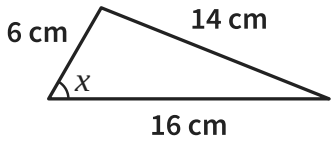
The cosine rule

ANSWERS

1

Find angle x.



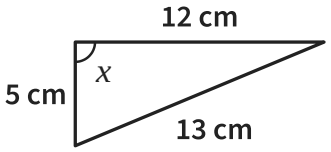
$\cos x = \dfrac{6^2 + 16^2 - 14^2}{2 \times 6 \times 16}$

$\cos x = 0.5$

$x = 60°$

2

Find angle x.



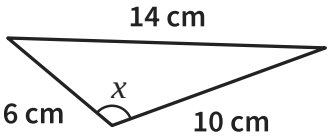
$\cos x = \dfrac{5^2 + 12^2 - 13^2}{2 \times 5 \times 12}$

$\cos x = 0$

$x = 90°$

3

Find angle x.



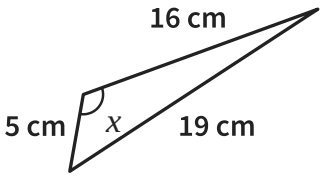
$\cos x = \dfrac{6^2 + 10^2 - 14^2}{2 \times 6 \times 10}$

$\cos x = -0.5$

$x = 120°$

4

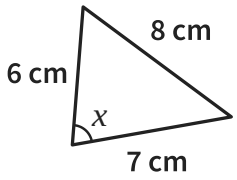
Find angle x.



$x = 120°$

5

Find angle x to 1 decimal place.



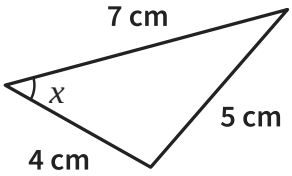
$\cos x = \dfrac{6^2 + 7^2 - 8^2}{2 \times 6 \times 7}$

$\cos x = 0.25$

$x = 75.5°$

6

Find angle x to 1 decimal place.



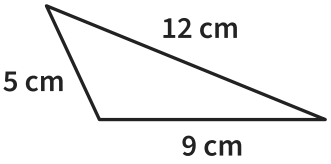
$\cos x = \dfrac{4^2 + 7^2 - 5^2}{2 \times 4 \times 7}$

$\cos x = 0.7143$

$x = 44.4°$

7 *Notice the change!*

Find the largest angle to 1 decimal place.



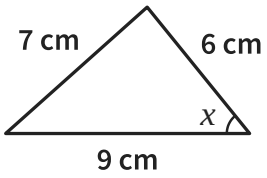
opposite the 12 cm side

$\cos = -0.4222$

Angle = $115.0°$

8

Lily finds angle x like this:
$\cos x = (6^2 + 7^2 - 9^2) \div (2 \times 6 \times 7)$.
Explain her mistake and find x.



9 cm is not opposite x: 7 cm is

$\cos x = 0.6296$

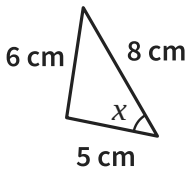
$x = 51.0°$

The cosine rule *further practice*

ANSWERS

9

Find angle x to 1 decimal place.



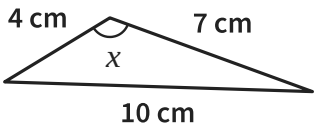
$\cos x = \dfrac{5^2 + 8^2 - 6^2}{2 \times 5 \times 8}$

$\cos x = 0.6625$

Answer $48.5°$

10

Find angle x to 1 decimal place.



$\cos x = \dfrac{4^2 + 7^2 - 10^2}{2 \times 4 \times 7}$

$\cos x = -0.625$

Answer $128.7°$

11

In triangle PQR, PQ = 7 cm, QR = 9 cm and PR = 5 cm. Find angle PQR to 1 decimal place.

$\cos Q = \dfrac{7^2 + 9^2 - 5^2}{2 \times 7 \times 9}$

$\cos Q = 0.8333$

Angle PQR = $33.6°$

12

A triangle has sides 8 cm, 11 cm and 13 cm. Find its smallest angle to 1 decimal place.

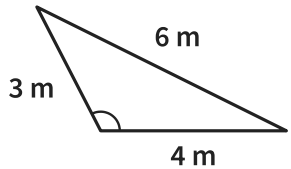
opposite the 8 cm side: $\dfrac{11^2 + 13^2 - 8^2}{2 \times 11 \times 13}$

$\cos = 0.7902$

Answer $37.8°$

13

A flowerbed is a triangle with sides 3 m, 4 m and 6 m. Find the angle between the 3 m and 4 m sides to 1 decimal place.



opposite the 6 m side: $\dfrac{3^2 + 4^2 - 6^2}{2 \times 3 \times 4}$

$\cos = -0.4583$

Answer $117.3°$

14

The end of a roof is a triangle with two sloping sides of 7 m and a base of 10 m. Find the angle at the top to 1 decimal place.

opposite the base: $\dfrac{7^2 + 7^2 - 10^2}{2 \times 7 \times 7}$

$\cos = -0.0204$

Answer $91.2°$

15

A triangle has sides 5 cm, 6 cm and 8 cm. Is it acute or obtuse?
Show how you know.

opposite 8 cm: $\dfrac{5^2 + 6^2 - 8^2}{2 \times 5 \times 6}$

$\cos = -0.05$, negative

So obtuse: $92.9°$

16

Sam tries to find the largest angle of a triangle with sides 3 cm, 4 cm and 8 cm. His calculator gives an error. Explain why.

$\cos = \dfrac{3^2 + 4^2 - 8^2}{2 \times 3 \times 4} = -1.625$

cos is never below −1

and 3 + 4 is less than 8

So there is no such triangle