

WA5MMGTH3

Three-dimensional space and structures

Core + Challenge

NAPLAN-style

Volume with Cubes — Marking Key

I can build and compare rectangular prisms from cubes and find their volume in cubic centimetres.

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

Marks summary

A Warm up: 16 B Practise: 21 C Think it through: 10 D Challenge: 9 **Total: 56**

Gold shading in this key shows what the child should have shaded or drawn. Accept any correct arrangement unless the question fixes it.

A

Warm up *answers*

/ 16 marks

Q	Answer	Model answer / notes	Marks
1	6 cm ³	1 layer: 2 rows of 3 = 6.	1
2	8 cm ³	2 layers of 4: 4 + 4 = 8.	1
3	10 cm ³	2 layers of 5: 5 + 5 = 10.	1
4	12 cm ³	2 layers of 6: 6 + 6 = 12.	1
5	cm ³	cm³ m³ Small objects: cm³. Rooms, halls and tanks: m³.	1
6	m ³	cm³ m³ Small objects: cm³. Rooms, halls and tanks: m³.	1
7	cm ³	cm³ m³ Small objects: cm³. Rooms, halls and tanks: m³.	1
8	m ³	cm³ m³ Small objects: cm³. Rooms, halls and tanks: m³.	1
9	6 cubes	Add the columns: 1 + 2 + 3 = 6.	1
10	8 cubes	Add the columns: 1 + 2 + 2 + 3 = 8.	1
11	5 cubes	Add the columns: 1 + 1 + 1 + 2 = 5.	1
12	15 cubes	Add the columns: 1 + 2 + 2 + 3 + 3 + 4 = 15.	1
13	24 cubes	One layer: 2 rows of 3 = 6. 4 layers: 4 × 6 = 24.	1
14	30 cubes	One layer: 2 rows of 5 = 10. 3 layers: 3 × 10 = 30.	1

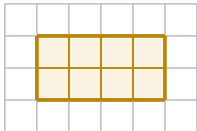
Volume with Cubes · WA5MMGTH3

Q	Answer	Model answer / notes	Marks
15	32 cubes	One layer: 4 rows of 4 = 16. 2 layers: $2 \times 16 = 32$.	1
16	27 cubes	One layer: 3 rows of 3 = 9. 3 layers: $3 \times 9 = 27$.	1

B

Practise *answers and working*

/ 21 marks

Q	Answer	Working / sample response	Marks																
1	A, by 2 cm^3 (18 and 16)	A: 3 layers of $3 \times 2 = 6$: 18 cm^3 . B: 2 layers of $4 \times 2 = 8$: 16 cm^3 . A is bigger by 2 cm^3 . <i>1 mark: both volumes.</i> <i>1 mark: A by 2 cm^3.</i>	2																
2	3 layers	One layer: 3 rows of 5 = 15 cubes. $15 + 15 + 15 = 45$, so 3 layers ($45 \div 15 = 3$). <i>1 mark: 15 cubes in a layer.</i> <i>1 mark: 3 layers.</i>	2																
3	a) 14 b) 18 c) 4	a) Column heights: front 1, 2, 3 and back 2, 3, 3: $1 + 2 + 3 + 2 + 3 + 3 = 14$. b) $3 \times 2 = 6$ in a layer, 3 layers: 18. c) $18 - 14 = 4$ more. <i>1 mark for each part.</i>	3																
4	A 24 cm^3 , B 16 cm^3 , C 30 cm^3	<table border="1"> <thead> <tr> <th>Prism</th><th>Layer</th><th>Layers</th><th>Volume</th></tr> </thead> <tbody> <tr> <td>A</td><td>12</td><td>2</td><td>24 cm^3</td></tr> <tr> <td>B</td><td>4</td><td>4</td><td>16 cm^3</td></tr> <tr> <td>C</td><td>10</td><td>3</td><td>30 cm^3</td></tr> </tbody> </table> A: $4 \times 3 = 12$ in a layer, 2 layers: 24 cm^3. B: $2 \times 2 = 4$ in a layer, 4 layers: 16 cm^3. C: $5 \times 2 = 10$ in a layer, 3 layers: 30 cm^3. <i>1 mark for each fully correct row.</i>	Prism	Layer	Layers	Volume	A	12	2	24 cm^3	B	4	4	16 cm^3	C	10	3	30 cm^3	3
Prism	Layer	Layers	Volume																
A	12	2	24 cm^3																
B	4	4	16 cm^3																
C	10	3	30 cm^3																
5	b) 8 c) 24 cm^3	 a) A 4 by 2 rectangle of squares. b) 2 rows of 4 = 8 cubes. c) 3 layers: $8 + 8 + 8 = 24 \text{ cm}^3$. <i>1 mark: layer shaded (4 by 2).</i> <i>1 mark: 8.</i> <i>1 mark: 24 cm^3.</i>	3																
6	60 cubes, about 60 cm^3	One layer: $5 \times 4 = 20$ cubes. 3 layers: $3 \times 20 = 60$ cubes, so about 60 cm^3 . <i>1 mark: 60 cubes.</i> <i>1 mark: about 60 cm^3.</i>	2																

Volume with Cubes · WA5MMGTH3

Q	Answer	Working / sample response	Marks
7	C	A: $2 \times 2 \times 2 = 8$. B: $5 \times 2 \times 1 = 10$. C: $3 \times 2 = 6$ in a layer, 2 layers = 12 cm^3 . D: $3 \times 3 \times 2 = 18$. <i>1 mark: C.</i> <i>1 mark: working or reasoning that rules out the others.</i>	2
8	36 cubes, 36 cm^3	One layer: 3 rows of 6 = 18 cubes. 2 layers: $18 + 18 = 36$ cubes, so 36 cm^3 . <i>1 mark: 36 cubes.</i> <i>1 mark: 36 cm^3.</i>	2
9	Jin, by 6 cubes	Jin: $2 \times 2 = 4$ in a layer, 6 layers: 24 cubes. Amy: $3 \times 3 = 9$ in a layer, 2 layers: 18 cubes. $24 - 18 = 6$. <i>1 mark: 24 and 18.</i> <i>1 mark: Jin, by 6.</i>	2

C

Think it through *sample answers and criteria*

/ 10 marks

Q	Answer	Working / sample response	Marks
1	No: A 6 cm^3 , B 12 cm^3	A has 6 cubes: 6 cm^3 . B has 2 layers of $3 \times 2 = 6$: 12 cm^3 . Taller does not mean more cubes. B has the bigger volume. <i>1 mark: No, with both volumes.</i> <i>1 mark: explains height alone does not decide volume.</i>	2
2	True, 24 each	First prism: $4 \times 3 = 12$ in a layer, 2 layers: 24 cubes. Second prism: $2 \times 3 = 6$ in a layer, 4 layers: 24 cubes. It is the first prism turned on its end. <i>1 mark: True.</i> <i>1 mark: shows both are 24 cubes (or explains it is the same prism turned).</i>	2
3	Sometimes	Always Sometimes Never True when the prism has 1 layer: $3 \times 2 \times 1 = 6$ becomes $3 \times 2 \times 2 = 12$ (doubled). False with 2 layers: 12 becomes 18, which is not double. <i>1 mark: Sometimes.</i> <i>1 mark: one example each way.</i>	2
4	$5 \times 5 \times 1$	$2 \times 2 \times 6$, $3 \times 4 \times 2$ and $12 \times 2 \times 1$ all have a volume of 24 cubes. $5 \times 5 \times 1$ has 25 cubes. <i>1 mark: $5 \times 5 \times 1$.</i> <i>1 mark: shows the volumes (24, 24, 24, 25).</i>	2
5	30 cubes	The front row has 5 cubes. There are 3 rows, so one layer has $3 \times 5 = 15$ cubes. There are 2 layers: $15 + 15 = 30$ cubes. <i>1 mark: finds one layer (15) using rows.</i> <i>1 mark: multiplies or adds for 2 layers: 30.</i>	2

D

Challenge *solutions and criteria*

/ 9 marks

Q	Answer	Working / sample response	Marks
1	$1 \times 1 \times 12$, $1 \times 2 \times 6$, $1 \times 3 \times 4$, $2 \times 2 \times 3$; closest: $2 \times 2 \times 3$	Smallest side 1: $1 \times 1 \times 12$, $1 \times 2 \times 6$, $1 \times 3 \times 4$. Smallest side 2: $2 \times 2 \times 3$. Smallest side 3 does not work ($3 \times 3 \times 3 = 27$ is too many). $2 \times 2 \times 3$ has the sides closest together, so it is most like a cube. <i>2 marks: all four (1 mark for three).</i> <i>1 mark: $2 \times 2 \times 3$.</i>	3
2	a) 64 b) 37 c) Tower 6	a) $4 \times 4 = 16$ in a layer, 4 layers: 64. b) Tower 3 has 27 cubes: $64 - 27 = 37$. c) Tower 5 has 125, Tower 6 has $6 \times 6 \times 6 = 216$. So Tower 6. <i>1 mark for each part.</i>	3
3	4 cubes long, 3 cubes wide	Each layer has $36 \div 3 = 12$ cubes. Pairs that make 12: 1×12 , 2×6 , 3×4 . Only 4 and 3 differ by 1. So the base is 4 cubes long and 3 cubes wide. Check: $4 \times 3 \times 3 = 36$. <i>1 mark: 12 cubes in a layer.</i> <i>1 mark: 4 and 3.</i> <i>1 mark: checks or explains why no other pair works.</i>	3