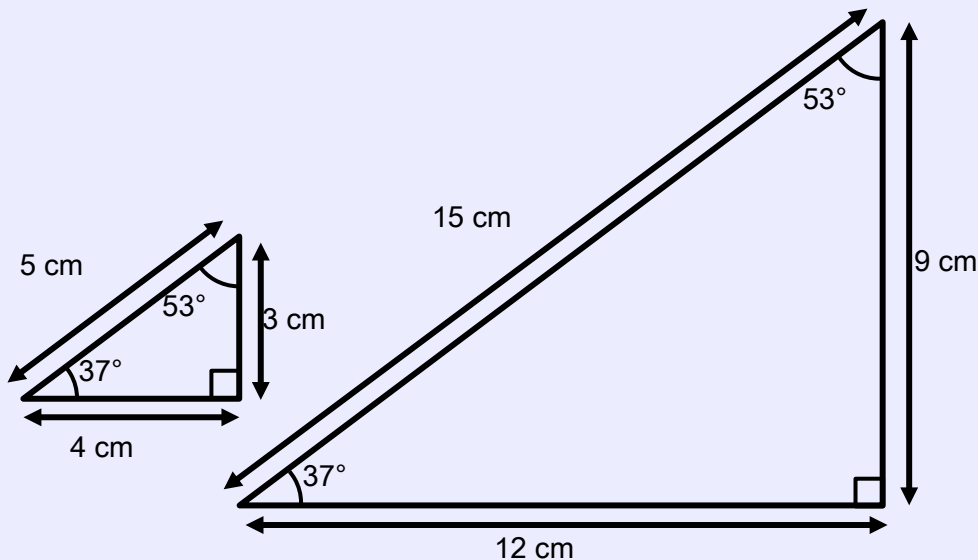
- c) Isticmaal protractor (protractor) si aad u cabbirto dhammaan xaglaha (angles) ee qaab kasta oo hubi in xagal kasta oo sawirka (image) ku jira uu la mid yahay xaggiisa u dhigma ee shayga (object).

Haddii xaashida shaqada (worksheet) lagu daabacay si saami ah, xagluhu waa inay la mid noqdaan kuwa hoose.

Xagluhu way kala duwanaa karaan haddii saamiyada (proportions) aan la ilaalin.

Xaglaha (angles) ee sawirka (image) waxay la mid yihiin xaglahooda u dhigma ee shayga (object).

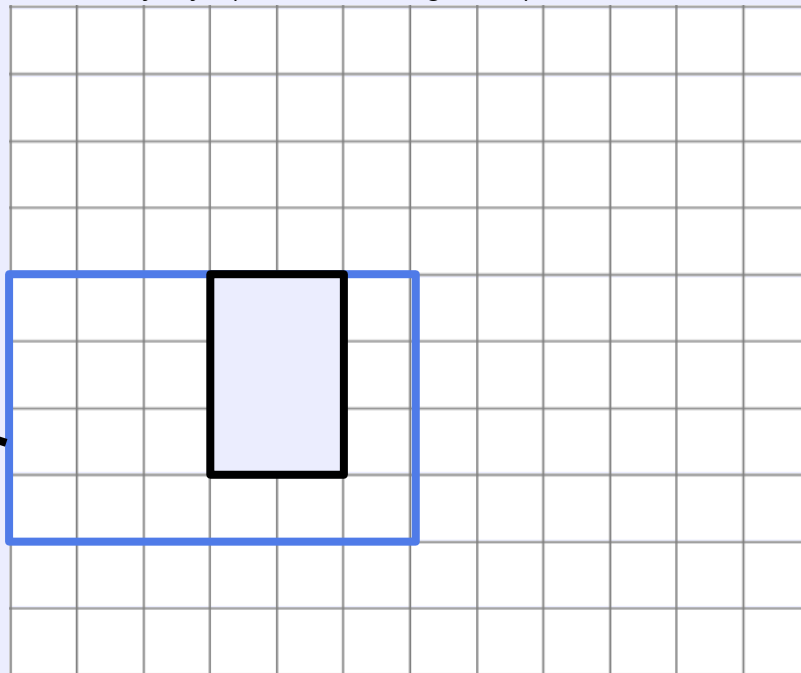
$53 + 90 + 37 = 180$ Xaglaha (angles) ee saddexagal kasta waa isku 180° .



2) Nuur wuxuu rabaa inuu weyneeyo (enlarge) qaabka isagoo isticmaalaya qiyaas weyneyn (scale factor) 2. Wuxuu u baahan yahay inuu si taxaddar leh u doorto xarunta weyneyn (centre of enlargement) si sawirka (image) oo dhan uu ugu sii jiro shabkada (grid).

Soo hel dhammaan dhibcaha (points) ee Nuur u isticmaali karo xarunta weyneyn (centre of enlargement).

Sawirku wuxuu ku sii jiraa shabkada marka la isticmaalo xarun kasta oo weyneyn (enlargement) ah oo ku taal goobtan.



 mujejis (demonstration) is-dhexgal ah

Hubinta fahamka isku ekaanshaha (similarity)



Hubinta fahamka weyneyn (enlargement)



Hubinta fahamka isku ekaanshaha (similarity)

Hubinta fahamka isku ekaanshaha (similarity)

Kani waa sawir magaalada Liverpool.

Suad iyo Nuur labaduba waxay koobiyeeyeen sawirka oo way weyneeyeen.

Maxay sawirka Nuur u eg yahay mid qalloocan?



sawirkii asalka ahaa



koobiga Suad

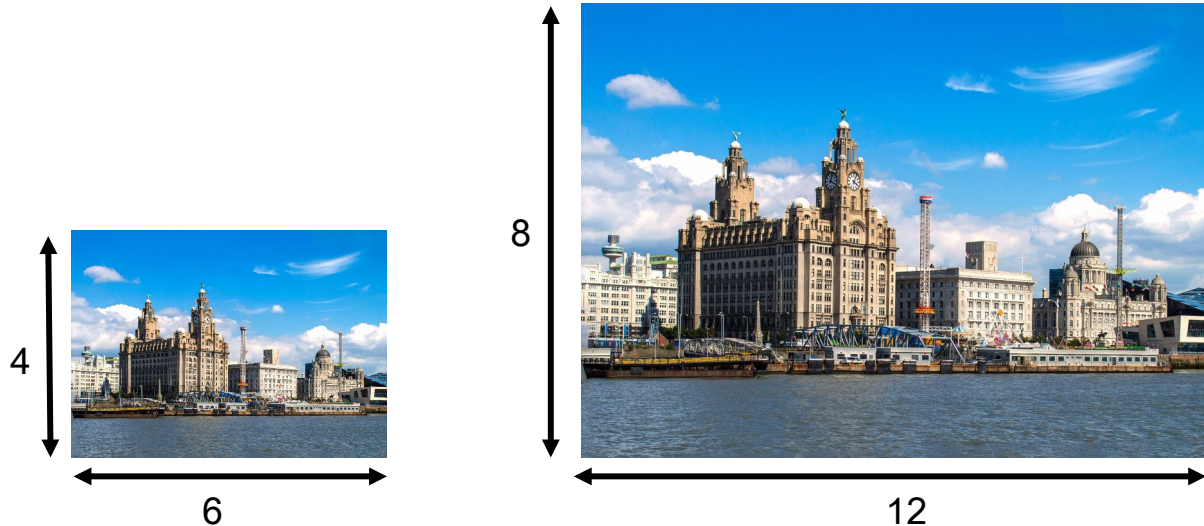


koobiga Nuur

Hubinta fahamka isku ekaanshaha (similarity)

Marka shay la weyneeyo (enlarged) si loo abuuro sawir, shayga iyo sawirku waa isku mid (similar).

Laba qaab (shape) waa isku mid (similar) haddii dhererradoodu isku saami (proportion) yihiin.



Qaababku (shapes) waa isku mid (similar) sababtoo ah...

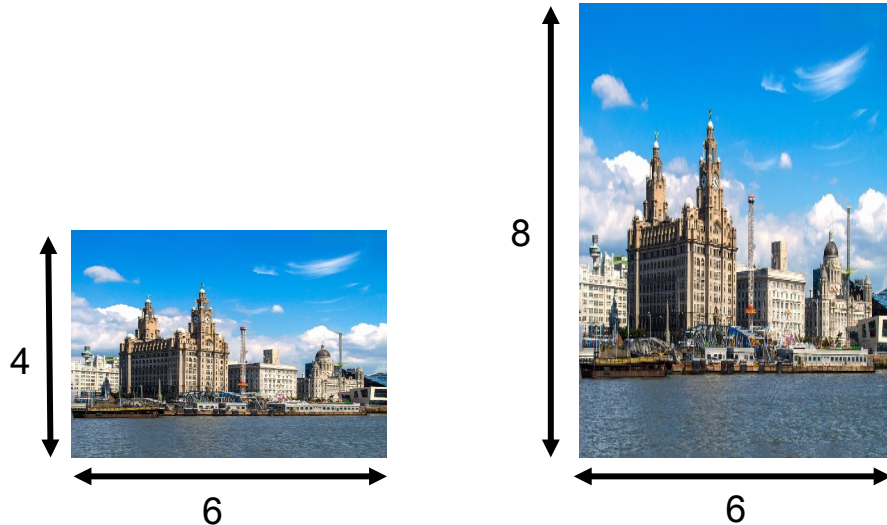
saamiyada (ratios) u dhexeeya dhererrada qaab kasta waa isku mid (equivalent).

$$\begin{array}{ccc} & \times 1.5 & \\ & \curvearrowright & \\ 4 : 6 & & \\ \times 2 \curvearrowleft & 8 : 12 & \curvearrowright \times 2 \\ & \times 1.5 & \end{array}$$

Hubinta fahamka isku ekaanshaha (similarity)

Marka shay la weyneeyo (enlarged) si loo abuuro sawir, shayga iyo sawirku waa isku mid (similar).

Laba qaab (shape) waa isku mid (similar) haddii dhererradoodu isku saami (proportion) yihiin.



Qaababku isku mid (similar) ma aha sababtoo ah...

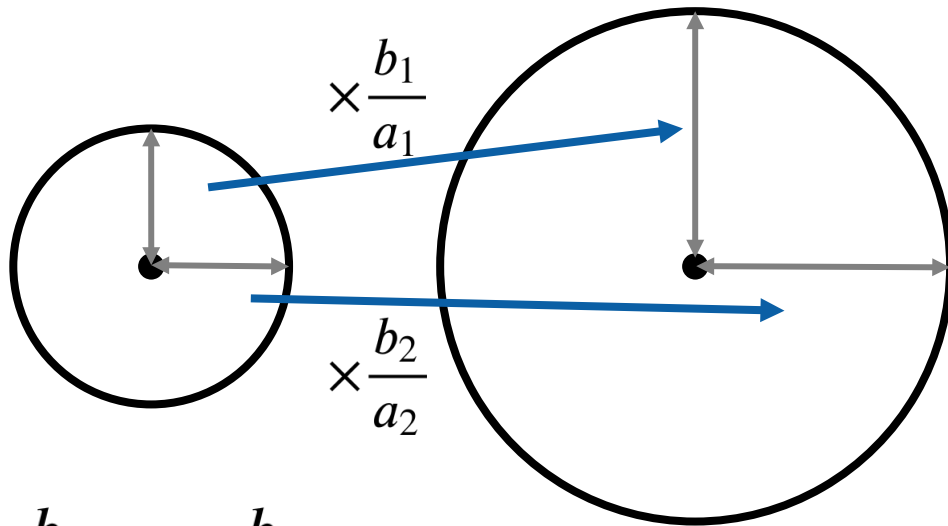
saamiyada (ratios) u dhexeeya dhererrada qaab kasta ma aha kuwa isku mid (equivalent).

$$\begin{array}{ccc} & \times 1.5 & \\ & \curvearrowright & \\ \times 2 & \left(\begin{array}{c} 4 : 6 \\ 8 : 6 \end{array} \right) & \times 1 \\ & \curvearrowleft & \\ & \times 0.75 & \end{array}$$

Gobollo (circles) oo dhan miyay isku mid (similar) yihiin?

Gacan-radius (radius) ee goobo (circle) wuxuu leeyahay dherer isku mid ah dhinac kasta.

Marka isku dhufashada (multipliers) ee u dhaxaysa gacanka-radius (radii) ee u dhigma waxay noqonayaan kuwo isku mid ah.

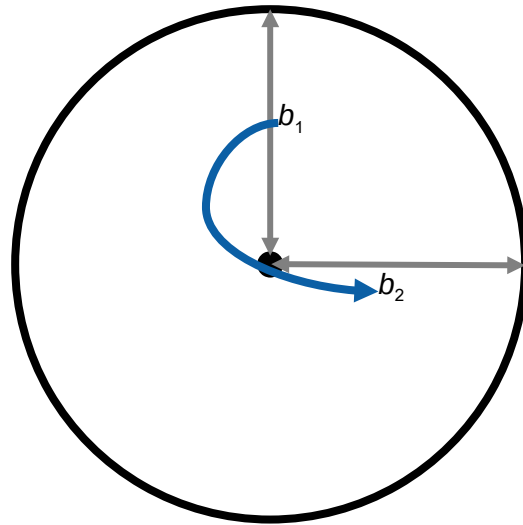
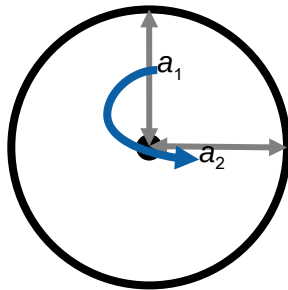


$$\frac{b_1}{a_1} = \frac{b_2}{a_2}$$

Gobollo (circles) oo dhan miyay isku mid (similar) yihiin? Sidee ku caddayn kartaa jawaabtaada?

Gacan-radius (radius) ee goobo (circle) wuxuu leeyahay dherer isku mid ah dhinac kasta.

Marka isku dhufashada (multipliers) ee u dhaxaysa gacanka-radius (radii) ee goobo kasta waa isku mid yihiin. Waxay had iyo jeer yihiin 1.



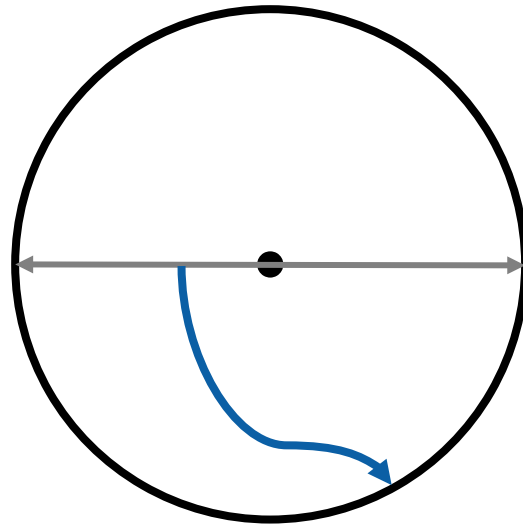
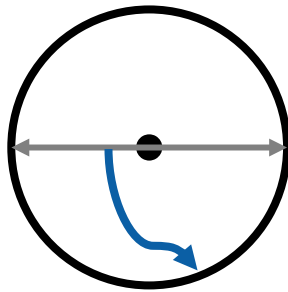
Caasha

Gobollo (circles) oo dhan miyay isku mid (similar) yihiin? Sidee ku caddayn kartaa jawaabtaada?

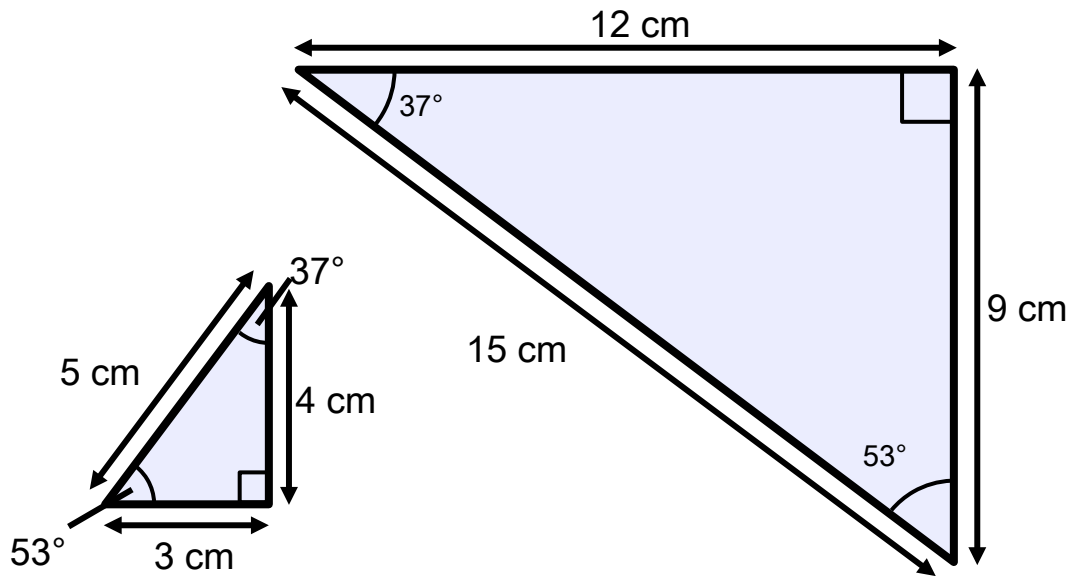
Saamiga (ratio) ee u dhexeeya dhexroorka (diameter) iyo wareegga (circumference) ee goobo kasta waa isku mid had iyo jeer.



Nuur



Laba qaab (shapes) waa isku mid (similar) haddii dhererkoodu yahay isku saami (proportion). Jihada (orientation) qaababka way ka duwanaan kartaa.



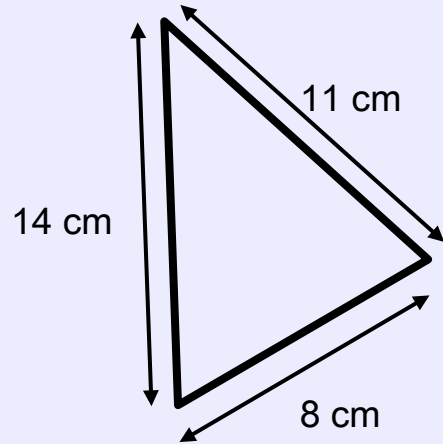
Qaababku waa isku mid (similar), taas oo macnaheedu yahay...

xaglaha isku midka ah (corresponding angles) waa siman yihiin.

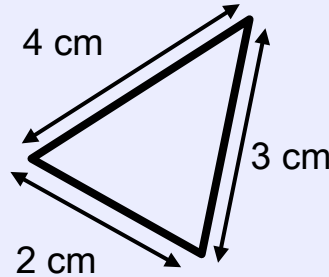
Xagluhu waa invariant (invariant) inta lagu jiro weyneyn (enlargement).

Hubinta fahamka isku midnimada (similarity)

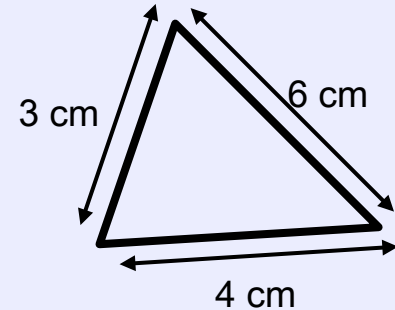
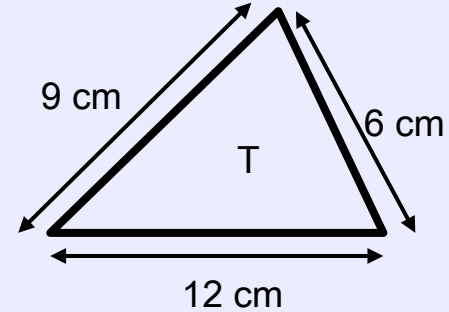
Qaabkee ayaa la mid ah saddexagalka T?



a



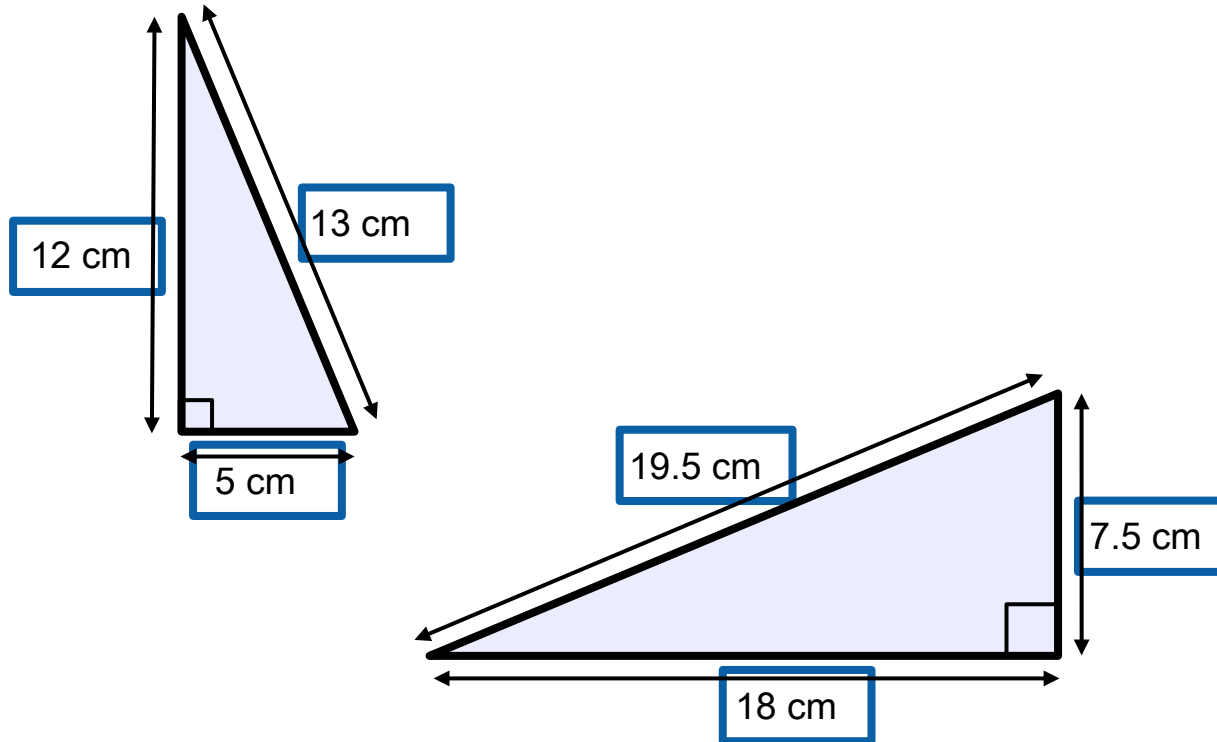
b



c

Hubinta fahamka isku midnimada (similarity)

Labada qaab ee hoose waa isku mid (similar). Raadi dhererka maqan.



caleen (scale factor):

$$18 \div 12 = \frac{3}{2}$$

dhinaca ugu dheer:

$$13 \times \frac{3}{2} = 19.5$$

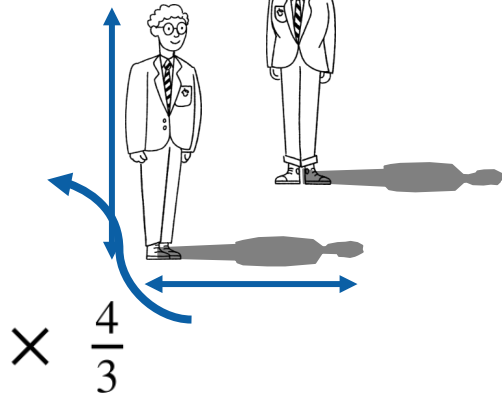
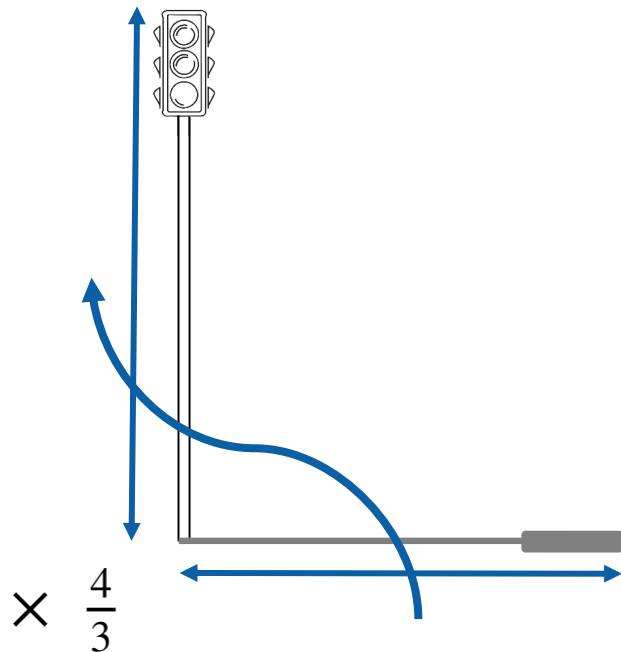
dhinaca ugu gaaban:

$$7.5 \div \frac{3}{2} = 5$$

Hubinta fahamka isku midnimada (similarity)

Axmed iyo Saciid waxay qiyaasayaan dhererka nalalka taraafikada maalin qorrax leh.

Sidee ayay u samayn karaan iyagoo isticmaalaya qaabab isku mid ah (similar shapes)?



Haddii aan ognahay dhererka Axmed, waxaan qiyaasi karnaa dhererka nalalka taraafikada adigoo cabbiraya hooska (shadows).

$$156 \div 117 = \frac{4}{3}$$

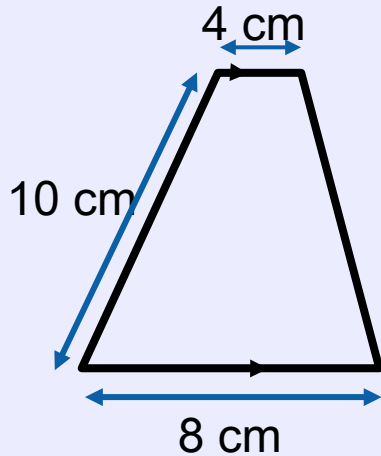
$$3 \times \frac{4}{3} = 4$$

Hubinta fahamka isku midnimada (similarity)

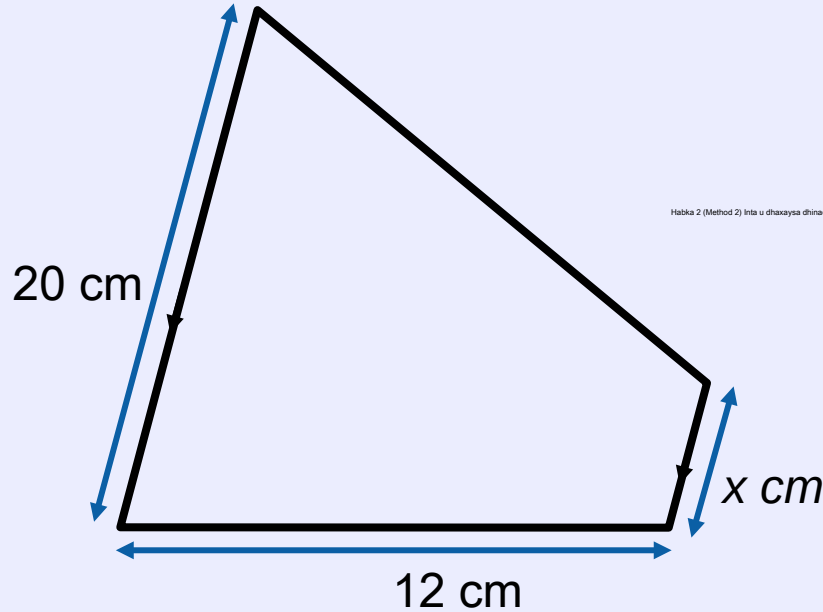
Labada qaab waa isku mid (similar). Raadi qiimaha (value) x.

$$\frac{5}{2}$$

$$\frac{5}{2}$$

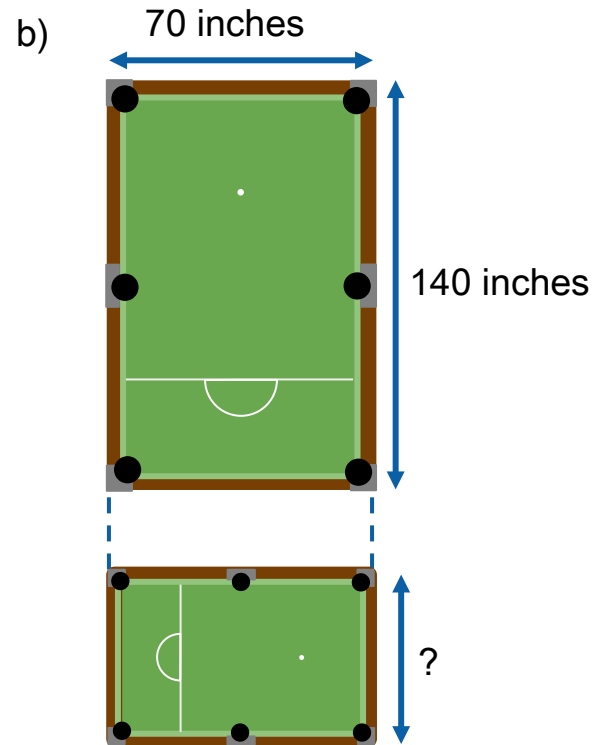
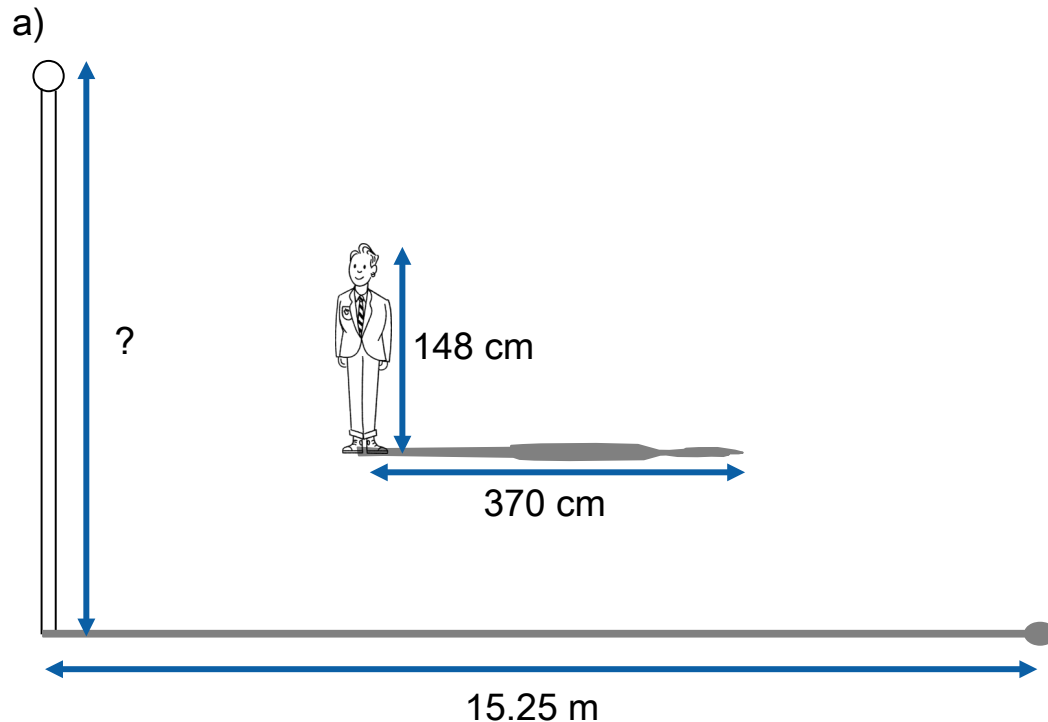


Habka 1 (Method 1) Inta u dhaxaysa qaababka (Between shapes)

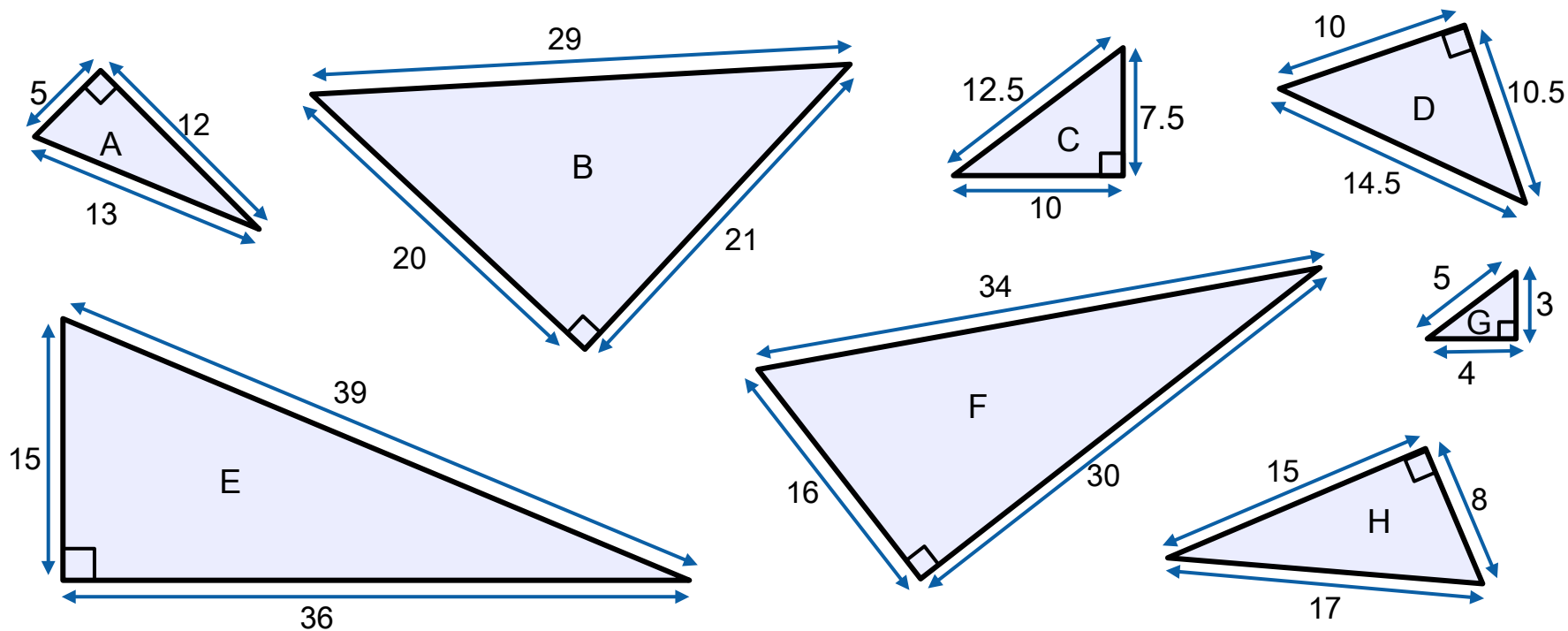


Habka 2 (Method 2) Inta u dhaxaysa dhinacyada isku qaabka (Between sides of same shape)

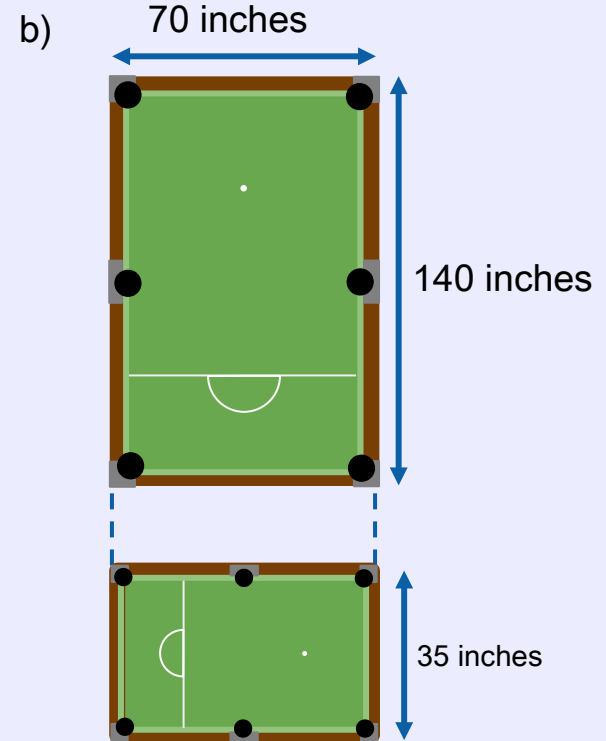
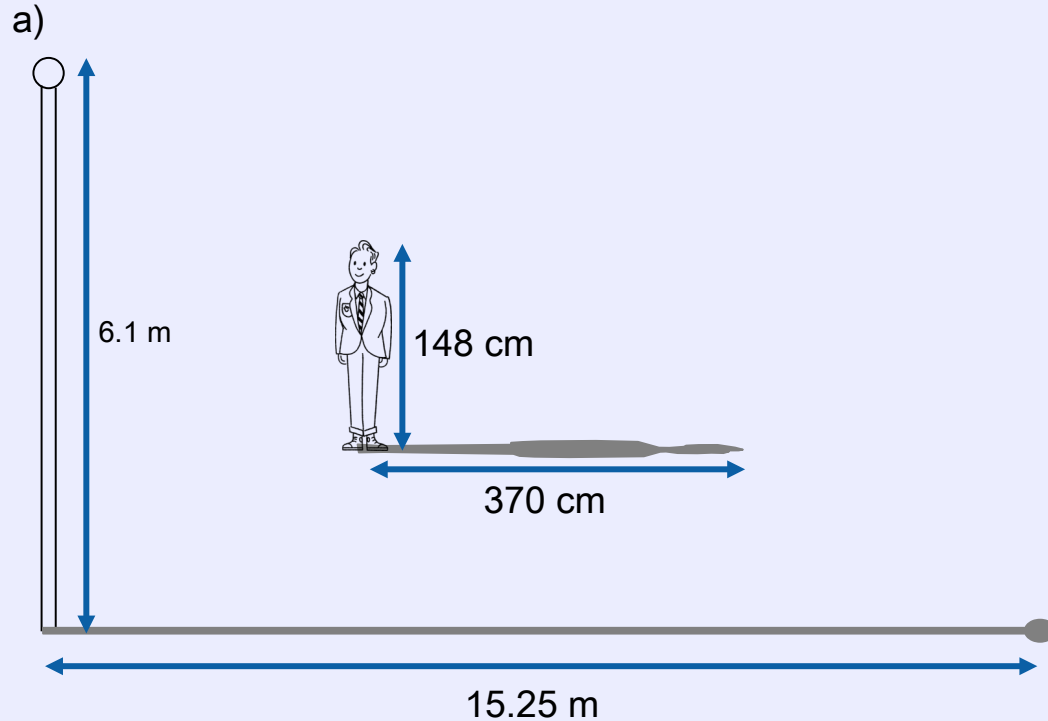
1) Isticmaal isku ekaanshaha (similarity) si aad u hesho dhererka maqan.



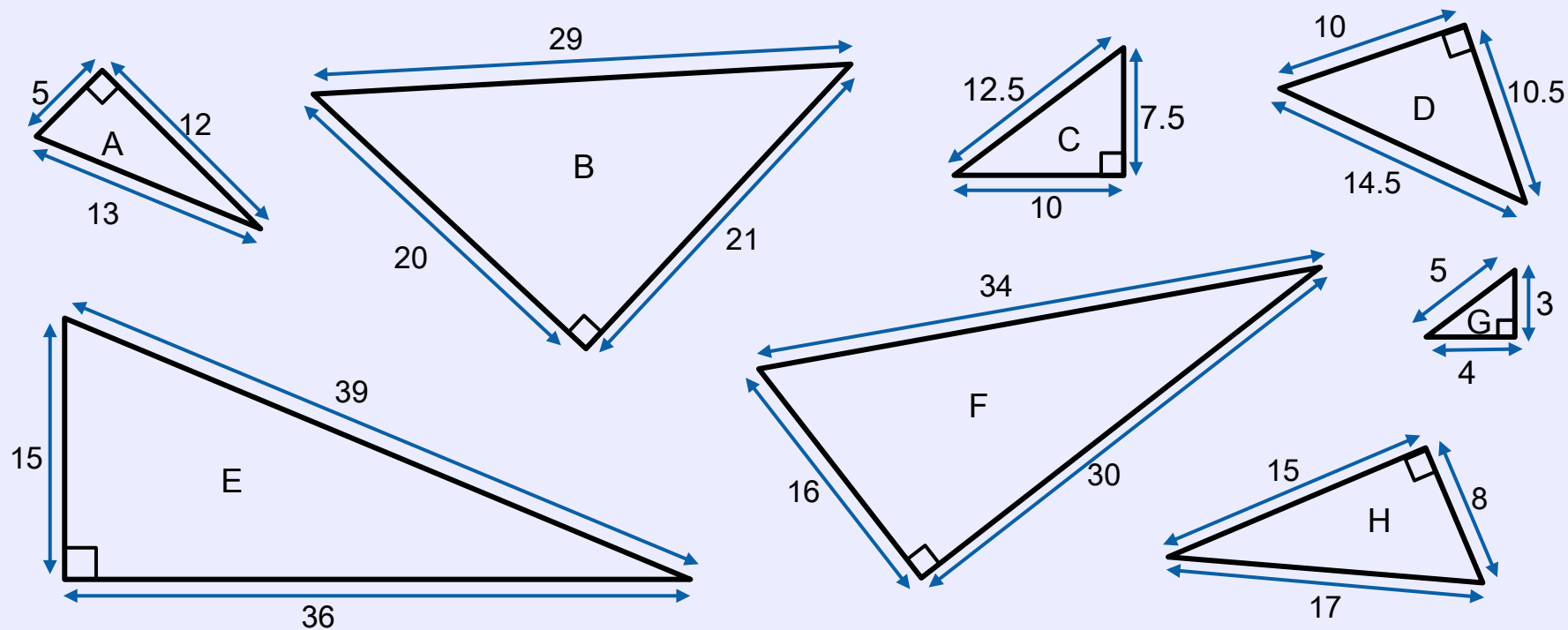
- 2) a) Isku dar saddexagal kasta (triangle) iyo saddexagalkiisa isku eg (similar triangle). b) Raadi qiyaasta isku ekaanshaha (scale factor) inta u dhaxaysa labada saddexagal ee isku eg.



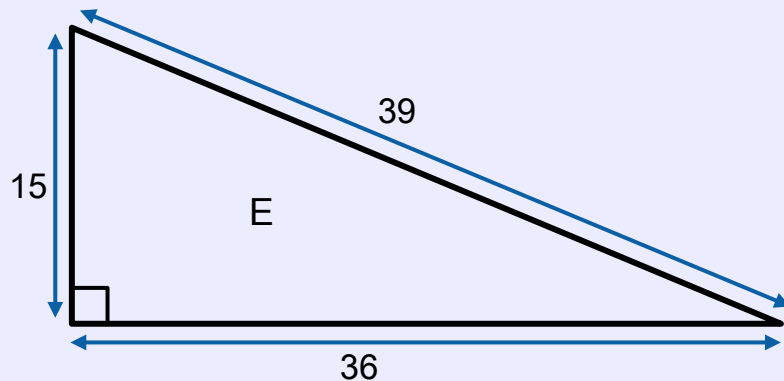
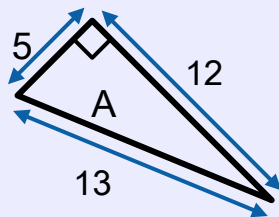
1) Isticmaal isku ekaanshaha (similarity) si aad u hesho dhererka maqan.



2) a) Isku dar saddexagal kasta (triangle) iyo saddexagalkiisa isku eg (similar triangle). b) Raadi qiyaasta isku ekaanshaha (scale factor) inta u dhaxaysa labada saddexagal ee isku eg.



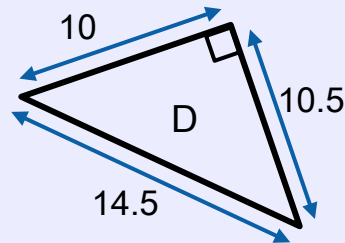
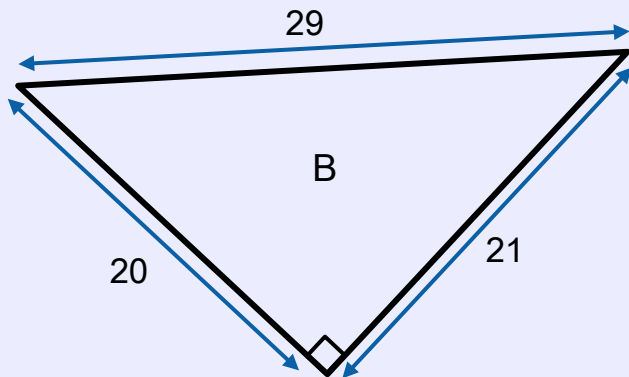
2) a) Isku dar saddexagal kasta oo leh saddexagalkiisa isku eg (similar triangle). b) Raadi qiyaasta (scale factor) ee u dhaxaysa labada saddexagal ee isku eg.



A iyo E

qiyaasta (scale factor) 3 ama $\frac{1}{3}$

2) a) Isku dar saddexagal kasta oo leh saddexagalkiisa isku eg (similar triangle). b) Raadi qiyaasta (scale factor) ee u dhaxaysa labada saddexagal ee isku eg.

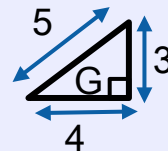
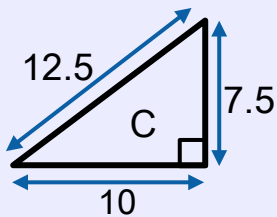


B iyo D

qiyaasta (scale factor) 2 ama $\frac{1}{2}$



2) a) Isku dar saddexagal kasta oo leh saddexagalkiisa isku eg (similar triangle). b) Raadi qiyaasta (scale factor) ee u dhaxaysa labada saddexagal ee isku eg.



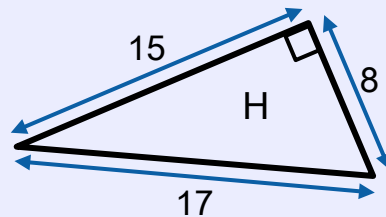
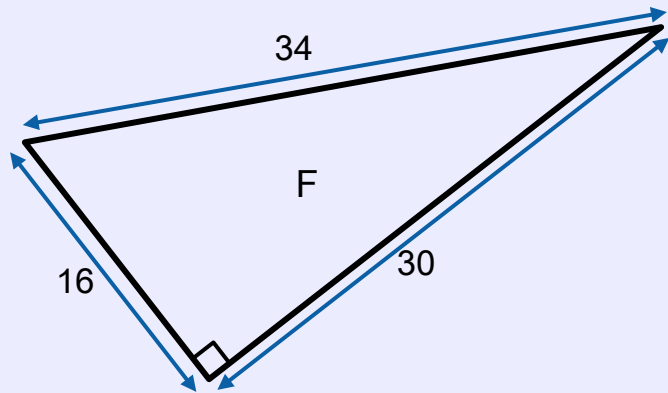
C iyo G

qiyaasta (scale factor) ama

$$\frac{3}{2}$$

$$\frac{2}{3}$$

2) a) Isku dar saddexagal kasta oo leh saddexagalkiisa isku eg (similar triangle). b) Raadi qiyaasta (scale factor) ee u dhaxaysa labada saddexagal ee isku eg.



F iyo H

qiyaasta (scale factor) 2 ama $\frac{1}{2}$

- Weyneyn (Enlargement) macneheedu waa isbeddel cabbirka.
- Dhererka xariiqyada (lines) ayaa laga yaabaa inay isbeddelaan marka la weyneeyo (enlarged).
- Xaglaha (angles) gudaha shayga kama isbeddelaan marka la weyneeyo (enlarged).
- Marka shay la weyneeyo (enlarged), sawirku waa isku eg (similar).
- Jihada (orientations) ee qaababka isku eg (similar shapes) way ku kala duwanaan karaan.