

WA8MMGTW1

Two-dimensional space and structures

Core + Challenge

Converting Units of Area — Marking Key

I can convert between mm^2 , cm^2 , m^2 , hectares and km^2 , and explain why the conversion factors are squares of the length factors.

For tutors and parents. Award method marks for correct working even if the final answer is wrong.

Marks summary

Section A Fluency: 16 Section B Core: 22 Section C Reasoning: 9 Section D Challenge: 11 **Total: 58**

Fluency: 1 mark each; accept an equivalent unsimplified answer for half credit at tutor's discretion.

A Fluency *answers and working*

/ 16 marks

Q	Answer	Working
1	400 mm^2	$4 \times 100 = 400 \text{ mm}^2$
2	250 mm^2	$2.5 \times 100 = 250 \text{ mm}^2$
3	7 cm^2	$700 \div 100 = 7 \text{ cm}^2$
4	0.85 cm^2	$85 \div 100 = 0.85 \text{ cm}^2$
5	$30\,000 \text{ cm}^2$	$3 \times 10\,000 = 30\,000 \text{ cm}^2$
6	6000 cm^2	$0.6 \times 10\,000 = 6000 \text{ cm}^2$
7	4.5 m^2	$45\,000 \div 10\,000 = 4.5 \text{ m}^2$
8	0.25 m^2	$2500 \div 10\,000 = 0.25 \text{ m}^2$
9	$50\,000 \text{ m}^2$	$5 \times 10\,000 = 50\,000 \text{ m}^2$
10	$12\,000 \text{ m}^2$	$1.2 \times 10\,000 = 12\,000 \text{ m}^2$
11	3.5 ha	$35\,000 \div 10\,000 = 3.5 \text{ ha}$
12	0.08 ha	$800 \div 10\,000 = 0.08 \text{ ha}$
13	200 ha	$2 \times 100 = 200 \text{ ha}$
14	0.75 km^2	$75 \div 100 = 0.75 \text{ km}^2$
15	$1\,000\,000 \text{ m}^2$	$1000 \times 1000 = 1\,000\,000 \text{ m}^2$
16	$400\,000 \text{ mm}^2$	$1 \text{ m}^2 = 1000 \times 1000 \text{ mm}^2$; $0.4 \times 1\,000\,000 = 400\,000 \text{ mm}^2$

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B

Core *answers, working and marks*

/ 22 marks

Q	Answer	Working / sample response	Marks
1	$105 \text{ cm}^2 = 10\,500 \text{ mm}^2$	$15 \times 7 = 105 \text{ cm}^2$ $105 \times 100 = 10\,500 \text{ mm}^2$ (or 150×70) <i>1 mark each</i>	2
2	(a) $3.6 \text{ m}^2 = 36\,000 \text{ cm}^2$ (b) 40 tiles	$2.4 \times 1.5 = 3.6 \text{ m}^2$; $\times 10\,000 = 36\,000 \text{ cm}^2$ One tile: $30 \times 30 = 900 \text{ cm}^2$ $36\,000 \div 900 = 40$ (8 tiles by 5 tiles) <i>1 mark: 3.6 and 36 000</i> <i>1 mark: 900 cm²</i> <i>1 mark: 40</i>	3
3	$144\,000 \text{ m}^2 = 14.4 \text{ ha}$	$450 \times 320 = 144\,000 \text{ m}^2$ $144\,000 \div 10\,000 = 14.4 \text{ ha}$ <i>1 mark each</i>	2
4	4 km^2 ; $4\,000\,000 \text{ m}^2$	$400 \div 100 = 4 \text{ km}^2$ $400 \times 10\,000 = 4\,000\,000 \text{ m}^2$ <i>1 mark each</i>	2
5	1900 ha	$1 \text{ km}^2 = 100 \text{ ha}$ $19 \times 100 = 1900$ <i>1 mark: 100 ha per km²</i> <i>1 mark: 1900 ha</i>	2
6	550 tonnes	$2.5 \text{ km}^2 = 250 \text{ ha}$ $250 \times 2.2 = 550$ <i>1 mark: 250 ha</i> <i>1 mark: 550 t</i>	2
7	4.8 ha , $490\,000\,000 \text{ cm}^2$, 0.05 km^2 , $52\,000 \text{ m}^2$	In m^2 : $0.05 \text{ km}^2 = 50\,000$; $4.8 \text{ ha} = 48\,000$; $490\,000\,000 \text{ cm}^2 = 49\,000$ $48\,000 < 49\,000 < 50\,000 < 52\,000$ <i>2 marks: all converted (1 mark for two)</i> <i>1 mark: order</i>	3
8	\$975	$650 \text{ cm} = 6.5 \text{ m}$; $12 \times 6.5 = 78 \text{ m}^2$ $78 \times 12.50 = 975$ <i>1 mark: 78 m²</i> <i>1 mark: \$975</i>	2
9	7.5 cm^2	$25 \times 30 = 750 \text{ mm}^2$ $750 \div 100 = 7.5 \text{ cm}^2$ (or 2.5×3) <i>1 mark: 750 mm²</i> <i>1 mark: 7.5 cm²</i>	2
10	32 blocks	$1.5 \text{ ha} = 15\,000 \text{ m}^2$; $15\,000 - 3000 = 12\,000$ $12\,000 \div 375 = 32$ <i>1 mark: 12 000 m²</i> <i>1 mark: 32</i>	2

C

Reasoning *sample answers and marking criteria*

/ 9 marks

Q	Answer	Working / sample response	Marks
1	1 m ² is a 100 cm by 100 cm square	A 1 m by 1 m square is 100 cm by 100 cm. Its area is $100 \times 100 = 10\,000\text{ cm}^2$: there are 100 rows of 100 small squares. <i>1 mark: 100 cm by 100 cm</i> <i>1 mark: 10 000</i>	2
2	5 cm ² = 500 mm ²	1 cm ² is 10 mm by 10 mm = 100 mm ² , so multiply by 100, not 10. $5 \times 100 = 500\text{ mm}^2$ <i>1 mark: error</i> <i>1 mark: 500 mm²</i>	2
3	False: 1 000 000 times	$1\text{ km}^2 = 1000\text{ m} \times 1000\text{ m} = 1\,000\,000\text{ m}^2$ <i>1 mark: false</i> <i>1 mark: reason</i>	2
4	100 m	Side $\times$ side = $10\,000\text{ m}^2$, so the side is 100 m. m ² gives very large numbers for farms (e.g. $250\,000\text{ m}^2$); km ² gives small decimals for most paddocks (e.g. 0.25 km^2); hectares give convenient numbers (25 ha). <i>1 mark: 100 m</i> <i>2 marks: sensible reason</i>	3

D

Challenge *solutions and marking criteria*

/ 11 marks

Q	Answer	Working / sample response	Marks
1	17 sheets	One sheet: $210 \times 297 = 62\,370\text{ mm}^2$ $1\text{ m}^2 = 1\,000\,000\text{ mm}^2$; 16 sheets = $997\,920\text{ mm}^2$, just short So 17 sheets are needed. <i>1 mark: 62 370</i> <i>1 mark: 1 000 000 mm²</i> <i>1 mark: 17 with reason</i>	3
2	3.2 km	$64\text{ ha} = 640\,000\text{ m}^2$ side = 800 m ($800 \times 800 = 640\,000$) Perimeter = $4 \times 800 = 3200\text{ m} = 3.2\text{ km}$ <i>1 mark: m²</i> <i>1 mark: 800 m</i> <i>1 mark: 3.2 km</i>	3
3	6 ha; 2500 m ²	Real size: 300 m by 200 m $300 \times 200 = 60\,000\text{ m}^2 = 6\text{ ha}$ 1 cm^2 represents $50\text{ m} \times 50\text{ m} = 2500\text{ m}^2$ (not 50 m^2) <i>1 mark: 300 by 200</i> <i>1 mark: 6 ha</i> <i>1 mark: 2500 m²</i>	3

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Q	Answer	Working / sample response	Marks
4	240 000 L	$2 \text{ ha} = 20\,000 \text{ m}^2$; $12 \text{ mm} = 0.012 \text{ m}$ $20\,000 \times 0.012 = 240 \text{ m}^3 = 240\,000 \text{ L}$ <i>1 mark: units converted</i> <i>1 mark: 240 000 L</i>	2