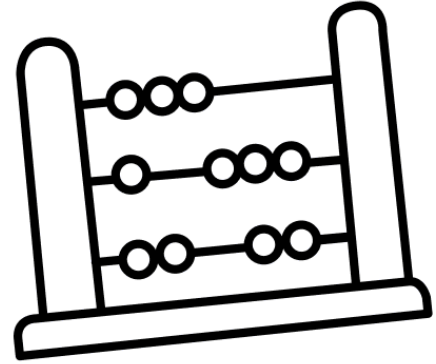


Dhererka hypotenuse-ka (Length of the hypotenuse)



Maths

Cutub: Sifooyin joomatari (Geometrical properties): isku ekaansho (similarity)
iyo aragtida Batagooras (Pythagoras' theorem)

Natiijo

Waxaan isticmaali karaa aragtida Batagooras (Pythagoras' theorem) si aan u helo dhererka hypotenuse-ka.

Erayada muhiimka ah

Saddexagalka qumman (right-angled triangle) wuxuu leeyahay hal xagal gudaha ah oo 90° ah.

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

Aragtida Batagooras (Pythagoras' theorem) waxay tusinaysaa in wadarta labajibbaaranayaasha (squares) labada dhinac ee gaagaaban ee saddexagalka qumman ay la mid tahay labajibbaaranaha dhinaca ugu dheer (hypotenuse-ka).

Qaabka casharka

Dhererka hypotenuse-ka (Length of the hypotenuse)



Labajibbaaranayaal (Squares) ka soo baxa dhinacyada saddexagalka



Aragtida Batagooras (Pythagoras' theorem) si loo helo hypotenuse-ka

Waxaan xusuustaa inaad ku biiri karto saddex labajibbaaranayaal (squares) meelaha ay isku xirtaan si aad u abuurto saddexagal.

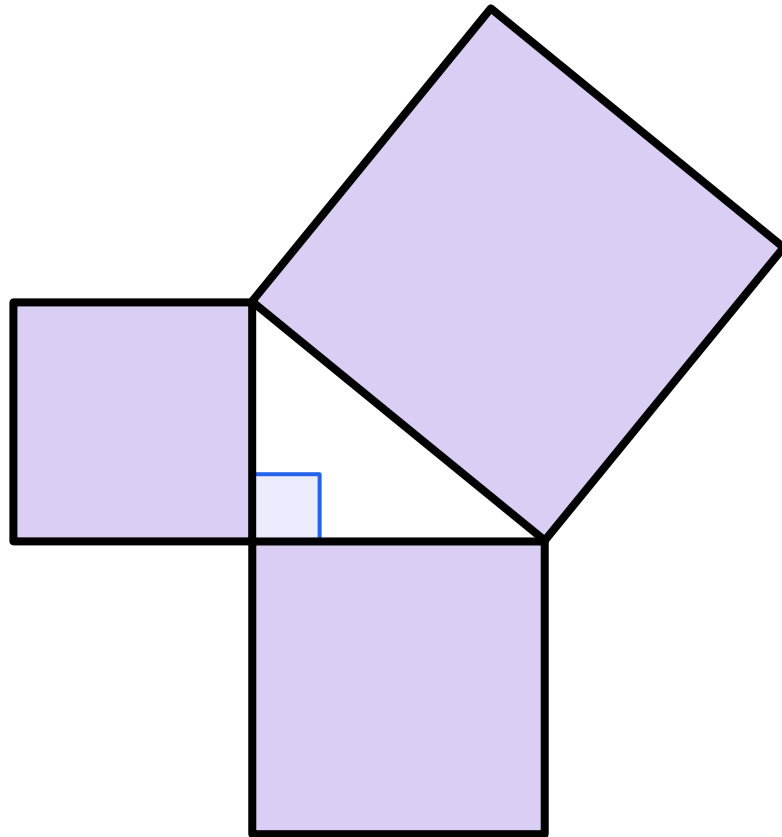


Caasha

Taasi waa fiican tahay, laakiin maxay kani u sameeyay saddexagal qumman (right-angled triangle)?



Cali



Bedka (areas) labada labajibbaaran ee yar waa inay la mid noqdaan bedka labajibbaaranaha ugu weyn.

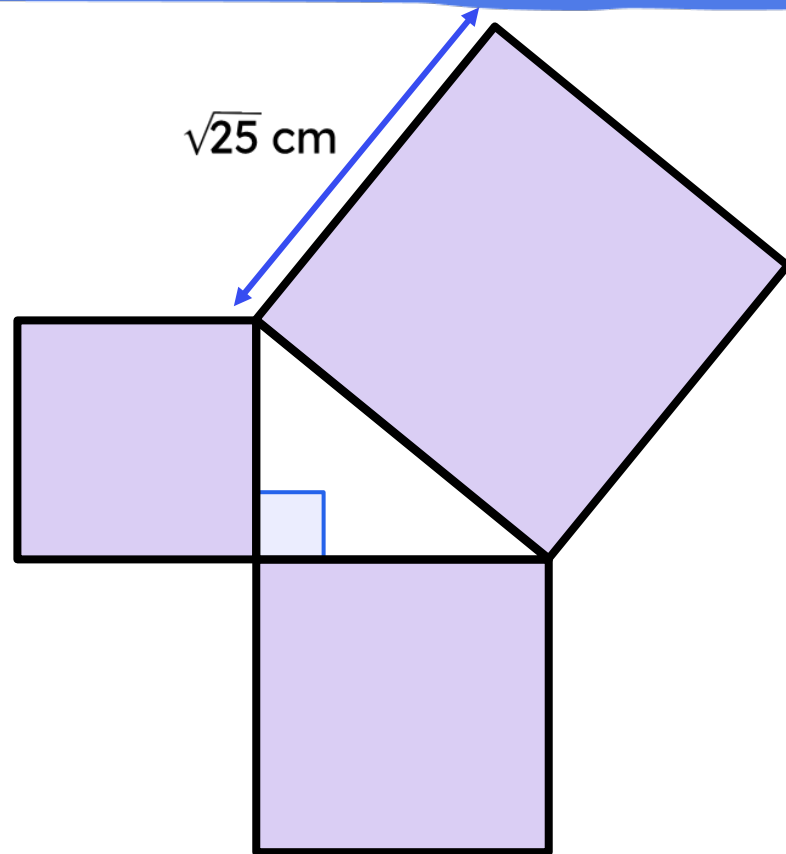


Caasha

Oh, waxaan xididka laba jibaaran (square root) ka qaadan karnaa bedka (area) laba jibaaran (square) si aan u helno dhererkiisa!



Cali





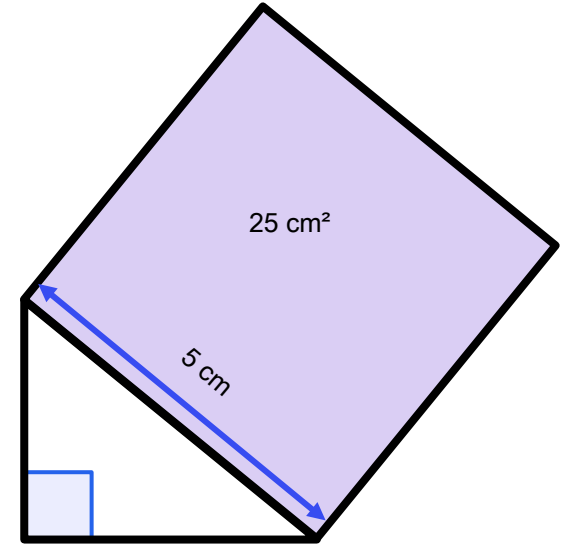
Caasha

Taas macneheedu waa in 5 cm uu sidoo kale yahay dhererka dhinaca ugu dheer ee saddex-xagalkaas (triangle).



Cali

Hypotenuse-ga (hypotenuse) waa mid fudud in la garto... Had iyo jeer waa dhinaca ka soo horjeeda xagasha qumman (right angle)!



Kee ka mid ah odhaalahan ayaa sax ah?

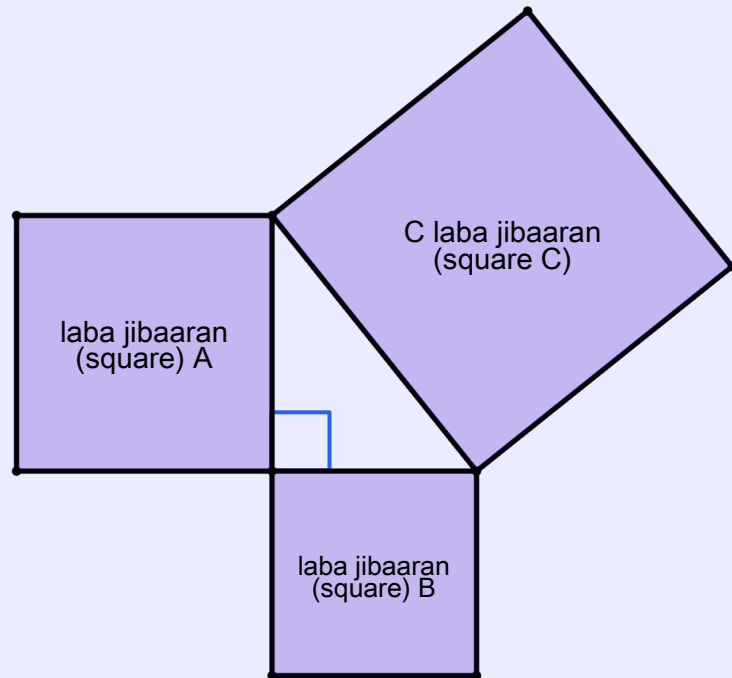
a Laba jibaaranka (square) leh bedka (area) ugu weyn had iyo jeer wuxuu ka soo horjeedaa xagasha qumman (right angle).



b Laba jibaaranka (square) leh bedka (area) ugu weyn had iyo jeer wuxuu ku yaalaa midigta saddex-xagalka (triangle).

c Hypotenuse-ga (hypotenuse) saddex-xagalka (triangle) had iyo jeer wuxuu taabtaa xagasha qumman (right angle).

d Hypotenuse-ga (hypotenuse) saddex-xagalka (triangle) had iyo jeer waa dhinaca ugu dheer saddex-xagalka (triangle).



Waxaan la yaabanahay in aan weli heli karo dhererka hypotenuse (hypotenuse) haddii aan haysto saddexagalka, laakiin aan haynin dhammaan laba jibaarannada (squares)?

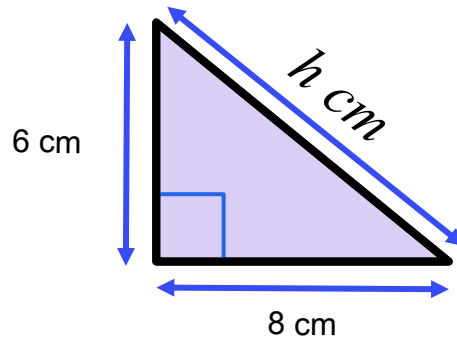


Cali

Haa, waad kartaa.
Waxaad kaliya ku sawiri kartaa laba jibaarannada (squares) aadan haysan.



Saciid

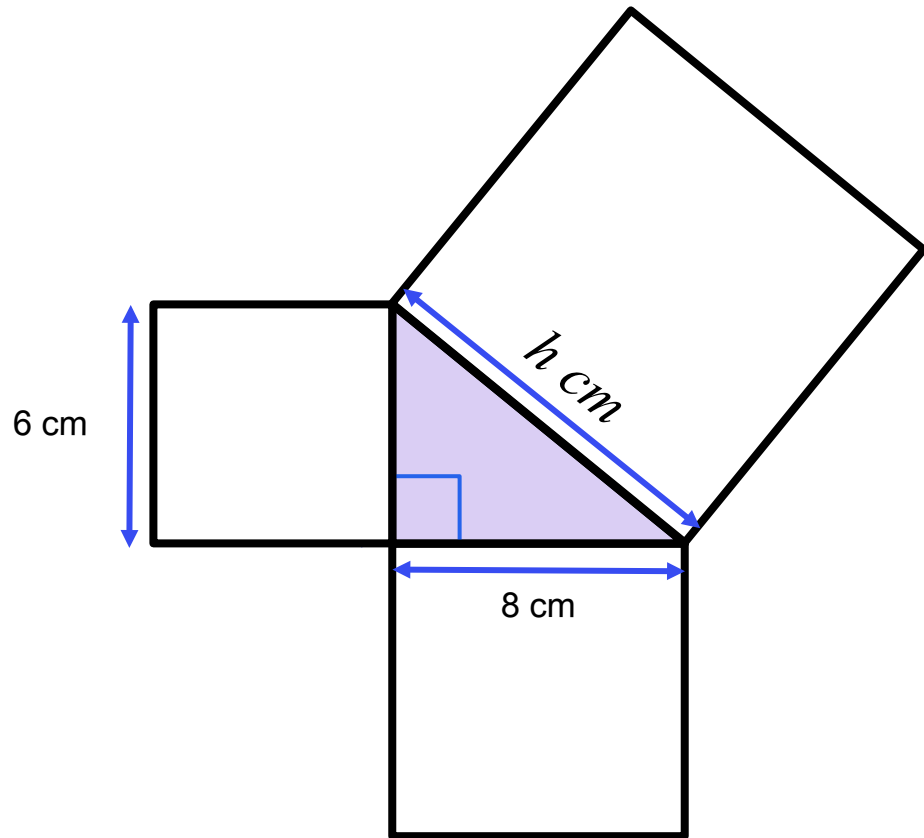


Haddii aan ognahay labada dhinac ee gaaban, waxaan sawiri karnaa labada labajibbaaran (squares) oo aan heli karnaa bedkooda (area).

Dhererka hypotenuse (hypotenuse) wuxuu la mid yahay dhinaca labajibbaaranaha (square) ugu weyn. Si loo helo dhererka hypotenuse (hypotenuse), xidid labajibbaaran (square root) ka qaad bedka (area) labajibbaaranaha (square) ugu weyn.

$$\sqrt{100}$$

Hypotenuse (hypotenuse) waa 10 cm dherer.



Isra waxay sawirtaa labajibbaarane (square) oo dhinaciisu la wadaago dhinaca 9 cm ee saddexagalka (triangle).



Waa maxay bedka (area) labajibbaaranahan (square)?

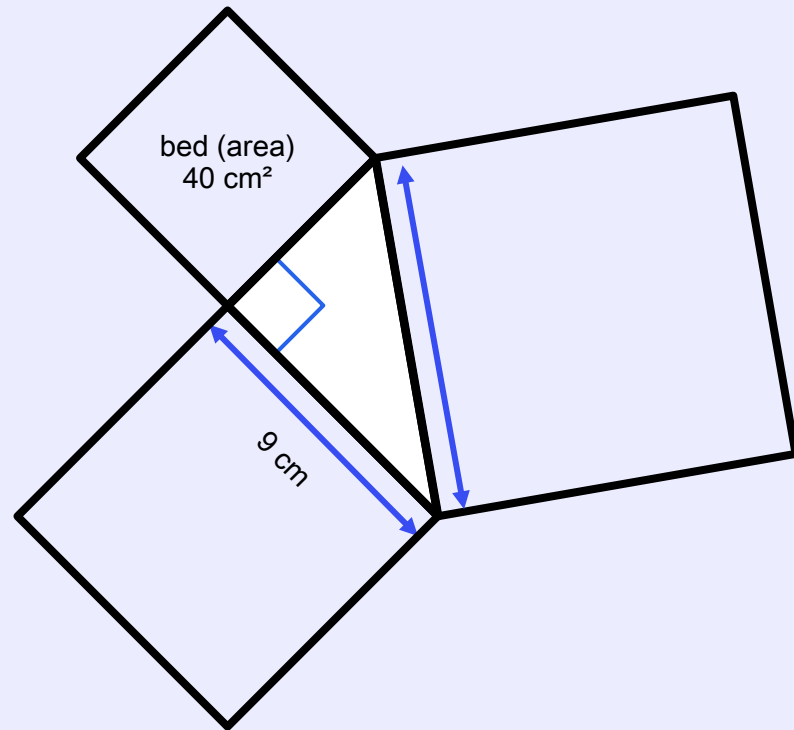
Isra waxay markaas sawirtaa labajibbaarane (square) oo dhinaciisu la wadaago hypotenuse (hypotenuse) ee saddexagalka (triangle).

Waa maxay bedka (area) labajibbaaranahan (square)?

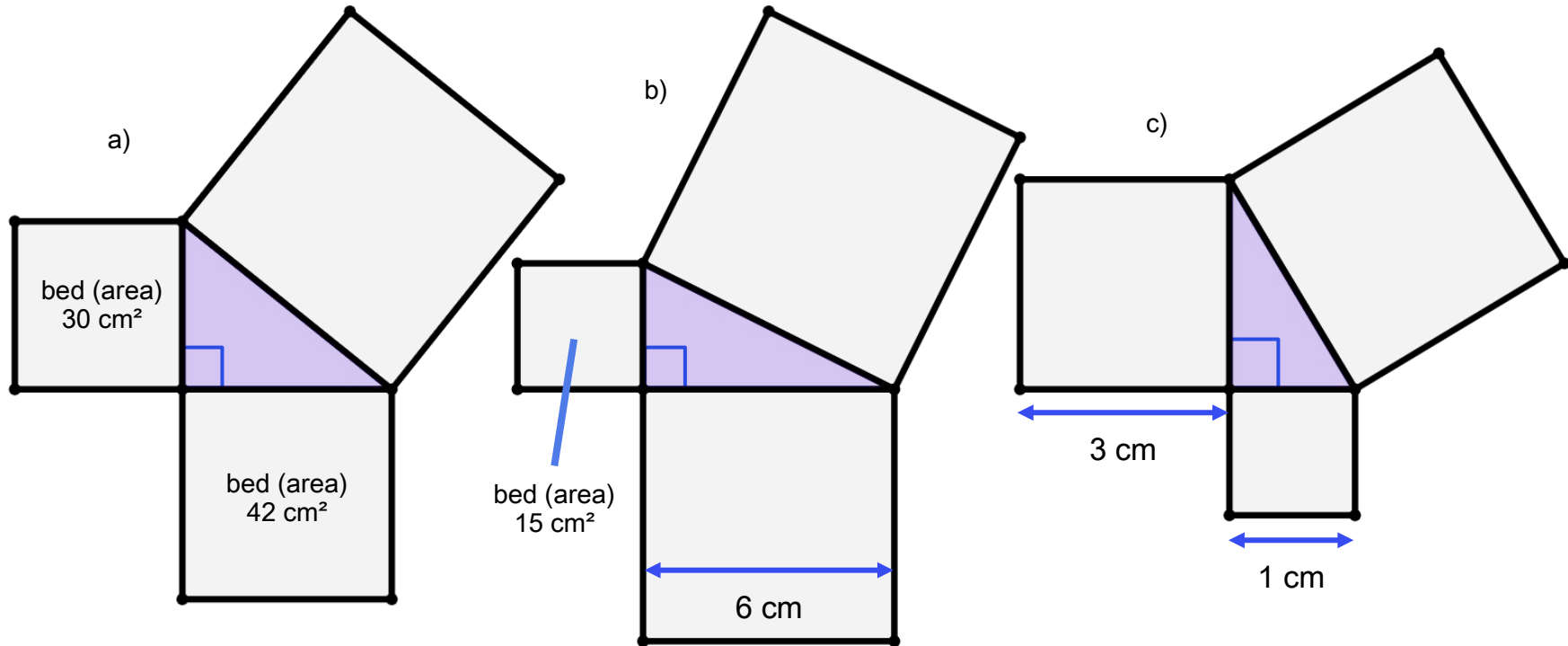
Waa maxay dhererka hypotenuse (hypotenuse) ee saddexagalkan (triangle)?

$$\sqrt{121}$$

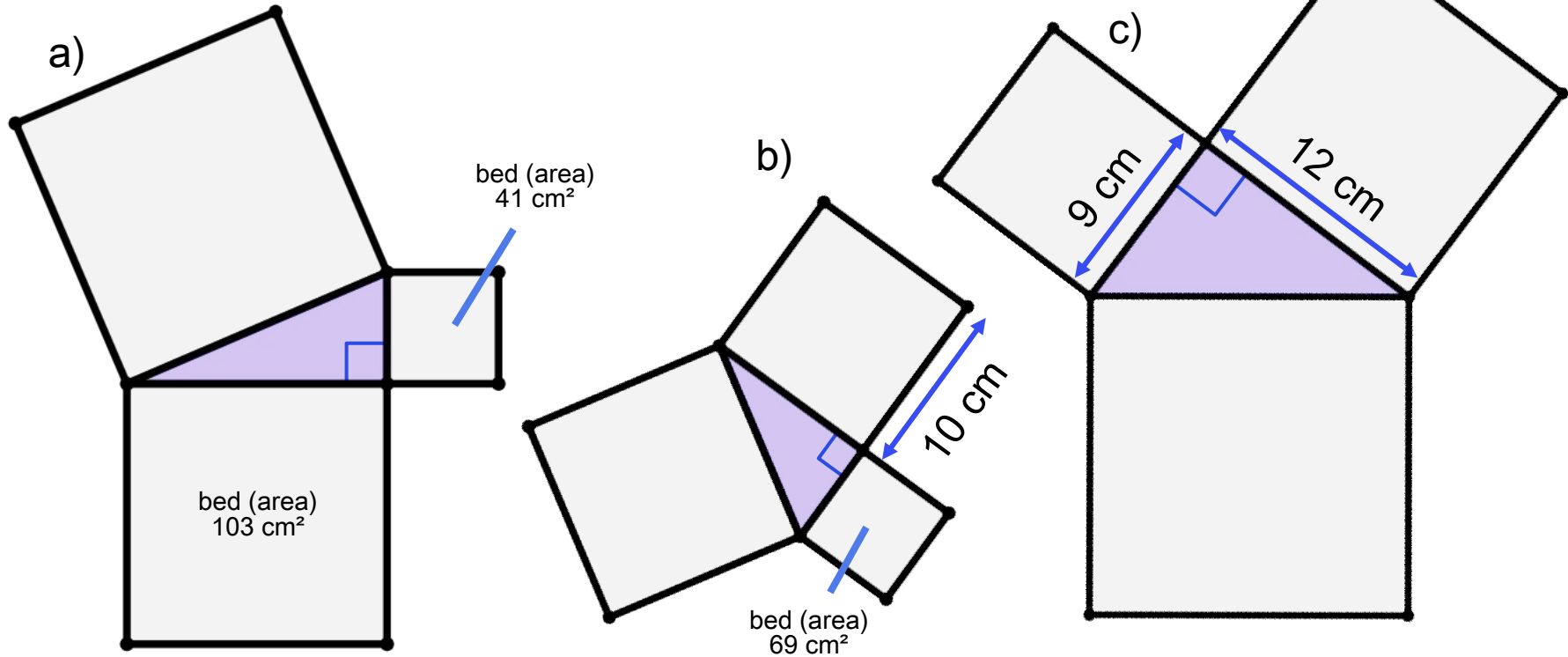
Hypotenuse (hypotenuse) waa 11 cm dherer.



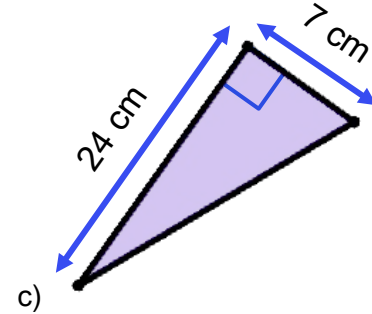
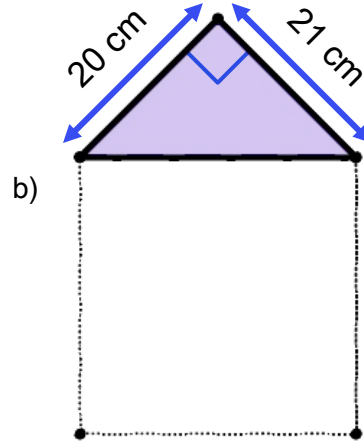
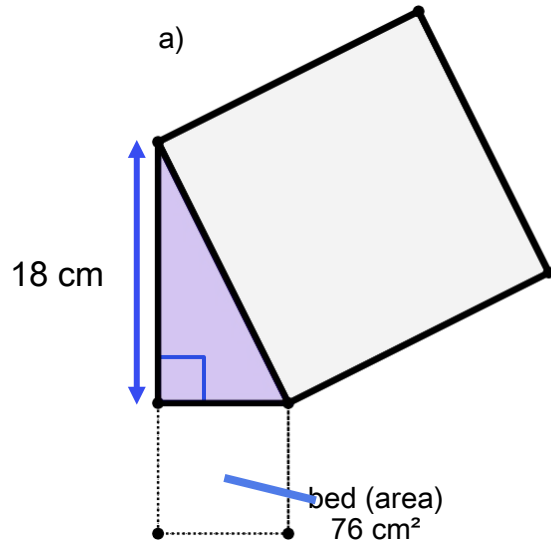
1) Soo hel bedka (area) labajibbaaranaha (square) kasta.



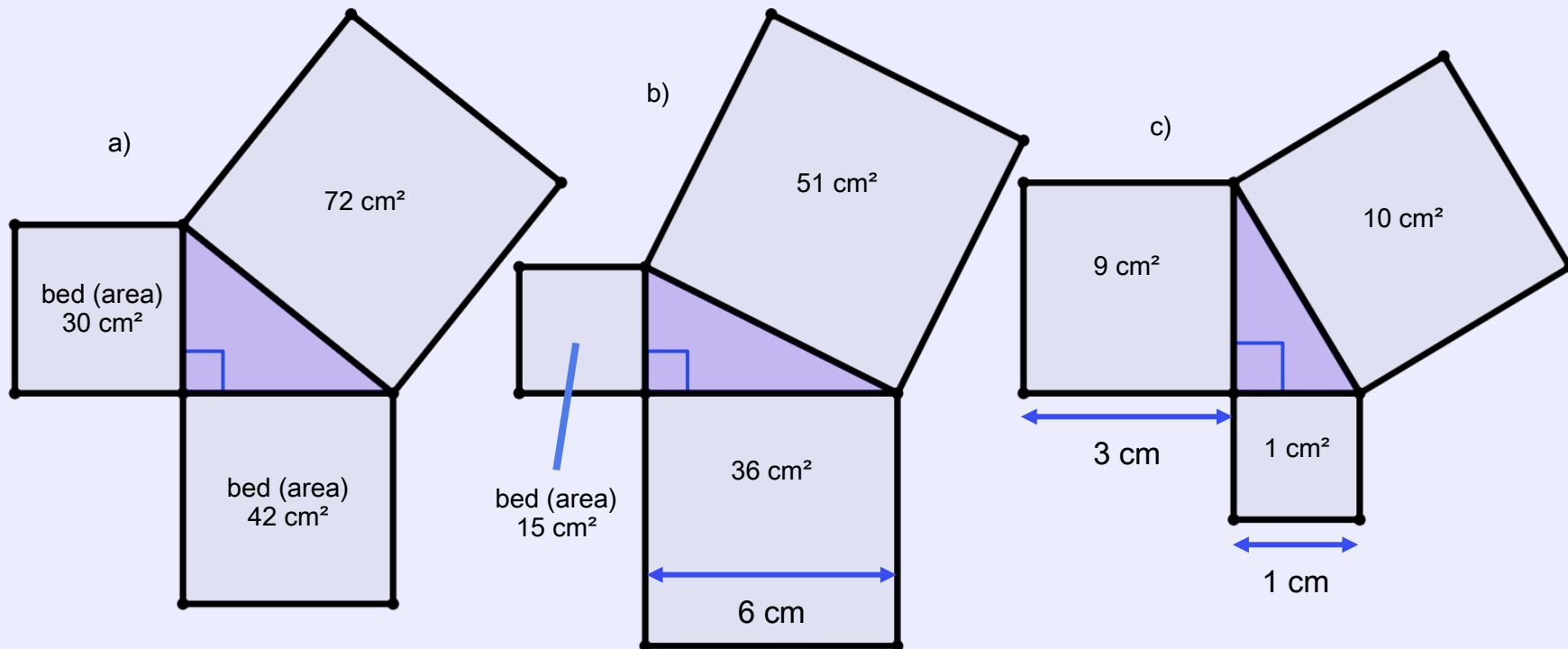
2) Raadi dhererka hypotenuse ee saddexagal kasta.



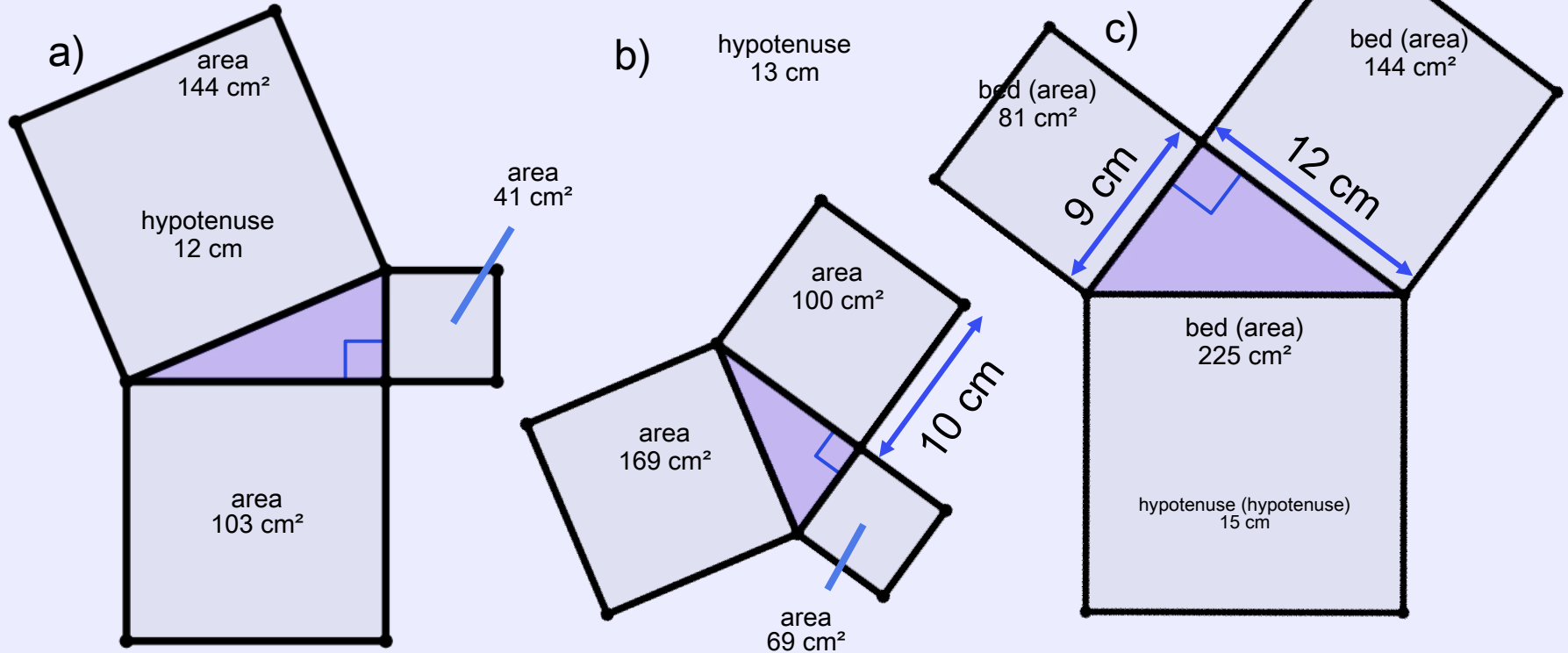
3) Adigoo marka hore sawiraya labajibbaaranaha maqan oo xisaabinaya beddooda, raadi dhererka hypotenuse ee saddexagal kasta.



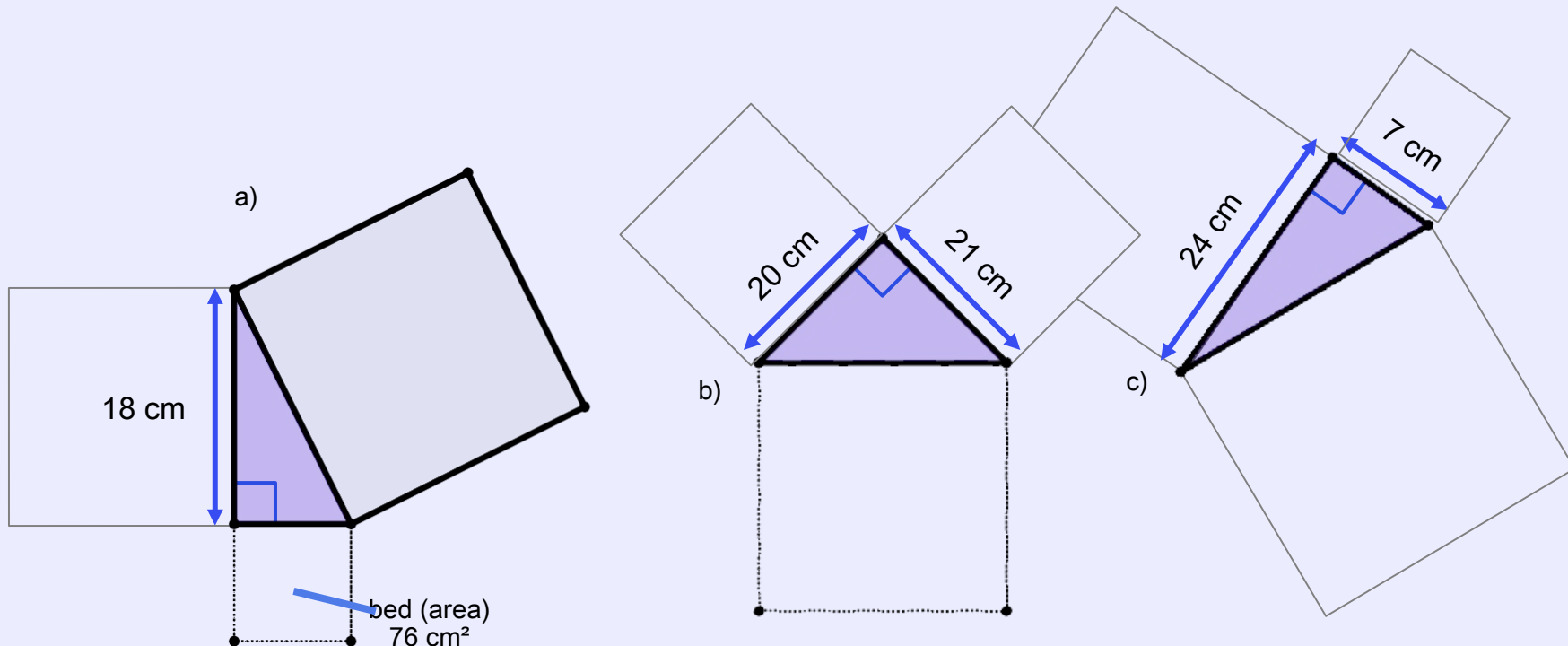
1) Soo hel bedka (area) labajibbaaran kasta.



2) Raadi dhererka hypotenuse (hypotenuse) ee saddexagal kasta.



3) Adigoo sawiraya labo jibbaaran oo maqan marka hore oo xisaabinaya bedkooda (area), soo hel dhererka hypotenuse (hypotenuse) ee saddexagal kasta.



Qaabka casharka

Dhererka jifaarka (hypotenuse)



Saddexagalka dhinacyadiisa laga sameeyay labajibbaaran (Squares from the sides of a triangle)



Aragtida Pythagoras si loo helo jifaarka (hypotenuse)



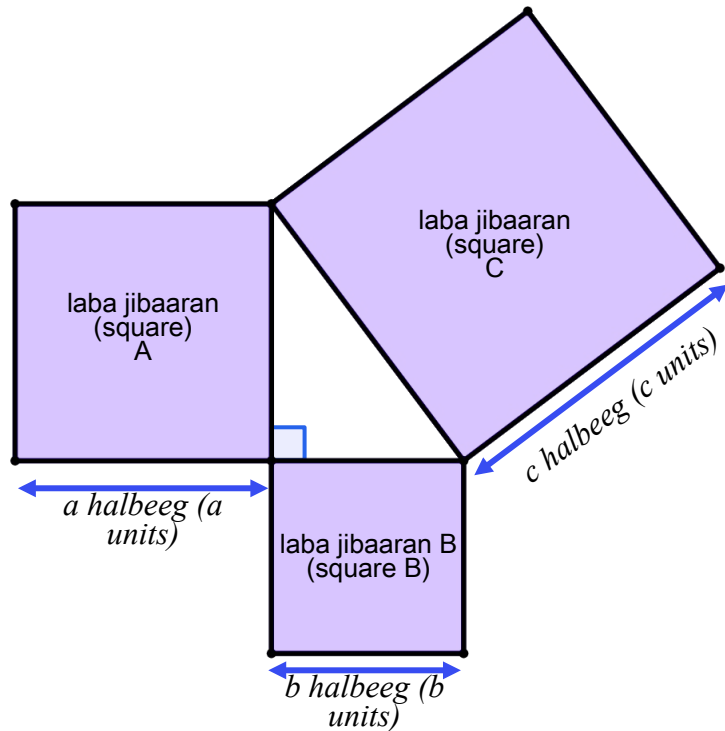
Waxaan u malaynayaa in aragtida (theorem) Pythagoras loo qori karo siyaabo kala duwan.

Saciid

bedka (area) labajibbaaran A + bedka (area) labajibbaaran B = bedka (area) labajibbaaran C

dhererka dhinaca a oo labajibbaaran (squared) + dhererka dhinaca b oo labajibbaaran (squared) = dhererka dhinaca c oo labajibbaaran (length of side c squared)

Aragtida (theorem) Pythagoras: $a^2 + b^2 = c^2$



Waxaan ku heli karnaa dhererka dhinaca ugu dheer (hypotenuse) ee saddexagalka qumman (right-angled triangle) laba siyood:

Xisaabinta bedka (areas) laba jibaaranayaasha (squares) ku dhegan dhinac kasta oo ka mid ah saddexda dhinac ee saddexagalka.

Ama iyadoo la sawiray ama aan la sawirin laba jibaaranayaasha (squares).

Xisaab ahaan (algebraically), iyadoo la beddelayo dhererka saddexagalka qaacidada (formula) aragtida (theorem) Pythagoras:

$$a^2 + b^2 = c^2$$

Halka a iyo b ay yihiin labada dhinac ee gaaban ee saddexagalka, c-na yahay dhinaca ugu dheer (hypotenuse) ee saddexagalka.

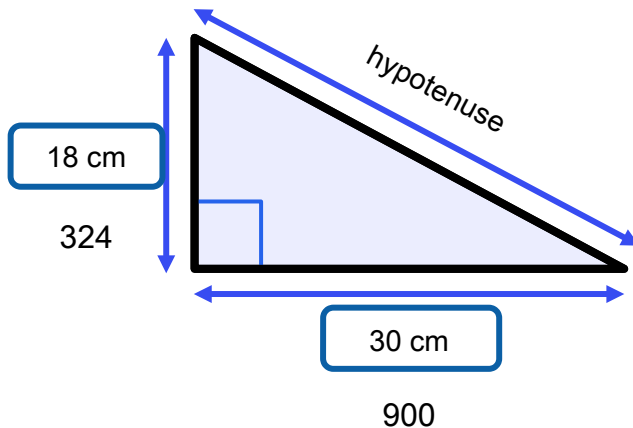
Aragtida Pythagoras si loo helo hypotenuse

Helista bedka (area) labajibbaaranayaasha

Saddexagal qumman (right-angled triangle) ah, haddii aad:
laba jibaar (square) labada dhinac ee gaaban
ku dar (add) natijadooda
natijadu waa laba jibaaranka (square of the)
dhinaca ugu dheer (hypotenuse)

Qaacidada (formula) aragtida Pythagoras

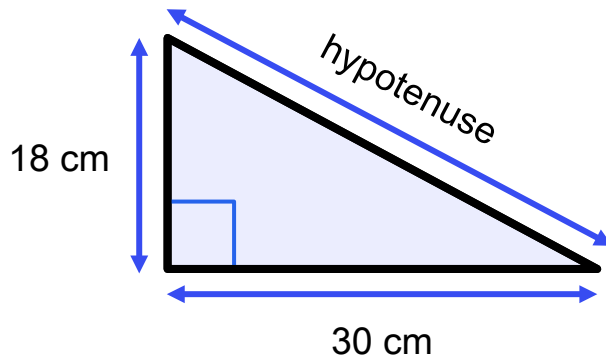
$$a^2 + b^2 = c^2$$



Aragtida Pythagoras si loo helo hypotenuse

Helista bedka (area) labajibbaaranayaasha

Tusaalahan, 1224 waxay ka dhigan tahay bedka (area) labajibbaaranaha hypotenuse-ka. Si loo helo dhererka hypotenuse-ka laftiisa, ka soo saar xididka labajibbaaran ee 1224.



Qaacidada (formula) aragtida Pythagoras

$$a^2 + b^2 = c^2$$

$$18^2 + 30^2 = c^2$$

$$324 + 900 = c^2$$

$$1224 = c^2$$

$$\sqrt{\quad} \quad \sqrt{\quad}$$

c waa hypotenuse, kaas oo ah 34.99 cm marka la soo koobo.

Aragtida Pythagoras si loo helo hypotenuse

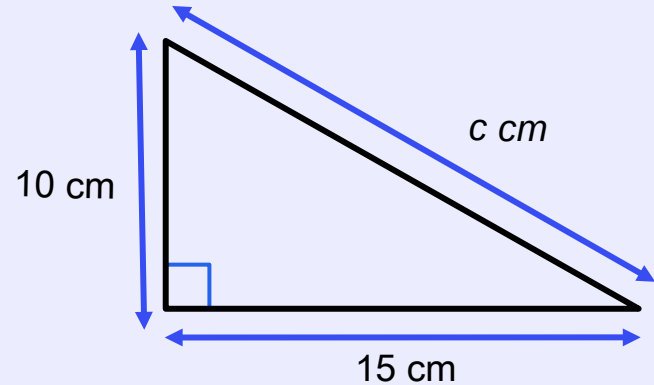
Buuxi meelaha bannaan ee habka si aad u hesho hypotenuse-ka saddexagalka qumman (right-angled) adigoo isticmaalaya aragtida Pythagoras.

$$10^2 + 15^2 = c^2$$

$$100 + 225 =$$

$$\boxed{} = c^2$$

$$\boxed{} = c$$



Waan la yaabanahay inay jirto hab ka dhaqso badan oo loo xisaabiyo dhererka hypotenuse-ka iyadoo la adeegsanayo qaacidada Baytagoorgas (Pythagoras' theorem) iyadoo kalkuleytar (calculator) si ka duwan loo isticmaalo?



Saciid

Qaacidada (formula) Baytagoorgas (Pythagoras' theorem)

$$a^2 + b^2 = c^2$$

$$18^2 + 30^2 = c^2$$

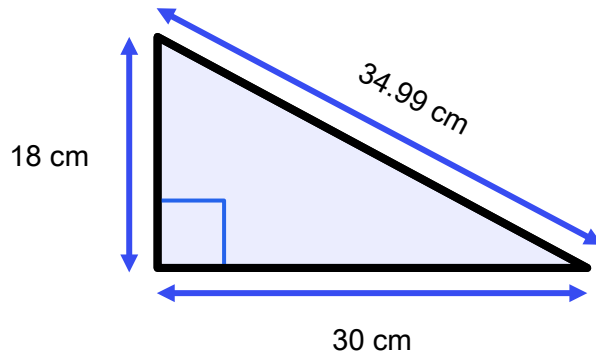
$$324 + 900 = c^2$$

$$1224 = c^2$$

$$\sqrt{1224} = \sqrt{c^2}$$
$$= c$$

34.985711

c waa hypotenuse-ka, kaas oo ah 34.99 cm marka la soo koobo (rounded).

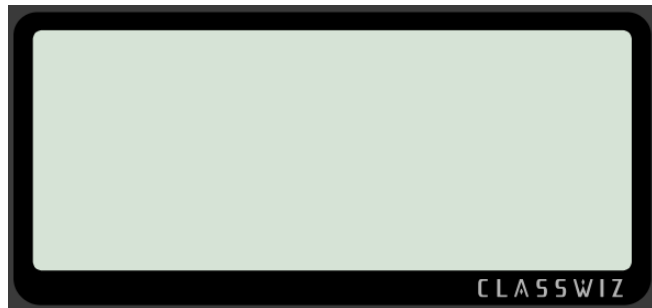
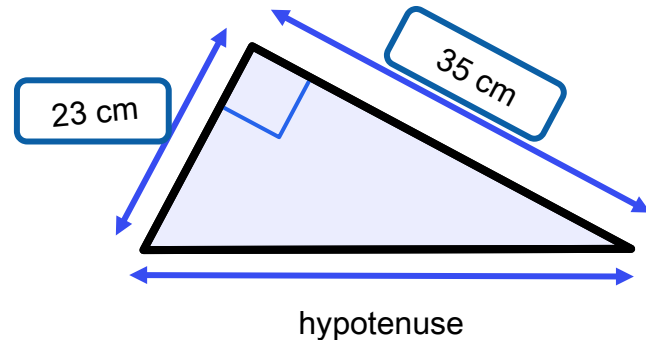


Qaacidada Baytagoorgas (Pythagoras' theorem) si loo helo hypotenuse-ka

Qaacidada Baytagoorgas (Pythagoras' theorem): $a^2 + b^2 = c^2$

a iyo b waa dhererka dhinacyada gaagaaban ee saddex-xagalka (kuwaas oo ah lugaha xagasha qumman (right angle)).

1754 waa qiimaha (value) c^2 , bedka (area) laba-jibbaaran ee hypotenuse-ka.



shaashadda kalkuleytarka (calculator screen)



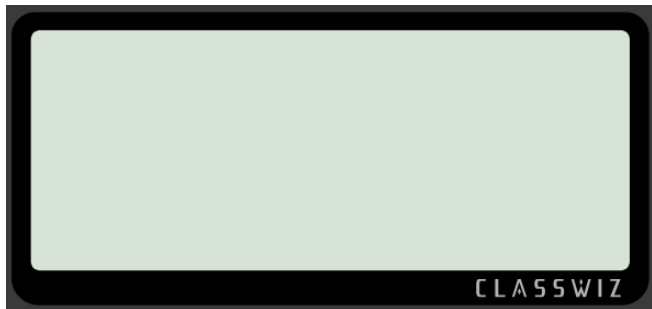
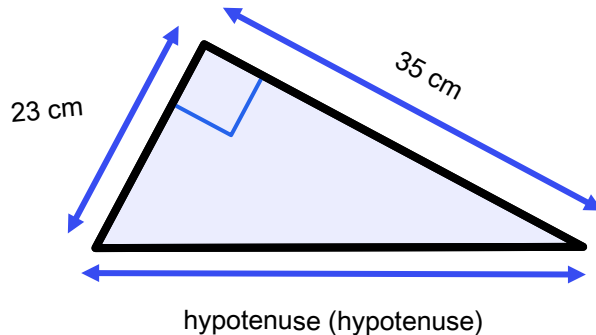
badhamada la riixo (buttons to press)

Qaacidada Baytagoorgas (Pythagoras' theorem) si loo helo hypotenuse-ka

Qaacidada Baytagoorgas (Pythagoras' theorem): $a^2 + b^2 = c^2$

Si loo helo qiimaha c , dhererka hypotenuse, waxaad u baahan tahay inaad xidid laba jibaaran ka soo saarto 1754.

Sidaas darteed, 41.88 cm waa dhererka hypotenuse.



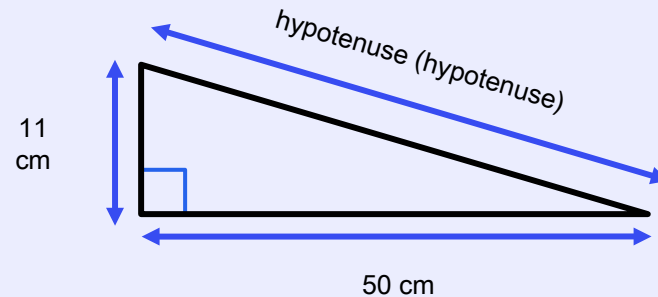
shaashadda xisaabiyaha (calculator screen)



badhamada la riixo (buttons to press)

Aragtida Pythagoras si loo helo hypotenuse

Yaa xisaabintiisa ugu horreysay si loo helo hypotenuse saddexagalka qumman?



√_✓ D

$$11^2 + 50^2$$

Cabdi 2621

CLASSWIZ

√_✓ D

$$61^2$$

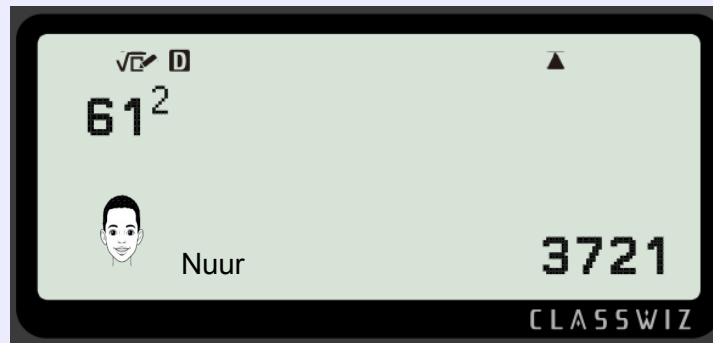
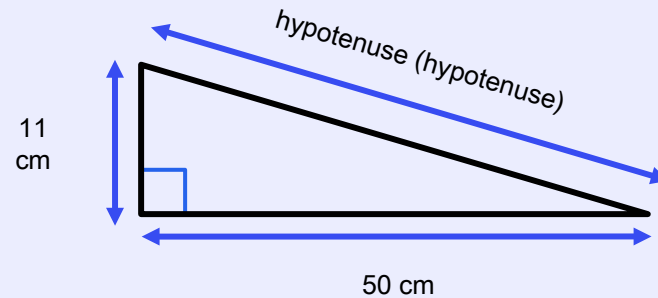
Nuur 3721

CLASSWIZ

Maxaa laga yaabaa in Nuur uu qaldamay habkiisa?

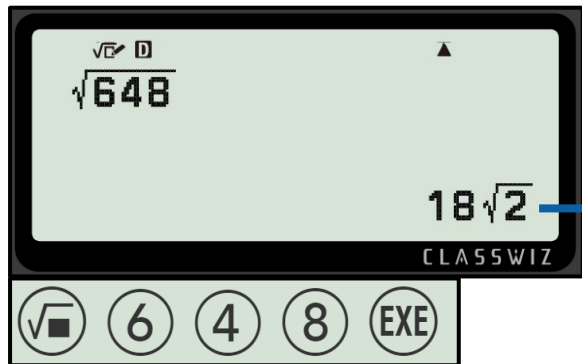
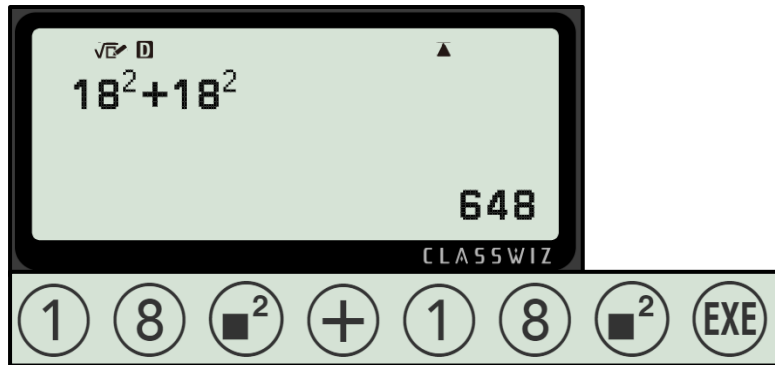
Nuur si khaldan ayuu ugu daray labada dhinac ee gaagaaban ka hor inta uusan laba jibaaran.

Tani waa habka khaldan ee hawlgallada.

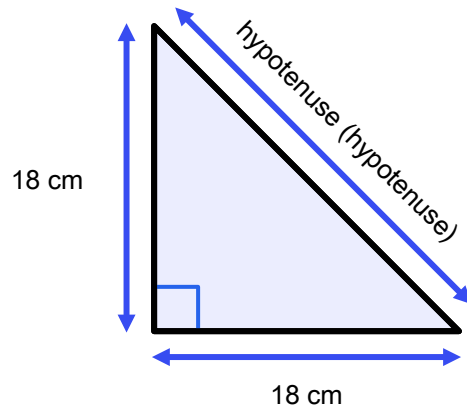


Aragtida Pythagoras (Pythagoras' theorem) si loo helo hypotenuse-ka (hypotenuse)

Mararka qaarkood, waa inaad beddeshaa qaabka jawaabtaada si hypotenuse-ku (hypotenuse) u noqdo dherer (length) loo qoray tobanle (decimal).

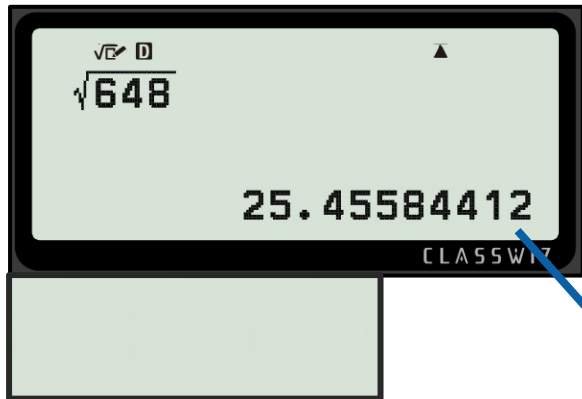


Tan waxaa loo yaqaan qaabka surd-ka (surd form).
Waxaan dooneynaa inaan u beddelno qaabka tobanle (decimal form).

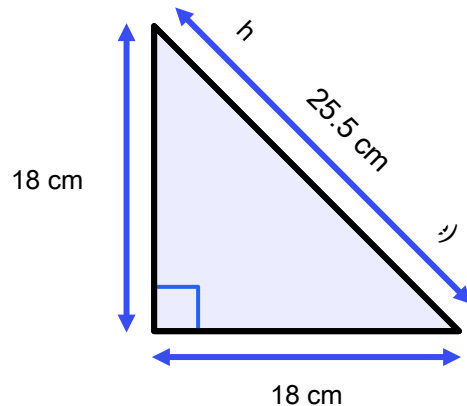


Aragtida Pythagoras (Pythagoras' theorem) si loo helo hypotenuse-ka (hypotenuse)

Mararka qaarkood, waa inaad beddeshaa qaabka jawaabtaada si hypotenuse-ku (hypotenuse) u noqdo dherer (length) loo qoray tobanle (decimal).



Tani waa hadda qaabka tobanle (decimal form) ee dhererka (length) hypotenuse-ka (hypotenuse), kaas oo aan ku soo koobi karnaa 1 meel tobanle (1 decimal place).



Aragtida Pythagoras (Pythagoras' theorem) si loo helo hypotenuse-ka (hypotenuse)

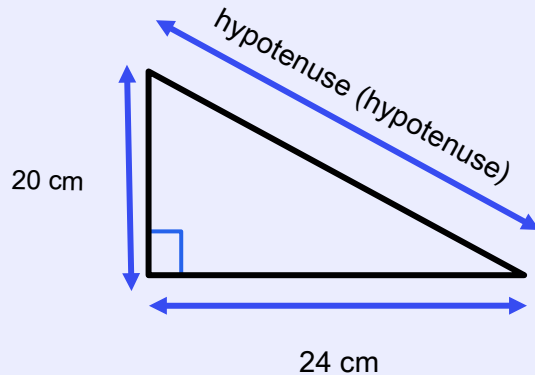


Hubi

Soo hel hypotenuse-ka (hypotenuse) saddex-xagalkan qumman (right-angled triangle).
Si jawaabtaada qaab tobanle (decimal form) ah oo ku habboon 1 meel tobanle (1 decimal place).

$$\sqrt{\quad} \quad \sqrt{\quad}$$

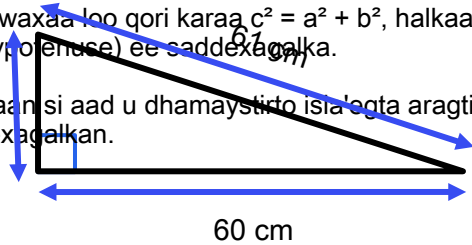
hypotenuse (hypotenuse) = 31.2 cm (1 d.p.)



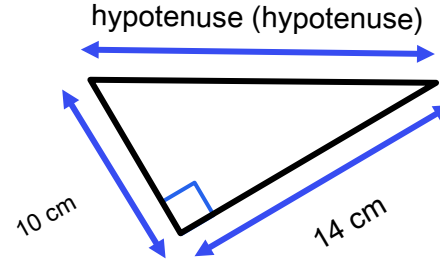
1) Kani waa saddex-xagal qumman (right-angled triangle).

Aragtida Pythagoras waxaa loo qori karaa $c^2 = a^2 + b^2$, halkaas oo c ay tahay hypotenuse (hypotenuse) ee saddexagalka.

Buuxi meelaha hannaan si aad u dhamaysiiso isla'ogta aragtida Pythagoras ee saddexagalka.



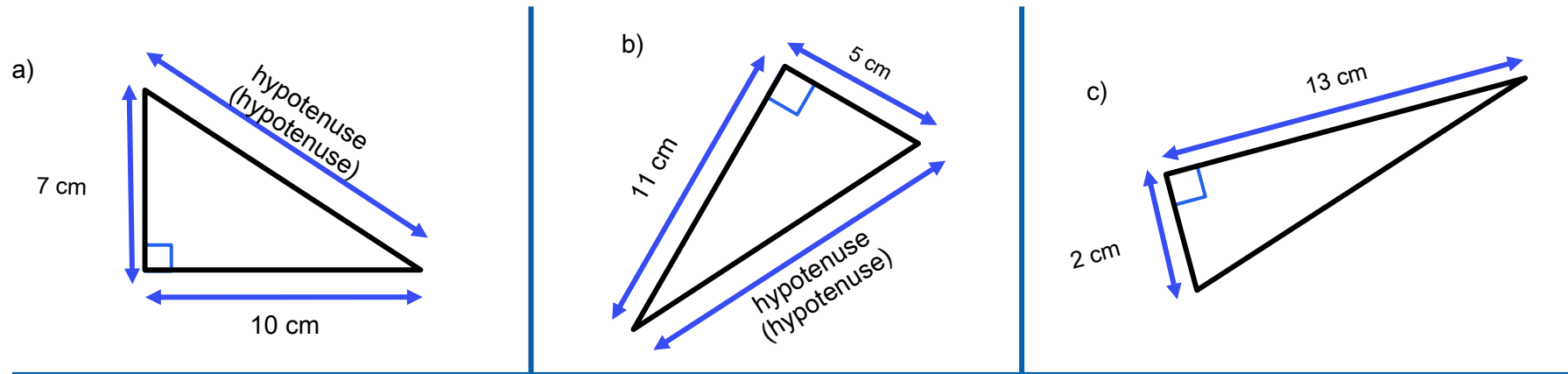
$$\boxed{}^2 = \boxed{}^2 + \boxed{}^2$$



2) Muuji in hypotenuse (hypotenuse) ee saddexagalkani yahay 17.2 cm (1 d.p.)

$$\boxed{}^2 + \boxed{}^2$$

3) Ku xidh saddexagal kasta labajibbaaranaha hypotenuse (hypotenuse) iyo dhererka hypotenuse (hypotenuse).



labajibbaaranaha hypotenuse (square of the hypotenuse)

d cm²

e cm²

f cm²

dhererka hypotenuse (length of the hypotenuse)
(1 d.p.)

g cm

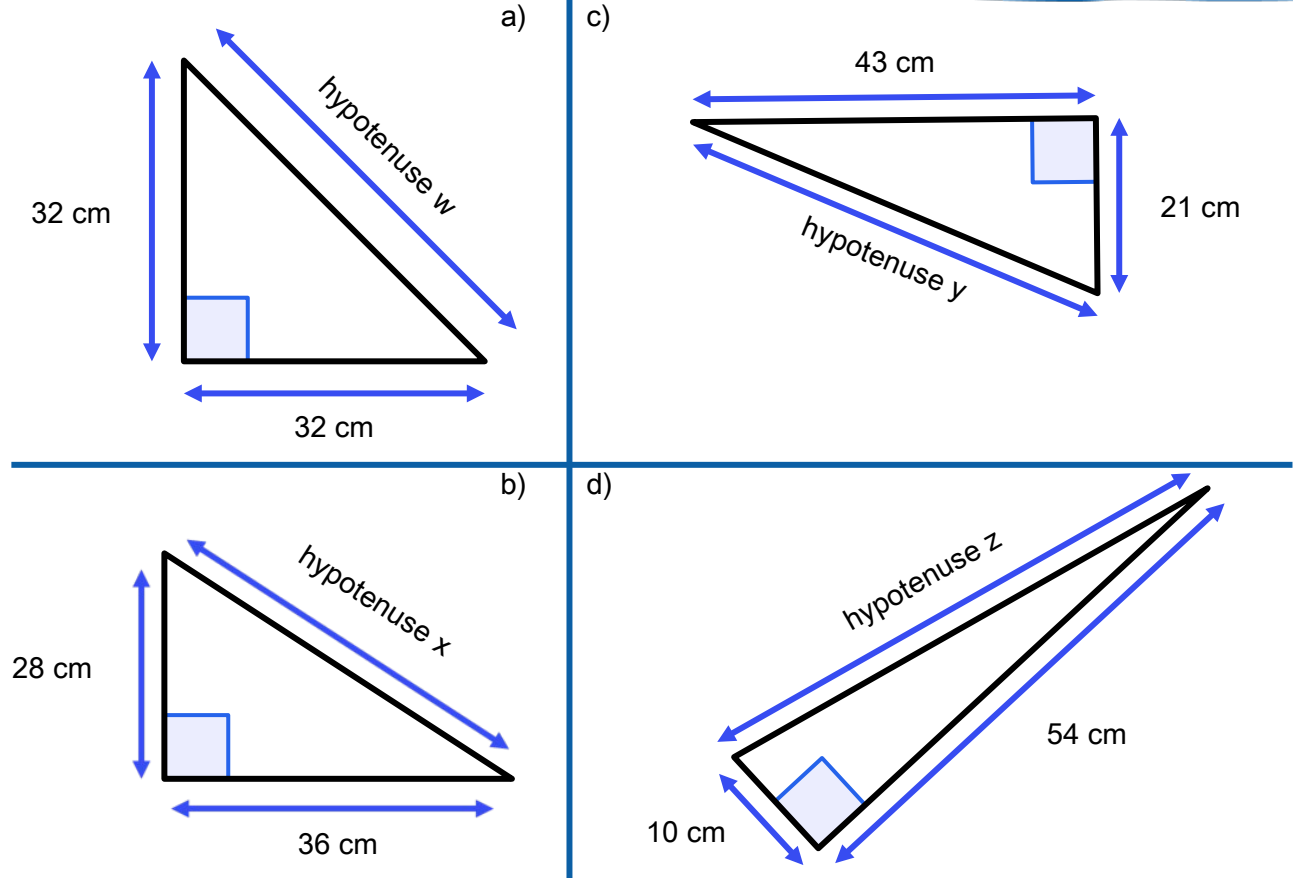
h cm

i cm

Hawsha B Aragtida (theorem) ee Pythagoras si loo helo hypotenuse-ka (hypotenuse)

4) Saddex-xagallada oo dhami waxay leeyihiin laba dherer (length) oo isku darkoodu yahay 64 cm.

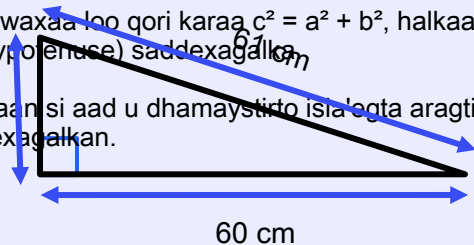
Laga bilaabo kan ugu gaaban, dhig hypotenuse-yada (hypotenuses) saddex-xagallada sida dhererka (length) u kala horreeyaan.



1) Kani waa saddex-xagal qumman (right-angled triangle).

Aragtida Pythagoras waxaa loo qori karaa $c^2 = a^2 + b^2$, halkaas oo c ay tahay hypotenuse (hypotenuse) saddexagalka.

Buuxi meelaha hannaan si aad u dhamaysiiso isla'ogta aragtida Pythagoras ee saddexagalka.



Jawaabaha:

2 2 2
61 11 60

=

+

61

60

11

ama

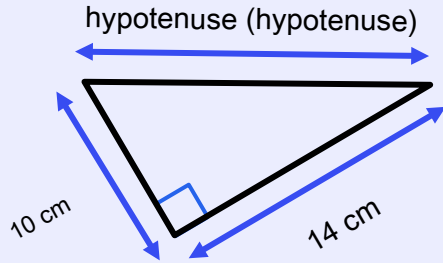
2

2

2

=

+



$$10^2 + 14^2 = 296$$

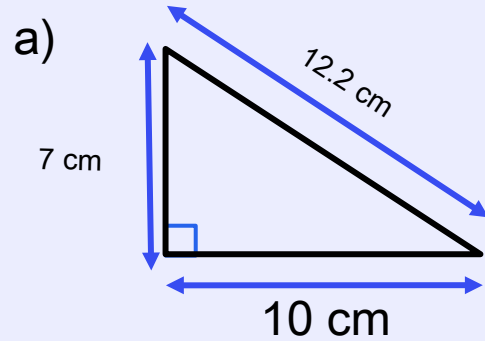
$$\sqrt{296} = 17.20465...$$

$$\text{hypotenuse (hypotenuse)} = 17.2 \text{ cm}$$

2) Muuji in hypotenuse (hypotenuse) saddexagalkani yahay 17.2 cm (1 d.p.)

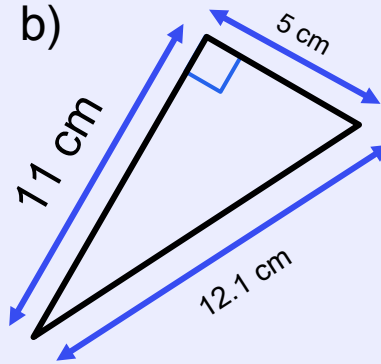
Hawsha B Aragtida Pythagoras si loo helo hypotenuse (hypotenuse)

3) Isku xidh saddexagal kasta iyo labajibbaaranaha hypotenuse (hypotenuse) iyo dhererka hypotenuse (hypotenuse) ee u dhigma.



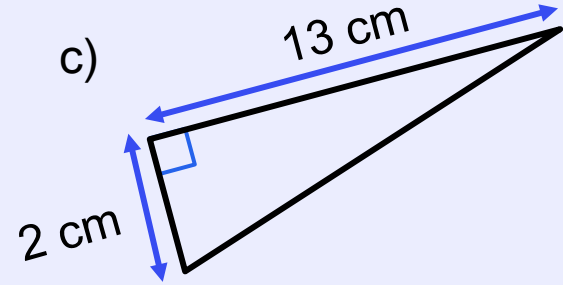
f) 9 cm^2

g) 2 cm



d) 6 cm^2

i) 1 cm



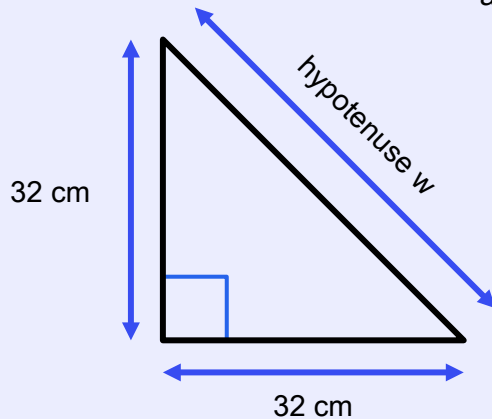
e) 3 cm^2

h) 2 cm

4) Saddex-xagalladan oo dhan waxay leeyihiin laba dherer oo isku darkoodu yahay 64 cm.

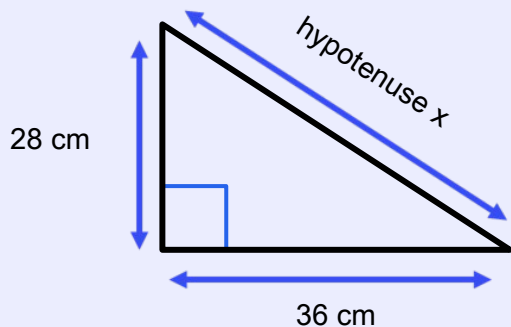
Laga bilaabo kan ugu gaaban, dhig hypotenuse-yada saddex-xagallada sida dhererka u kala horreeyaan.

a)



hypotenuse $w = 45.25$ cm

b)



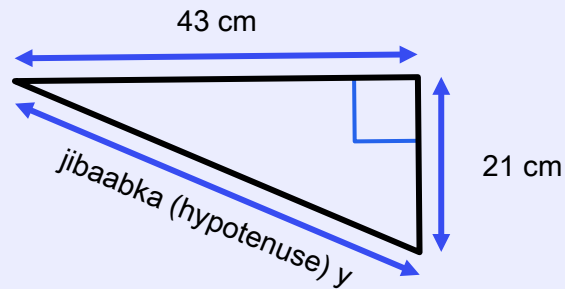
hypotenuse $x = 45.61$ cm

4) Saddex-xagalladan kasta, wadarta dhererka labada dhinac ee gaaban waa isku mid, 64 cm mid kasta.

Laga bilaabo kan ugu gaaban, dhig hypotenuse-yada sida dhererka u kala horreeyaan.

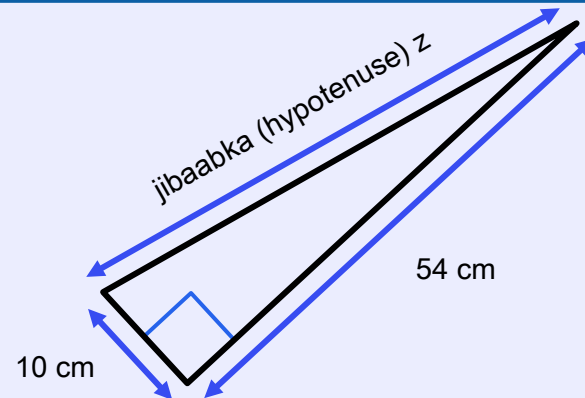
jibaabka (hypotenuse) $y = 47.85$ cm

c)



d)

jibaabka (hypotenuse) $z = 54.92$ cm





4) Saddexagal kasta, wadarta dhererka labada dhinac ee gaagaaban waa isku mid, 64 cm midkiiba.

Laga bilaabo kan ugu gaaban, dhig jibaabyada (hypotenuses) sida dhererka u kala horreeyaan.

Sida saxda ah ee loo kala horreeyay waa

$$W \rightarrow X \rightarrow Y \rightarrow Z$$

Marka farjiga u dhexeeya labada dhinac ee gaagaaban uu weynaado, jibaabka (hypotenuse) ayaa weynaada.

Soo koobid

Dhererka jibaabka (hypotenuse)

Bedka laba labagoodle (squares) oo dhinacyadoodu yihiin labada dhinac ee gaagaaban ee saddexagal qumman (right-angled triangle) waxay u dhigmaan bedka labagoodle (square) ee jibaabka (hypotenuse) isla saddexagalka.

Qaacidada aragtida Pythagoras (Pythagoras' theorem formula) (oo badanaa loo arko $a^2 + b^2 = c^2$, halka c uu yahay dhererka jibaabka (hypotenuse)) waxaa loo isticmaali karaa in lagu xisaabiyo dhererka jibaabka (hypotenuse) ee saddexagal qumman (right-angled triangle), marka la eego labada dherer ee gaagaaban.

Waxaa jira habab wax ku ool ah oo lagu xisaabiyo jibaabka (hypotenuse) ee saddexagal qumman (right-angled triangle) iyadoo la adeegsanayo aragtida Pythagoras (Pythagoras' theorem) kalkuleylar.