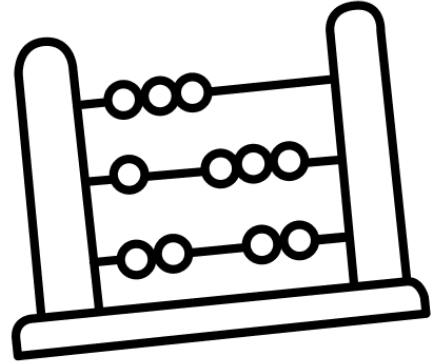


Isku-dhigma wareeg (Rotational symmetry)

Maths

Cutub: Sifooyinka joomatari iyo aragtida Pythagoras



Natiijo

Waxaan aqoonsan karaa isku-dhigma wareeg ee qaababka.

Xarunta wareeggu waa barta go'an ee shayga lagu wareejiyo.

Isku-dhigma wareeg (Rotational symmetry) wuxuu qeexaa marka qaabku u muuqdo isku mid ka dib wareeg yar. Nidaamka isku-dhigma wareeggu waa tirada jeer ee sawirku u muuqdo isku mid sida shayga hal wareeg oo buuxa.

Isku-dhigma wareeg (Rotational symmetry)



Aqoonsashada isku-dhigma wareeg ee qaababka



Helista qaababka leh isku-dhigma wareeg gaar ah

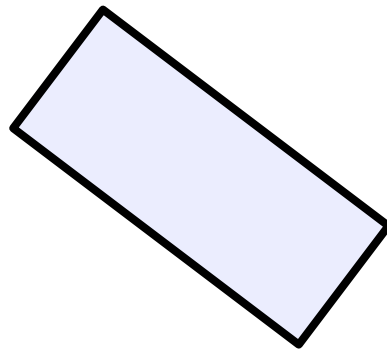
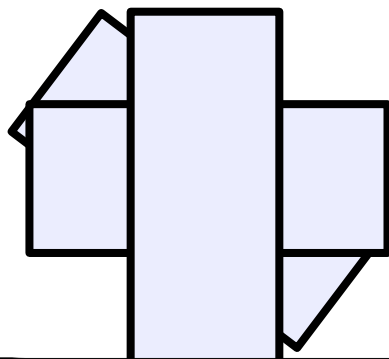
Layliyada hoose waa isku mid (congruent).

Layla waxay u wareejin doontaa layliga bidix hal wareeg oo buuxa.

Imisa jeer ayay u muuqan doontaa inay isku jihada tahay sida layliga midig?



Waxaan calaamadeeyay dusha si aan u arko markaan dhammaysto hal wareeg.

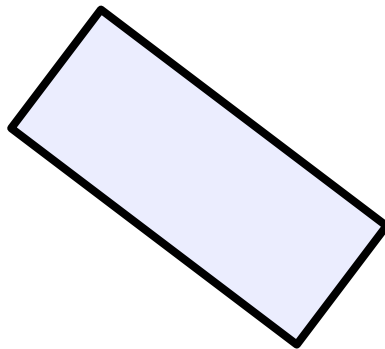


Laydhyaasha hoose waa isku qaab (congruent).

Layla waxay u wareejin doontaa laydhka bidix wareeg buuxa (full turn).

Immisa jeer ayuu u ekaan doonaa isla jihada (orientation) sida laydhka midig?

laba jeer



Waxaa jiray laba jeer oo laydhka bidix u ekaa laydhka midig intii aan wareejinayay. Sababta?

Aqoonsiga wareeg-simmetri (rotational symmetry) ee qaababka

Wareeg-simmetri (rotational symmetry) waa marka qaabku isku mid noqdo wareeg ka dib.

Dalabka (order) wareeg-simmetrigu waa tirada boosaska uu qaabku isku mid uga muuqdo sidii asalka marka la wareejiyo wareeg buuxa (full turn).

Xarunta wareejintu (centre of rotation) waxay ku taallaa dhexda qaabka hawshan.

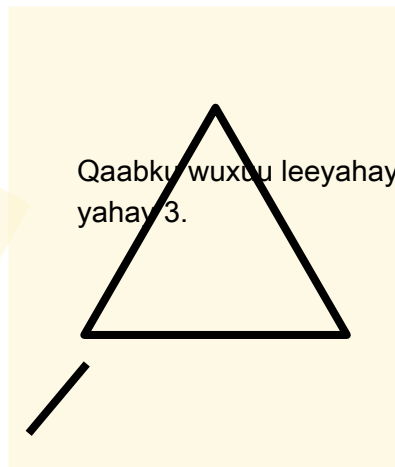
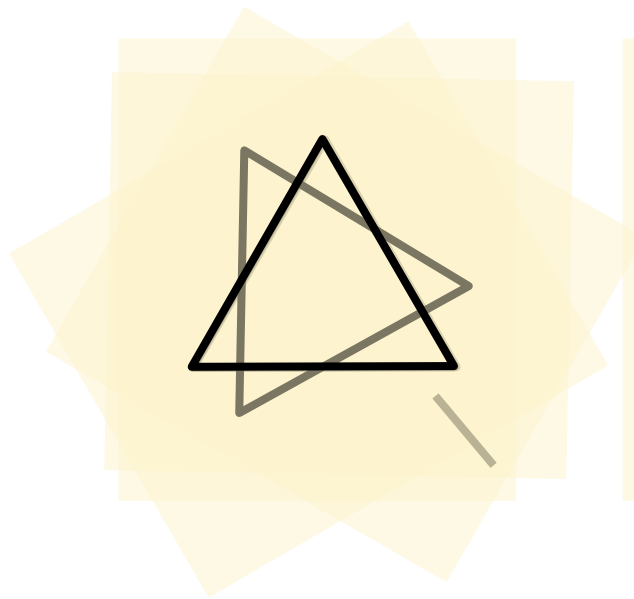


Tusaale: Laydhyaashu waxay leeyihiin wareeg-simmetri dalabkiisu yahay 2.

Aqoonsiga wareeg-simmetri (rotational symmetry) ee qaababka

Waxaan heli karnaa wareeg-simmetriga qaabka iyadoo la sawiro qaab isku mid ah (congruent) warqad raadraac (tracing paper) ah.

Kadib waxaan wareejin karnaa warqadda raadraaca oo tirin karnaa inta jeer ay si fiican ugu habboonaato kii asalka ah inta lagu jiro wareeg buuxa (full turn).

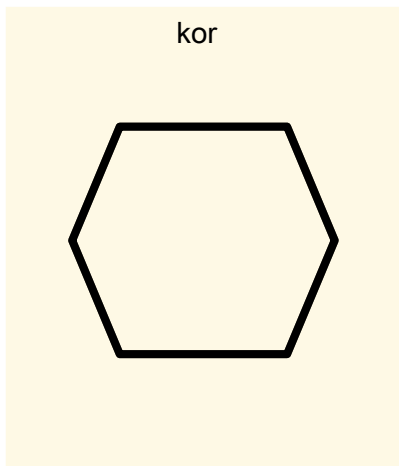


Qaabku wuxuu leeyahay wareeg-simmetri dalabkiisu yahay 3.

Warqad raadraac (tracing paper) looma baahna qaababka wareeg-simmetrigoodu cad yahay.

Laakiin waxay noqon kartaa mid waxtar leh marka wareegga (rotational symmetry) uu yar yahay.

1



Waxay u egtahay inay leedahay wareeg (rotational symmetry) oo ah 6.

Laakiin aan ku hubinno warqad raadraaca (tracing paper).

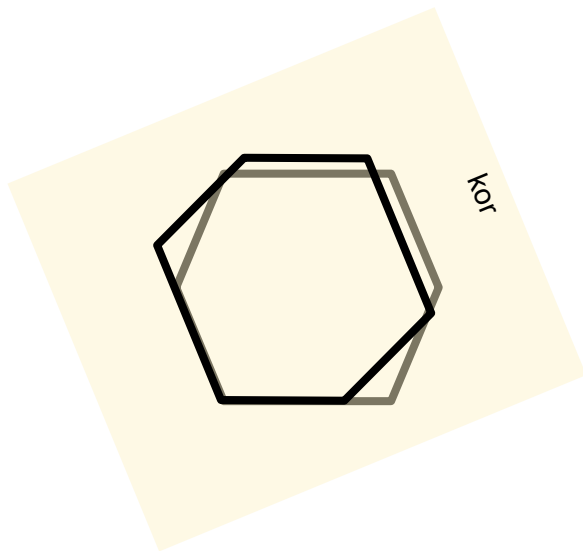


Nuur

Warqadda raadraaca (tracing paper) waxaa laga yaabaa inaysan lagama maarmaan ahayn qaababka wareegga (rotational symmetry) cad.

Laakiin waxay noqon kartaa mid waxtar leh marka wareegga (rotational symmetry) uu yar yahay.

1



Si fiican uma habboona.

Waa inaysan ahayn lix geesood
(hexagon) caadi ah.

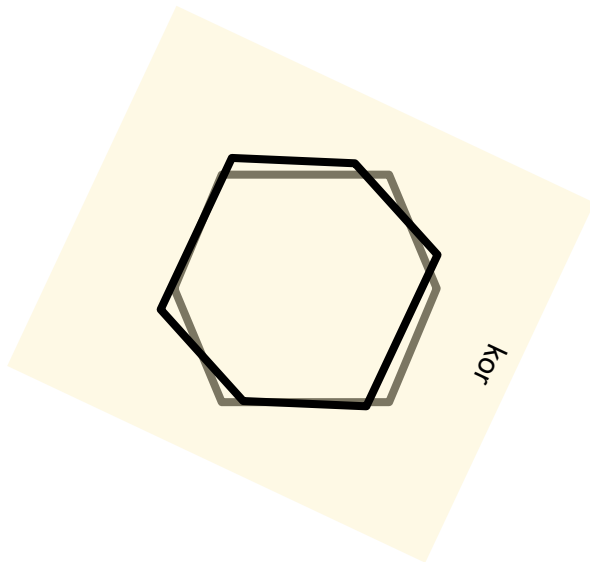


Nuur

Warqadda raadraaca (tracing paper) waxaa laga yaabaa inaysan lagama maarmaan ahayn qaababka wareegga (rotational symmetry) cad.

Laakiin waxay noqon kartaa mid waxtar leh marka wareegga (rotational symmetry) uu yar yahay.

1



Halkan sidoo kale kuma habboona.

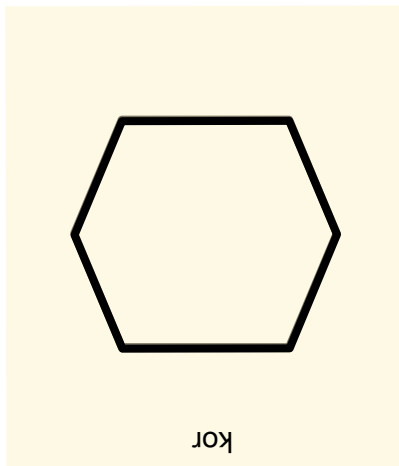


Nuur

Warqadda raadraaca (tracing paper) waxaa laga yaabaa inaysan lagama maarmaan ahayn qaababka wareegga (rotational symmetry) cad.

Laakiin waxay noqon kartaa mid waxtar leh marka wareegga (rotational symmetry) uu yar yahay.

2



Waa ku habboon
yahay halkan.

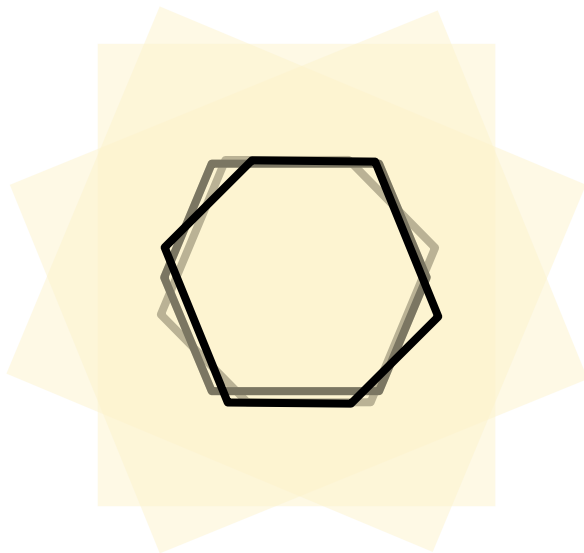


Nuur

Warqad raadraac (Tracing paper) loolama baahna qaababka isku-dhafka wareega (rotational symmetry) si cad u muuqda.

Laakiin waxay faa'iido yeelan kartaa marka isku-dhafka wareega uu yahay mid aan caddayn.

2

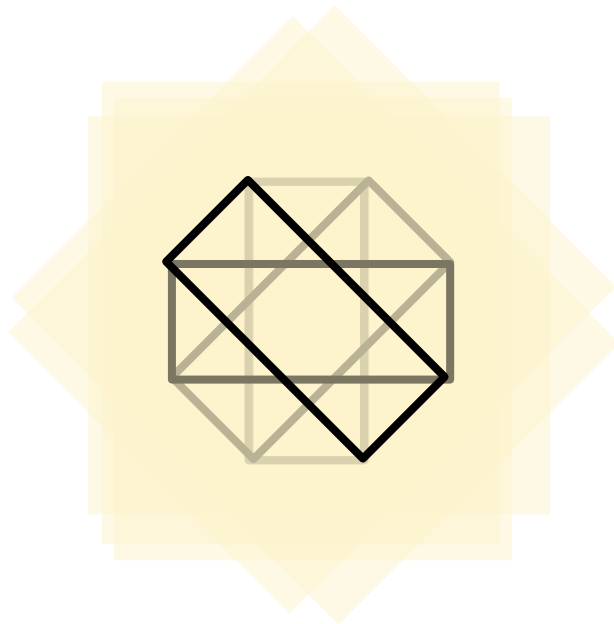


Waxay leedahay isku-dhaf
wareeg (rotational symmetry)
oo amar (order) 2 ah.



Nuur

Axmed wuxuu baarayaa isku-dhafka wareega (rotational symmetry) ee qaabka hoose.



Axmed

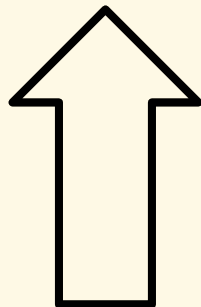
Amarka (order) isku-dhafka
wareega (rotational
symmetry) waa 3.

Axmed wuxuu laba jeer tiriyey barta bilowga (starting point).

Aqoonsashada isku-dhafka wareega (rotational symmetry) ee qaababka

Cabdi iyo Suad waxay raadinayaan nidaamka isku-dhafka wareega (rotational symmetry) ee qaabka hoose.

Waxaan u malaynayaa inay yeelan doonto isku-dhaf wareeg oo ah nidaam 0 sababtoo ah kuma ekaan doono meel kale.



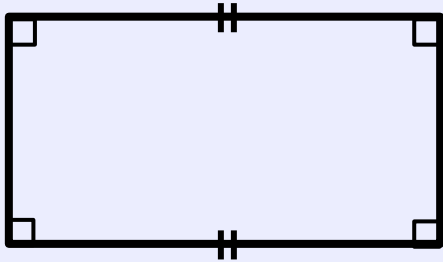
Haddii aan ku sawirno qaab isku mid ah (congruent) warqad raadraac ah, waxay ku habboonaan doontaa si fiican korka hal mar. Sidaas darteed waxay leedahay isku-dhaf wareeg oo nidaam 1.



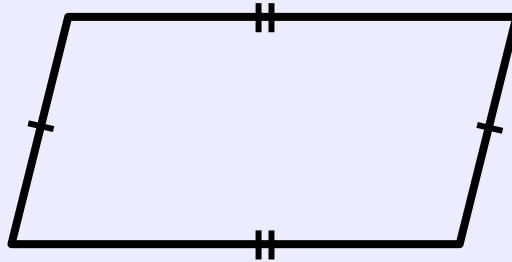
Dhammaan qaababku waxay leeyihiin isku-dhaf wareeg oo ugu yaraan nidaam 1.

Aqoonsashada isku-dhafka wareega (rotational symmetry) ee qaababka

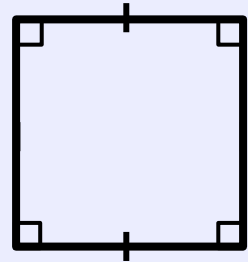
Qaabkee ayaa leh isku-dhaf wareeg oo nidaam 4?



a



b

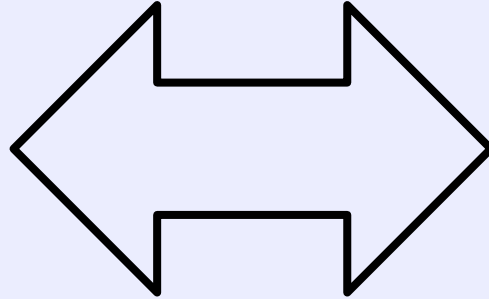


c



Aqoonsashada isku-dhafka wareega (rotational symmetry) ee qaababka

Qaabka hoose wuxuu leeyahay isku-dhaf wareeg oo nidaam².



Aqoonsashada isku-dhafka wareega (rotational symmetry) ee qaababka

Run mise been?

Qaabku wuxuu yeelan karaa isku-dhaf wareeg oo nidaam 0.



Run



Been



Sabab u sheeg jawaabtaada

a

Dhammaan qaababku waxay leeyihiin isku-dhaf wareeg oo ugu yaraan 1.

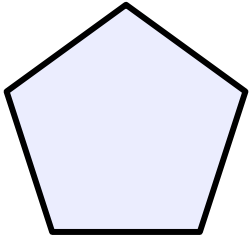


b

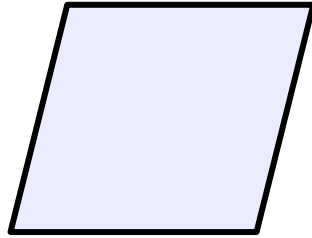
Qaabku wuxuu yeelan karaa isku-dhaf wareeg oo nidaam 0 haddii uusan waligiis isku ekaan marka la wareejiyo.

1) Qor nidaamka isku-dhafka wareega ee qaab kasta. Warqad raadraac ayaa laga yaabaa inay ku caawiso hawshan.

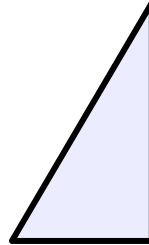
a)



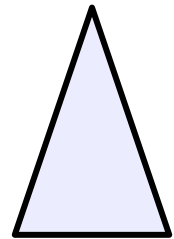
b)



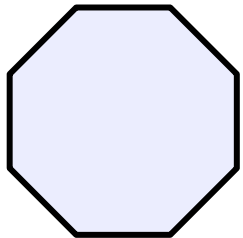
c)



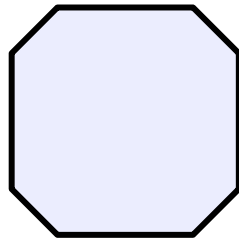
d)



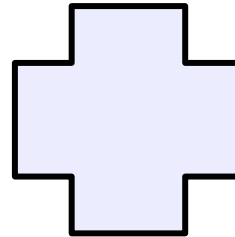
e)



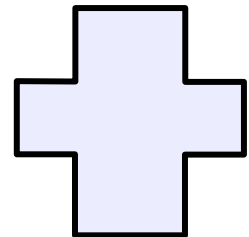
f)



g)



h)



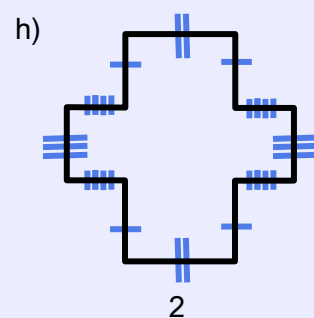
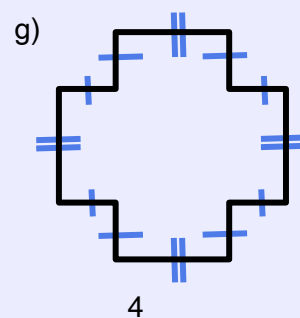
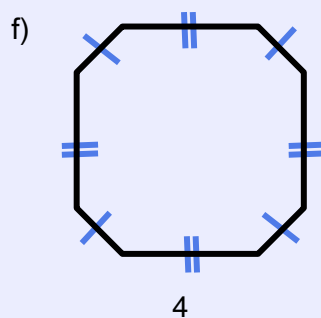
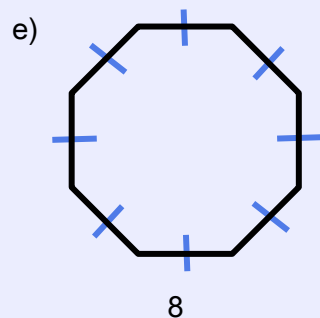
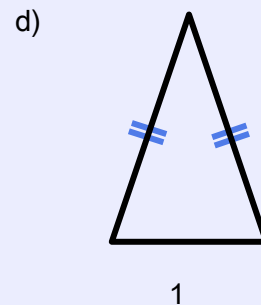
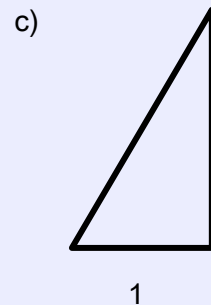
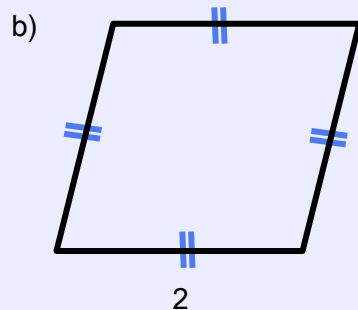
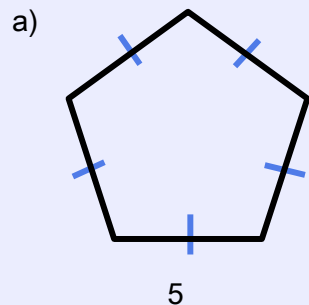
2) Kala saar xarfaha shaxda, marka loo eego nidaamka isku-dhafka wareega.

A B C D E F G H I J K L M N O P
Q R S T U V W X Y Z

nidaam 1	amar 2	amar 3	amar 4	amar ka weyn 4

Hawsha A Aqoonsiga summetriyada wareegta (rotational symmetry) ee qaababka

1) Qor amarka (order) summetriyada wareegta (rotational symmetry) ee qaab kasta. Warqad raadraac (tracing paper) ayaa kaa caawin karta hawshan.



2) Kala sooc xuruuftan (letters) miiska, iyadoo loo eegayo amarka (order) summetriyadooda wareegta (rotational symmetry).

A B C D E F G H I J K L M N O P
Q R S T U V W X Y Z

amar 1	amar 2	amar 3	amar 4	amar ka weyn 4
A, B, C, D, E, F, G, J, K, L, M, P, Q, R, T, U, V, W, Y	H, I, N, S, X, Z			O

Fiiro: summetriyada wareegta (rotational symmetry) ee xuruufta O iyo X waxay ku kala duwanaan kartaa nooca xarafka (font).

Summetriyada wareegta (Rotational symmetry)



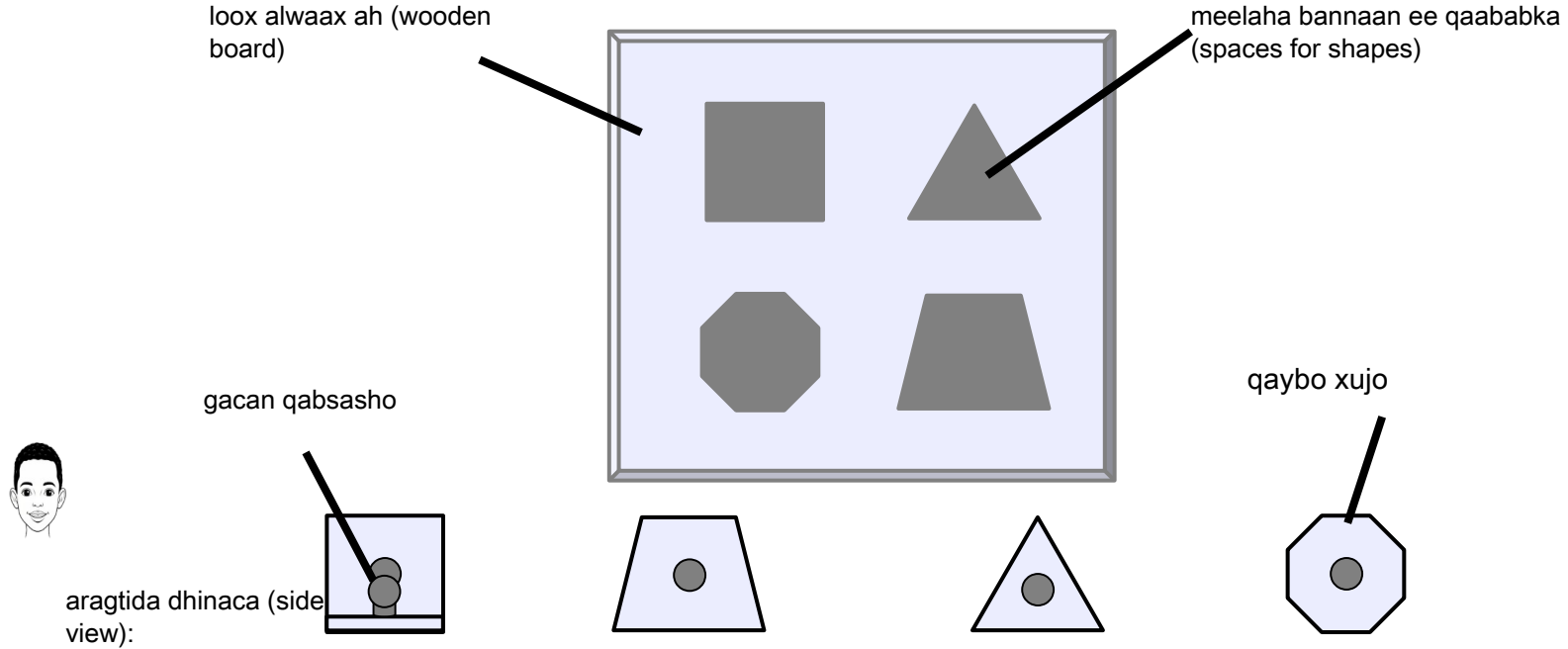
Aqoonsiga summetriyada wareegta (rotational symmetry) ee qaababka



Helista qaababka leh summetriyada wareegta (rotational symmetries) gaar ah

Helista qaababka leh summetriyada wareegta (rotational symmetries) gaar ah

Cali iyo Isra waxay naqshadeynayaan loox ciyaareed (puzzle board) carruurta dugsiga barbaarinta (preschool).

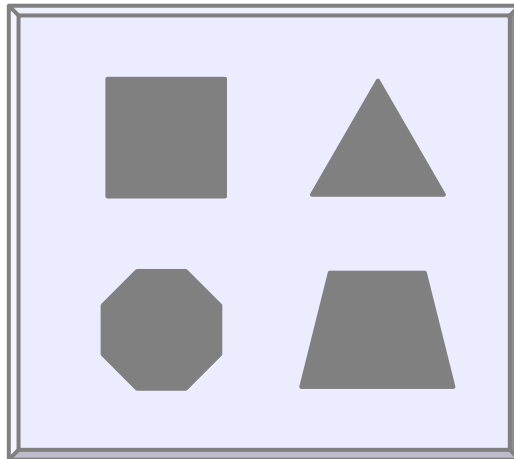


Carruurta waxay xalliyaan xujada iyagoo qaybaha gelinaya meelaha saxda ah.

Helista qaabab leh wareegyo siman oo gaar ah (rotational symmetries)

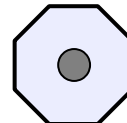
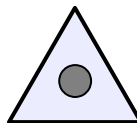
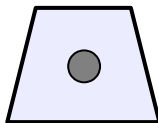
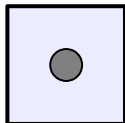
Waxay tijaabiyaan xujadooda carruur qaar waxayna ka wada hadlaan waxay arkeen.

Carruurtu si fudud ayay ugu dhigmaan qaybaha meelaha. Laakiin waxay ogaadeen in qaybaha qaar ay ka fudud yihiin in la geliyo meelaha marka loo eego kuwa kale.



Qaybtee xujo ayay ugu fududayd?

Qaybtee xujo ayay ugu adkayd?

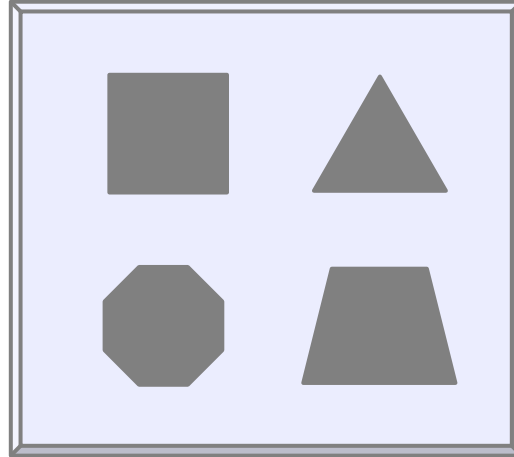


Helista qaabab leh wareegyo siman oo gaar ah (rotational symmetries)

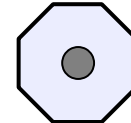
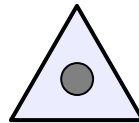
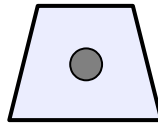
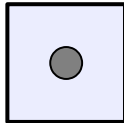
Waxay tijaabiyaan xujadooda carruur qaar waxayna ka wada hadlaan waxay arkeen.

Waxay ogaadeen in octagon-ka caadiga ah uu yahay kan ugu fudud in la geliyo meeshiisa.

Waxay la halgameen trapezium-ka inta badan.



Maxaad u malaynaysaa inay u arkeen octagon-ka caadiga ah inuu ka fudud yahay trapezium-ka?



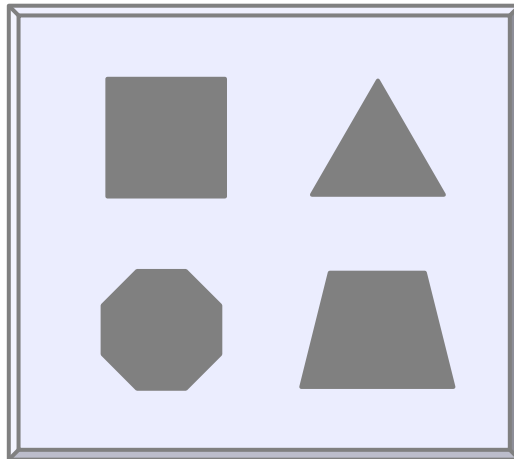
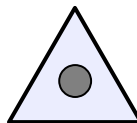
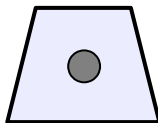
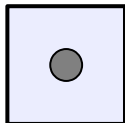
ugu fudud



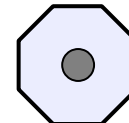
Helista qaabab leh wareegyo siman oo gaar ah (rotational symmetries)

Waxay tijaabiyaan xujadooda carruur qaar waxayna ka wada hadlaan waxay arkeen.

Octagon-ka caadiga ah wuxuu leeyahay wareegyo siman oo amarka 8 (rotational symmetry of order 8). Marka waxaa jira 8 siyaabood oo kala duwan oo qaybtu ku habboonaato meesheeda.



Haa! Trapezium-ku wuxuu leeyahay wareegyo siman oo amarka 1 (rotational symmetry of order 1). Marka waxaa jira 1 hab kaliya oo ay ku habboonaato meesha.

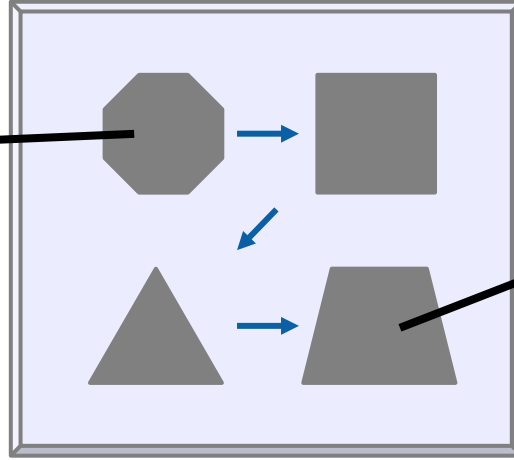


amar 8

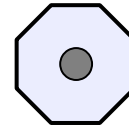
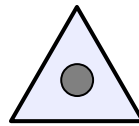
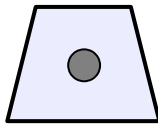
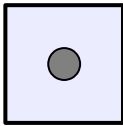
Helista qaababka leh wareeg-simmetry (rotational symmetry) gaar ah

Waxay go'aansadeen inay dib u habeeyaan meelaha sabuurada si qaybuhu ugu qulqulaan sida ugu fudud ilaa ugu adag in la geliyo meelaha.

heerka ugu sarreeya ee wareeg-simmetry (rotational symmetry)

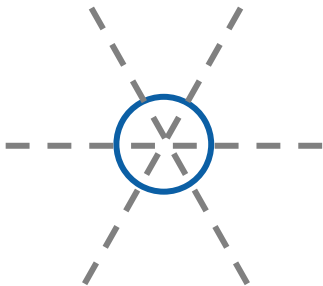


heerka ugu hooseeya ee wareeg-simmetry (rotational symmetry)



Sidee qaababka loo dhigi karaa si habboon?

Yacquub wuxuu naqshadeynayaa astaan (logo). Wuxuu doonayaa in qaabka astaanta uu leeyahay wareeg-simmetry (rotational symmetry) oo ah heer 6.



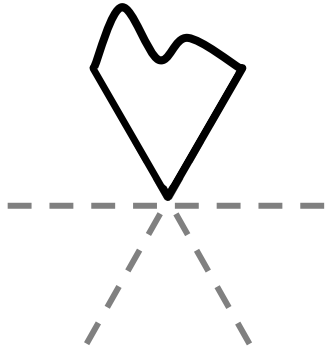
Waxaa jira 360° wareeg buuxa. Marka waxaan bilaabayaa anigoo u qaybinaya 360 6 si aan u helo 60° .

Taas macneheedu waa waxaan doonayaa in qaabku uu isku mid noqdo mar kasta oo aan u rogo 60° .



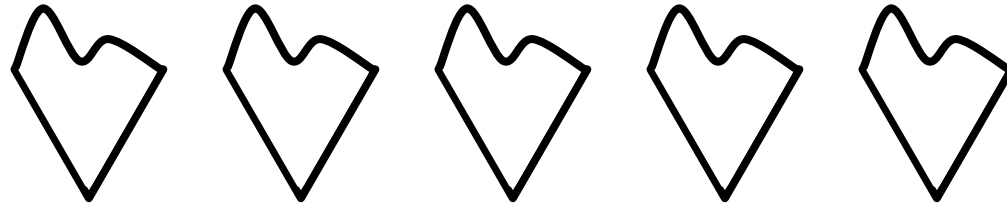
Yacquub

Yacquub wuxuu naqshadeynayaa astaan (logo). Wuxuu doonayaa in qaabka astaanta uu leeyahay wareeg-simmetry (rotational symmetry) oo ah heer 6.



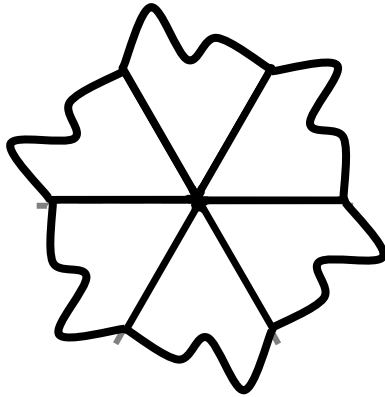
Waxaan sawiri doonaa qaab leh xagal 60° oo ku yaal gees (vertex).

Kadibna waxaan abuuri doonaa shan qaab oo dheeri ah oo la mid ah (congruent) kii hore.

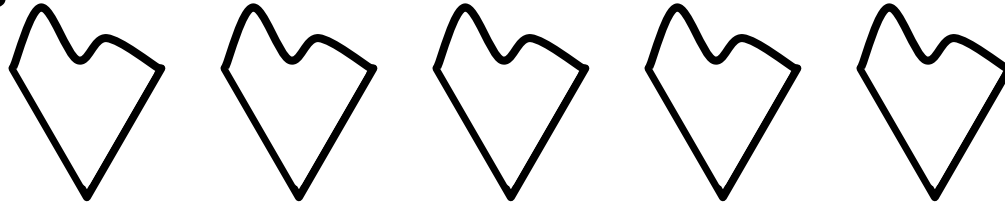


Yacquub

Yacquub wuxuu naqshadeynayaa astaan (logo). Wuxuu doonayaa in qaabka astaanta uu leeyahay wareeg-simmetry (rotational symmetry) oo ah heer 6.



Kadib waxaan u rogi karaa qaab kasta oo aan ku habeeyaa agagaarka barta dhexe.



Yacquub

Yacquub wuxuu naqshadeynayaa astaan (logo). Wuxuu doonayaa in qaabka astaanta uu leeyahay wareeg-simmetry (rotational symmetry) oo ah heer 6.



Hadda waxaan haystaa astaantayda, halkaas oo qaabkeedu leeyahay wareeg-simmetry (rotational symmetry) heer 6.



Yacquub

Helista qaababka leh isku-dhigma wareeg gaar ah

Qaabkee ayaa lahaan lahaa isku-dhigma wareeg ah oo nidaamkiisu yahay 6?

a heptagon joogto ah

b hexagon joogto ah



c octagon joogto ah

d pentagon joogto ah

Saciid wuxuu naqshadeynayaa astaan.

Waxay samayn doontaa qaabab isku mid ah (congruent) kan hoose, ka dibna isku dhejin doontaa meel ku wareegsan.

Waa maxay nidaamka isku-dhigma wareeg ee uu yeelan doono?



Isku-dhigma wareeggiisu wuxuu noqon doonaa nidaam 8.

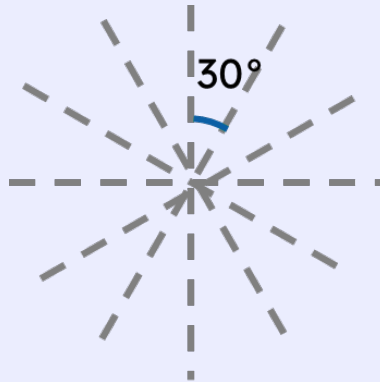
Helista qaababka leh isku-dhigma wareeg gaar ah

Axmed wuxuu naqshadeynayaa astaan.

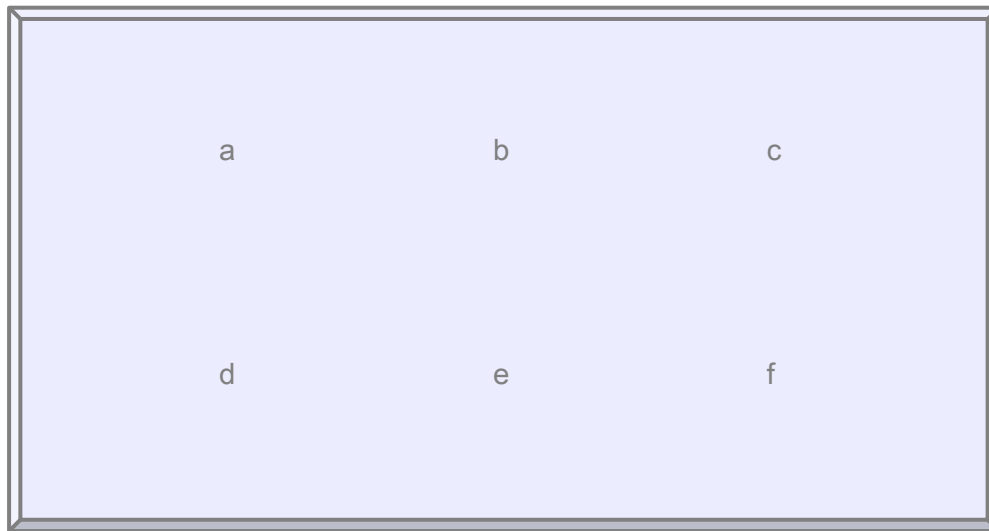
Wuxuu rabaa inay leedahay isku-dhigma wareeg oo nidaamkiisu yahay 12.

Xagal intee le'eg ayuu u isticmaali doonaa geeska qaab kasta oo isku mid ah?

$$360 \div 12 = 30^\circ$$



1) Caasha waxay naqshadeynaysaa sabuurad ciyaar ah carruurta dugsiga hoose, halkaas oo ay geliyaan qaabab meelo sabuuradda ku yaal. Waxay rabtaa inay u habayso meelaha si qaababku ugu kala horreeyaan nidaamka isku-dhigma wareeg (hoos u sii kaca).



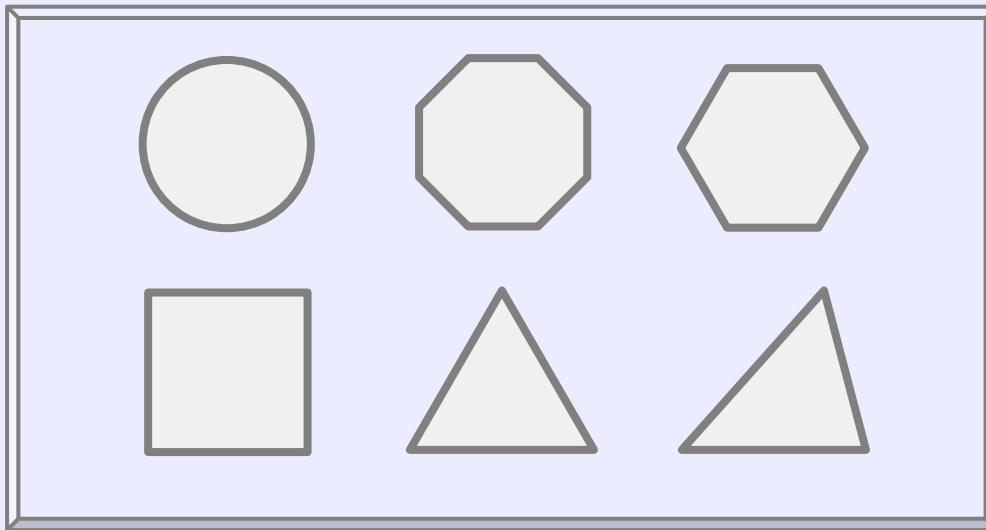
Ku sawir lix qaab oo sabuuradda ah si qaab kasta uu u yeesho nidaam isku-dhigma wareeg oo ka hooseeya kii hore.

2) Naqshadeed oo sawir astaan gaar ah oo leh isku-dhigma wareeg oo nidaamkiisu yahay 5. Waraaqda raadraaca (tracing paper) iyo xagalbeere (protractor) ayaa laga yaabaa inay faa'iido u leeyihiin hawshan. Haddii kale, waxaad rabtaa inaad isticmaasho software kombuyuutar.

1) Caasha waxay naqshadeynaysaa sabuurad ciyaar ah carruurta dugsiga hoose, halkaas oo ay geliyaan qaabab meelo sabuuradda ku yaal. Waxay rabtaa inay u habayso meelaha si qaababku ugu kala horreeyaan nidaamka isku-dhigma wareeg (hoos u sii kaca).

Tusaale:

a) goobo b) sideed gees oo joogto ah c) lix gees oo joogto ah d) afar gees e) saddex gees oo siman f) saddex gees oo aan simanayn

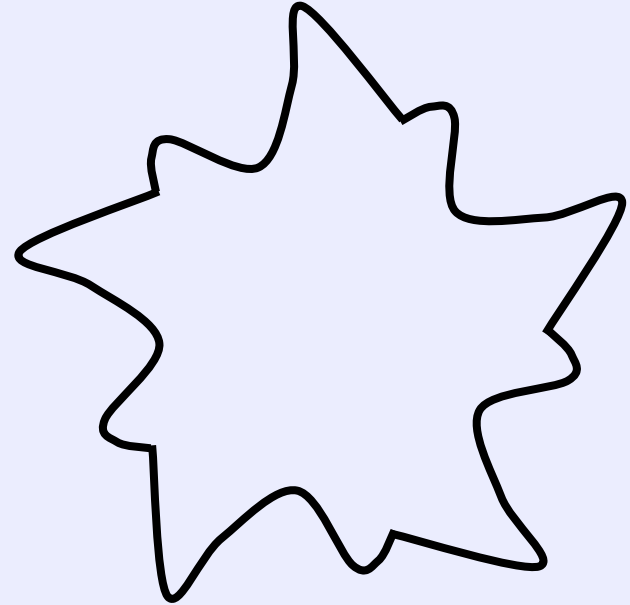
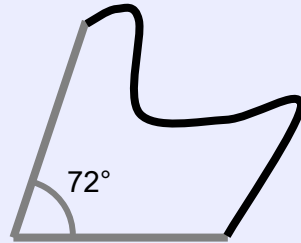


Ku sawir lix qaab oo sabuuradda ah si qaab kasta uu u leeyahay nidaam hoose oo isku-dhigma wareeg ah marka loo eego kii hore.

2) Naqshadeed oo sawir astaan gaar ah oo leh isku-dhigma wareeg oo nidaamkiisu yahay 5. Waraaqda raadraaca iyo protractor ayaa laga yaabaa inay faa'iido u leeyihiin hawshan. Haddii kale, waxaad rabtaa inaad isticmaasho software-ka kombuyuutarka.

Geeska xuddunta ku yaal wuxuu lahaan doonaa xagal cabbirkiisu yahay 72° .

Tusaale:



Jawaabaha waxaa lagu hubin karaa waraaqda raadraaca.

- **Isku-dhigma wareeg wuxuu qeexaa marka qaab uu u muuqdo isku mid ka dib wareeg qaar.**
- Qaababka isku midka ah (Congruent) ayaa loo isticmaali karaa in lagu baaro isku-dhigma wareeg.
- Marka la baarayo isku-dhigma wareeg, xuddunta wareeggu waa xuddunta qaabka.
- Marka la aqoonsanayo nidaamka wareegga qaab, waa inaad ka digtoonaataa inaad ku xisaabin bilowga laba jeer.
- Dhammaan qaababku waxay leeyihiin isku-dhigma wareeg oo nidaamkiisu ugu yaraan yahay 1.