# MATHEMATICS

## Stage 4

**Measurement and Space, Area**

**Quadrilaterals**
**Unit conversion**
**Circular measure**
**Triangles**

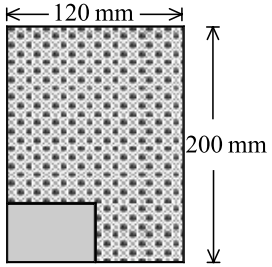
**Teacher:** Chi Binh Le

**Exam Equivalent Time:** 178.5 minutes *(based on allocation ~1.25 min/mark)*

## Questions

1. C Quadrilaterals (256387) Core

Brock decided to cut out a small rectangle from a piece of patterned rectangular paper.




The rectangle cut out has a length of 60 mm and a height of 40 mm.

Which of the following expressions gives the area of patterned paper that was left after cutting out the smaller rectangle?

**A.** $(120 \times 200) - (60 \times 160)$
**B.** $(60 \times 160)$
**C.** $(120 \times 200) - (40 \times 160)$
**D.** $(120 \times 200) - (60 \times 40)$

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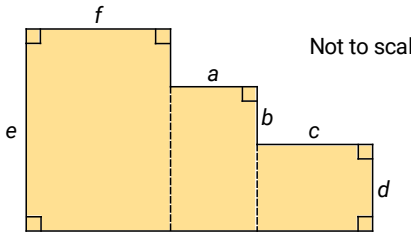
2. C Quadrilaterals (257544) Core

Vera drew this plan of her entertaining area.




Which expression gives the area of Vera's entertaining area?

**A.** $(e \times f) \times (a \times b) \times (c \times d)$
**B.** $(e \times f) + (a \times b) + (c \times d)$
**C.** $(e + f) + (a + b) + (c + d)$
**D.** $(e \times f) + (a \times (b + d)) + (c \times d)$

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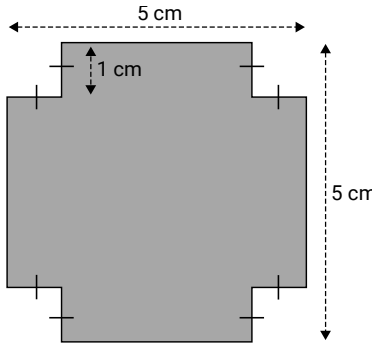
3. C Quadrilaterals (256539) Core

A piece of cardboard is shown in the diagram below.




The area of the cardboard, in square centimetres, is

**A.** 4
**B.** 21
**C.** 25
**D.** 29

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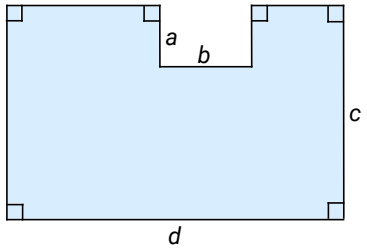
4. C Quadrilaterals (257556) Core

Bernie drew this plan of his timber deck.




Not to scale

Which expression gives the area of Bernie's timber deck?

A. $(c + d) - (a + b)$

B. $(c \times d) - (a \times b)$

C. $(c \times d) \times (a \times b)$

D. $(c \times d) + (a \times b)$

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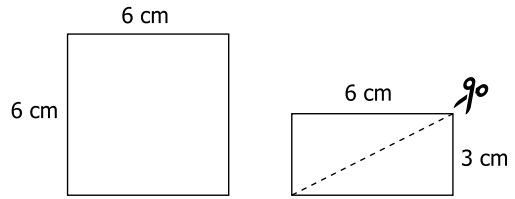
5. B Quadrilaterals (256439) Core

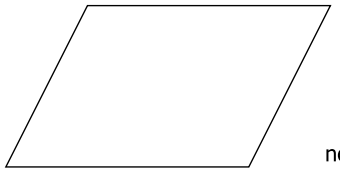
Bruce has a square and a rectangle.

He cuts the rectangle along the dotted line as shown below.




not to scale

Bryce then joins these 3 pieces to make a parallelogram.



not to scale

Which of these calculations could Bryce use to find the area of the parallelogram?

A. $3\text{ cm} \times 6\text{ cm}$

B. $6\text{ cm} \times 9\text{ cm}$

C. $12\text{ cm} \times 6\text{ cm}$

D. $21\text{ cm} \times 3\text{ cm}$

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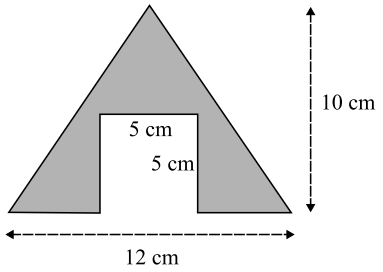
6. B Quadrilaterals (256492) Core

Consider the diagram below.




The shaded area, in square centimetres, is

A. 35
B. 45
C. 60
D. 95

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7. B+ Quadrilaterals (256456) Core

Mark decides to make the paddock on his farm bigger.

The paddock is in the shape of a rectangle.

Mark makes both the length and the width of the paddock 3 times longer.

How many times bigger is the area of the new paddock than the original paddock?

A. 3
B. 4
C. 6
D. 9

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8. B+ Quadrilaterals (256460) Core

David's backyard is in shape of a rectangle and has an area of $50\ m^2$.

Tim's backyard is also rectangular but with side lengths that are double those of David's backyard.

What is the area of Tim's backyard.

A. $25\ m^2$
B. $100\ m^2$
C. $200\ m^2$
D. $300\ m^2$

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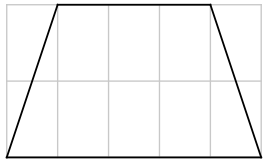
9. B+ Quadrilaterals (256363) Core

A trapezium is constructed on a grid of 10 rectangles.

Each rectangle measures 3 cm × 7 cm.



What is the area of the trapezium?

A. $150\ cm^2$
B. $168\ cm^2$
C. $189\ cm^2$
D. $210\ cm^2$

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10. A Unit conversion (257611) Core

Ben bought a dog mat with an area of 0.5 square metres.

What is the area of the dog mat in square centimetres?

A. $2.5\ cm^2$
B. $5\ cm^2$
C. $5000\ cm^2$
D. $25\ 000\ cm^2$

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11. A Unit conversion (257588) Core

A large square feature tile has an area of 15 625 square centimetres.

What is the area of the feature tile in square millimetres?

A. 156.25 square millimetres
B. 1562.5 square millimetres
C. 156 250 square millimetres
D. 1 562 500 square millimetres

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12. A Unit conversion (257582) Core

A square table top has an area of 9025 square centimetres.

What is the area of the table top in square millimetres?

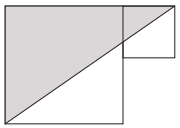
A. **9.025 square millimetres**
B. **90.25 square millimetres**
C. **90 250 square millimetres**
D. **902 500 square millimetres**

13. A Quadrilaterals (257818) Core

Ken puts two cardboard squares together, as shown in the diagram below.

The squares have areas of 4 cm² and 25 cm².

Ken draws a line from the bottom left to top right, and shades the region above the line.



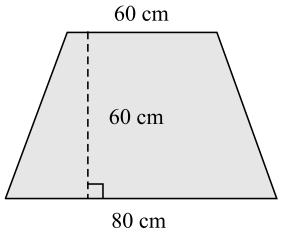
not to scale

What is the area of the shaded region?

A. **13.5 $cm^2$**
B. **14.5 $cm^2$**
C. **17.5 $cm^2$**
D. **19 $cm^2$**

14. A Quadrilaterals (256341) Core

The top of a table is in the shape of a trapezium, as shown below.




The area of the tabletop, in square centimetres, is

A. **200**
B. **4200**
C. **4800**
D. **288 000**

15. A+ Unit conversion (257593) Core

A square table top has an area of 4225 square centimetres.

What is the area of the table top in square metres?

A. **0.4225 square metres**
B. **4.225 square metres**
C. **42.25 square metres**
D. **42 250 square metres**

16. C Quadrilaterals (256229) Core

The area of the shaded rectangle below is **84 $cm^2$**.


What is the length of the shaded rectangle? ***(2 marks)***

17. C Unit conversion (259201) Core

A rectangle has an area of 450 square centimetres.

Using the conversion ratio, 1 cm² = 100 mm², express the area of the rectangle in square millimetres. ***(1 mark)***

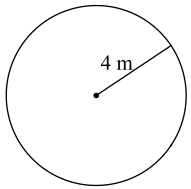
18. C Unit conversion (259236) Core

A pickleball court has an area of 81.74 square metres.

Using the conversion ratio, 1 m² = 10 000 cm², express this area in square centimetres. ***(1 mark)***

19. C Circular measure (258073) Core

Calculate the area of the following circle, correct to one decimal place. ***(2 marks)***



## 20. C Unit conversion (259246) Core

A poster has an area of 2500 square centimetres.

Using the conversion ratio, 1 m² = 10 000 cm², express this area in square centimetres. ***(1 mark)***

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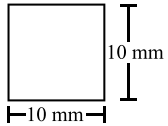
## 21. C Unit conversion (259286) Core

The square below has an area of 1 square centimetre.




a. Complete the unit conversion equation below:

1 cm² = _____ mm × _____ mm = _____ mm² ***(1 mark)***

b. A square has an area of 125 square centimetres.

Using the conversion equation, or otherwise, express the area of the rectangle in square millimetres. ***(1 mark)***

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## 22. C Unit conversion (259261) Core

A Queensland outback pastoralist owns a property with an area of 500 square kilometres.

Using the conversion ratio, 1 km² = 1 000 000 m², determine the exact area of the property in square metres. ***(2 marks)***

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## 23. C Unit conversion (259206) Core

A circle with radius 1 cm, has an area of $\pi$ square centimetres.

Using the conversion ratio, 1 cm² = 100 mm², express the area of the circle in square millimetres. ***(1 mark)***

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## 24. C Unit conversion (259276) Core

The Google main campus in California covers an area of 137 500 square metres.

Using the conversion ratio, 1 hectare = 10 000 m², determine the area of the property in hectares. ***(1 mark)***

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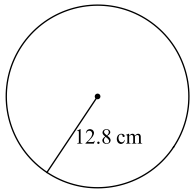
## 25. C Circular measure (258031) Core

Calculate the area of the following circle, correct to one decimal place. ***(2 marks)***

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## 26. C Circular measure (258222) Core

Calculate the area of a circle with a radius of 72.3 centimetres. Give your answer correct to one decimal place. ***(2 marks)***

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## 27. C Unit conversion (259970) Core

a. By considering the dimensions of a square with an area of 1 square centimetre, complete the unit conversion equation below:

1 cm² = _____ mm × _____ mm = _____ mm² ***(1 mark)***

b. A circle has an area of 950 square centimetres.

Using the conversion equation, or otherwise, express the area of the circle in square millimetres. ***(1 mark)***

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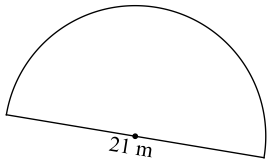
## 28. C Circular measure (258084) Core

Calculate the area of the following semi-circle, giving your answer to 2 decimal places. ***(2 marks)***

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## 29. C Circular measure (258113) Core

Calculate the area of a circle with a radius of 20 metres. Give your answer as an exact value in term of $\pi$. ***(2 marks)***

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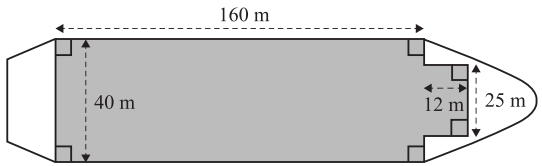
30. C Quadrilaterals (256578) Core

The following diagram shows a cargo ship viewed from above.




The shaded region illustrates the part of the deck on which shipping containers are stored.

What is the area, in square metres, of the shaded region? ***(2 marks)***

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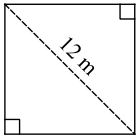
31. C Quadrilaterals (257289) Core

The square below has a diagonal of 12 metres.




a. Use Pythagoras' Theorem to calculate the side length of the square. Give your answer in exact surd form. ***(2 marks)***

b. Calculate the are of the square correct to one decimal place. ***(2 marks)***

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32. C Quadrilaterals (257468) Core

A parallelogram has an area of 1872 square metres and a perpendicular height of 78 metres.

Calculate the base length of the parallelogram. ***(2 marks)***

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33. C Circular measure (258985) Core

If a circle has an area of 100 square millimetres, find the radius of the circle, giving your answer to 2 decimal places. ***(2 marks)***

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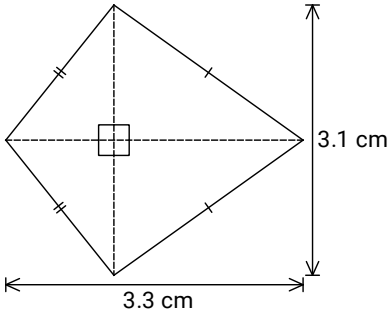
34. C Quadrilaterals (258530) Core

Calculate the area of the following kite in square centimetres. ***(2 marks)***

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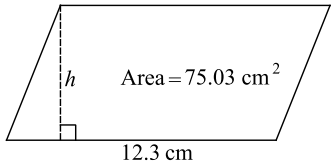
35. C Quadrilaterals (257465) Core

The parallelogram below has an area of 75.03 square centimetres and a base length of 12.3 centimetres.

Calculate the perpendicular height of the parallelogram. ***(2 marks)***

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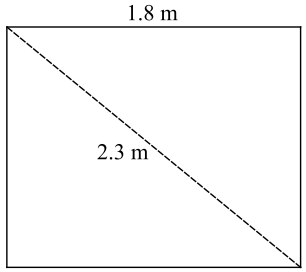
36. C Quadrilaterals (257081) Core

Jocasta is sewing a quilt in the shape of a rectangle, as shown below. She knows the length of one side, and the length of diagonal of the quilt.




Not to scale

a. Calculate the length of the other side of the quilt, giving your answer in exact surd form. ***(2 marks)***

b. Using your answer from (a) calculate the area of the quilt in square metres, correct to 1 decimal place? ***(2 marks)***

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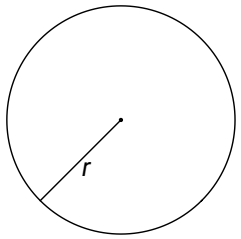
37. C Circular measure (258983) Core

The circle pictured below has an area of $144\pi$ square centimetres.




Area = 144π cn

Calculate the radius of the circle. *(2 marks)*

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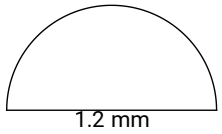
38. C Circular measure (258090) Core

Calculate the area of the following semi-circle, giving your answer to 2 decimal places. *(2 marks)*

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39. C Circular measure (258232) Core

Calculate the area of a circle with a diameter of 37.4 millimetres. Give your answer correct to one decimal place. *(2 marks)*

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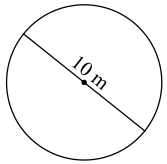
40. C Circular measure (258078) Core

Calculate the area of the following circle, giving your answer as an exact value in terms of $\pi$. *(2 marks)*

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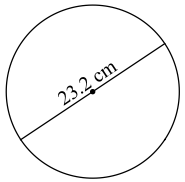
41. C Circular measure (258075) Core

Calculate the area of the following circle, correct to one decimal place. *(2 marks)*

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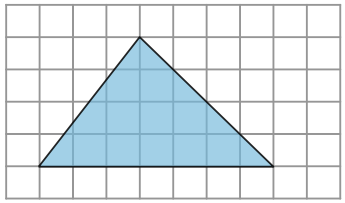
42. C Triangles (256260) Core

Jill is playing in her parents' rectangular courtyard.

The courtyard is measured at 6 metres by 10 metres.

Jill draws a triangle on the courtyard with chalk, pictured below.

What is the area of this triangle? *(2 marks)*

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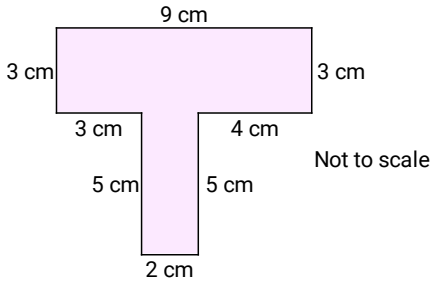
43. B Quadrilaterals (256489) Core

Calculate the area of the composite figure below. *(2 marks)*



## 44. B Unit conversion (260053) Core

a. By considering the dimensions of a square with an area of 1 square kilometre, complete the unit conversion equation below:

1 km² = _____ m × _____ m = _____ km² ***(1 mark)***

b. The Barangaroo precinct in Sydney has a total floor space of 681 000 square metres.

Find the area of this floor space in square kilometres. ***(1 mark)***

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## 45. B Unit conversion (259239) Core

Athletes throw shot puts from a shot put circle with a standard diameter of 2.13 metres.

Using the conversion ratio, 1 m² = 10 000 cm², or otherwise, calculate the area of a shot put circle to the nearest square centimetres. ***(3 marks)***

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## 46. B Unit conversion (259256) Core

A circle has a radius of 60 centimetres.

Using the conversion ratio, 1 m² = 10 000 cm², or otherwise, calculate the exact area of the circle in square metres. ***(2 marks)***

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## 47. B Unit conversion (259980) Core

a. By considering the dimensions of a square with an area of 1 square metre, complete the unit conversion equation below:

1 m² = _____ cm × _____ cm = _____ cm² ***(1 mark)***

b. A circular elevator has a diameter of 1.6 metres.

Find the area of the elevator's floor in square metres and using the conversion equation, express the area to the nearest square centimetre. ***(2 marks)***

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## 48. B Quadrilaterals (258658) Core

A rhombus has an area of 250 square centimetres. If one diagonal measures 10 centimetres, find the length of the other diagonal. ***(2 marks)***

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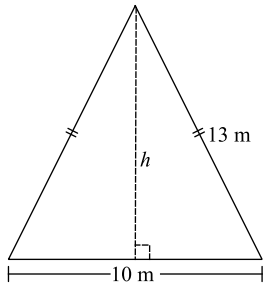
## 49. B Triangles (257977) Core

The triangle below is isosceles.




a. Use Pythagoras' Theorem to calculate the perpendicular height ($h$) of the triangle. ***(2 marks)***

b. Using your answer from (a), find the area of the triangle. ***(2 marks)***

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## 50. B Quadrilaterals (258652) Core

A rhombus has an area of 140.8 square metres. If one diagonal measures 16 metres, find the length of the other diagonal. ***(2 marks)***

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## 51. B Quadrilaterals (258546) Core

A kite has an area of 52 square metres. Given that one of the diagonals has a length of 8 metres, calculate the length of the other diagonal. ***(2 marks)***

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## 52. B+ Unit conversion (260048) Core

a. By considering the dimensions of a square with an area of 1 square kilometre, complete the unit conversion equation below:

1 km² = _____ m × _____ m = _____ km² ***(1 mark)***

b. A rural property is in the shape of a rectangle with sides of length 1.20 kilometres and 2.36 kilometres.

Find the area of the property in square kilometres and using the conversion equation, express the area in square metres. ***(2 marks)***

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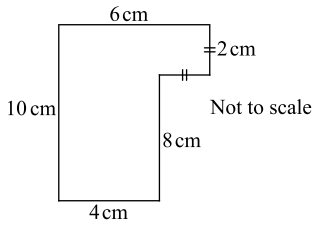
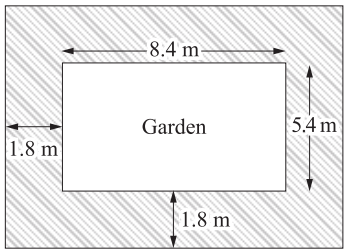
## 53. B+ Quadrilaterals (256445) Core

Calculate the area of this composite shape. ***(2 marks)***




## 54. B+ Quadrilaterals (258591) Core

A path 1.8 m wide is being built around a rectangular garden. The garden is 8.4 m long and 5.4 m wide. The path is shaded in the diagram.

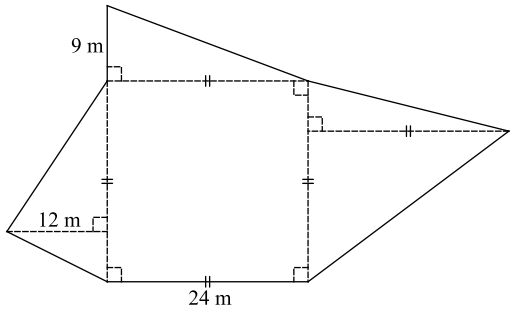



NOT TO SCALE

Calculate the area of the path in square metres. ***(2 marks)***

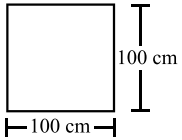
## 55. B+ Quadrilaterals (258020) Core

Calculate the area of the following composite figure in metres squared. ***(2 marks)***




## 56. B+ Unit conversion (260041) Core

The square below has an area of 1 square metre.




a. Complete the unit conversion equation below:

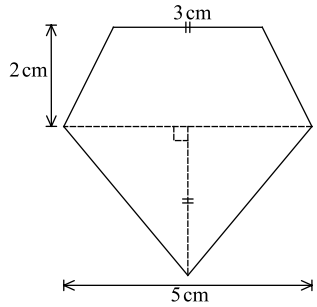
$1\ m^2 =$ _____ cm × _____ cm = _____ $cm^2$ ***(1 mark)***

b. A circular poster has an area of $0.09\pi$ square metres.

Express this area in square centimetres, giving your answer in exact form. ***(1 mark)***

## 57. B+ Quadrilaterals (258024) Core

Calculate the area of the following composite figure in square centimetres ***(2 marks)***




## 58. A Unit conversion (257613) Core

Julia bought a kitchen rug with an area of 0.85 square metres.

What is the area of the kitchen rug in square centimetres? ***(2 marks)***

## 59. A Unit conversion (257752) Core

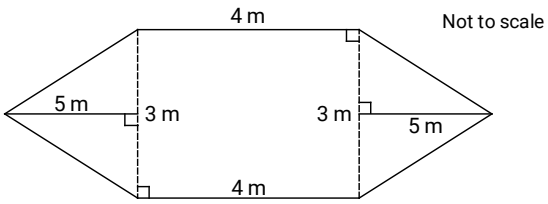
A remote island has a land area of 4.6 square kilometres.

Convert this area into square metres. ***(1 mark)***

60. A Quadrilaterals (257572) Core

A swimming pool is shaped like a hexagon.

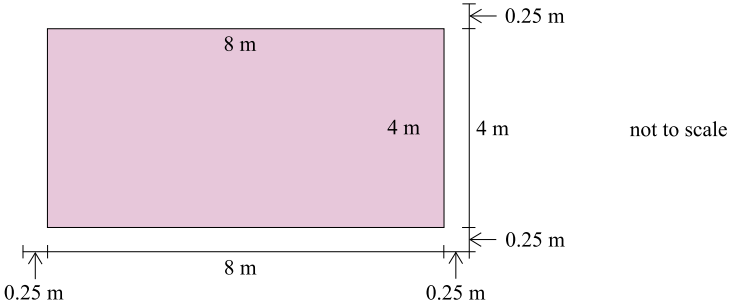
The dimensions are given from the top view of the swimming pool.




What is the total area of the swimming pool in square metres? *(2 marks)*

61. A Quadrilaterals (257843) Core

A cement slab is laid in Yvette's backyard that forms an 8 metre by 4 metre rectangle.



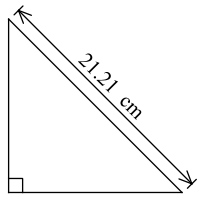

Yvette is going to lay a 0.25 metre wide path around the full perimeter of her slab.

a. What is the total area of the perimeter path in square metres? *(2 marks)*

b. She is covering the path with artificial grass at a cost of $45 per square metre. Calculate the cost of laying turf on the path. *(1 mark)*

62. A Triangles (256270) Core

This triangle was made by cutting a square in half.



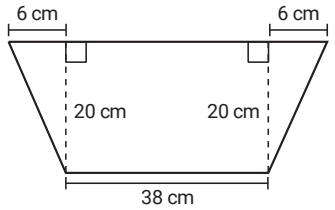

The perimeter of the triangle is 51.21 cm.

What is the area of the triangle? *(2 marks)*

63. A+ Quadrilaterals (256324) Core

Luke designs a table that is in the shape of a trapezium.

The dimensions of the table top are shown in the picture below.

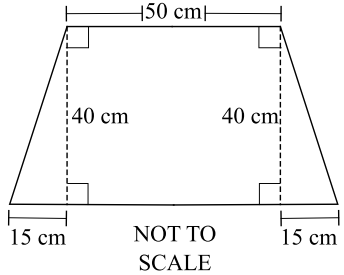



What is the area of Luke's table top? *(2 marks)*

64. A+ Quadrilaterals (256337) Core

Lucy designs an outdoor table that is in the shape of a trapezium.

The dimensions of the table top are shown in the picture below.




What is the area of Lucy's table top? *(2 marks)*

65. A+ Unit conversion (257765) Core

Express an area of 0.003 square metres in square millimetres. *(2 marks)*

66. A+ Unit conversion (257772) Core

A walled city has a land area of 950 hectares.

Express the area of the city in square kilometres. *(2 marks)*



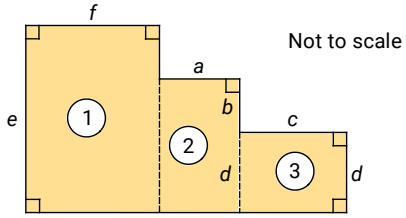
## Worked Solutions

1. C Quadrilaterals (256387) Core

$$\begin{aligned}\text{Area} &= \text{Area of large rectangle} - \text{Area of small rectangle} \\ &= (120 \times 200) - (60 \times 40)\end{aligned}$$

$\Rightarrow D$

2. C Quadrilaterals (257544) Core




$$\begin{aligned}\text{Total area} &= \text{Area 1} + \text{Area 2} + \text{Area 3} \\ &= (e \times f) + (a \times (d + b)) + (c \times d)\end{aligned}$$

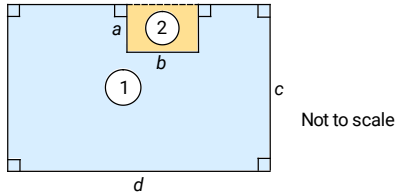
$\Rightarrow D$

3. C Quadrilaterals (256539) Core

$$\begin{aligned}\text{Area} &= \text{Large square} - 4 \times \text{Corner squares} \\ &= (5 \times 5) - 4 \times (1 \times 1) \\ &= 21 \text{ cm}^2\end{aligned}$$

$\Rightarrow B$

4. C Quadrilaterals (257556) Core




$$\begin{aligned}\text{Total area} &= \text{Area 1} - \text{Area 2} \\ &= (c \times d) - (a \times b)\end{aligned}$$

$\Rightarrow B$

5. B Quadrilaterals (256439) Core

$$\begin{aligned}\text{Area} &= \text{area of square} + \text{area of rectangle} \\ &= 6 \times 6 + 3 \times 6 \\ &= 6 \times (6 + 3) \\ &= 6 \times 9\end{aligned}$$

$\Rightarrow B$

---

6. B Quadrilaterals (256492) Core

$$\begin{aligned}\text{Shaded Area} &= \text{Area of Triangle} - \text{Area of Square} \\ &= \left(\frac{1}{2} \times 12 \times 10\right) - (5 \times 5) \\ &= 60 - 25 \\ &= 35 \text{ cm}^2\end{aligned}$$

$\Rightarrow A$

---

7. B+ Quadrilaterals (256456) Core

$$\text{Area of original paddock} = l \times b$$

$$\begin{aligned}\text{Area of new paddock} &= 3l \times 3b \\ &= 9 \times (l \times b) \\ &= 9 \times \text{Area of original paddock}\end{aligned}$$

$\Rightarrow D$

---

8. B+ Quadrilaterals (256460) Core

Let the dimensions of David's yard be: $x, y$

$$\text{Area} = x \times y$$

$\Longrightarrow$ Tim's yard's dimensions are: $2x, 2y$

$$\begin{aligned}\text{Area} &= 2x \times 2y \\ &= 4 \times xy \\ &= 4 \times 50 \\ &= 200 \text{ m}^2\end{aligned}$$

$\Rightarrow C$

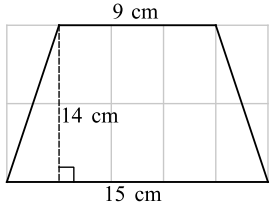
---

9. B+ Quadrilaterals (256363) Core

Method 1: Composite

$$\begin{aligned}\therefore \text{Total Area} &= \text{Area 1 rectangle} + 2 \times \text{ Area of triangle} \\ &= 6 \times 21 + 2 \times \left(\frac{1}{2} \times 3 \times 14\right) \\ &= 126 + 42 \\ &= 168 \text{ cm}^2\end{aligned}$$

Method 2: Trapezium




$$\begin{aligned}\text{Area} &= \frac{h}{2}(a + b) \\ &= \frac{14}{2}(15 + 9) \\ &= 168 \text{ cm}^2\end{aligned}$$

$\Rightarrow B$

---

10. A Unit conversion (257611) Core

$$1 \text{ m}^2 = 100 \text{ cm} \times 100 \text{ cm} = 10\,000 \text{ cm}^2$$

$$0.5 \text{ m}^2 = 0.5 \times 10\,000 = 5000 \text{ cm}^2$$

$\Rightarrow C$

---

11. A Unit conversion (257588) Core

$$\text{Side length } = \sqrt{15\,625} = 125 \text{ cm} = 125 \times 10 = 1250 \text{ mm}$$

$$\text{Area } = 1250^2 = 1\,562\,500 \text{ square millimetres}$$

$\Rightarrow D$

---

12. A Unit conversion (257582) Core

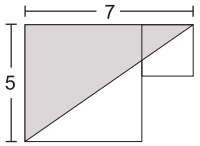
$$\text{Side length} = \sqrt{9025} = 95 \text{ cm} = 95 \times 10 = 950 \text{ mm}$$

$$\text{Area } = 950^2 = 902\,500 \text{ square millimetres}$$

$\Rightarrow D$

13. A Quadrilaterals (257818) Core

Small square $\rightarrow$ 2 cm sides
Large square $\rightarrow$ 5 cm sides



not to scale

$$\text{Shaded Area} = \frac{1}{2} \times bh$$
$$= \frac{1}{2} \times 5 \times 7$$
$$= 17.5 \text{ cm}^2$$

$\Rightarrow C$

---

14. A Quadrilaterals (256341) Core

$$\text{Area} = \frac{h}{2}(a+b)$$
$$= \frac{60}{2}(80+60)$$
$$= 4200$$

$\Rightarrow B$

---

15. A+ Unit conversion (257593) Core

$$\text{Side length} = \sqrt{4225} = 65 \text{ cm} = \frac{65}{10\,000} = 0.65 \text{ m}$$
$$\text{Area} = 0.65^2 = 0.4225 \text{ square metres}$$
$\Rightarrow A$

---

16. C Quadrilaterals (256229) Core

Let $l$ = length of rectangle
$l \times 6 = 84$
$\therefore l = \frac{84}{6}$
$= 14$ cm

---

17. C Unit conversion (259201) Core

$$450 \text{ cm}^2 = 450 \times 100 \text{ mm}^2$$
$$= 45\,000 \text{ mm}^2$$

---

18. C Unit conversion (259236) Core

$$81.74 \text{ m}^2 = 81.74 \times 10\,000 \text{ cm}^2$$
$$= 817\,400 \text{ cm}^2$$

---

19. C Circular measure (258073) Core

$$\text{Area} = \pi r^2$$
$$= \pi \times 4^2$$
$$= 50.2654\ldots$$
$$\approx 50.3 \text{ m}^2 \text{ (1 d.p.)}$$

---

20. C Unit conversion (259246) Core

$$2500 \text{ cm}^2 = \frac{2500}{10\,000} \text{ m}^2$$
$$= 0.25 \text{ m}^2$$

---

21. C Unit conversion (259286) Core

a. $1 \text{ cm}^2 = 10 \text{ mm} \times 10 \text{ mm} = 100 \text{ mm}^2$

b. $125 \text{ cm}^2 = 125 \times 100 \text{ mm}^2$
$= 12\,500 \text{ mm}^2$

---

22. C Unit conversion (259261) Core

$$\text{Area} = 500 \times 1\,000\,000$$
$$= 500\,000\,000 \text{ m}^2$$

---

23. C Unit conversion (259206) Core

$$\pi \text{ cm}^2 = \pi \times 100 \text{ mm}^2$$
$$= 100\pi \text{ mm}^2$$

24. C Unit conversion (259276) Core

$$\begin{aligned}\text{Area} &= \frac{137\,500}{10\,000}\ \text{ha}\\ &= 13.75\ \text{ha}\end{aligned}$$

---

25. C Circular measure (258031) Core

$$\begin{aligned}\text{Area} &= \pi r^2\\ &= \pi \times 12.8^2\\ &= 514.7185\ldots\\ &\approx 514.7\ \text{cm}^2\ (1\text{ d.p.})\end{aligned}$$

---

26. C Circular measure (258222) Core

$$\begin{aligned}\text{Area} &= \pi r^2\\ &= \pi \times 72.3^2\\ &= 16\,422.015\ldots\\ &= 16\,422.0\ \text{cm}^2\ (1\text{ d.p.})\end{aligned}$$

---

27. C Unit conversion (259970) Core

a. $1\ \text{cm}^2 = 10\ \text{mm} \times 10\ \text{mm} = 100\ \text{mm}^2$

b. $$\begin{aligned}900\ \text{cm}^2 &= 900 \times 100\ \text{mm}^2\\ &= 90\,000\ \text{mm}^2\end{aligned}$$

---

28. C Circular measure (258084) Core

$\text{Diameter} = 21\ \text{m}$

$\therefore\ \text{Radius} = 10.5\ \text{m}$

$$\begin{aligned}\text{Area semi-circle} &= \frac{1}{2} \times \pi r^2\\ &= \frac{1}{2} \times \pi \times 10.5^2\\ &= 173.1802\ldots\\ &\approx 173.18\ \text{m}^2\ (2\text{ d.p.})\end{aligned}$$

---

29. C Circular measure (258113) Core

$$\begin{aligned}\text{Area} &= \pi r^2\\ &= \pi \times 20^2\\ &= 400\pi\ \text{m}^2\end{aligned}$$

---

30. C Quadrilaterals (256578) Core

$$\begin{aligned}\text{Area} &= 160 \times 40 + 12 \times 25\\ &= 6700\ \text{m}^2\end{aligned}$$

---

31. C Quadrilaterals (257289) Core

a. Using Pythagoras to find the side length of the square:

$$\begin{aligned}a^2 + b^2 &= c^2\\ a^2 + a^2 &= 12^2\\ 2a^2 &= 144\\ a^2 &= \frac{144}{2} = 72\\ a &= \sqrt{72}\ \text{m}\end{aligned}$$

b.

$$\begin{aligned}\text{Area} &= s^2\\ &= (\sqrt{72})^2\\ &= 72\ \text{m}^2\end{aligned}$$

---

32. C Quadrilaterals (257468) Core

$$\begin{aligned}\text{Area} &= \text{base} \times \text{height}\\ \therefore\ 1872 &= b \times 78\\ b &= \frac{1872}{78}\\ &= 24\end{aligned}$$

$\therefore$ The base length of the parallelogram is 24 m.

---

33. C Circular measure (258985) Core

$$\begin{aligned} A &= \pi r^2 \\ 100 &= \pi r^2 \\ r^2 &= \frac{100}{\pi} \\ r &= \sqrt{31.8309} \\ &= 5.641\ldots \\ &= 5.64 \text{ mm (2 d.p.)} \end{aligned}$$

34. C Quadrilaterals (258530) Core

$$\begin{aligned} A &= \frac{1}{2}xy \\ &= \frac{1}{2} \times 3.3 \times 3.1 \\ &= 5.115 \text{ cm}^2 \end{aligned}$$

35. C Quadrilaterals (257465) Core

$$\begin{aligned} \text{Area} &= \text{base} \times \text{height} \\ \therefore\ 75.03 &= 12.3 \times h \\ h &= \frac{75.03}{12.3} \\ &= 6.1 \end{aligned}$$

$\therefore$ The perpendicular height of the parallelogram is 6.1 cm.

36. C Quadrilaterals (257081) Core

a. Using Pythagoras to find the shorter side:

$$\begin{aligned} a^2 + b^2 &= c^2 \\ a^2 + 1.8^2 &= 2.3^2 \\ a^2 &= 2.3^2 - 1.8^2 \\ a^2 &= 2.05 \\ a &= \sqrt{2.05} \text{ m} \end{aligned}$$

b. $$\begin{aligned} \text{Area} &= l \times b \\ &= 1.8 \times \sqrt{2.05} \\ &= 2.577\ldots \\ &= 2.6 \text{ m}^2 \text{ (1 d.p.)} \end{aligned}$$

37. C Circular measure (258983) Core

$$\begin{aligned} A &= \pi r^2 \\ 144\pi &= \pi r^2 \\ r^2 &= 144 \\ r &= \sqrt{144} \\ &= 12 \text{ cm} \end{aligned}$$

38. C Circular measure (258090) Core

$$\begin{aligned} &\text{Diameter} = 1.2 \text{ mm} \\ &\therefore\ \text{Radius} = 0.6 \text{ mm} \\ \text{Area semi-circle} &= \frac{1}{2} \times \pi r^2 \\ &= \frac{1}{2} \times \pi \times 0.6^2 \\ &= 0.5654\ldots \\ &\approx 0.57 \text{ mm}^2 \text{ (2 d.p.)} \end{aligned}$$

39. C Circular measure (258232) Core

$$\begin{aligned} &\text{Diameter} = 37.4 \text{ mm} \\ &\therefore\ \text{Radius} = 18.7 \text{ mm} \\ \text{Area} &= \pi r^2 \\ &= \pi \times 18.7^2 \\ &= 1098.583\ldots \\ &= 1098.6 \text{ mm}^2 \text{ (1 d.p.)} \end{aligned}$$

40. C Circular measure (258078) Core

$$\begin{aligned} &\text{Diameter} = 10 \text{ m} \\ &\therefore\ \text{Radius} = 5 \text{ m} \\ \text{Area} &= \pi r^2 \\ &= \pi \times 5^2 \\ &= 25\pi \text{ m}^2 \end{aligned}$$

41. C Circular measure (258075) Core

$\text{Diameter} = 23.2 \text{ cm}$

$\therefore \text{ Radius} = 11.6 \text{ cm}$

$$\begin{aligned}\text{Area} &= \pi r^2 \\ &= \pi \times 11.6^2 \\ &= 422.7327\ldots \\ &\approx 422.7 \text{ cm}^2 \text{ (1 d.p.)}\end{aligned}$$

---

42. C Triangles (256260) Core

$\text{Base} = 7 \text{ m}, \text{ Height} = 4 \text{ m}$

$$\begin{aligned}\text{Area of } \Delta &= \frac{1}{2} \times bh \\ &= \frac{1}{2} \times 7 \times 4 \\ &= 14 \text{ m}^2\end{aligned}$$

---

43. B Quadrilaterals (256489) Core

$$\begin{aligned}\text{Area} &= \text{Area of upper rectangle} + \text{Area of lower rectangle} \\ &= 9 \times 3 + 5 \times 2 \\ &= 37 \text{ cm}^2\end{aligned}$$

---

44. B Unit conversion (260053) Core

a. $1 \text{ km}^2 = 1000 \text{ m} \times 1000 \text{ m} = 1\,000\,000 \text{ km}^2$

b. $$\begin{aligned}\text{Area} &= \frac{681\,000}{1\,000\,000} \\ &= 0.681 \text{ km}^2\end{aligned}$$

---

45. B Unit conversion (259239) Core

$$\text{Radius} = \frac{2.13}{2} = 1.065 \text{ m}$$

$$\begin{aligned}\text{Area} &= \pi \times 1.065^2 \\ &= 3.56327\ldots \text{m}^2 \\ &= 3.56327\ldots \times 10\,000 \text{ cm}^2 \\ &= 35\,633 \text{ cm}^2 \text{ (nearest cm}^2\text{)}\end{aligned}$$

---

46. B Unit conversion (259256) Core

$$\begin{aligned}\text{Area} &= \pi \times 60^2 \\ &= 3600\pi \text{ cm}^2 \\ &= \frac{3600}{10\,000}\pi \text{ m}^2 \\ &= 0.36\pi \text{ m}^2\end{aligned}$$

---

47. B Unit conversion (259980) Core

a. $1 \text{ m}^2 = 100 \text{ cm} \times 100 \text{ cm} = 10\,000 \text{ cm}^2$

b. $$\begin{aligned}\text{Radius} &= \frac{1.6}{2} = 0.8 \text{ m} \\ \text{Area} &= \pi \times 0.8^2 \\ &= 2.01061\ldots \text{ m}^2 \\ &= 2.01061\ldots \times 10\,000 \text{ cm}^2 \\ &= 20\,106 \text{ cm}^2\end{aligned}$$

---

48. B Quadrilaterals (258658) Core

$\text{Area of rhombus} = 250 \text{ cm}^2$

$\text{Length of diagonal: } x = 10 \text{ m}$

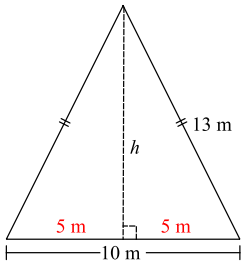
$$\begin{aligned}A &= \frac{1}{2}xy \\ 250 &= \frac{1}{2} \times 10 \times y \\ 5y &= 250 \\ y &= \frac{250}{5} \\ &= 50 \text{ cm}\end{aligned}$$

$\therefore$ The other diagonal is 50 cm long.

---

49. B Triangles (257977) Core

a.




$a^2 + b^2 = c^2$

$h^2 + 5^2 = 13^2$

$h^2 = 13^2 - 5^2$

$h^2 = 144$

$h = 12$

$\therefore$ The perpendicular height of the triangle is 12 m

b. $\text{Area} = \frac{1}{2} \times bh$

$= \frac{1}{2} \times 10 \times 12$

$= 60 \text{ m}^2$

---

50. B Quadrilaterals (258652) Core

Area of rhombus $= 140.8 \text{ m}^2$

Length of diagonal: $x = 16 \text{ m}$

$A = \frac{1}{2}xy$

$140.8 = \frac{1}{2} \times 16 \times y$

$8y = 140.8$

$y = \frac{140.8}{8}$

$= 17.6 \text{ m}$

$\therefore$ The other diagonal is 17.6 m long.

---

51. B Quadrilaterals (258546) Core

Let the unknown diagonal $= x$

$A = \frac{1}{2}xy$

$52 = \frac{1}{2} \times 8 \times x$

$4x = 52$

$x = \frac{52}{4}$

$= 13 \text{ m}$

---

52. B+ Unit conversion (260048) Core

a. $1 \text{ km}^2 = 1000 \text{ m} \times 1000 \text{ m} = 1\,000\,000 \text{ km}^2$

b. $\text{Area} = 1.20 \times 2.36$

$= 2.832 \text{ km}^2$

$= 2.832 \times 1\,000\,000 \text{ m}^2$

$= 2\,832\,000 \text{ m}^2$

---

53. B+ Quadrilaterals (256445) Core

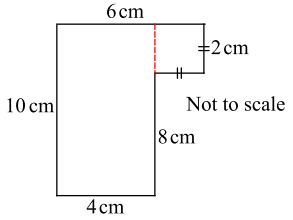
Method 1: Subtraction

Area = Area of large rectangle − Area of cut-out rectangle

$= (10 \times 6) - (8 \times 2)$

$= 44 \text{ cm}^2$

Method 2: Addition




Area = Area of large rectangle + Area of small rectangle

$= (10 \times 4) + (2 \times 2)$

$= 44 \text{ cm}^2$

54. B+ Quadrilaterals (258591) Core

$$\text{Length of large rectangle} = 1.8 + 8.4 + 1.8 = 12 \text{ m}$$
$$\text{Width of large rectangle} = 1.8 + 5.4 + 1.8 = 9 \text{ m}$$
$$\begin{aligned}\text{Shaded Area} &= \text{Large rectangle} - \text{garden area} \\ &= 12 \times 9 - 8.4 \times 5.4 \\ &= 108 - 45.36 \\ &= 62.64 \text{ m}^2\end{aligned}$$

---

55. B+ Quadrilaterals (258020) Core

$$\begin{aligned}\text{Area} &= 3 \times \text{triangles} + 1 \times \text{square} \\ &= \frac{1}{2} \times 24 \times 12 + \frac{1}{2} \times 24 \times 9 + \frac{1}{2} \times 24 \times 24 + 24^2 \\ &= 144 + 108 + 288 + 576 \\ &= 1116 \text{ m}^2\end{aligned}$$

---

56. B+ Unit conversion (260041) Core

a. $1 \text{ m}^2 = 100 \text{ cm} \times 100 \text{ cm} = 10\,000 \text{ cm}^2$

b. $$\begin{aligned}0.09\pi \text{ m}^2 &= 0.09\pi \times 10\,000 \\ &= 900\pi \text{ cm}^2\end{aligned}$$

---

57. B+ Quadrilaterals (258024) Core

$$\begin{aligned}\text{Area} &= 1 \times \text{triangles} + 1 \times \text{trapezium} \\ &= \frac{1}{2} \times bh + \frac{h}{2}(a + b) \\ &= \frac{1}{2} \times 5 \times 3 + \frac{2}{2} \times (3 + 5) \\ &= 7.5 + 8 \\ &= 15.5 \text{ cm}^2\end{aligned}$$

---

58. A Unit conversion (257613) Core

$$1 \text{ m}^2 = 100 \text{ cm} \times 100 \text{ cm} = 10\,000 \text{ cm}^2$$
$$0.85 \text{ m}^2 = 0.85 \times 10\,000 = 8500 \text{ cm}^2$$

---

59. A Unit conversion (257752) Core

$$1 \text{ km}^2 = 1000 \text{ m} \times 1000 \text{ m} = 1\,000\,000 \text{ m}^2$$
$$4.6 \text{ km}^2 = 4.6 \times 1\,000\,000 = 4\,600\,000 \text{ m}^2$$

---

60. A Quadrilaterals (257572) Core

$$\begin{aligned}\text{Pool area} &= \text{Area of rectangle} + 2 \times \text{Area of triangle} \\ &= (3 \times 4) + 2 \times \left(\frac{1}{2} \times 3 \times 5\right) \\ &= 12 + 15 \\ &= 27 \text{ m}^2\end{aligned}$$

---

61. A Quadrilaterals (257843) Core

a. $$\begin{aligned}\text{Area of path} &= 2 \times (8 \times 0.25) + 2 \times (4 \times 0.25) + 4 \times (0.25^2) \\ &= 4 + 2 + 0.25 \\ &= 6.25 \text{ m}^2\end{aligned}$$

b. $$\begin{aligned}\text{Cost of artificial turf} &= 6.25 \times \$45 \\ &= \$281.25\end{aligned}$$

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62. A Triangles (256270) Core

Triangle is isosceles with perimeter $= 51.21$ cm.

$\Rightarrow$ Length of triangle side

$$\begin{aligned}&= \frac{1}{2} \times (51.21 - 21.21) \\ &= \frac{1}{2} \times 30 \\ &= 15 \text{ cm}\end{aligned}$$

$$\begin{aligned}\therefore \text{Area} &= \frac{1}{2} \times bh \\ &= \frac{1}{2} \times 15 \times 15 \\ &= 112.5 \text{ cm}^2\end{aligned}$$

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63. A+ Quadrilaterals (256324) Core

**Method 1: Composite**

$$\begin{aligned}\text{Area} &= \text{Area of rectangle} + 2 \times \text{Area of triangle} \\ &= (38 \times 20) + 2 \times \left(\frac{1}{2} \times 6 \times 20\right) \\ &= 760 + 120 \\ &= 880 \text{ cm}^2\end{aligned}$$

**Method 2: Trapezium**

$$\begin{aligned}\text{Area} &= \frac{h}{2}(a+b) \\ &= \frac{20}{2}(38+50) \\ &= 880 \text{ cm}^2\end{aligned}$$

64. A+ Quadrilaterals (256337) Core

**Method 1: Composite**

$$\begin{aligned}\text{Area} &= \text{Area of rectangle} + 2 \times \text{Area of triangle} \\ &= (50 \times 40) + 2 \times \left(\frac{1}{2} \times 15 \times 40\right) \\ &= 2000 + 600 \\ &= 2600 \text{ cm}^2\end{aligned}$$

**Method 2: Trapezium**

$$\begin{aligned}\text{Area} &= \frac{h}{2}(a+b) \\ &= \frac{40}{2}(80+50) \\ &= 2600 \text{ cm}^2\end{aligned}$$

65. A+ Unit conversion (257765) Core

$$1 \text{ m}^2 = 1000 \text{ mm} \times 1000 \text{ mm} = 1\,000\,000 \text{ mm}^2$$
$$0.003 \text{ m}^2 = 0.003 \times 1\,000\,000 = 3000 \text{ mm}^2$$

66. A+ Unit conversion (257772) Core

$$1 \text{ hectare} = 10\,000 \text{ m}^2$$
$$950 \text{ hectares} = 950 \times 10\,000 = 9\,500\,000 \text{ m}^2$$
$$1 \text{ km}^2 = 1000 \text{ m} \times 1000 \text{ m} = 1\,000\,000 \text{ m}^2$$
$$950 \text{ hectares} = \frac{9\,500\,000}{1\,000\,000} = 9.5 \text{ km}^2$$