

WA6MMGTH1

Three-dimensional space and structures

Core + Challenge

Prisms and Pyramids — Marking Key

I can name, sketch and build prisms and pyramids, and count their faces, edges and vertices.

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

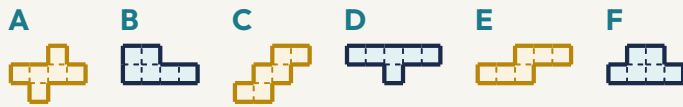
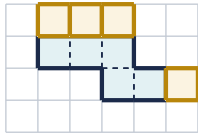
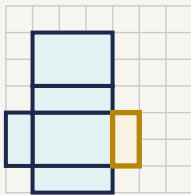
Warm up *answers*

/ 16 marks

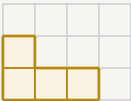
Q	Answer	Model answer / notes	Marks
1	pentagonal prism	Two identical ends joined by rectangles. The base has 5 sides.	1
2	hexagonal pyramid	One base; triangles meet at the apex. The base has 6 sides.	1
3	rectangular prism	Two identical ends joined by rectangles. The base has 4 sides.	1
4	square pyramid	One base; triangles meet at the apex. The base has 4 sides.	1
5	hexagonal prism	Two identical ends joined by rectangles. The base has 6 sides.	1
6	pentagonal pyramid	One base; triangles meet at the apex. The base has 5 sides.	1
7	octagonal prism	Two identical ends joined by rectangles. The base has 8 sides.	1
8	cube (accept square prism)	Six square faces: a cube is a special square prism.	1
9	9	Heptagonal prism: 7 side faces + 2 = 9.	1
10	16	Octagonal pyramid: 8 base edges + 8 slanting edges = 16.	1
11	8	Heptagonal pyramid: 7 on the base + 1 apex = 8.	1
12	6	Square prism: 4 side faces + 2 = 6.	1
13	cube	Six squares.	1
14	rectangular prism (accept square prism)	Four matching rectangles and two squares: a $2 \times 1 \times 1$ box.	1
15	square pyramid	A square base and four triangles.	1
16	pentagonal pyramid	A pentagon base and five triangles.	1

B Practise *answers and working*

/ 21 marks

Q	Answer	Working / sample response	Marks																								
1	See table	<table border="1"> <thead> <tr> <th>Object</th><th>Faces</th><th>Edges</th><th>Vertices</th></tr> </thead> <tbody> <tr> <td>triangular prism</td><td>5</td><td>9</td><td>6</td></tr> <tr> <td>rectangular prism</td><td>6</td><td>12</td><td>8</td></tr> <tr> <td>pentagonal prism</td><td>7</td><td>15</td><td>10</td></tr> <tr> <td>square pyramid</td><td>5</td><td>8</td><td>5</td></tr> <tr> <td>hexagonal pyramid</td><td>7</td><td>12</td><td>7</td></tr> </tbody> </table> Prism with an n-sided base: faces $n + 2$, edges $3 \times n$, vertices $2 \times n$. Pyramid with an n-sided base: faces $n + 1$, edges $2 \times n$, vertices $n + 1$. <i>3 marks: all correct. 2 marks: four rows correct. 1 mark: two or three rows.</i>	Object	Faces	Edges	Vertices	triangular prism	5	9	6	rectangular prism	6	12	8	pentagonal prism	7	15	10	square pyramid	5	8	5	hexagonal pyramid	7	12	7	3
Object	Faces	Edges	Vertices																								
triangular prism	5	9	6																								
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hexagonal pyramid	7	12	7																								
2	A, C, E	 A, C and E fold into cubes. B: the 2 by 2 block means two faces overlap. D: five in a row wraps round onto itself. F: the two top squares both fold onto the same face. <i>3 marks: A, C and E only. Take off 1 mark for each wrong or missing letter.</i>	3																								
3	Any gold square	 There are 4 places that work (shown in gold). Any one of them is correct. Check by imagining folding: no two squares may land on the same face. <i>2 marks: a correct square. 0 marks for any other square.</i>	2																								
4	A 1 by 2 rectangle	 The missing face is the right end: 1 square wide, 2 squares tall. It can go next to the base (shown) or on another edge where it folds into the gap. <i>1 mark: correct size (1 by 2). 1 mark: in a place where it folds correctly.</i>	2																								
5	Model drawn	 Start with the front corner, then draw the vertical edges straight up. Lines go up-right, up-left or straight up: never across. <i>1 mark: 5 cubes. 1 mark: correct shape. 1 mark: lines on the dots.</i>	3																								

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Q	Answer	Working / sample response	Marks									
6	$3 \times 2 \times 2$ prism drawn	 The finished prism is made of 12 cubes. Accept a drawing that shows only the outside edges. <i>1 mark: correct shape.</i> <i>1 mark: correct size on the dots.</i>	2									
7	a) 8 b) 4	a) A square pyramid has 4 base edges and 4 slanting edges: 8 poles. b) The 4 slanting edges meet at the apex. <i>1 mark each.</i>	2									
8	See table	<table><tr><th></th><th>All faces flat</th><th>Curved surface</th></tr><tr><td>Has an apex</td><td>square pyramid, triangular pyramid</td><td>cone</td></tr><tr><td>No apex</td><td>cube, triangular prism</td><td>cylinder, sphere</td></tr></table> An apex is a point where faces meet. Cones and pyramids have one. Cylinders, cones and spheres have a curved surface. <i>2 marks: all seven correct. 1 mark: five or six.</i>		All faces flat	Curved surface	Has an apex	square pyramid, triangular pyramid	cone	No apex	cube, triangular prism	cylinder, sphere	2
	All faces flat	Curved surface										
Has an apex	square pyramid, triangular pyramid	cone										
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9	a) 6 b) L of 4 squares	 a) 4 cubes on the bottom layer and 2 on top: 6. b) From above you see only the 4 squares of the bottom layer (accept the L turned round). <i>1 mark: 6.</i> <i>1 mark: correct top view.</i>	2									

C

Think it through *sample answers and criteria*

/ 10 marks

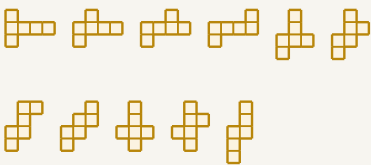
Q	Answer	Working / sample response	Marks
1	No	Having six squares is not enough: they must fold without overlapping. When the row of four wraps round, the two squares sticking up both fold onto the same face (the top), so the bottom is left open. <i>1 mark: No.</i> <i>1 mark: explains two squares overlap (or one face is missing).</i>	2
2	False	A triangular prism has 2 triangles + 3 rectangles = 5 faces. A triangular pyramid has 1 triangle base + 3 triangles = 4 faces. <i>1 mark: False.</i> <i>1 mark: 5 and 4 faces with a reason.</i>	2

Q	Answer	Working / sample response	Marks
		Always Sometimes Never	
3	Always	A pyramid's base has some number of edges, and there is one slanting edge from each base corner to the apex. So the edges are base edges $\times 2$, which is always even (e.g. square pyramid 8, pentagonal pyramid 10). <i>1 mark: Always.</i> <i>1 mark: explains doubling (or shows several examples and the reason).</i>	2
4	C (square pyramid)	A, B and D are prisms: two identical ends joined by rectangles. C is a pyramid: it has an apex and triangular faces that meet at a point. <i>1 mark: C.</i> <i>1 mark: explains C is the only pyramid (has an apex). Accept another choice with a correct reason.</i>	2
5	Same: 5 faces	Same: both have 5 faces. Different: the pyramid has 8 edges and 5 vertices; the prism has 9 edges and 6 vertices. (Or: the pyramid has an apex.) <i>1 mark: something correct that is the same.</i> <i>1 mark: something correct that is different.</i>	2

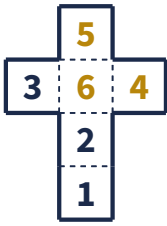
D

Challenge solutions and criteria

/ 9 marks

Q	Answer	Working / sample response	Marks																
1	$F + V - E = 2$	<table border="1"> <thead> <tr> <th>Sides</th><th>Faces</th><th>Vertices</th><th>Edges</th></tr> </thead> <tbody> <tr> <td>7</td><td>9</td><td>14</td><td>21</td></tr> <tr> <td>8</td><td>10</td><td>16</td><td>24</td></tr> <tr> <td>10</td><td>12</td><td>20</td><td>30</td></tr> </tbody> </table> A prism with n sides on its base has $n + 2$ faces, $2 \times n$ vertices and $3 \times n$ edges. Rule: faces + vertices – edges = 2 every time ($F + V - E = 2$). <i>1 mark: the 7 and 8 rows.</i> <i>1 mark: the 10 row.</i> <i>1 mark: a correct rule that uses all three of F, V and E, e.g. $F + V - E = 2$ or $F + V = E + 2$.</i>	Sides	Faces	Vertices	Edges	7	9	14	21	8	10	16	24	10	12	20	30	3
Sides	Faces	Vertices	Edges																
7	9	14	21																
8	10	16	24																
10	12	20	30																
2	Any 3 of the other 7 nets	 All 11 nets are shown. The cross (Warm up 13) and nets A, C and E (Practise 2) do not count, which leaves 7 to choose from. Check each by imagining folding it. <i>1 mark for each correct, different net.</i>	3																

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Q	Answer	Working / sample response	Marks
3	See net	 When the net folds, 1 is opposite 6, 2 is opposite 5 and 3 is opposite 4. Squares with one square between them in a straight line end up opposite each other. <i>1 mark for each number in the correct place.</i>	3