Higher Check In - 10.03 Area calculations

1. Calculate the total area of the shape below.

16 cm

20 cm

1. Calculate the area of the sector, giving your answer in terms of .

12 cm

50°

1. The area of the trapezium is 75 cm2. Work out the length of *x*.

*x*

8 cm

11.5 cm

1. A semicircle has an area of  cm2. What is the length of its diameter?
2. Calculate the area of this parallelogram.

6 cm

100°

14 cm

1. Ali says that the area of the triangle below can be worked out by calculating giving 40 cm2. Petra says that the area is 20 cm2. Show that Petra is correct.

8 cm

30°

10 cm

1. The diagram shows an equilateral triangle *ABC* with side length 12 cm. *P* is the midpoint of *AB* and *Q* is the midpoint of *AC*. Show that the shaded area is 43.5 cm2 to 3 significant figures.

*B*

*C*

*A*

*P*

*Q*

1. Show that the total shaded area is 99.5 cm2.

7 cm

8 cm

5 cm

7 cm

5 cm

8 cm

5 cm

5 cm

5 cm

5 cm

1. The diagram represents a circular pond with a path that is 75 cm wide around it. Mr Smith is going to cover the path in gravel. One bag of gravel covers 2 m2. How many bags of gravel will Mr Smith need to buy?

Path

1.4 m

Pond

1. Calculate the area of a regular hexagon with sides of length 8 cm.

**Extension**

A rectangular paddock is to be made using 120 m of fencing.

Plot a graph with length (m) on the horizontal axis and area (m2) on the vertical axis.

What is the largest possible area for the paddock? Explain how you worked this out from your graph. What values of length and width give the largest possible area for the paddock?

Answers

1. 420.5 cm2
2. cm2
3. 7.25 cm
4. 2.5 cm
5. 82.7 cm2
6. 8 cm is the slant height not the perpendicular height. The formula  can only be used if you know the base and perpendicular height.

Using Area  gives Area cm2, so Petra is correct.

1. Shaded area  area of triangle – area of sector

Shaded area , so 43.5 cm2 to 3 sf.

1. Area of top left-hand grey triangle cm2.

Area of bottom right-hand grey triangle cm2.

Total area of central grey stripe cm2.

Therefore the area of the quadrilateral is cm2.

1. The area of the path is given by m2, so he needs 3 bags of gravel.
2. Divide the hexagon into 6 equilateral triangles.

Area of one triangle cm2

Total area cm2 (3 sf)

**Extension**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Length (m) | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 | 55 |
| Width (m) | 55 | 50 | 45 | 40 | 35 | 30 | 25 | 20 | 15 | 10 | 5 |
| Area (m2) | 275 | 500 | 675 | 800 | 875 | 900 | 875 | 800 | 675 | 500 | 275 |

The greatest area is 900 m2 as the graph of area against length is a curve which has a maximum at (30, 900).

The greatest area is achieved when the length and width are both 30 m, that is, when the paddock is square.

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| **Assessment Objective** | **Qu.** | **Topic** | **R** | **A** | **G** |  | **Assessment Objective** | **Qu.** | **Topic** | **R** | **A** | **G** |
| AO1 | 1 | Apply area formulae to find the area of a composite 2D shape  |  |  |  |  | AO1 | 1 | Apply area formulae to find the area of a composite 2D shape  |  |  |  |
| AO1 | 2 | Find the area of a sector |  |  |  |  | AO1 | 2 | Find the area of a sector |  |  |  |
| AO1 | 3 | Use the area formula for a trapezium |  |  |  |  | AO1 | 3 | Use the area formula for a trapezium |  |  |  |
| AO1 | 4 | Find the diameter of a semicircle given the area |  |  |  |  | AO1 | 4 | Find the diameter of a semicircle given the area |  |  |  |
| AO1 | 5 | Find the area of a parallelogram using the area sine rule |  |  |  |  | AO1 | 5 | Find the area of a parallelogram using the area sine rule |  |  |  |
| AO2 | 6 | Apply the sine rule to find the area of a triangle |  |  |  |  | AO2 | 6 | Apply the sine rule to find the area of a triangle |  |  |  |
| AO2 | 7 | Find a shaded area using area formulae |  |  |  |  | AO2 | 7 | Find a shaded area using area formulae |  |  |  |
| AO2 | 8 | Find the area of a composite shape using area formulae |  |  |  |  | AO2 | 8 | Find the area of a composite shape using area formulae |  |  |  |
| AO3 | 9 | Solve a real life problem involving area of a circle |  |  |  |  | AO3 | 9 | Solve a real life problem involving area of a circle |  |  |  |
| AO3 | 10 | Find the area of a regular polygon by splitting it into triangles |  |  |  |  | AO3 | 10 | Find the area of a regular polygon by splitting it into triangles |  |  |  |
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