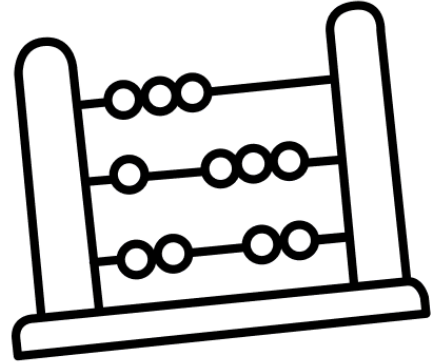


Isticmaalka saamiga cosine (cosine ratio)

Maths

Cutub: Trigonometry (Trigonometry)



Natiijo

Waxaan u isticmaali karaa saamiga cosine (cosine ratio) si aan u helo dhinaca ama xagasha maqan ee saddexagalka qumman (right-angled triangle).

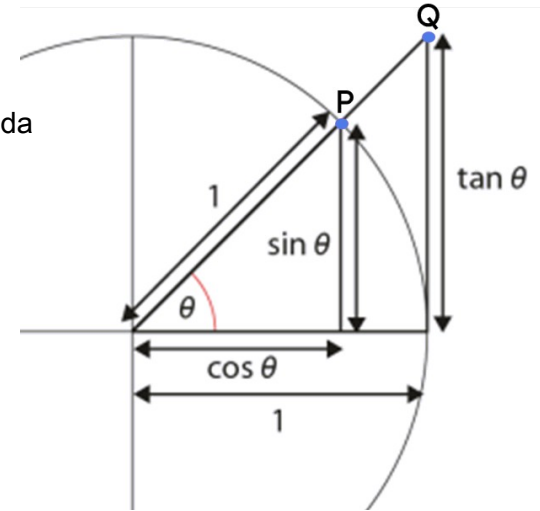
Erayada muhiimka ah

Hypotenuse (hypotenuse) waa dhinaca saddexagalka qumman (right-angled triangle) ee ka soo horjeeda xagasha qumman.

Dhinaca ku xiga (adjacent side) ee saddexagalka qumman (right-angled triangle) waa dhinaca ku xiga xagasha qumman iyo xagasha calaamadsan labadaba.

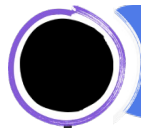
Hawlaha trigonometric (trigonometric functions) waxaa sida caadiga ah lagu qeexaa saamiyada labada dhinac ee saddexagalka qumman (right-angled triangle) ee ka kooban xagasha.

Cosine-ka xagasha ($\cos(\theta^\circ)$) waa isku-duwayaasha x (x-coordinate) ee barta P ee saddexagalka ka samaysan gudaha goobada halbeegga (unit circle).



Qaabka casharka

Isticmaalka saamiga cosine (cosine ratio)



Qaabaynta qaacidada cosine (cosine formula)



Xisaabinta xagasha iyadoo la isticmaalayo qaacidada cosine (cosine formula)

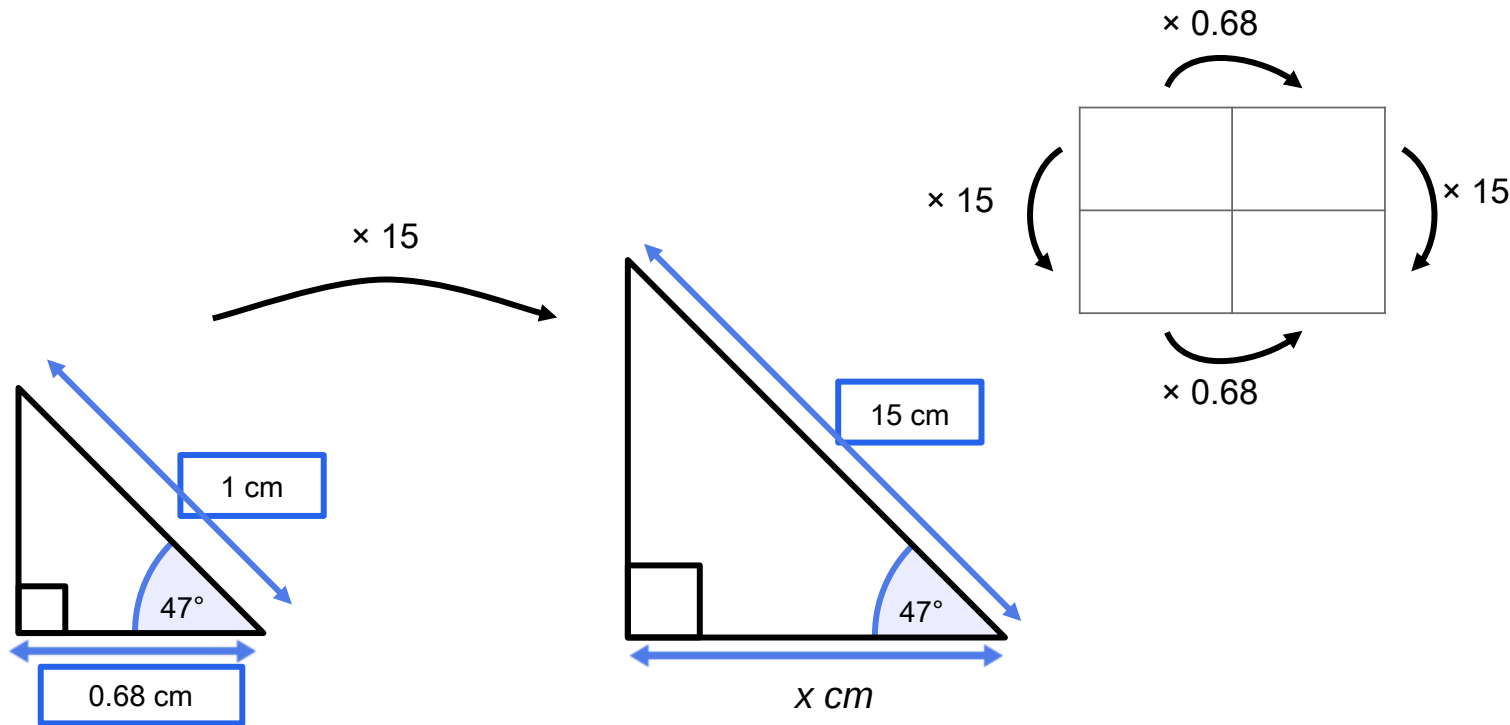
Qaabaynta qaacidada cosine (cosine formula)



Sharaxaad

Waxaan ognahay in labadan saddexagal ay isku mid yihiin (similar), sababtoo ah labada xagal ee mid ka mid ah waxay la mid yihiin labada xagal ee kan kale.

Waxaan ku heli karnaa dhererka dhinaca lagu calaamadeeyay x adigoo isticmaalaya jaantuska saamiga (ratio table).

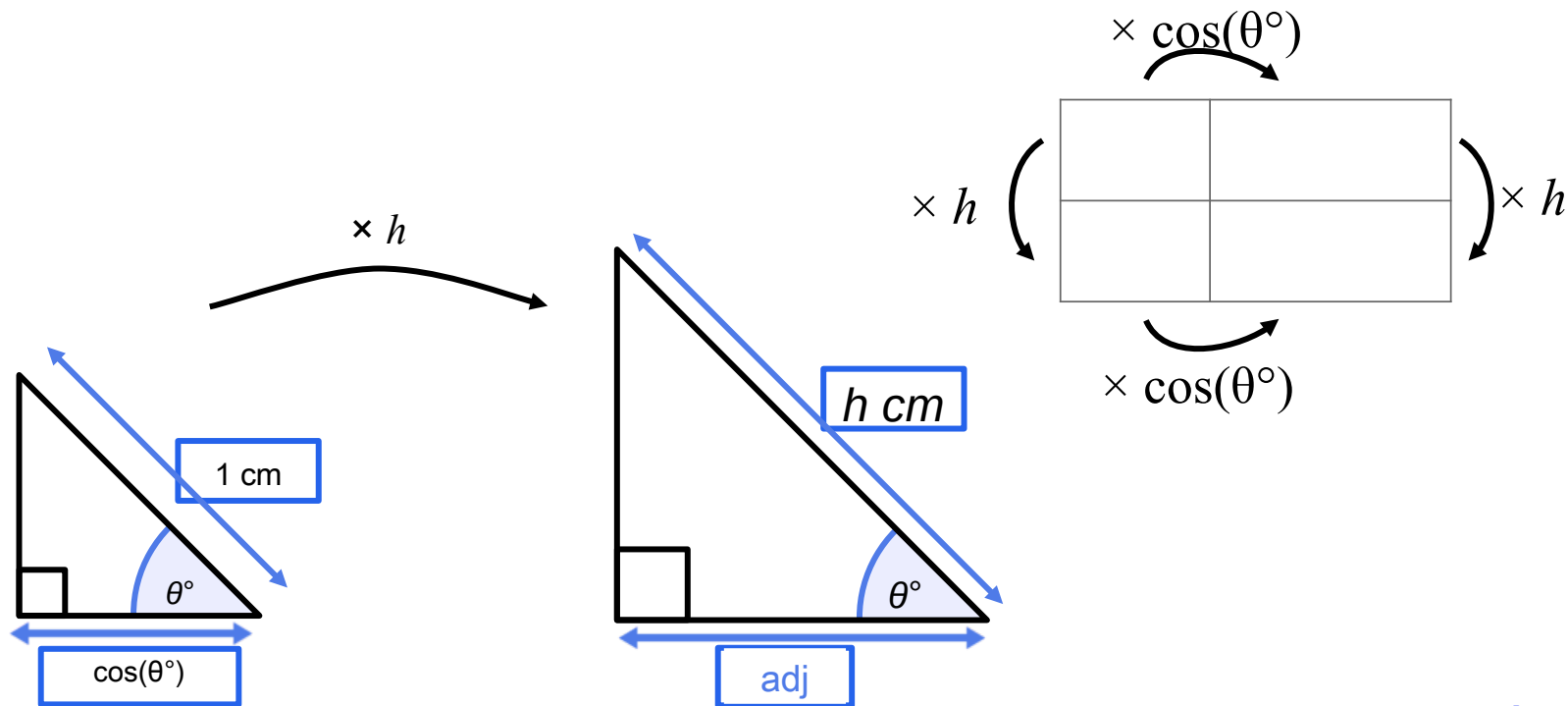


Qaabaynta qaacidada cosine (cosine formula)



Sharaxaad

Waxaan kaloo guudeyn karnaa habkan saddex-xagal kasta oo qumman (right-angled triangle) oo leh xagal θ° , halkaasoo dhinaca ku xiga θ° iyo xagasha qumman uu le'eg yahay $\cos(\theta^\circ)$.

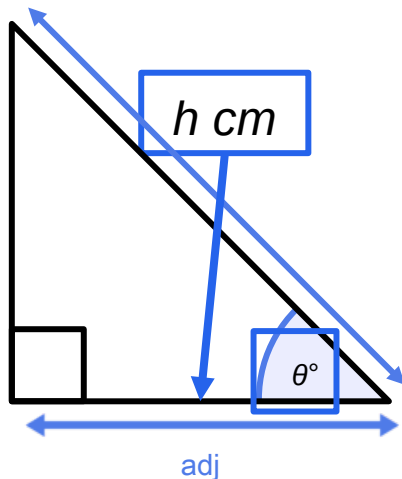


Qaabaynta qaacidada cosine (cosine formula)



Sharaxaad

Waxaan kaloo guudeyn karnaa habkan saddex-xagal kasta oo qumman (right-angled triangle) oo leh xagal θ° , halkaasoo dhinaca ku xiga θ° iyo xagasha qumman uu le'eg yahay $\cos(\theta^\circ)$.



1	$\cos(\theta^\circ)$
h	$h \times \cos(\theta^\circ)$

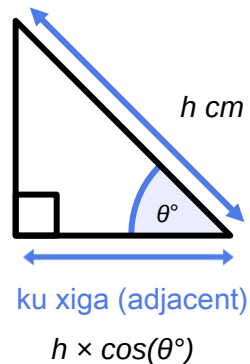
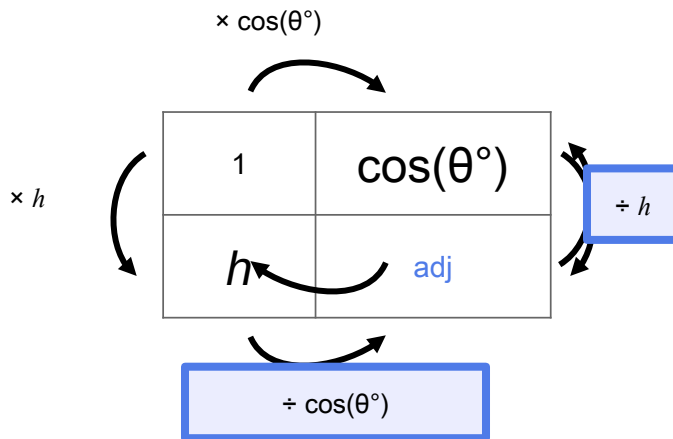
$\times \cos(\theta^\circ)$

wuxuu la mid yahay dhererka dhinaca ku xiga xagashaas iyo xagasha qumman.

Qaabaynta qaacidada cosine (cosine formula)

Waxaan u isticmaali karnaa jaantuska saamiga si aan u soo saarno qaacidada muujinaysa xiriirka ka dhexeeya dhinaca ku xiga (adjacent) xagasha θ° iyo hypotenuse, waxaana u matali karnaa qaacidada saddex siyaabood.

Qaacidada cosine (cosine formula)



Qaabaynta qaacidada cosine (cosine formula)

Waxaan sidoo kale ka soo saari karnaa laba nooc oo qaacidada ah marka la eego mid ka mid ah kuwa kale adoo sameynaya qaybin (division).

$$\frac{h}{h} \times \cos(\theta^\circ) = \frac{\text{adj}}{h}$$

$$\boxed{\frac{\text{adj}}{h} = \cos(\theta^\circ)}$$

$$h \times \frac{\cancel{\cos(\theta^\circ)}}{\cancel{\cos(\theta^\circ)}} = \frac{\text{adj}}{\cos(\theta^\circ)}$$

$$\boxed{\frac{\text{adj}}{\cos(\theta^\circ)} = h}$$

Qaabaynta qaacidada cosine (cosine formula)

Waxaan ku beddeli karnaa qiimayaasha (values) saddexagal qumman (right-angled triangle) nooc kasta oo ka mid ah qaacidada cosine si aan u matalo xiriirka ka dhexeeya dhinaca ku xiga (adjacent) xagal iyo hypotenuse siyaabo kala duwan.

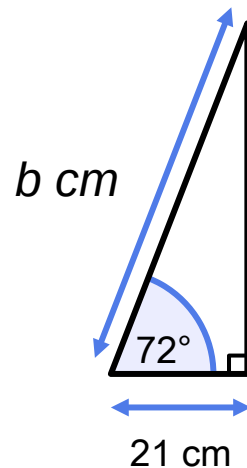
$$h \times \cos(\theta^\circ) = \text{adj} \quad b \times \cos(72^\circ) = 21$$

$$\frac{\text{adj}}{\cos(\theta^\circ)} = h$$

$$\frac{21}{\cos(72^\circ)} = b$$

$$\frac{\text{adj}}{h} = \cos(\theta^\circ)$$

$$\frac{21}{b} = \cos(72^\circ)$$



Qaabaynta qaacidada cosine (cosine formula)

Isla'egta saxda ah ee muujinaysa xiriirka ka dhexeeya hypotenuse iyo dhinaca ku xiga (adjacent) xagasha 38° waa:

$$\frac{20}{20} \times \cos(38^\circ) = \frac{\text{adj}}{20}$$

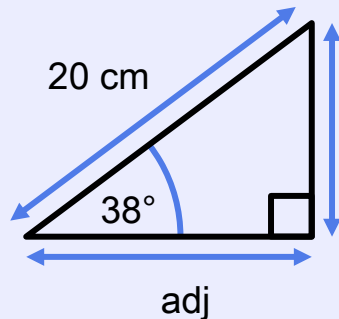
Mid ka mid ah kuwaan ayaa sidoo kale si sax ah u muujinaya xiriirka ka dhexeeya hypotenuse iyo dhinaca ku xiga (adjacent) ee saddexagalkaan?

a $\cos(38^\circ) = \frac{20}{\text{adj}}$ ✗

b $\cos(38^\circ) = \frac{\text{adj}}{20}$ ✓

1	$\cos(\theta^\circ)$
20	adj

$\times 20$ (left), $\times 20$ (right), $\times \cos(38^\circ)$ (bottom)



Qaabaynta qaacidada cosine (cosine formula)

Mid ka mid ah kuwaan ayaa si sax ah u muujinaya xiriirka ka dhexeeya hypotenuse iyo dhinaca ku xiga (adjacent) xagasha 82° ee saddexagalkaan (qiimayaasha waxaa lagu soo koobay tirada ugu dhow)?

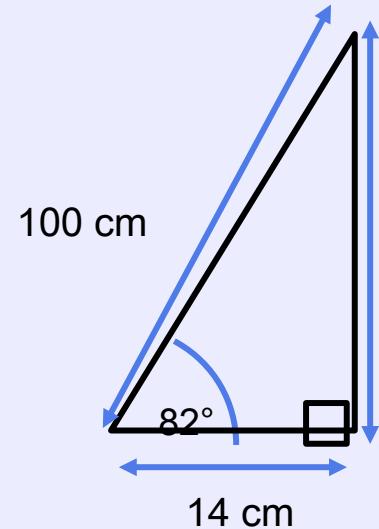
a $\cos\left(\frac{82^\circ}{14}\right) = 100$ ✗

b $\frac{14}{100} = \cos(82^\circ)$ ✓

c $100 \times \cos(82^\circ) = 14$ ✓

d $\cos(82^\circ \times 100) = 14$ ✗

e $\frac{14}{\cos(82^\circ)} = 100$ ✓



Qaabaynta qaacidada cosine (cosine formula)

Mid ka mid ah kuwaan ayaa si sax ah u muujinaya xiriirka ka dhexeeya hypotenuse iyo dhinaca ku xiga (adjacent) xagasha θ° ee saddexagalkaan?

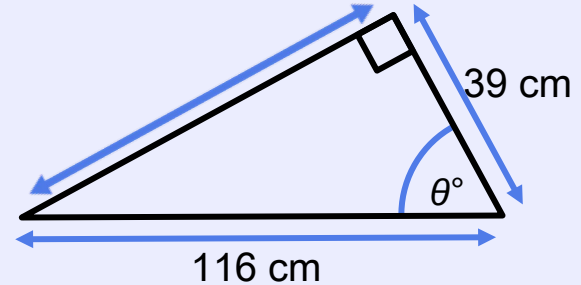
a $116 \times \cos(39^\circ) = \theta$ ✗

b $\frac{39}{\cos(\theta^\circ)} = 116$ ✓

c $\frac{39}{116} = \cos(\theta^\circ)$ ✓

d $116 \times \cos(\theta^\circ) = 39$ ✓

e $\frac{\cos(\theta^\circ)}{39} = 116$ ✗

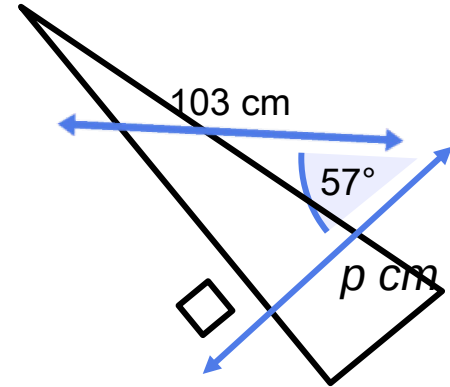


Qaabaynta qaacidada cosine (cosine formula)

Nooc kasta oo ka mid ah qaacidada, qayb ka duwan oo saddexagalka ah ayaa loo qoray mawduuc (subject).

Waxaa faa'iido leh inaad isticmaasho nooca qaacidada uu mawduuciisu (subject) u dhigma qaybta saddexagalka ee aad rabto inaad qiimeheeda (value) hesho.

$$h \times \cos(\theta^\circ) = \text{adj}$$



Waxaan rabnaa inaan helno qiimaha (value) p , oo ah dhererka dhinaca ku xiga (adjacent) xagasha 57° .

Qaabaynta qaacidada cosine-ka (cosine formula)

Kee ayaa si sax ah u muujinaya xiriirka ka dhexeeya hypotenuse-ka iyo dhinaca ku xiga xagasha 16° saddexagalkaan (qiimaha waxaa lagu soo koobay tiro dhammaystiran)?

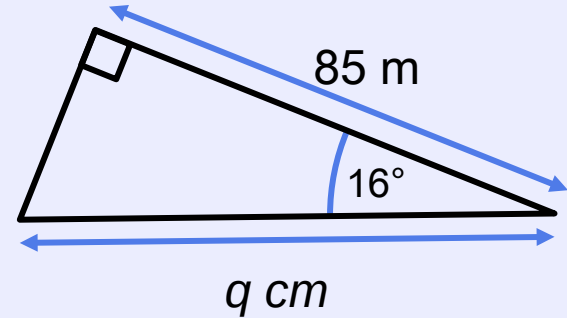
a $\frac{85}{q} = \cos(16^\circ)$ ✓

b $\frac{85}{\cos(16^\circ)} = q$ ✓

c $\frac{\cos(16^\circ)}{q} = 85$ ✗

d $q \times \cos(16^\circ) = 85$ ✓

e $85 \times \cos(q^\circ) = 16$ ✗



Qaabaynta qaacidada cosine-ka (cosine formula)

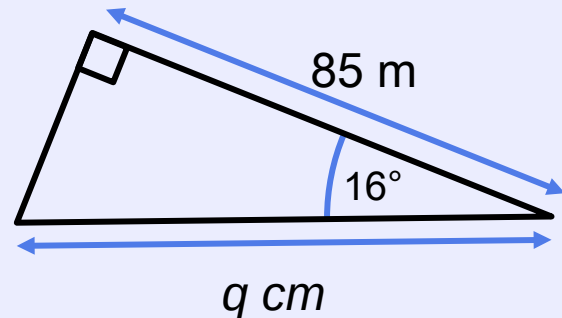
Kee waa isla'egta saxda ah si loo helo qiimaha (value) q si ugu habboon?

Sidaas awgeed, hel qiimaha (value) dhinaca lagu calaamadeeyay q (2 d.p.)

$$\mathbf{a} \quad \frac{85}{q} = \cos(16^\circ)$$

$$\mathbf{b} \quad \frac{85}{\cos(16^\circ)} = q \quad \checkmark$$

$$\mathbf{d} \quad q \times \cos(16^\circ) = 85$$



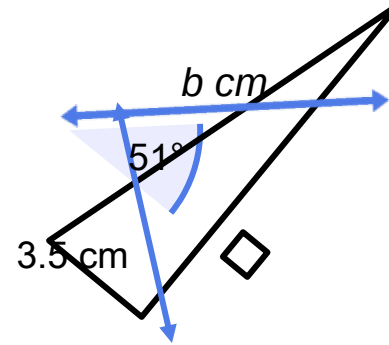
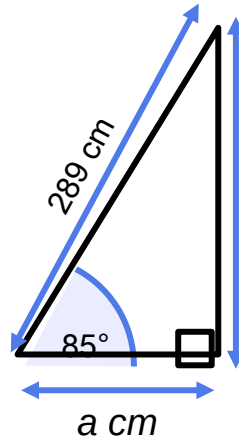
88.43 cm waxay u muuqataa jawaab macquul ah, maadaama kani yahay hypotenuse-ka, sidaas darteed waa inuu ka weyn yahay dhererka dhinaca 85 cm.

1) Ku beddel dhinacyada iyo xagasha la calaamadeeyay saddexagal kasta qaacidada cosine-ka (cosine formula) ee la bixiyay, oo hel dhererka dhinaca maqan.

$$h \times \cos(\theta^\circ) = \text{adj}$$

$$289 \cos(\) = \boxed{} \boxed{}$$

$$a = \boxed{}$$



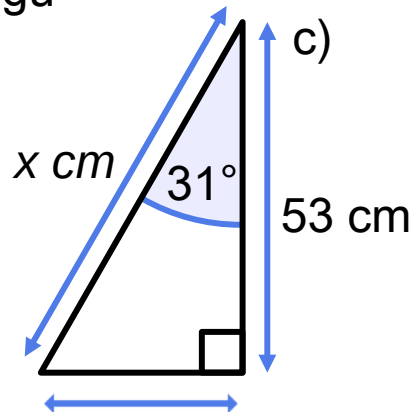
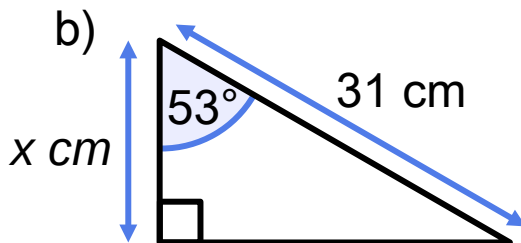
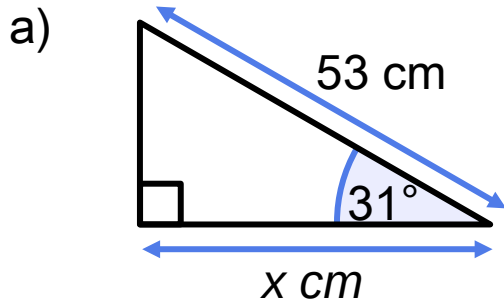
$$\frac{\text{adj}}{\cos(\theta^\circ)} = h$$

$$\frac{\boxed{}}{\cos(\boxed{})} = \boxed{}$$

$$b = \boxed{}$$

2) Isku dhig saddexagalka isla'egta muujinaysa xiriirka ka dhexeeya hypotenuse-kiisa iyo dhinaca ku xiga.

Isticmaal isla'egta si aad u hesho dhererka dhinaca maqan ee lagu calaamadeeyay x saddexagal kasta (2 d.p.)



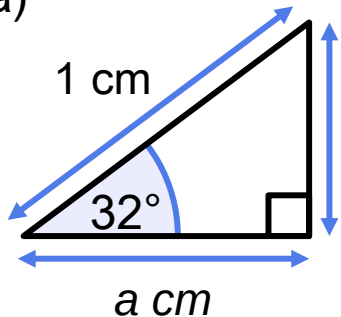
d) $53 \times \cos(31^\circ) = x$

e) $x \times \cos(31^\circ) = 31$

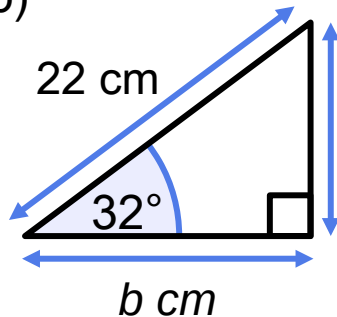
f) $31 \times \cos(53^\circ) = x$

3) Adigoo isticmaalaya qaacidada cosine (cosine formula), hel dhererka dhinaca maqan ee lagu calaamadeeyay xaraf saddexagalka kasta (2 d.p.)

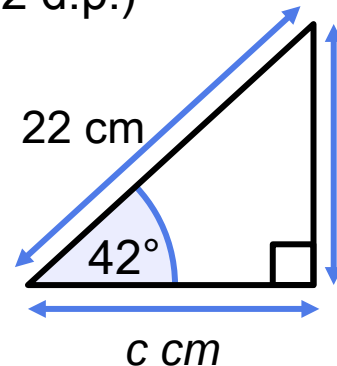
a)



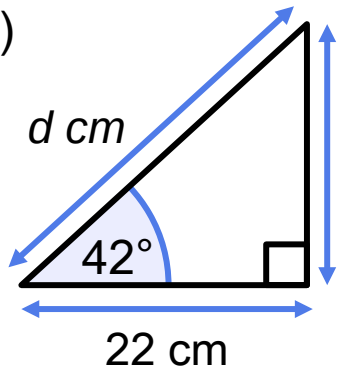
b)



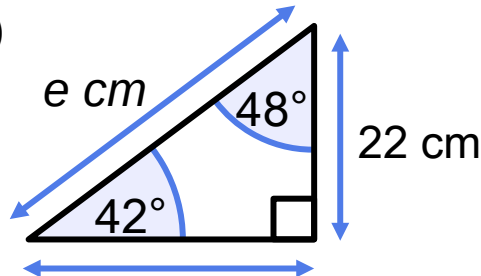
c)



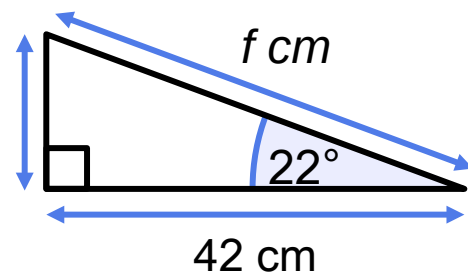
d)



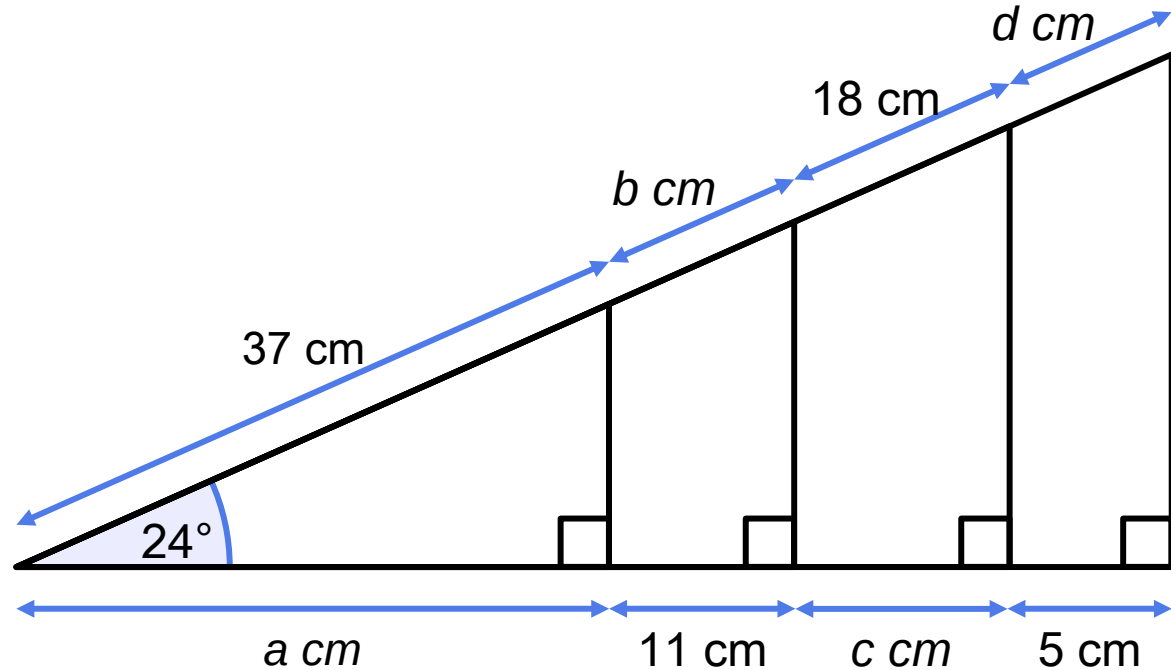
e)



f)



4) Raadi dhererka masaafada a , b , c , iyo d
(ku dhawaad tirada guud ee ugu dhow).



1) Ku beddel dhinacyada iyo xagasha calaamadeysan ee saddexagal kasta qaacidada la siiyay ee cosine, oo raadi dhererka dhinaca maqan.

$$h \times \cos(\theta^\circ) = \text{adj}$$

289

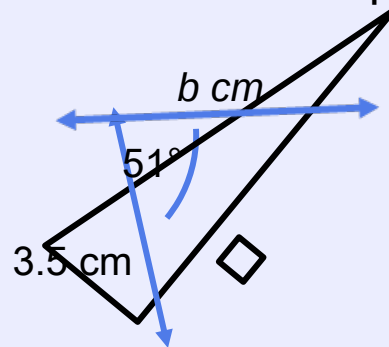
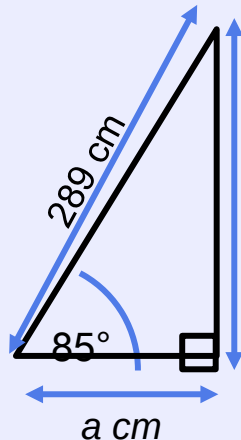
$$\cos() =$$

85°

a

a =

25.19



$$\frac{\text{adj}}{\cos(\theta^\circ)} = h$$

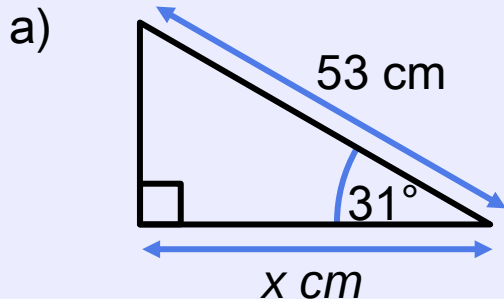
$$\frac{3.5}{\cos() 51^\circ} = b$$

b =

5.56

2) Isku dhig saddexagalka iyo isla'egta tusaysa xiriirka ka dhexeeya hypotenuse-kiisa iyo dhinaca ku xiga.

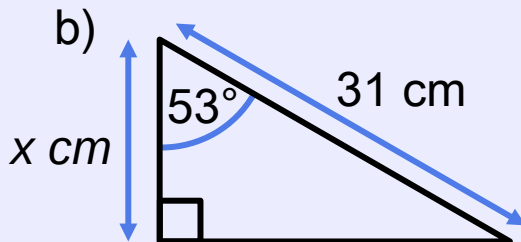
Isticmaal isla'egta si aad u raadiso dhererka dhinaca maqan ee lagu calaamadeeyay x ee saddexagal kasta (2 d.p.)



d) $53 \times \cos(31^\circ) = x$

$X = 45.43$

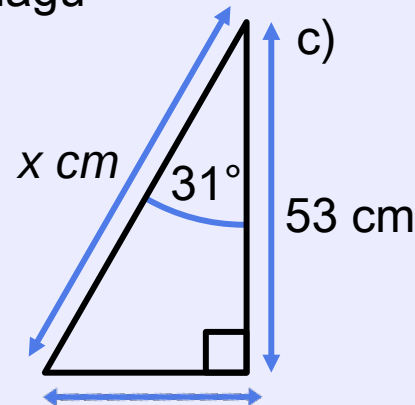
Dhinaca ku xiga 31° wuxuu leeyahay dherer 45.43 cm



f) $31 \times \cos(53^\circ) = x$

$X = 18.66$

Dhinaca ku xiga 53° wuxuu leeyahay dherer 18.66 cm



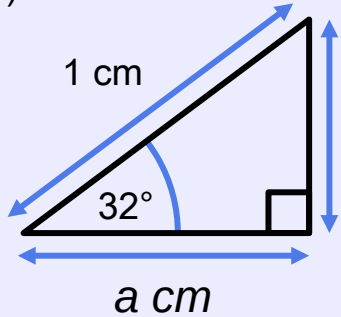
e) $x \times \cos(31^\circ) = 53$

$X = 61.83$

Hypotenuse-ga wuxuu leeyahay dherer 61.83 cm

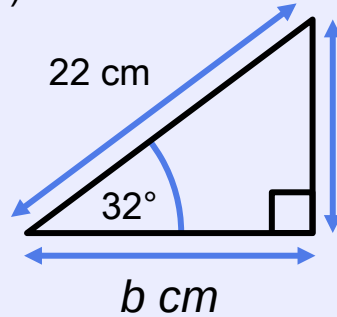
3) Adigoo isticmaalaya qaacidada cosine (cosine formula), raadi dhererka dhinaca maqan ee lagu calaamadeeyay xaraf mid kasta oo ka mid ah saddexagalladan (2 d.p.)

a)



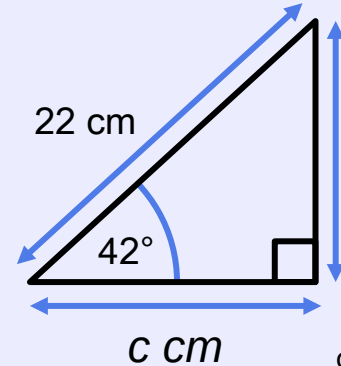
$$a = 0.85$$

b)



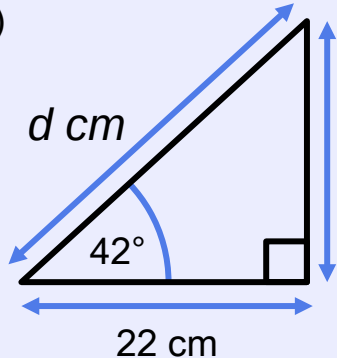
$$b = 18.66$$

c)



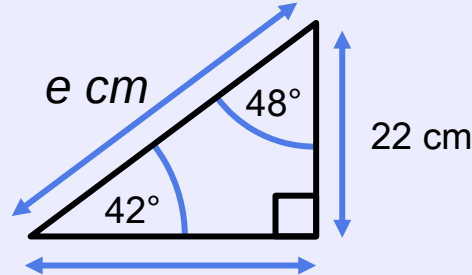
$$c = 16.35$$

d)



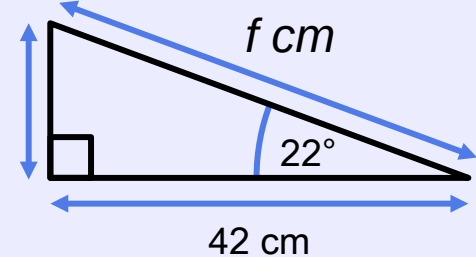
$$d = 29.60$$

e)



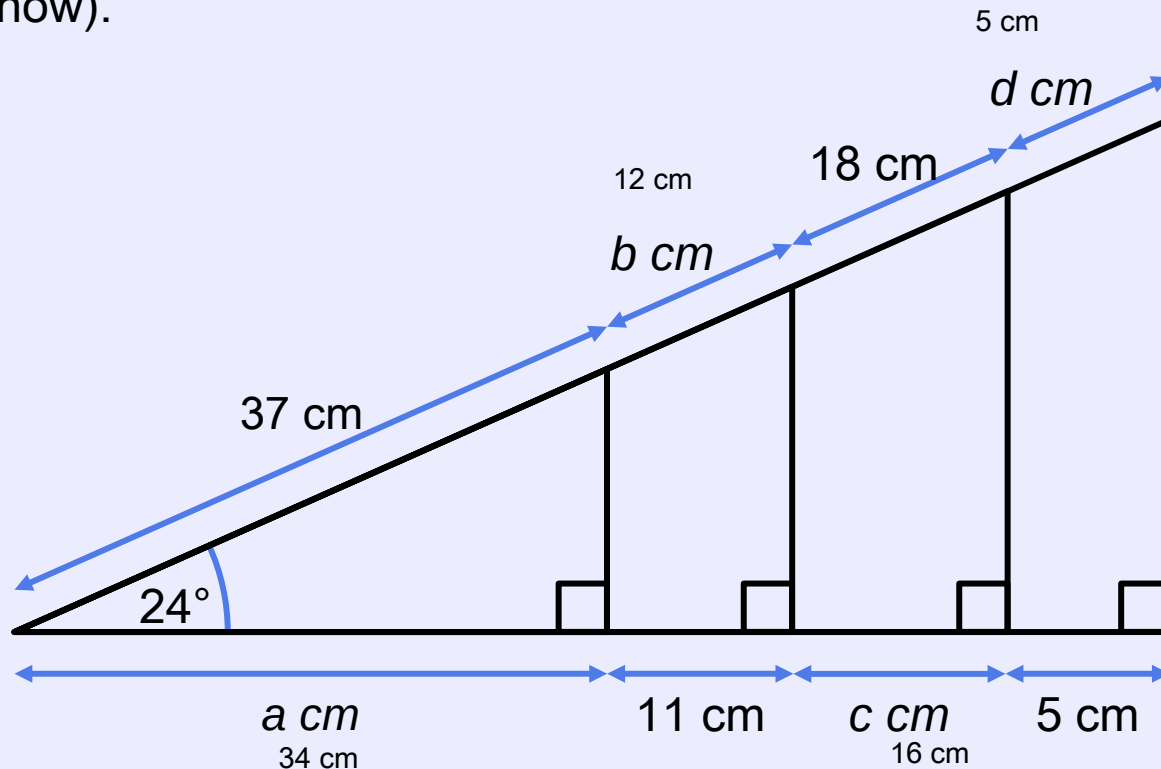
$$e = 32.88$$

f)



$$f = 45.30$$

4) Raadi dhererka masaafada a , b , c , iyo d (ku wareeji tirada ugu dhow).



Qaabka casharka

Isticmaalka saamiga cosine (cosine ratio)



Qaabaynta qaacidada cosine (cosine formula)



Xisaabinta xaglaha iyadoo la adeegsanayo qaacidada cosine (cosine formula)

Xisaabinta xaglaha iyadoo la isticmaalayo qaacidada cosine (cosine formula)

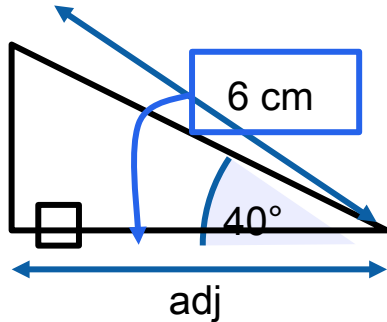


Sharaxaad

Waxaan xisaabin karaa dhererka dhinaca ku xiga (adjacent) 40° sababtoo ah waxaan sidoo kale ogahay dhererka hypotenuse-ka!



Yacquub

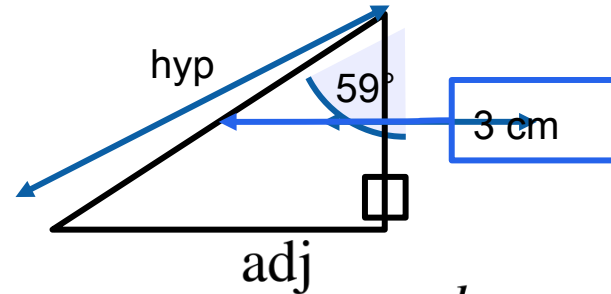


$$h \times \cos(\theta^\circ) = \text{adj}$$

Waxaan xisaabin karaa dhererka hypotenuse-ka sababtoo ah waxaan sidoo kale ogahay dhererka dhinaca ku xiga (adjacent) 59° .



Isra



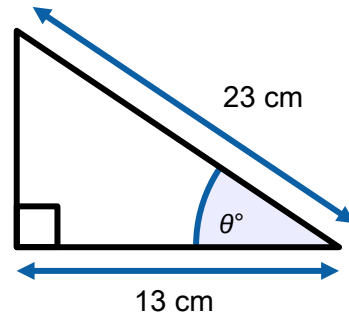
$$\frac{\text{adj}}{\cos(\theta^\circ)} = h$$

$$\frac{3}{\cos(59^\circ)}$$

Laakiin sidee u isticmaali karnaa noocan kale ee qaacidada cosine (cosine formula) si aan u helno xagasha haddii aan ognahay dhererka hypotenuse-ka iyo dhinaca ku xiga (adjacent) xagashaas?



Yacquub



$$\frac{\text{adj}}{h} = \cos(\theta^\circ)$$

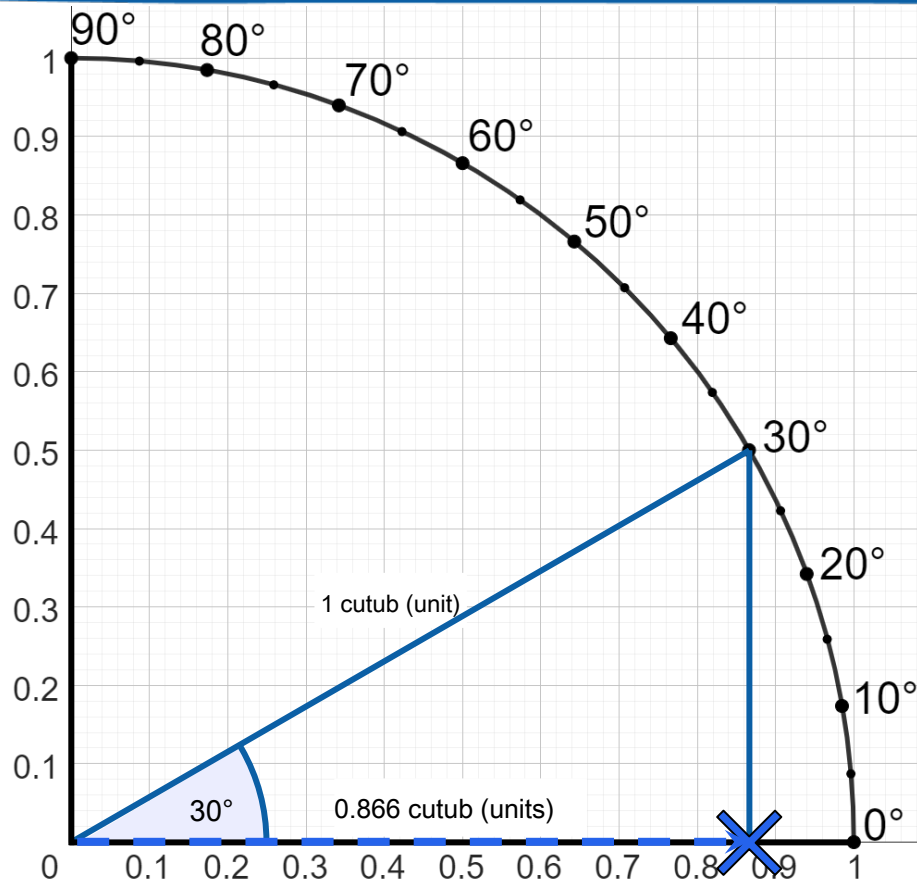
$$\frac{13}{23}$$

Sidee ku heli kartaa cabbirka xagasha θ° ?

Xisaabinta xaglaha iyadoo la adeegsanayo qaacidada cosine (cosine formula)



Sharaxaad



Goobo cutub ah (unit circle), waxaan ku heli karnaa dhererka dhinaca ku xiga xagasha 30° adigoo ku dabaqaya shaqada cosine (cosine function) xagashaas:

30°
xagal (angle)

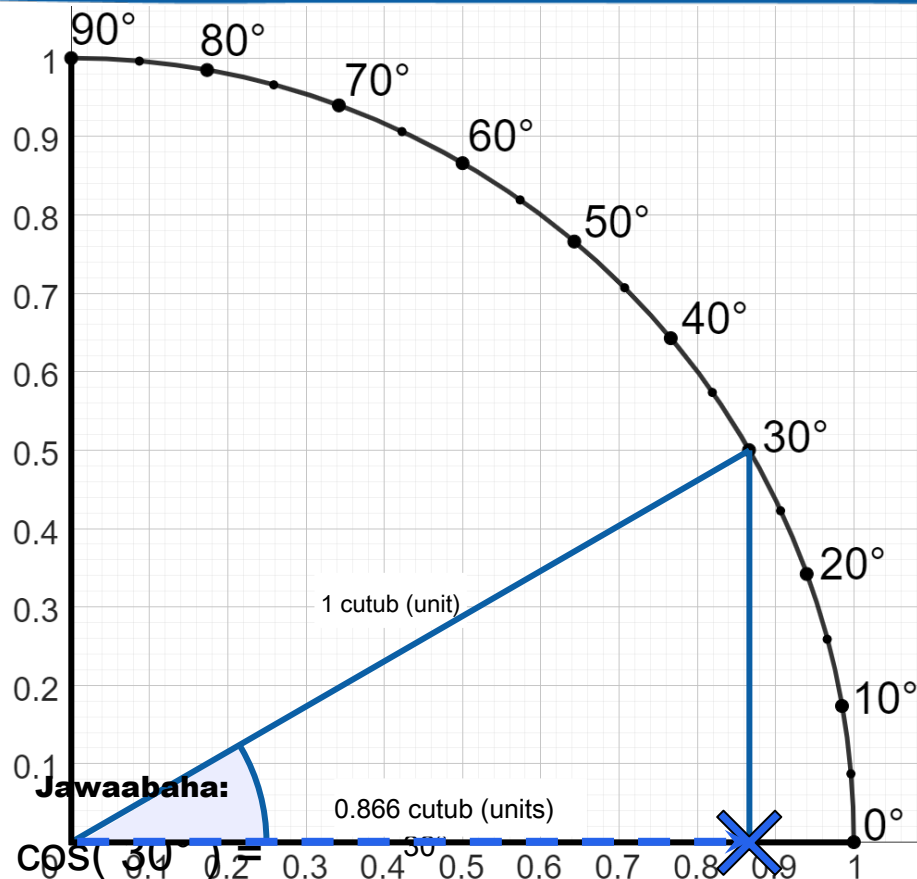
dhererka dhinaca ku xiga ee goobta cutubka (unit circle)

Shaqada cosine waxay leedahay shaqo rogaal ah oo loo yaqaan arccosine (arccos function). Waxaad ku arki kartaa cos-1 kalkuule (calculator).

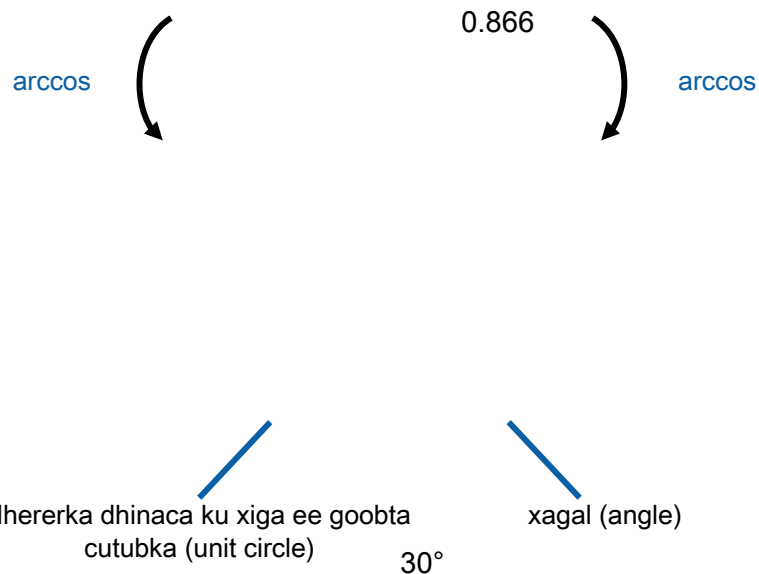
Xisaabinta xaglaha iyadoo la adeegsanayo qaacidada cosine (cosine formula)



Sharaxaad



Goobo cutub ah (unit circle), waxaan ku heli karnaa dhererka dhinaca ku xiga xagasha 30° adigoo ku dabaqaya shaqada cosine (cosine function) xagashaas:



Xisaabinta xaglaha iyadoo la adeegsanayo qaacidada cosine (cosine formula)



Sharaxaad

Helista cosine (cosine) ee xagal waxay soo saartaa saami (ratio) dhinaca ku xiga (adjacent) iyo hypotenuse.

In kastoo saamigan (ratio) inta badan loo qoro tobanle (decimal) (marka loo eego hypotenuse 1), waxaan u fasiri karnaa tobanlehan (decimal) sida jaantusyo (fractions) u dhigma:

$$\frac{0.866}{1} = \frac{1.732}{2} = \frac{86.6}{100}$$

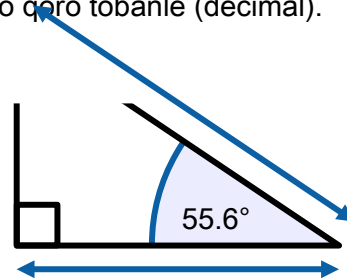
Dhinaca ku xiga (Adjacent) ee 1.732 oo ku yaal saddexagal leh hypotenuse 2.

Hawlaha rogaal celiska ah ee cosine, hawlaha arccos, wuxuu qaataa saamiga (ratio) dhinaca ku xiga (Adjacent) xagasha iyo hypotenuse (oo loo qoro jajab ama tobanle), wuxuuna ku siinayaa cabbirka xagashaas.

$$\frac{13}{23}$$

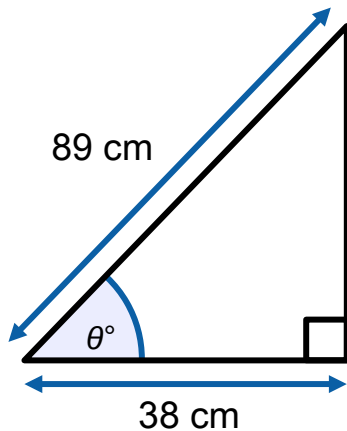


Dhinaca ku xiga (adjacent) Ama loo qoro tobanle (decimal).
13, hypotenuse-na waa 23



Xisaabinta xagasha iyadoo la adeegsanayo qaacidada cosine

Waxaan isticmaali karnaa hawlaha arccos ee xisaabiyaha (calculator) si aan u helno xagal.



$$\cos(\theta^\circ) = \frac{38}{89}$$

$$\frac{38}{89}$$

$$\cos^{-1}\left(\frac{38}{89}\right)$$



Xisaabinta xagasha iyadoo la adeegsanayo qaacidada cosine



Kee ka mid ah isla'egyadan (equations) ayaa sax ah marka la raadinayo cabbirka xagasha n° ee isla'egta:

$$\cos(n^\circ) = 0.86?$$

☐ **a** $n = \frac{0.86}{\cos()}$

☒ **c** $n = \arccos(0.86)$

☒ **b** $n = \cos^{-1}(0.86)$

☐ **d** $n = \cos(0.86)$

Xisaabinta xagasha iyadoo la adeegsanayo qaacidada cosine



Kee ka mid ah kuwan ayaa u dhigma isla'egtan?

$$\cos(n^\circ) = \frac{4}{9}$$

✓ **a** $\cos(n^\circ) = \frac{8}{18}$

✓ **c** $n = \cos^{-1}\left(\frac{4}{9}\right)$

b $n = \cos\left(\frac{4}{9}\right)$

✓ **d** $n = \cos^{-1}\left(\frac{40}{90}\right)$

Xisaabinta xaglaha (angles) iyadoo la isticmaalayo qaacidada cosine (cosine formula)



Hubi

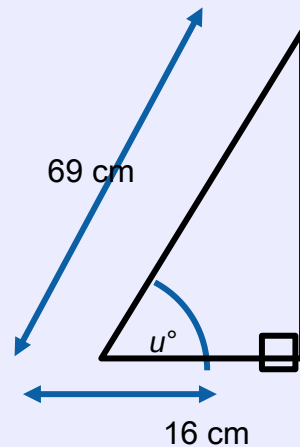
Mid ka mid ah isla'egyada (equations) soo socda ayaa sax ah marka la raadinayo cabbirka xagasha u° (angle u°) saddex-xagalkan (triangle)?

✓ **a** $\cos(u^\circ) = \frac{16}{69}$

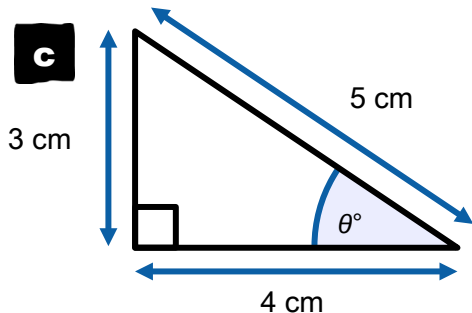
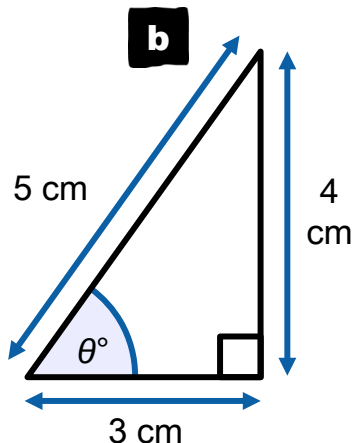
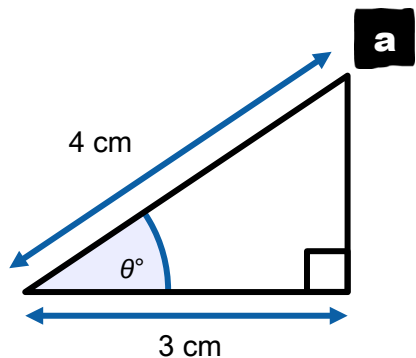
c $u = \cos^{-1}\left(\frac{69}{16}\right)$

b $u = \cos\left(\frac{16}{69}\right)$

✓ **d** $u = \cos^{-1}\left(\frac{16}{69}\right)$



1) U dhigma (Match) saddex-xagal (triangle) kasta: isla'eg (equation) qeexaysa xiriirka ka dhexeeya hypotenuse-kiisa iyo dhinaca ku xiga (adjacent side), iyo cabbirka xagashiisa (angle) (2 d.p.).



d $\cos(\theta^\circ) = \frac{3}{4}$

e $\cos(\theta^\circ) = \frac{4}{5}$

f $\theta^\circ = \cos^{-1}\left(\frac{3}{5}\right)$

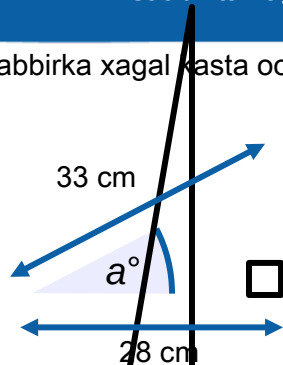
g $\theta^\circ = 53.13^\circ$

h $\theta^\circ = 36.87^\circ$

i $\theta^\circ = 41.41^\circ$

2) Raadi cabbirka xagal kasta oo calaamad u leh xaraf (1 d.p.)

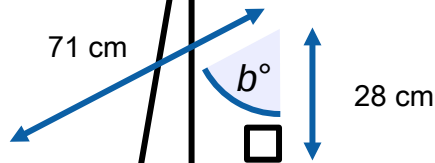
a)



$$\cos(a^\circ) = \frac{28}{33}$$

$$a^\circ = \cos^{-1}\left(\frac{28}{33}\right) = \boxed{}$$

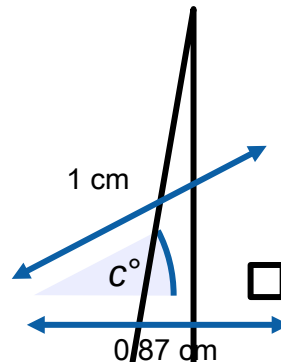
b)



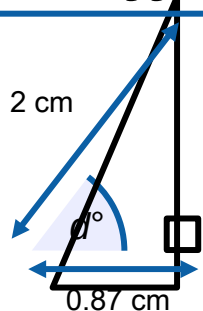
$$\cos(b^\circ) = \frac{28}{71}$$

$$b^\circ = \cos^{-1}\left(\frac{28}{71}\right) = \boxed{}$$

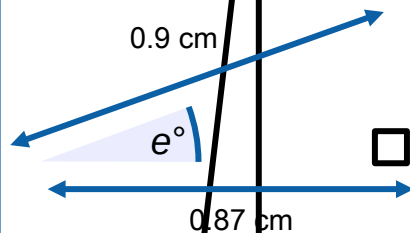
c)



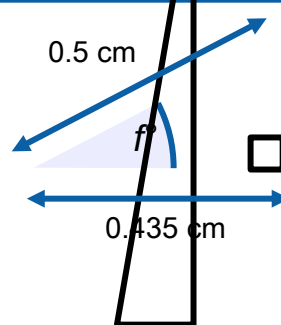
d)



e)

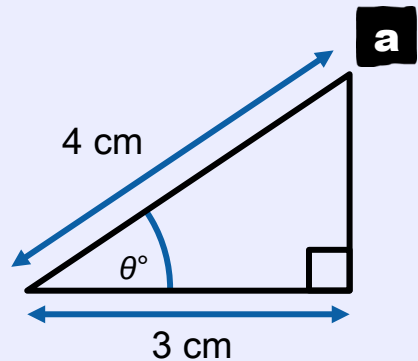


f)



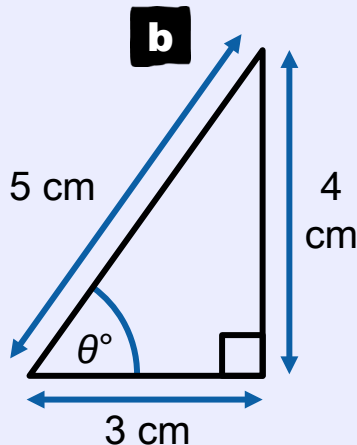
Hawsha B Xisaabinta xaglaha iyadoo la adeegsanayo qaacidada cosine (cosine formula)

1) Isku dhig saddexagal kasta: isla'eg (equation) qeexaysa xiriirka ka dhexeeya hypotenuse iyo dhinac ku xiga, iyo cabbirka xagalkiisa (2 d.p.).



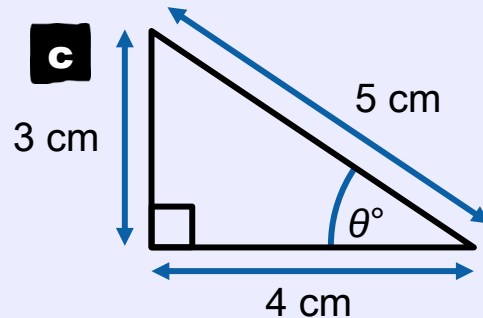
d $\cos(\theta^\circ) = \frac{3}{4}$

i $\theta^\circ = 41.41^\circ$



f $\theta^\circ = \cos^{-1}\left(\frac{3}{5}\right)$

g $\theta^\circ = 53.13^\circ$



e $\cos(\theta^\circ) = \frac{4}{5}$

h $\theta^\circ = 36.87^\circ$

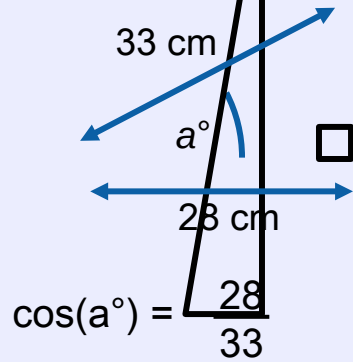
Hawsha B Xisaabinta xaglaha iyadoo la adeegsanayo qaacidada cosine (cosine formula)



Jawaab

2) Soo hel cabbirka xagal kasta oo calaamad u leh xaraf (1 d.p.)

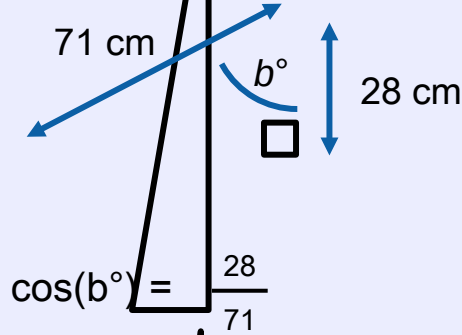
a)



$$\cos(a^\circ) = \frac{28}{33}$$

$$a^\circ = \cos^{-1}\left(\frac{28}{33}\right) = 32.0^\circ$$

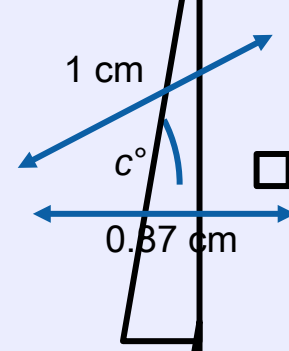
b)



$$\cos(b^\circ) = \frac{28}{71}$$

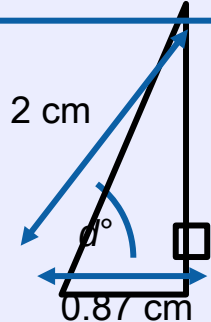
$$b^\circ = \cos^{-1}\left(\frac{28}{71}\right) = 66.8^\circ$$

c)



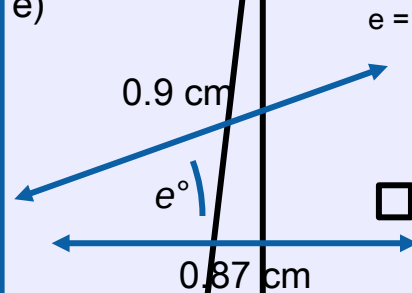
$$c = 29.5^\circ$$

d)



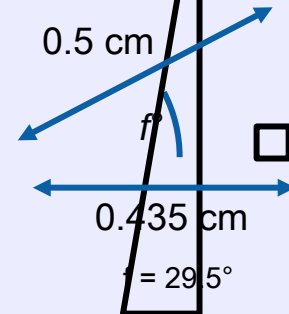
$$d = 64.2^\circ$$

e)



$$e = 14.8^\circ$$

f)



$$f = 29.5^\circ$$

Xiriirka ka dhexeeya hypotenuse (hypotenuse) ee saddex-xagal quman (right-angled triangle) iyo dhinaca ku xiga xagal θ° iyo xagasha quman (right-angle) waxaa loo qori karaa qaaciddo (formula) siyaabo kala duwan:

$$\frac{\text{adj}}{h} = \cos(\theta^\circ) \quad \frac{\text{adj}}{\cos(\theta^\circ)} = h \quad h \times \cos(\theta^\circ) = \text{adj}$$

Qaaciddadan cosine (cosine formula) waxaa loo isticmaali karaa in lagu helo dhererka hypotenuse (hypotenuse), dhererka dhinaca ku xiga xagal θ° , ama cabbirka xagasha θ° lafteeda.

Si loo helo cabbirka xagal, waa in la isticmaalaa shaqada ka soo horjeeda cosine (cosine function): shaqada arccos (arccos function).

Kalkuleytar (calculator) gudahiisa, shaqada arccosine (arccosine function) waxaa badanaa loo qoraa $\cos^{-1}$.

Saddex-xagal (triangle) waxaa laga dhisi karaa qaaciddadiisa cosine (cosine formula) iyo dhererka hypotenuse (hypotenuse) ama dhinaca ku xiga mid ka mid ah xagalladiisa.