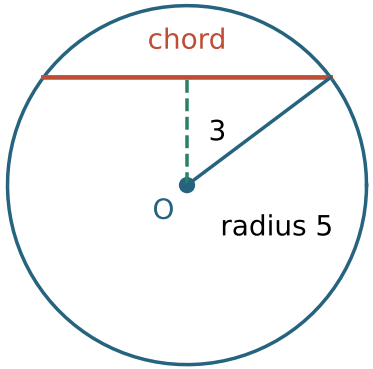
Exercise walk-through

4.3.1 Geometry

AQA · GCSE · Mathematics

Figure: Congruence, similarity and circles (2)

Circle of radius 5: distances use one consistent scale

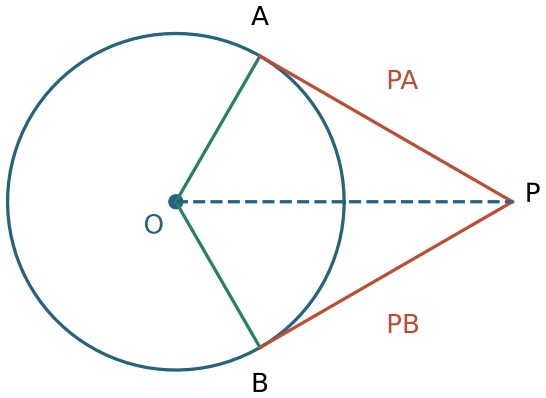


Perpendicular bisects chord: half-length 4

- Radius 5, distance 3: half the chord is $\sqrt{(5^2 - 3^2)} = 4$, so the chord is 8
- Match each part of the diagram to the text.

Figure: Congruence, similarity and circles (4)

Shared OP and equal radii → RHS → PA = PB



- Equal radii, shared OP and right angles give congruent triangles (RHS), so PA = PB
- Match each part of the diagram to the text.

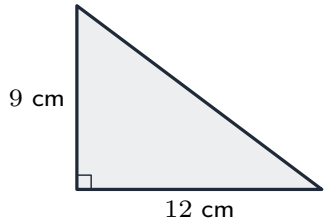
Pythagoras and trigonometry

- **Pythagoras' theorem.** In a right-angled triangle, $a^2 + b^2 = c^2$, where c is the **hypotenuse**, the longest side, opposite the right angle.
- A ladder whose foot is 3 m from a wall and whose top is 4 m up the wall is $\sqrt{9+16} = 5$ m long.
- **Trigonometric ratios.** Label the sides from the angle θ: opposite, **adjacent** (next to the angle) and **hypotenuse**.
- **Worked example 12.** In a right-angled triangle the hypotenuse is 23.7 cm and x is the side **adjacent** to an angle of $52°$.

$$\sin\theta = \frac{\text{opp}}{\text{hyp}} \qquad \cos\theta = \frac{\text{adj}}{\text{hyp}} \qquad \tan\theta = \frac{\text{opp}}{\text{adj}}$$

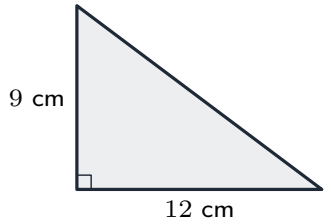
Exercise 2.1

2.1 Work out the hypotenuse of the triangle. Show that a triangle with sides 7, 24 and 25 has a right angle. [2]



Exercise 2.1

2.1 Work out the hypotenuse of the triangle. Show that a triangle with sides 7, 24 and 25 has a right angle. [2]

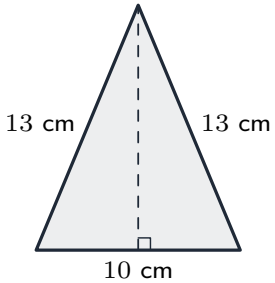


2.1

- $\sqrt{81 + 144} = \mathbf{15}$ cm
- $49 + 576 = 625 = 25^2$

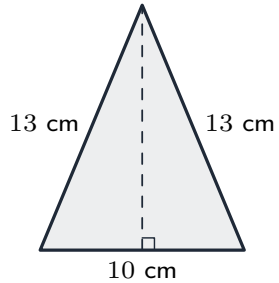
Exercise 2.2

2.2 An isosceles triangle has sides of 13 cm, 13 cm and 10 cm. Work out its height. [2]



Exercise 2.2

2.2 An isosceles triangle has sides of 13 cm, 13 cm and 10 cm. Work out its height. [2]

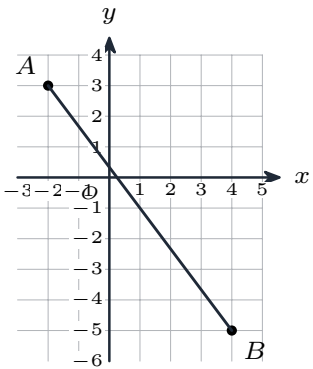


2.2

- half the base is 5 cm: $13^2 - 5^2 = 144$
- **12** cm

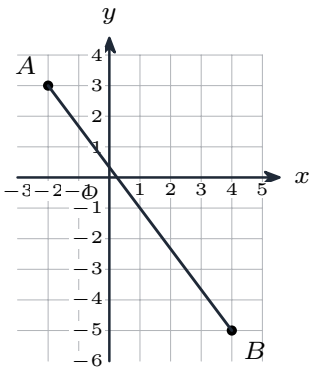
Exercise 3.1

3.1 Work out the distance between $A(-2, 3)$ and $B(4, -5)$. [3]



Exercise 3.1

3.1 Work out the distance between $A(-2, 3)$ and $B(4, -5)$. [3]



3.1

- differences 6 and 8
- $\sqrt{36 + 64}$
- **10** units

Exercise 3.2 (a)

3.2 A rectangular park is 120 m long and 50 m wide. A path goes straight across it from one corner to the opposite corner.

(a) Work out the length of the path. [2]

Exercise 3.2 (a)

3.2 A rectangular park is 120 m long and 50 m wide. A path goes straight across it from one corner to the opposite corner.

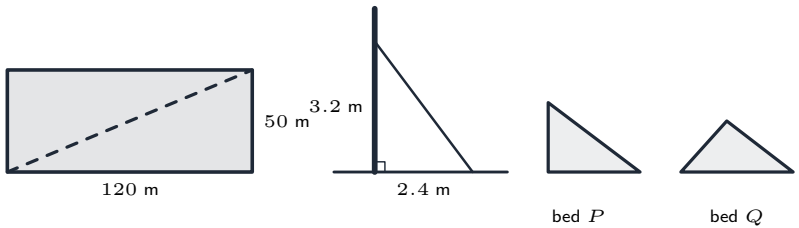
(a) Work out the length of the path. [2]

(a) $\sqrt{120^2 + 50^2} = \mathbf{130}$ m

Exercise 3.2 (b)

3.2 A rectangular park is 120 m long and 50 m wide. A path goes straight across it from one corner to the opposite corner.

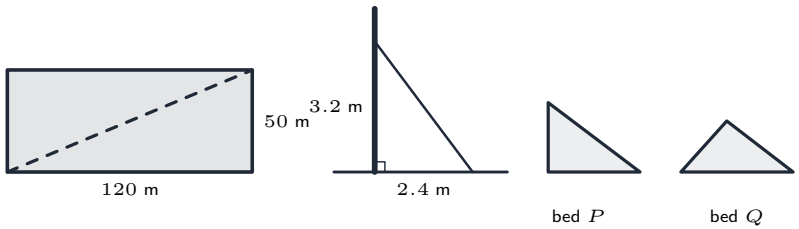
(b) Lily walks along the path instead of round two sides of the park. How much shorter is her walk? She walks at 1.25 m/s. How many seconds does she save? [3]



Exercise 3.2 (b)

3.2 A rectangular park is 120 m long and 50 m wide. A path goes straight across it from one corner to the opposite corner.

(b) Lily walks along the path instead of round two sides of the park. How much shorter is her walk? She walks at 1.25 m/s. How many seconds does she save? [3]



(b) $170 - 130 = \mathbf{40}$ m; $40 \div 1.25 = \mathbf{32}$ seconds

Exercise 3.2 (c)

3.2 A rectangular park is 120 m long and 50 m wide. A path goes straight across it from one corner to the opposite corner.

(c) Each fence post is held by a wire from 3.2 m up the post to the ground 2.4 m from the post. Work out the length of one wire. There are 6 posts with 2 wires each. Wire costs £3.50 per metre. Work out the cost of the wire. [4]

Exercise 3.2 (c)

3.2 A rectangular park is 120 m long and 50 m wide. A path goes straight across it from one corner to the opposite corner.

(c) Each fence post is held by a wire from 3.2 m up the post to the ground 2.4 m from the post. Work out the length of one wire. There are 6 posts with 2 wires each. Wire costs £3.50 per metre. Work out the cost of the wire. [4]

(c) $\sqrt{3.2^2 + 2.4^2} = \mathbf{4}$ m; $12 \times 4 = 48$ m; £**168**

Exercise 3.2 (d)

3.2 A rectangular park is 120 m long and 50 m wide. A path goes straight across it from one corner to the opposite corner.

(d) Flower bed P has sides 9 m, 12 m and 15 m. Flower bed Q has sides 6 m, 9 m and 11 m. Show that P has a right angle and work out its area. Does Q have a right angle? [5]

Exercise 3.2 (d)

3.2 A rectangular park is 120 m long and 50 m wide. A path goes straight across it from one corner to the opposite corner.

(d) Flower bed P has sides 9 m, 12 m and 15 m. Flower bed Q has sides 6 m, 9 m and 11 m. Show that P has a right angle and work out its area. Does Q have a right angle? [5]

(d) $9^2 + 12^2 = 225 = 15^2$, so P has a right angle; area $\frac{1}{2} \times 9 \times 12 = \mathbf{54}$ m^2; $6^2 + 9^2 = 117$ and $11^2 = 121$; $117 \neq 121$, so **no**