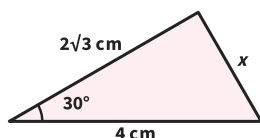


The Cosine Rule *extend*

ANSWERS 

1

Find the exact value of x .



$$x^2 = 12 + 16 - 16\sqrt{3} \times \frac{\sqrt{3}}{2}$$

$$= 28 - 24 = 4$$

$$x = 2 \text{ cm}$$

Answer

2

A triangle has sides of 5 cm, 6 cm and 8 cm. Without finding any angle, show that it has an obtuse angle.

the largest angle is opposite 8 cm

$$\cos = \frac{25 + 36 - 64}{60} = -\frac{1}{20}$$

$$\cos = -\frac{1}{20} < 0$$

Reason

3

A drone flies 14 km on a bearing of 065° , then 9 km on a bearing of 150° . How far must it fly to return straight to its start, and on what bearing? Give the distance to 3 significant figures and the bearing to the nearest degree.

$$\text{angle at the turn} = 245^\circ - 150^\circ = 95^\circ$$

$$d^2 = 14^2 + 9^2 - 252 \cos 95^\circ$$

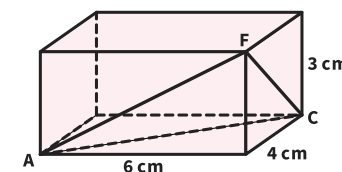
$$\text{bearing} = 065^\circ + 31.2^\circ + 180^\circ$$

$$17.3 \text{ km on } 276^\circ$$

Answer

4

The cuboid is 6 cm by 4 cm by 3 cm. Find angle CAF to 1 decimal place.



$$AC = \sqrt{52}, AF = \sqrt{45}, CF = 5$$

$$\cos CAF = \frac{52 + 45 - 25}{2\sqrt{52}\sqrt{45}}$$

$$41.9^\circ$$

Answer

5

A triangle has sides of 4 cm, 5 cm and 6 cm. Show that its largest angle is twice its smallest angle.

$$\text{smallest: } \cos = \frac{5^2 + 6^2 - 4^2}{60}, 41.41^\circ$$

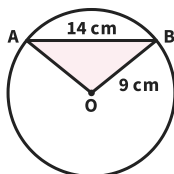
$$\text{largest: } \cos = \frac{4^2 + 5^2 - 6^2}{40}, 82.82^\circ$$

$$82.82^\circ = 2 \times 41.41^\circ$$

Reason

6

A and B lie on a circle with centre O and radius 9 cm. $AB = 14$ cm. Find the length of the minor arc AB to 3 significant figures.



$$\cos AOB = \frac{81 + 81 - 196}{162}, AOB = 102.12^\circ$$

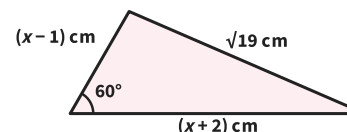
$$\frac{102.12}{360} \times 2\pi \times 9$$

$$16.0 \text{ cm}$$

Answer

7

$\cos 60^\circ = \frac{1}{2}$. Find x .



$$(x+2)^2 + (x-1)^2$$

$$- (x+2)(x-1) = 19$$

$$x^2 + x - 12 = 0, (x+4)(x-3) = 0$$

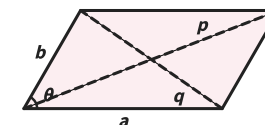
$$x = 3$$

Answer

8

A parallelogram has sides a and b and diagonals p and q .

Prove that $p^2 + q^2 = 2(a^2 + b^2)$.



$$p^2 = a^2 + b^2 - 2ab \cos(180^\circ - \theta)$$

$$q^2 = a^2 + b^2 - 2ab \cos \theta$$

$$\cos(180^\circ - \theta) = -\cos \theta, \text{ add}$$

$$\text{the cos terms cancel}$$

Proof