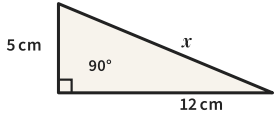


The Cosine Rule

1

Sides 5 cm and 12 cm with 90° between them. Find x .



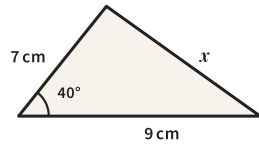
$$x^2 = 5^2 + 12^2 = 169$$

$$x = \sqrt{169}$$

so $x = 13$ cm

2

Find x to 1 decimal place.



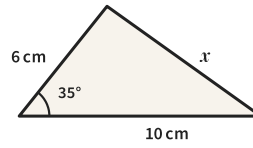
$$x^2 = 7^2 + 9^2 - 2 \times 7 \times 9 \times \cos 40^\circ$$

$$x^2 = 33.48$$

Answer 5.8 cm

3

Find x to 1 decimal place.



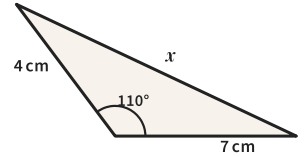
$$x^2 = 6^2 + 10^2 - 2 \times 6 \times 10 \times \cos 35^\circ$$

$$x^2 = 37.70$$

Answer 6.1 cm

4

Find x to 1 decimal place.



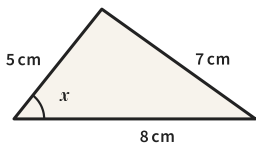
$$x^2 = 4^2 + 7^2 - 2 \times 4 \times 7 \times \cos 110^\circ$$

$$x^2 = 84.15$$

Answer 9.2 cm

5

Find angle x to 1 decimal place.



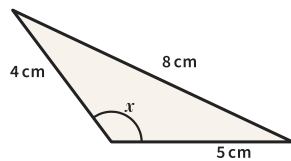
$$\cos x = \frac{5^2 + 7^2 - 8^2}{2 \times 5 \times 7}$$

$$\cos x = 0.5000$$

Answer 60.0°

6

Find angle x to 1 decimal place.



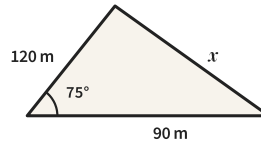
$$\cos x = \frac{4^2 + 5^2 - 8^2}{2 \times 4 \times 5}$$

$$\cos x = -0.5750$$

Answer 125.1°

7

Two paths leave a gate. One is 120 m long and the other is 90 m. The angle between them is 75° . How far apart are the ends of the paths?

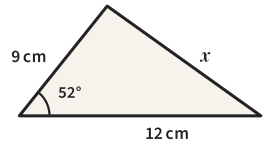


$$x^2 = 120^2 + 90^2 - 2 \times 120 \times 90 \times \cos 75^\circ$$

Answer 130.0 m

8

Find the perimeter of the triangle to 1 decimal place.



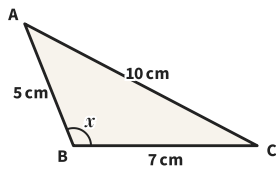
$$x = 9.6, \text{ then } 9.6 + 9 + 12$$

Answer 30.6 cm

The Cosine Rule further practice

9

Find angle ABC, marked x , to 1 decimal place.



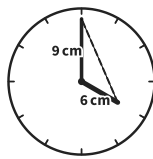
$$\cos x = \frac{5^2 + 7^2 - 10^2}{2 \times 5 \times 7}$$

$$\cos x = -26/70$$

Answer $x = 111.8^\circ$

10

The hour hand of a clock is 6 cm long and the minute hand is 9 cm long. How far apart are their tips at 4 o'clock? Give your answer to 1 decimal place.



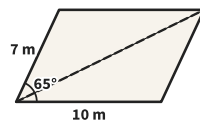
the hands are $4 \times 30 = 120^\circ$ apart

$$\sqrt{6^2 + 9^2 - 2 \times 6 \times 9 \times \cos 120^\circ} = \sqrt{171}$$

Answer 13.1 cm

11

A garden is a parallelogram with sides 10 m and 7 m and an angle of 65° . A path runs along the longer diagonal (dashed). How long is the path, to 1 decimal place?



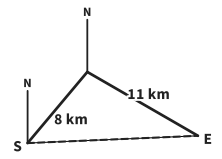
the angle opposite the path is $180 - 65 = 115^\circ$

$$\sqrt{10^2 + 7^2 - 2 \times 10 \times 7 \times \cos 115^\circ}$$

Answer 14.4 m

12

A ship sails 8 km from S on a bearing of 040° . It then sails 11 km on a bearing of 120° to E. How far is E from S, to 1 decimal place?



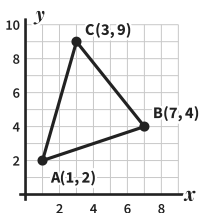
the angle at the turn is $180 - 80 = 100^\circ$

$$\sqrt{8^2 + 11^2 - 2 \times 8 \times 11 \times \cos 100^\circ}$$

Answer 14.7 km

13

A is (1, 2), B is (7, 4) and C is (3, 9). Find angle ABC to 1 decimal place.



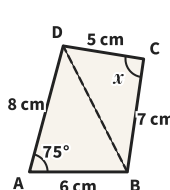
$$AB^2 = 40, BC^2 = 41, AC^2 = 53 \text{ (Pythagoras)}$$

$$\cos B = \frac{40 + 41 - 53}{2 \times \sqrt{40} \times \sqrt{41}}$$

Answer 69.8°

14

Find angle BCD, marked x , to 1 decimal place.



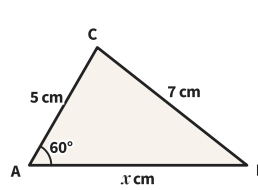
$$BD^2 = 6^2 + 8^2 - 2 \times 6 \times 8 \times \cos 75^\circ = 75.15...$$

$$\cos x = \frac{7^2 + 5^2 - 75.15...}{2 \times 7 \times 5}$$

Answer $x = 90.9^\circ$

15

Use the cosine rule to find x . ($\cos 60^\circ = \frac{1}{2}$)



$$7^2 = x^2 + 5^2 - 2 \times x \times 5 \times \frac{1}{2}, \text{ so } x^2 - 5x - 24 = 0$$

$$(x - 8)(x + 3) = 0, \text{ and a length is positive}$$

Answer $x = 8$

16

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

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

$\cos$ is never below -1 : and $3 + 4$ is shorter than 8

So there is no such triangle