

WA8MMGTW1

Two-dimensional space and structures

Core + Challenge

Area of Parallelograms and Trapeziums

I can find the area of parallelograms and trapeziums using the perpendicular height, and work backwards to missing lengths.

Name: _____ Date: _____ Score: _____ / 59

Key idea

Parallelogram: $A = b \times h$ (h is the **perpendicular** height, not the slant side). $b = 9 \text{ cm}$, $h = 4 \text{ cm} \rightarrow 36 \text{ cm}^2$.

Trapezium (parallel sides a and b): $A = \frac{1}{2}(a + b)h$. $a = 5$, $b = 9$, $h = 4 \text{ (cm)} \rightarrow \frac{1}{2} \times 14 \times 4 = 28 \text{ cm}^2$.

Why: a parallelogram rearranges into a $b \times h$ rectangle; two trapeziums make a parallelogram with base $a + b$.

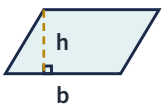
Backwards: parallelogram $h = A \div b$; trapezium $a + b = 2A \div h$. $A = 40$, $h = 5 \rightarrow a + b = 80 \div 5 = 16$.

A Fluency *practise the skill*

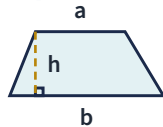
/ 16 marks

Par. = parallelogram, Trap. = trapezium (a , b are the parallel sides). Find the area unless a length is asked for.

Parallelogram



Trapezium



1. Par. $b = 8 \text{ cm}$, $h = 5 \text{ cm}$ _____
2. Par. $b = 12 \text{ m}$, $h = 7 \text{ m}$ _____
3. Par. $b = 6.5 \text{ cm}$, $h = 4 \text{ cm}$ _____
4. Par. $b = 2.4 \text{ m}$, $h = 1.5 \text{ m}$ _____
5. Trap. $a = 6$, $b = 10$, $h = 4 \text{ (cm)}$ _____
6. Trap. $a = 3$, $b = 9$, $h = 5 \text{ (m)}$ _____
7. Trap. $a = 7$, $b = 12$, $h = 6 \text{ (cm)}$ _____
8. Trap. $a = 4.5$, $b = 7.5$, $h = 3 \text{ (mm)}$ _____
9. Par. $A = 60 \text{ cm}^2$, $b = 12 \text{ cm}$: h _____
10. Par. $A = 54 \text{ m}^2$, $h = 9 \text{ m}$: b _____
11. Trap. $A = 70$, $a + b = 20 \text{ (cm)}$: h _____
12. Trap. $A = 36 \text{ m}^2$, $h = 4 \text{ m}$: $a + b$ _____
13. Trap. $A = 32$, $h = 4$, $a = 5 \text{ (cm)}$: b _____
14. Par. $b = 15 \text{ mm}$, $h = 8 \text{ mm}$ _____
15. Trap. $a = 2.5$, $b = 5.5$, $h = 10 \text{ (m)}$ _____
16. Par. $b = 20$, slant 13 , $h = 12 \text{ (cm)}$ _____

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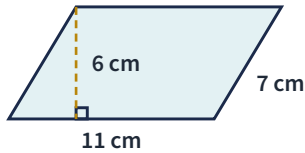
B

Core *apply the skill to problems*

/ 23 marks

- 1 Find the area and the perimeter of this parallelogram.

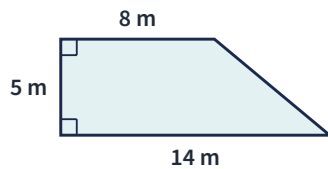
[2 marks]



Answer: _____

- 2 Find the area of this trapezium.

[2 marks]



Answer: _____

- 3 A paved courtyard at a Fremantle café is a parallelogram with base 7.5 m and perpendicular height 4 m. Paving costs \$45 per m^2 . Find the cost of paving it.

[2 marks]

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Answer: _____

- 4 A house block in Baldivis is a trapezium. Its front and back boundaries are parallel, 18 m and 24 m long, and they are 32 m apart. Find the area of the block.

[2 marks]

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Answer: _____

- 5 A parallelogram has an area of 84 cm^2 and a base of 12 cm. Find its perpendicular height.

[2 marks]

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Answer: _____

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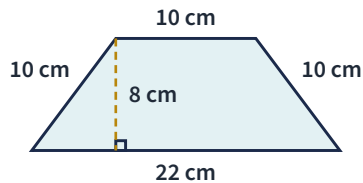
- 6 A trapezium has an area of 99 m^2 and a perpendicular height of 9 m. One of the parallel sides is 8 m. Find the other parallel side. [3 marks]

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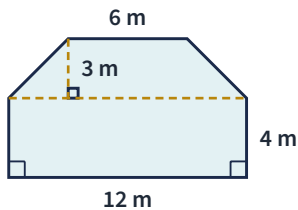
Answer: _____

- 7 Find the area and the perimeter of this isosceles trapezium. [2 marks]



Answer: _____

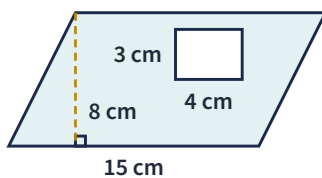
- 8 The end wall of a shed is a rectangle with a trapezium on top. Find the area of the wall. [3 marks]



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Answer: _____

- 9 A metal plate is a parallelogram with a rectangular hole 4 cm by 3 cm cut out. Find the area of metal. [2 marks]



Answer: _____

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- 10 Kerry paints a trapezium-shaped wall: parallel sides 3.2 m and 4.8 m, 2.5 m apart. She needs two coats and one tin covers 8 m^2 . How many tins must she buy? [3 marks]

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Answer:

C Reasoning *explain, justify and check*

/ 9 marks

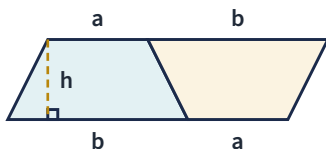
- 1 Use a sketch to explain why the area of a parallelogram is $b \times h$. [2 marks]

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- 2 Jai says the area of a parallelogram with base 10 cm, slant sides 6 cm and perpendicular height 5 cm is $10 \times 6 = 60 \text{ cm}^2$. Explain his mistake and give the correct area. [2 marks]

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- 3 Two copies of the same trapezium are joined as shown. Use the diagram to explain why the area of a trapezium is $\frac{1}{2}(a + b)h$. [3 marks]



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- 4 True or false: "A rectangle and a parallelogram with the same side lengths have the same area." Explain. [2 marks]

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D**Challenge** *multi-step and problem-solving*

/ 11 marks

- 1 A trapezium has an area of 60 cm^2 and a perpendicular height of 6 cm. One parallel side is 4 cm longer than the other. Find the lengths of the two parallel sides. [2 marks]

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Answer:

- 2 A parallelogram has sides 10 cm and 15 cm. The perpendicular height to the 15 cm side is 8 cm. Find the perpendicular height to the 10 cm side. [3 marks]

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Answer:

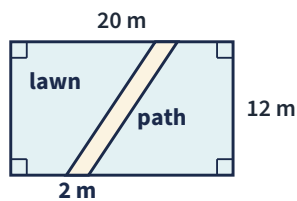
- 3 Trapezium ABCD: AB is parallel to DC, $AB = 6 \text{ cm}$, $DC = 14 \text{ cm}$, height 8 cm. M is any point on DC. What fraction of the trapezium is triangle ABM? Why does the position of M not matter? [3 marks]

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Answer:

- 4 A 20 m by 12 m lawn has a shaded path, 2 m wide along the 20 m sides. Find the path's area, the lawn left, and what fraction of the whole 20 m by 12 m area is path. [3 marks]



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Answer:

How did I go?Fluency ____ / 16 Core ____ / 23 Reasoning ____ / 9 Challenge ____ / 11 **Total ____ / 59**

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