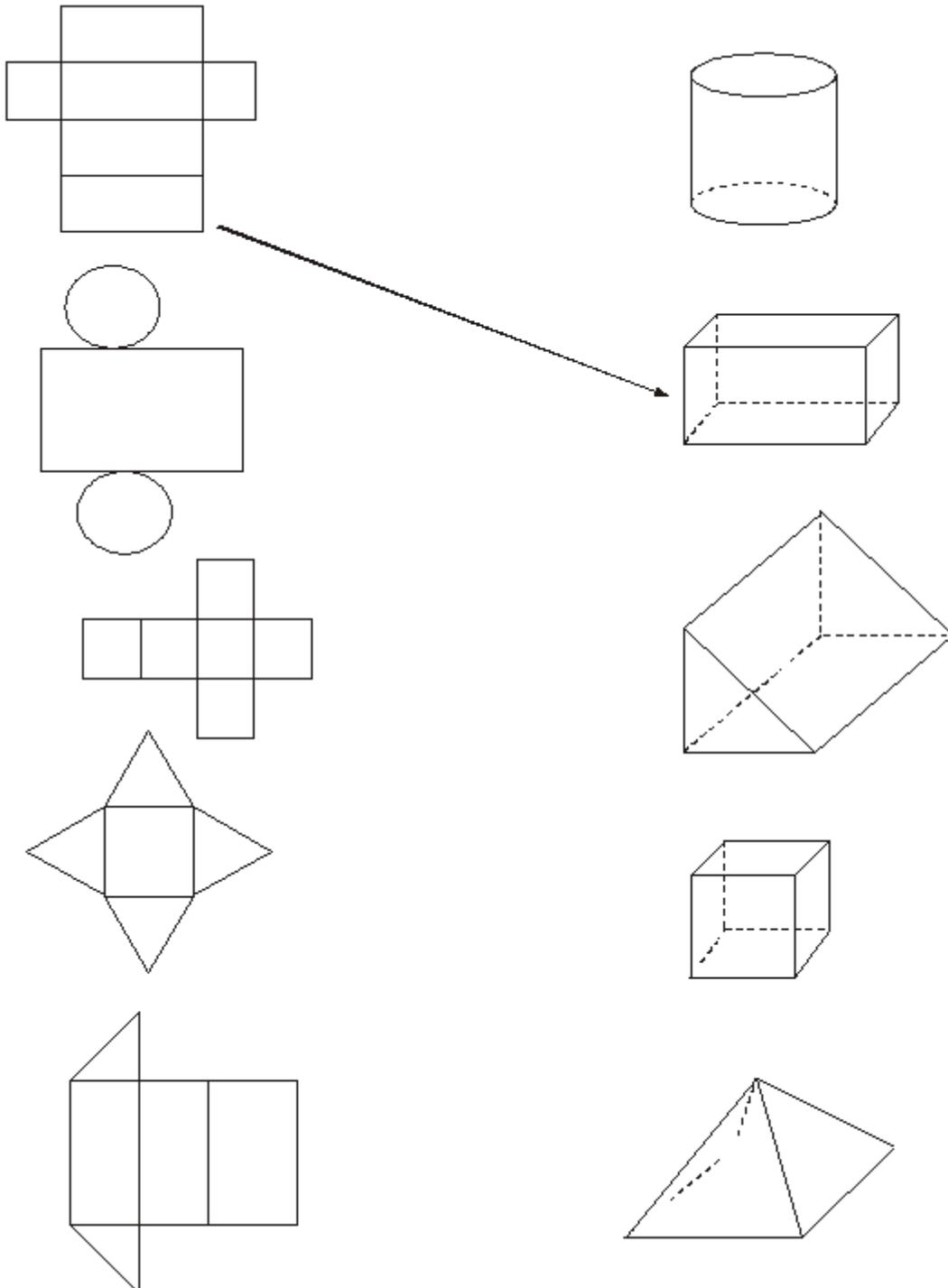


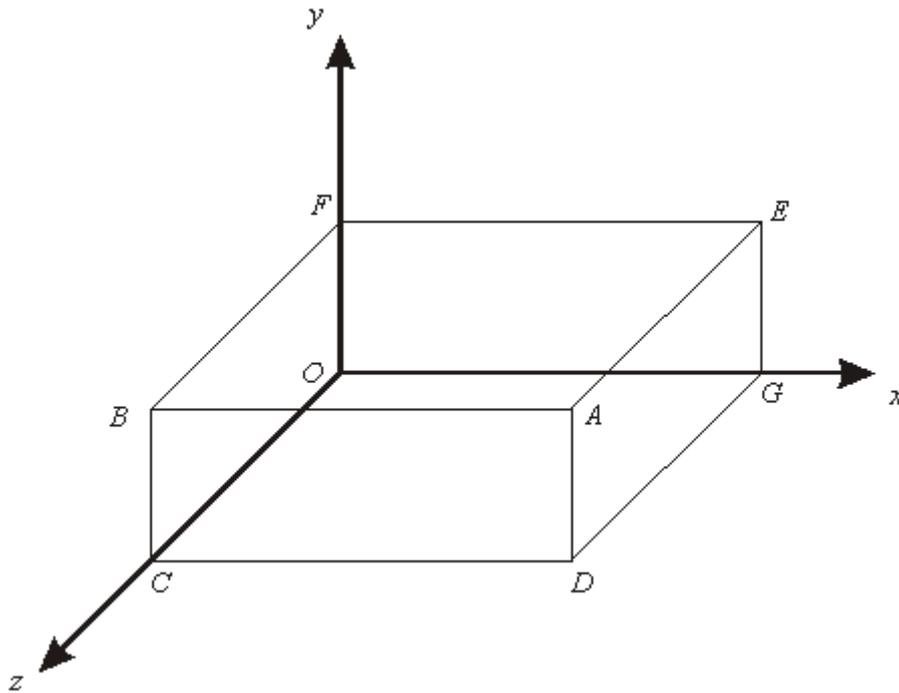
**Q1.** The diagram shows some nets and some solid shapes.  
An arrow has been drawn from one net to its solid shape.

Draw an arrow from each of the other nets to its solid shape.



**(Total 3 marks)**

Q2.

Diagram **NOT** accurately drawn

The diagram shows a cuboid drawn on a 3-D grid.

Vertex  $A$  has coordinates  $(5, 2, 3)$ .

(a) Write down the coordinates of vertex  $E$ .

( ..... , ..... , ..... )

(1)

$B$  and  $D$  are vertices of the cuboid.

(b) Work out the coordinates of the midpoint of  $BD$ .

( ..... , ..... , ..... )

(3)  
(Total 4 marks)

Q3.

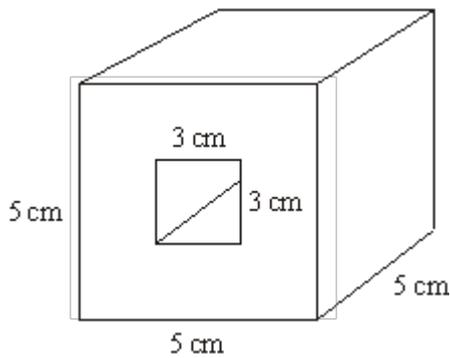


Diagram **NOT** accurately drawn

The solid shape, shown in the diagram, is made by cutting a hole all the way through a wooden cube.

The cube has edges of length 5 cm.

The hole has a square cross section of side 3 cm.

(a) Work out the volume of wood in the solid shape.

..... cm<sup>3</sup>

(2)

The mass of the solid shape is 64 grams.

(b) Work out the density of the wood.

..... grams per  $\text{cm}^3$

(2)  
(Total 4 marks)

**Q4.** Here is a cuboid.

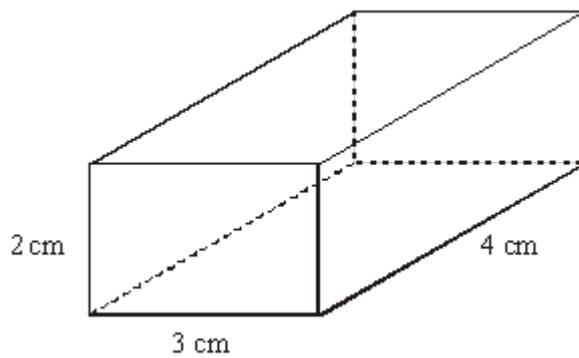
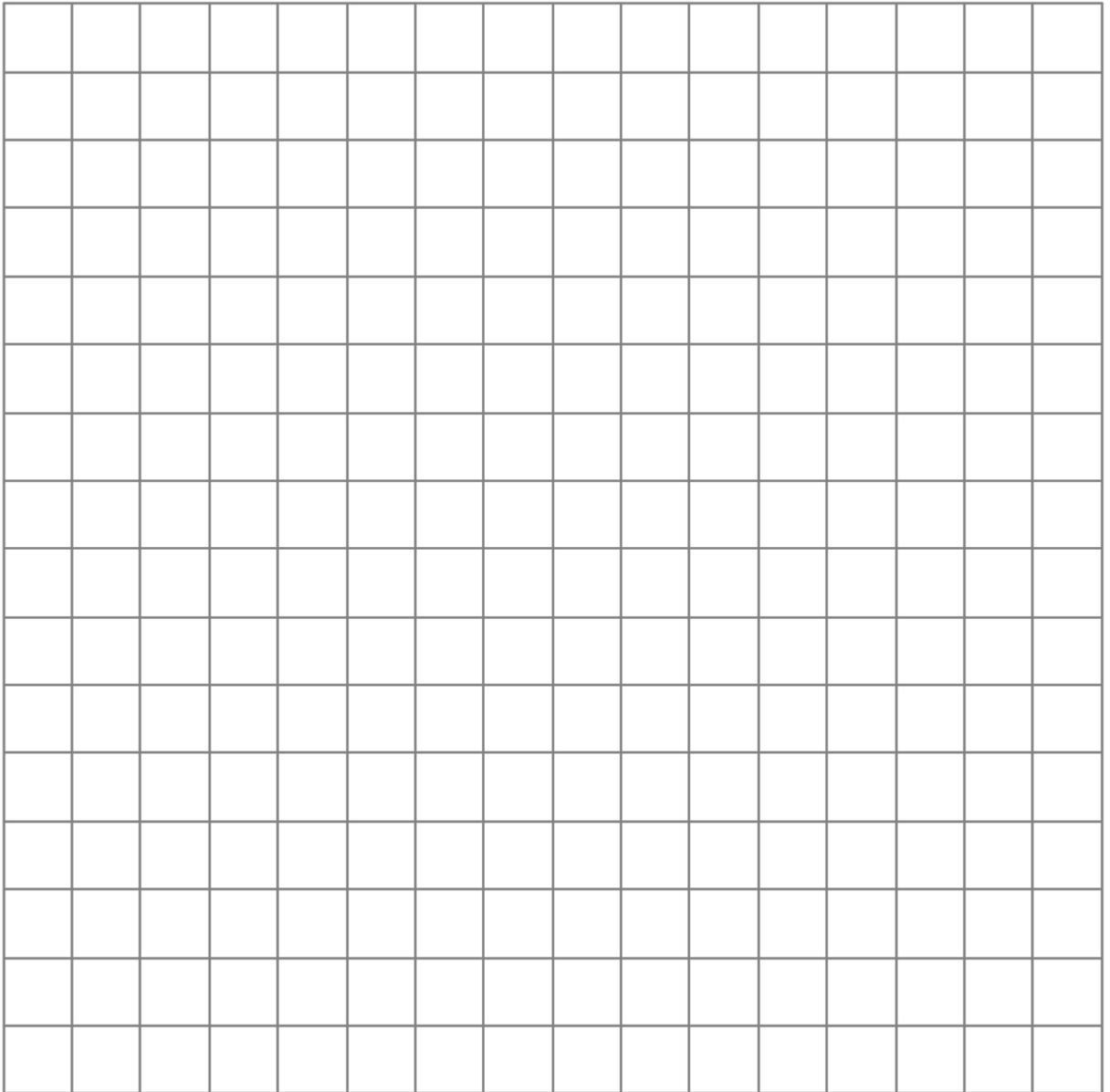


Diagram **NOT** accurately drawn

Draw an accurate net of this cuboid.



(Total 3 marks)

**Q5.** A water trough is in the shape of a prism.

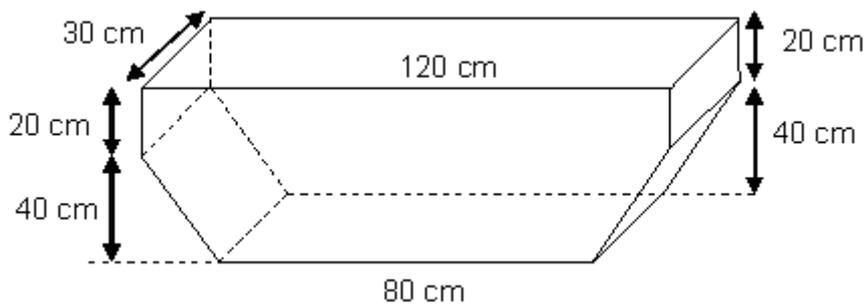


Diagram **NOT** accurately drawn

Hamish fills the trough completely.

Water leaks from the bottom of the trough at a constant rate.  
2 hours later, the level of the water has fallen by 20 cm.

Water continues to leak from the trough at the same rate.

How many more minutes will it take for the trough to empty completely?

..... minutes

**(Total 6 marks)**

**Q6.** Here is a solid cuboid.

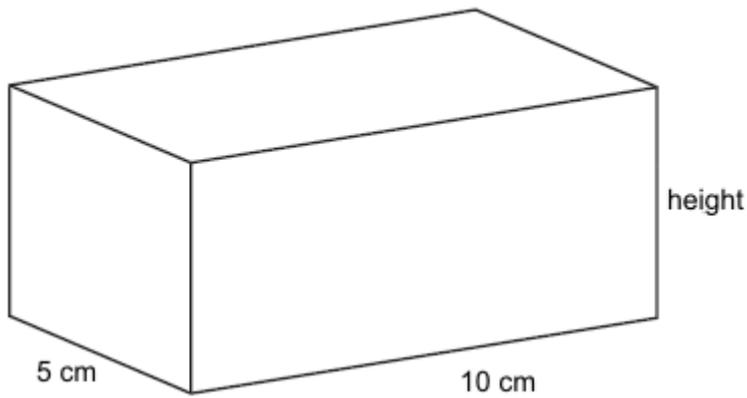


Diagram **NOT** accurately drawn

The cuboid has a width of 5 cm and a length of 10 cm.  
The cuboid has a total surface area of  $280 \text{ cm}^2$ .

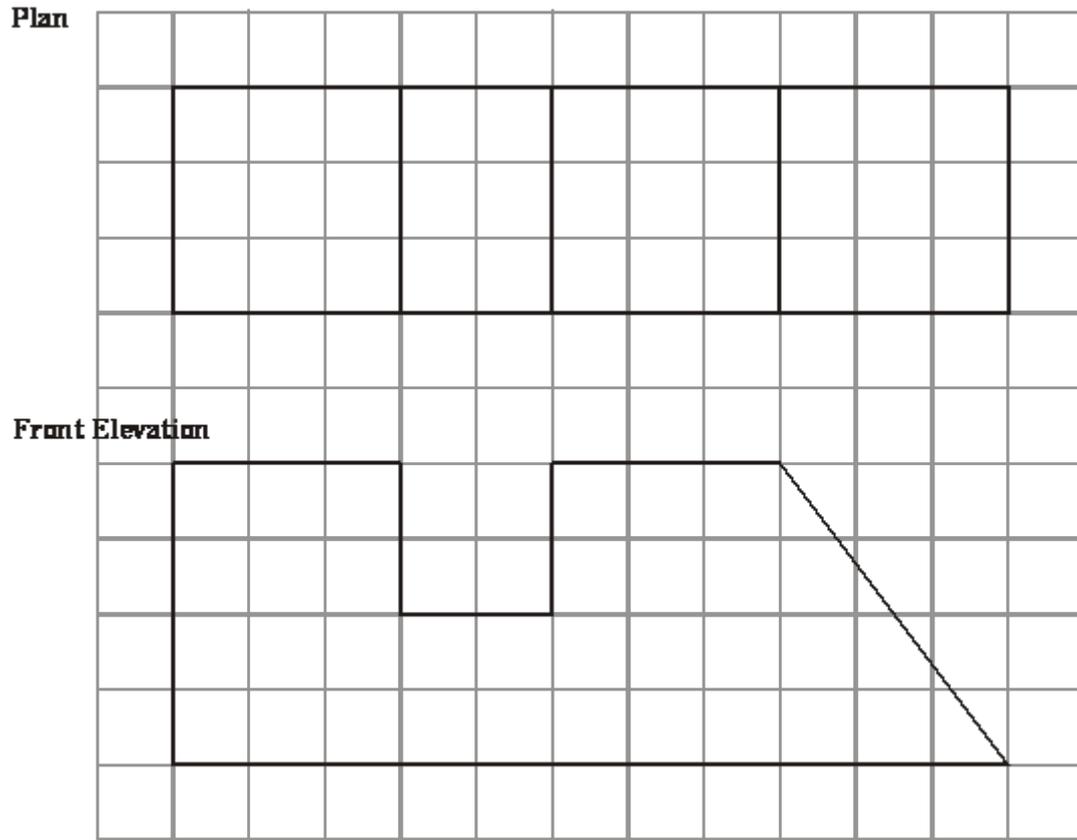
Work out the height of the cuboid.

..... cm

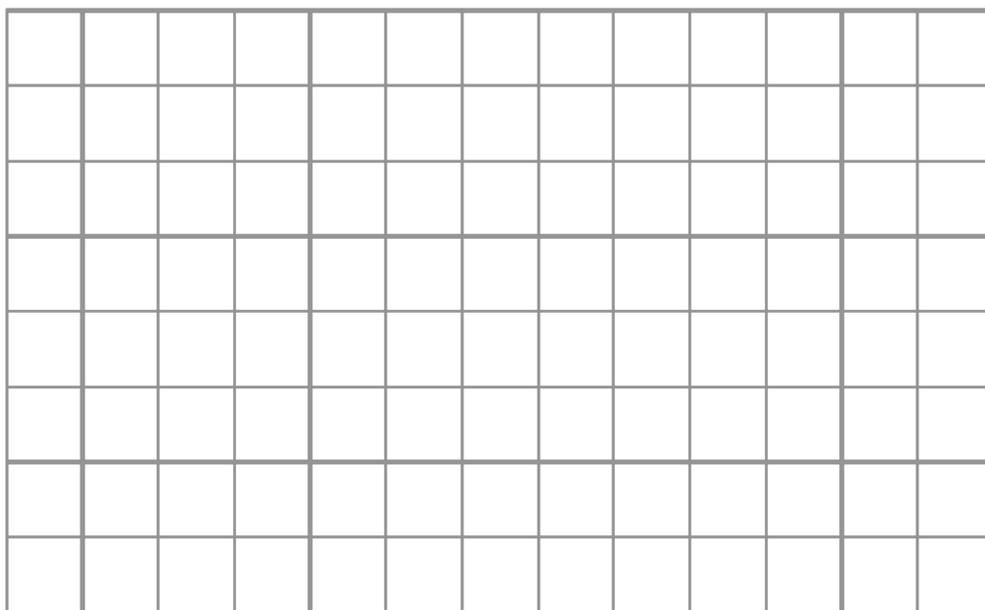
**(Total 4 marks)**

**Q7.** Here are the plan and front elevation of a prism.

The front elevation shows the cross section of the prism.

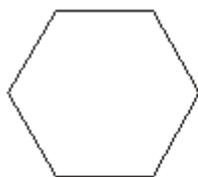


On the grid below draw a side elevation of the prism.



(Total 3 marks)

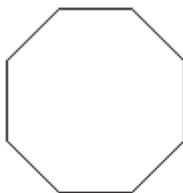
**Q8.** Here are 8 polygons.



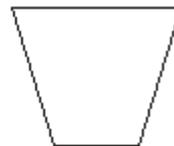
**A**



**B**



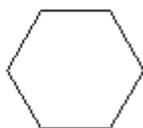
**C**



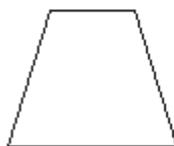
**D**



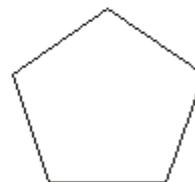
**E**



**F**



**G**



**H**

(a) Write down the mathematical name for shape **A**.

.....

(1)

(b) Write down the letter of the shape that is an octagon.

.....

(1)

(c) Write down the letters of the pair of congruent shapes.

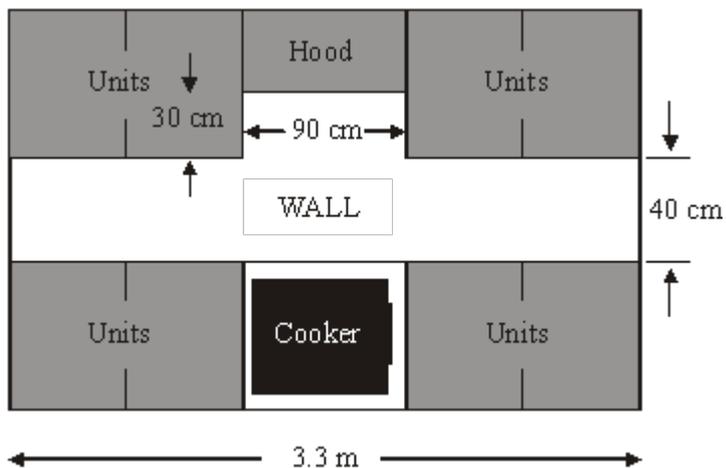
..... and .....

(1)

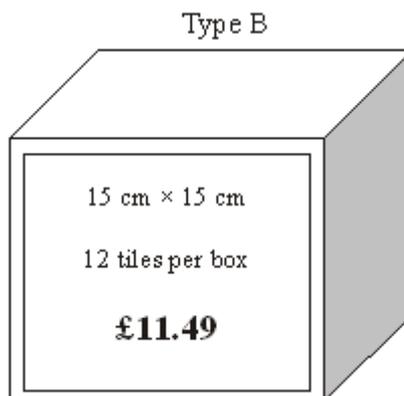
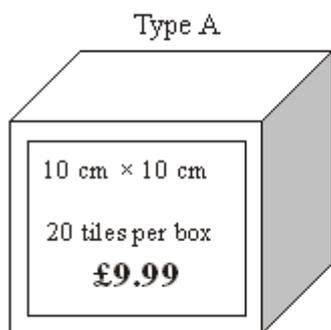
(Total 3 marks)

**Q9.** The diagram shows a wall in Jenny's kitchen.

Diagram **NOT** accurately drawn



Jenny wishes to tile this wall in her kitchen.  
She chooses between the two types of tile shown below.



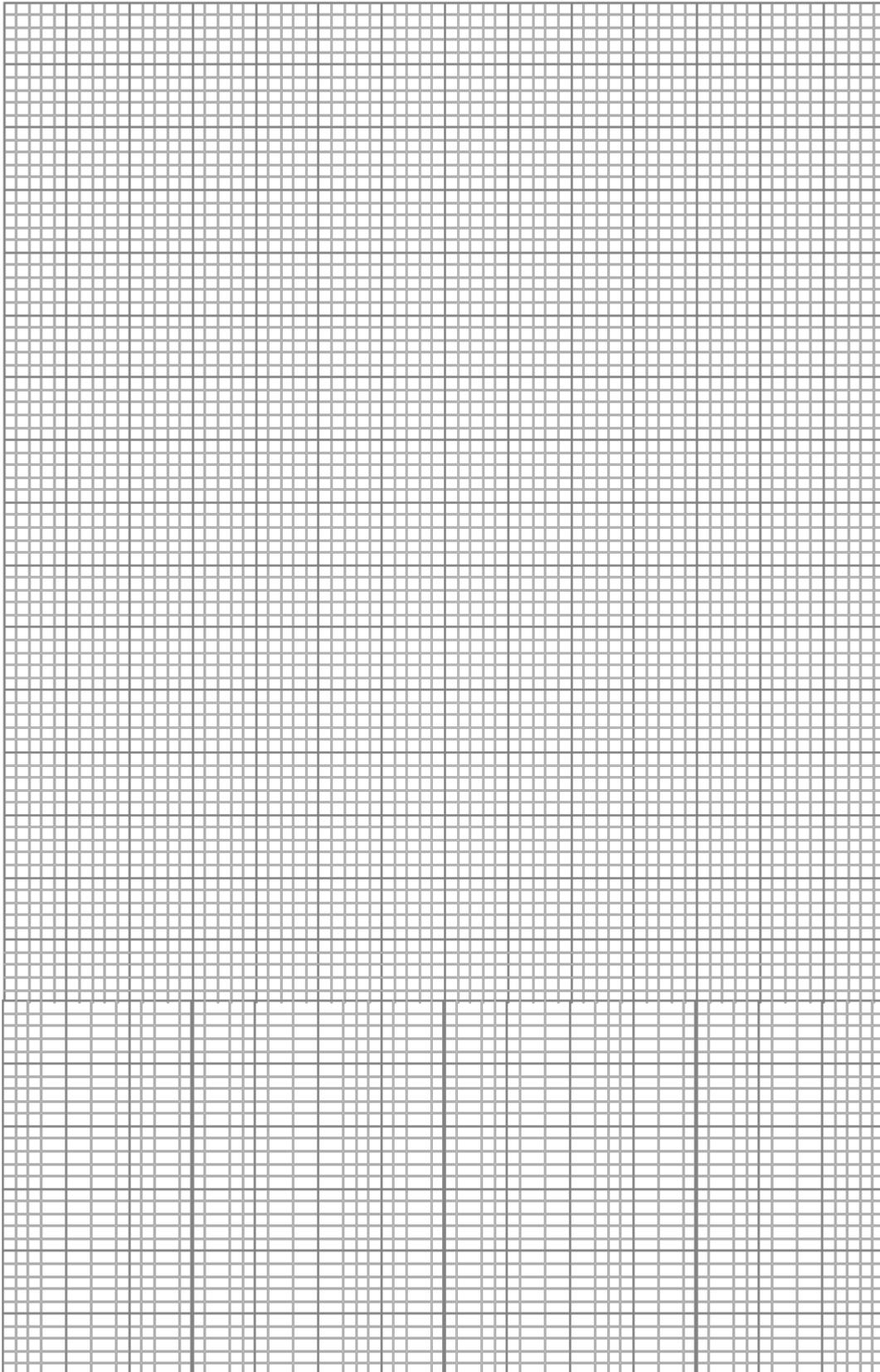
(a) Which tiles should Jenny use to spend the least amount of money on tiling the wall?

You must show all of your working.

(6)

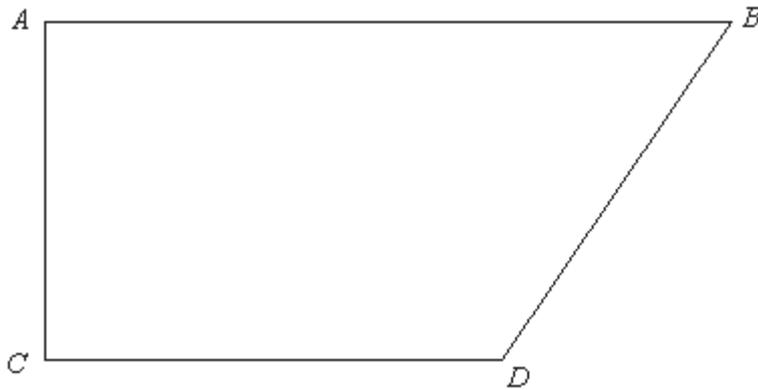
A Box of Type A tiles has dimensions  $10.5 \text{ cm} \times 10.5 \text{ cm} \times 21 \text{ cm}$ .  
Readypac wants to produce cartons which hold 12 boxes of Type A tiles, when full.

(b) On the grid below, design a net of a carton that Readypac could use.



(3)  
(Total 9 marks)

**Q10.** This is an accurately drawn quadrilateral.



(a) Write down the mathematical name of this quadrilateral.

.....

(1)

(b) Which line is perpendicular to the line  $CD$ ?

.....

(1)

(c) Measure the length of the line  $AC$ .

.....

(1)

- (d) Measure the size of the angle  $ABD$ .

.....  
(1)  
(Total 4 marks)

Q11.

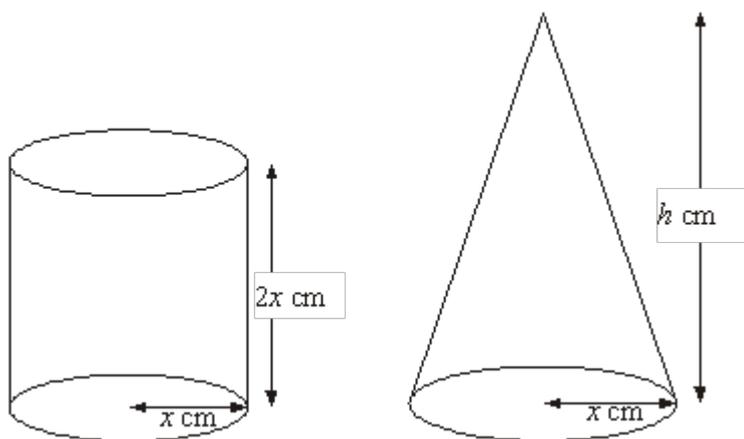


Diagram **NOT** accurately drawn

A cylinder has base radius  $x$  cm and height  $2x$  cm.

A cone has base radius  $x$  cm and height  $h$  cm.

The volume of the cylinder and the volume of the cone are equal.

Find  $h$  in terms of  $x$ .  
Give your answer in its simplest form.

$h = \dots\dots\dots$

(Total 3 marks)

Q12.

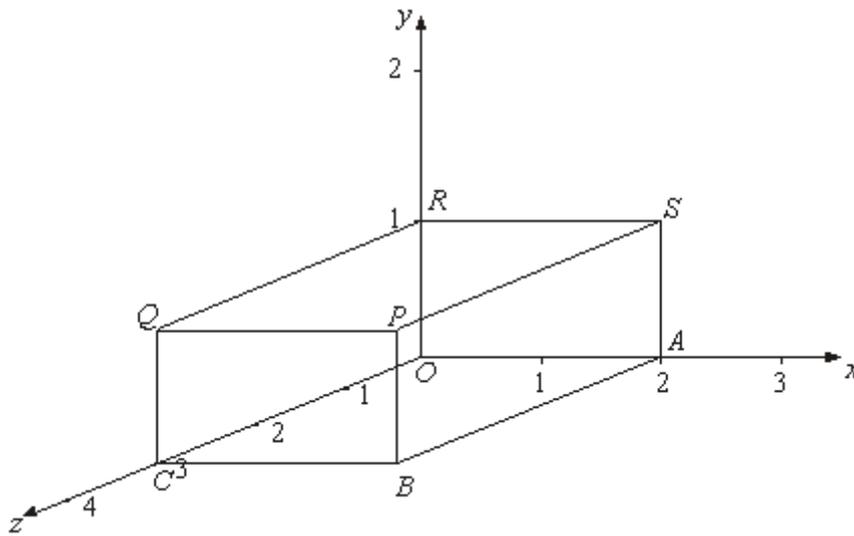


Diagram **NOT** accurately drawn

A cuboid is shown on a 3-dimensional grid.

- (a) Write down the letter of the point with coordinates (2, 1, 0).

.....

(1)

- (b) Write down the coordinates of the point P.

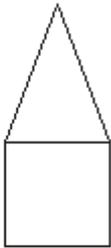
( ..... , ..... , ..... )

(1)

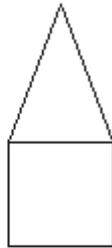
(Total 2 marks)

**Q13.** Here are the front elevation, side elevation and the plan of a 3-D shape.

Front elevation



Side elevation



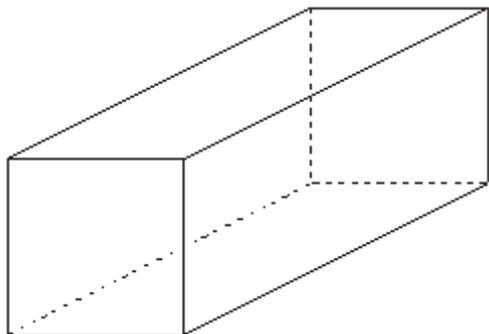
Plan



In the space below, draw a sketch of the 3-D shape.

**(Total 2 marks)**

**Q14.**



Here is a diagram of a cuboid.

Write down the number of

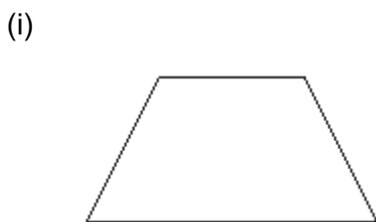
(i) faces .....

(ii) edges .....

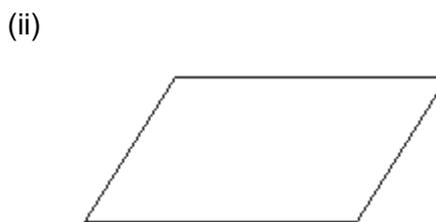
(iii) vertices .....

**(Total 3 marks)**

**Q15.** (a) Write down the mathematical name of each of these quadrilaterals.



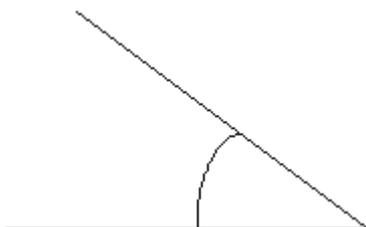
(i) .....



(ii) .....

**(2)**

(b) What type of angle is this?



.....  
(1)  
(Total 3 marks)

Q16.

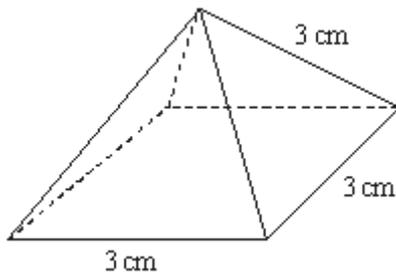


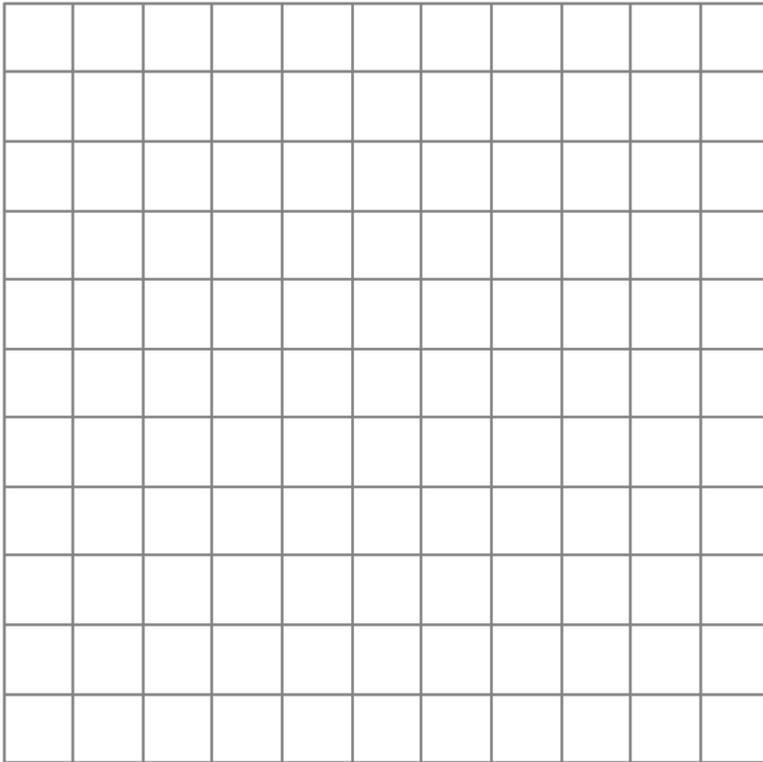
Diagram **NOT** accurately drawn

The diagram shows a pyramid with a square base.

The length of each side of the base is 3 cm.

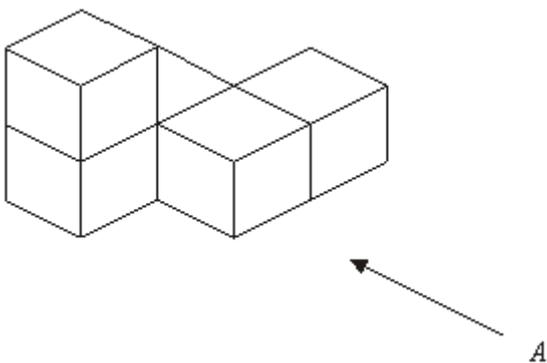
The length of each sloping edge is 3 cm.

On the grid of centimetre squares, draw an accurate net of the pyramid.

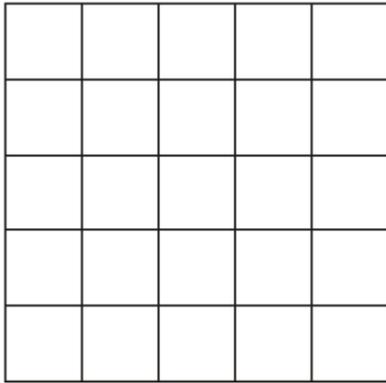


(Total 3 marks)

**Q17.** The diagram represents a solid made from 5 identical cubes.



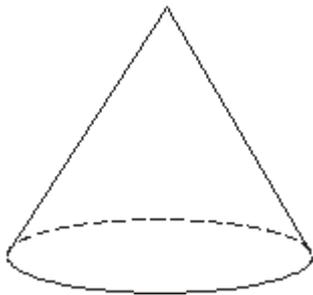
On the grid below, draw the view of the solid from direction *A*.



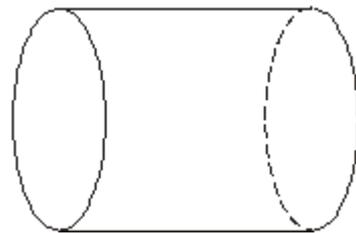
(Total 2 marks)

**Q18.** Write down the name of each of these two 3-D shapes.

(i)



(ii)

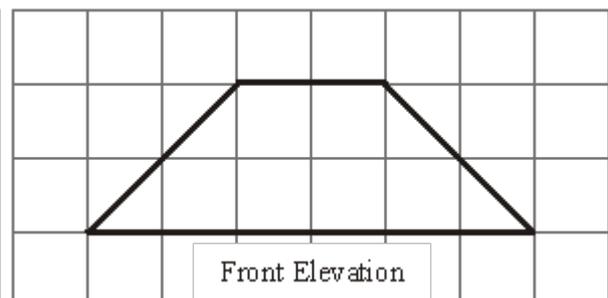
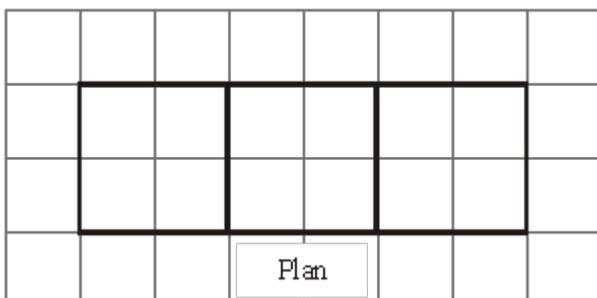


(i).....

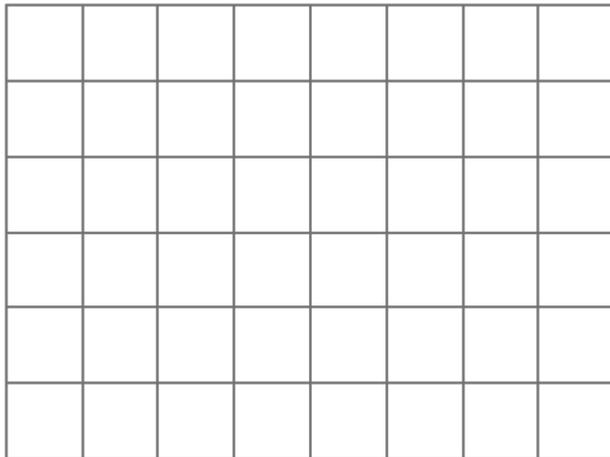
(ii) .....

(Total 2 marks)

**Q19.** Here are the plan and front elevation of a solid shape.



(a) On the grid below, draw the side elevation of the solid shape.

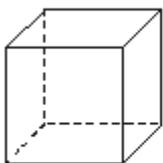


(2)

(b) In the space below, draw a sketch of the solid shape.

(2)  
(Total 4 marks)

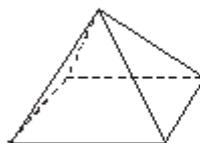
Q20.



**A**



**B**



**C**



**D**

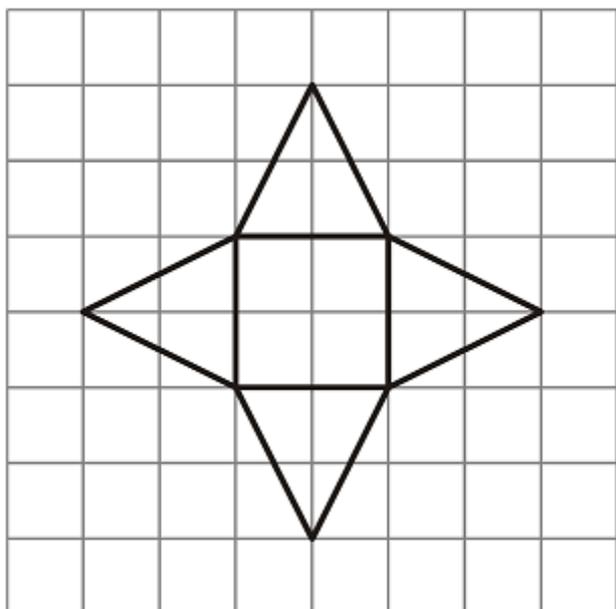
Diagram **NOT** accurately drawn

The diagram shows four 3-D solid shapes.

(a) Write down the number of vertices of shape **A**.

.....

(1)



Here is the net of one of the shapes, **A**, **B**, **C** or **D**.

(b) Which shape?

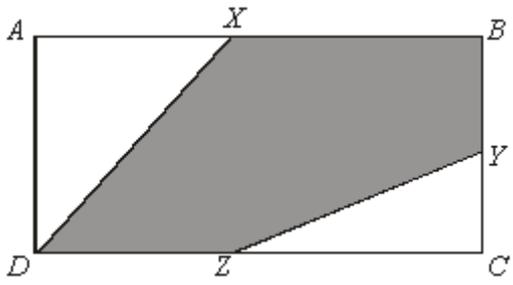
.....

(1)

(Total 2 marks)

**Q21.**

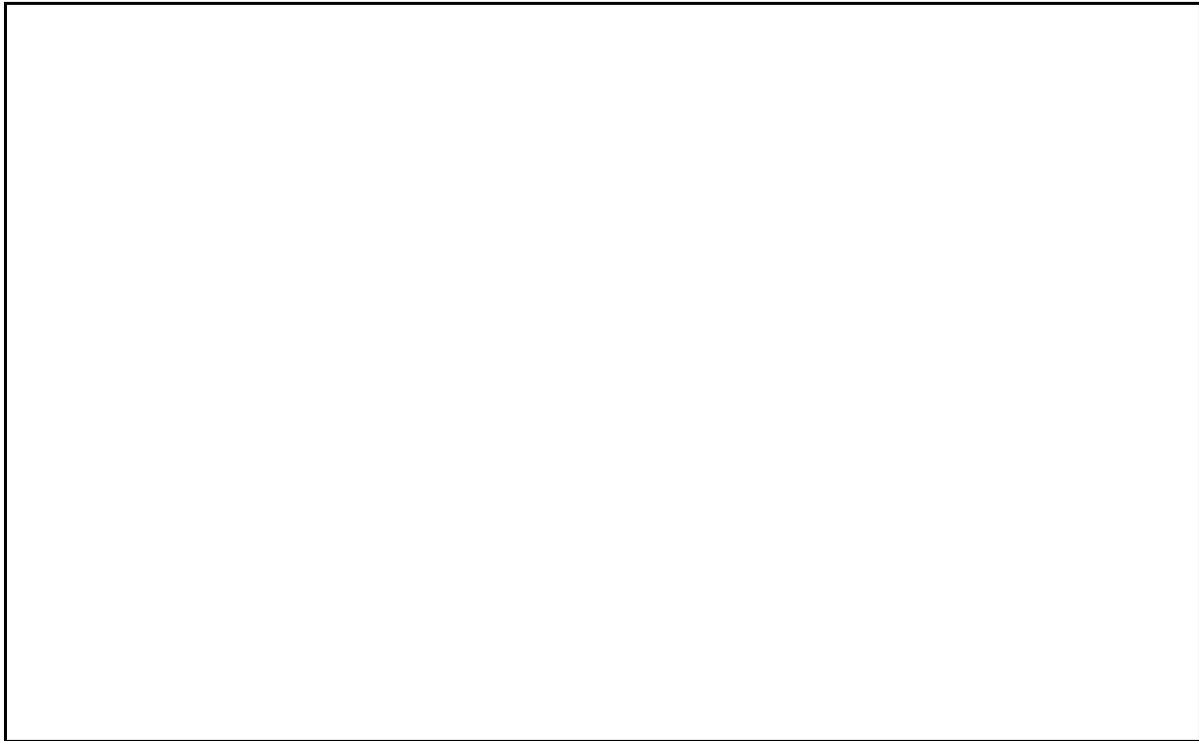
Diagram **NOT**  
accurately drawn



$ABCD$  is a rectangle.  
 $X$  is the midpoint of  $AB$ .  
 $Y$  is the midpoint of  $BC$ .  
 $Z$  is the midpoint of  $CD$ .

What fraction of the total area of  $ABCD$  is shaded?

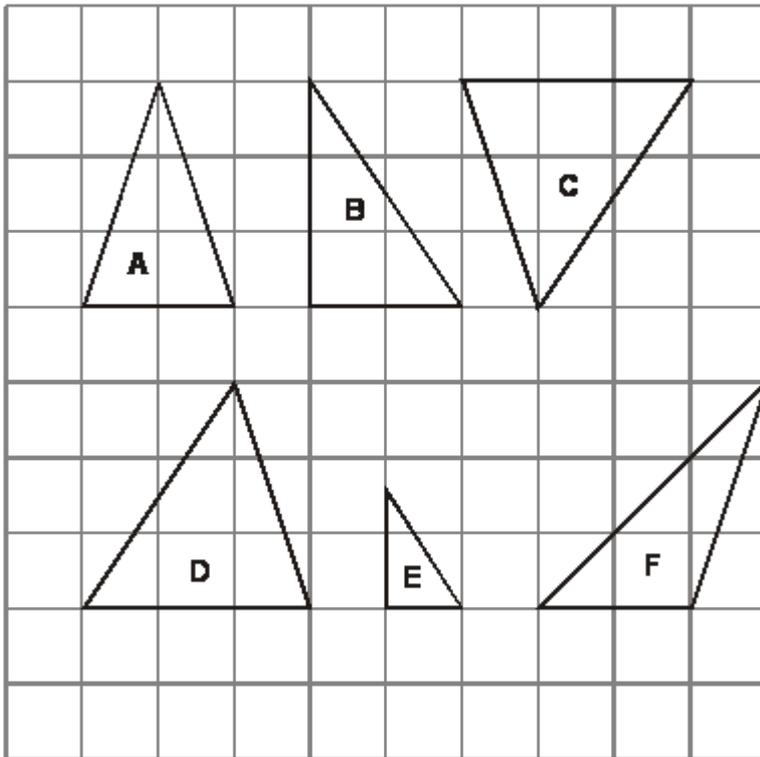
Show clearly how you get your answer.



.....

**(Total 4 marks)**

**Q22.** These triangles have been drawn on a centimetre grid.



(a) Write down the letters of the **two** triangles that are congruent.

..... and .....

(1)

(b) Write down the letters of **two different** triangles that are similar.

..... and .....

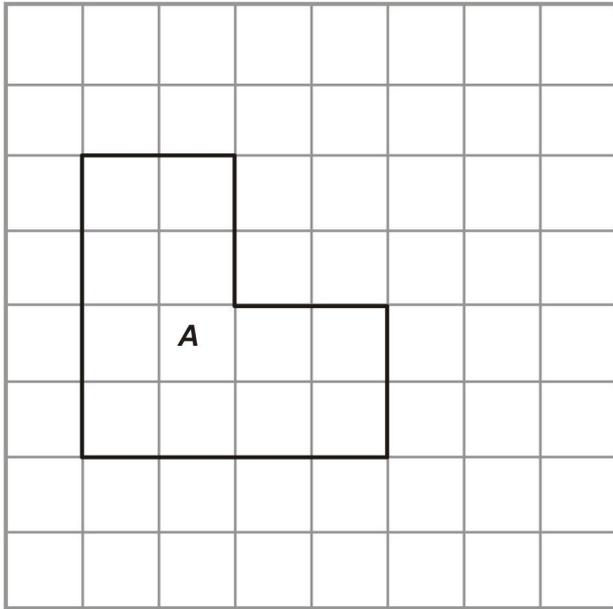
(1)

(c) Find the area of triangle **D**.

.....

(1)  
(Total 3 marks)

**Q23.**



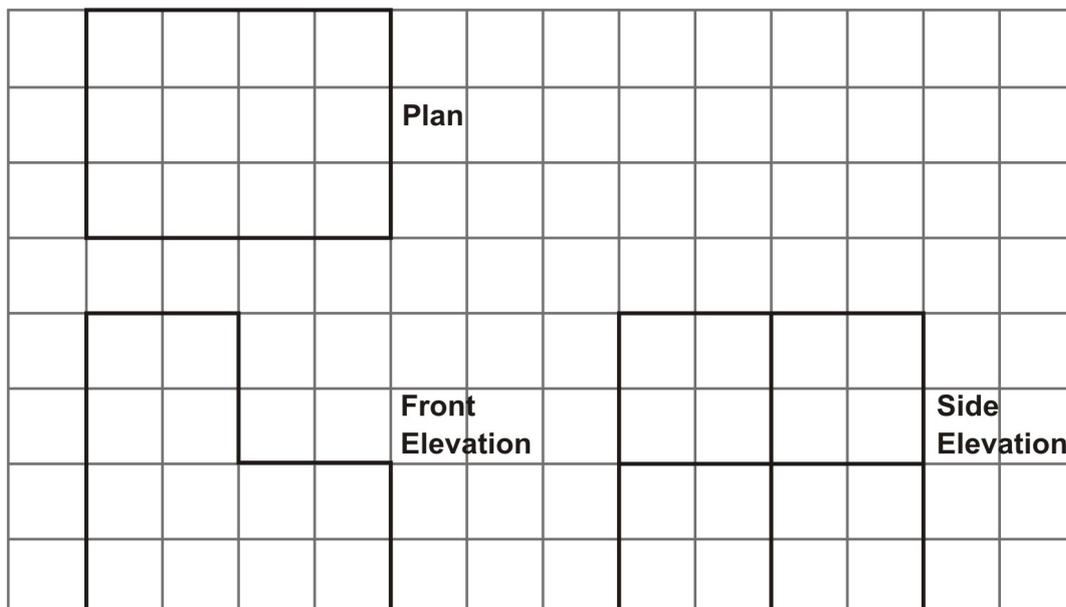
Shape *A* has been drawn on a centimetre grid.

- (a) Find the perimeter of shape *A*.

.....

**(1)**

The diagram shows the plan, the front elevation and the side elevation of a 3-D solid made from one centimetre cubes drawn full size.



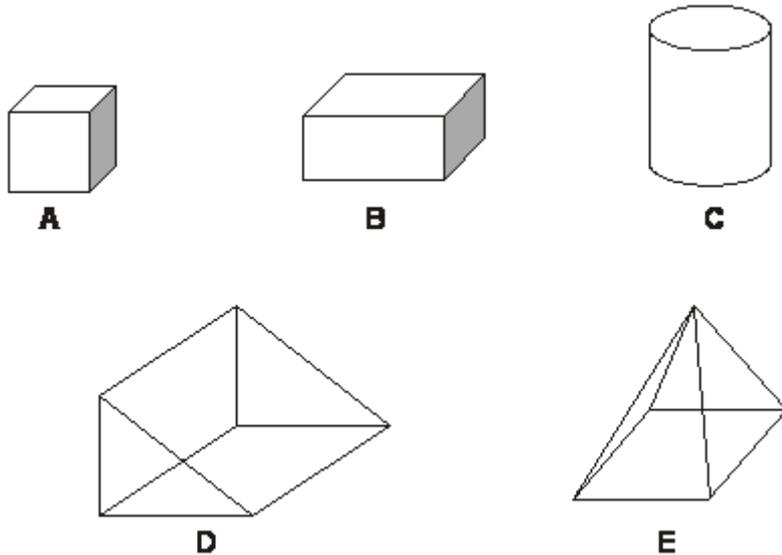
(b) Find the volume of the 3-D shape.

.....

(4)  
(Total 5 marks)

**Q24.** Ben is planning to make some blocks for a child.

The diagram shows some 3-D shapes.



(a) Write down the mathematical name of the 3-D shape **C**.

.....

(1)

(b) Write down the number of edges on the 3-D shape **D**.

.....

(1)

(c) Write down the letters of all the 3-D shapes that have 5 faces.

.....

(1)

Ben is going to make one of the boxes, the 3-D shape **B**.  
The 3-D shape is to be 4 cm high, 5 cm wide and 6 cm long.

- (d) (i) In the space below draw an accurate net of the solid shape **B**.
- (ii) Find the length and width of the smallest rectangle of card needed for the net.

Smallest width .....

Smallest length .....

(5)  
(Total 8 marks)

M1.

Answer	Mark	Additional Guidance
	3	<b>B3</b> all 4 correct <b>B2</b> for 2 or 3 correct <b>(B1</b> for 1 correct)
<b>Total for Question: 3 marks</b>		

M2.

	Working	Answer	Mark	Additional Guidance
(a)		(5, 2, 0)	1	<b>B1</b> for (5, 2, 0) cao
(b)	$\left(\frac{0+5}{2}, \frac{2+0}{2}, \frac{3+3}{2}\right)$	$\left(\frac{5}{2}, 1, 3\right)$	3	<b>B1</b> for (0, 2, 3) or for (5, 0, 3) or for (0, 0, 3) seen or implied <b>M1</b> for $\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}, \frac{z_1 + z_2}{2}\right)$ <b>A1</b> for $\left(\frac{5}{2}, 1, 3\right)$ oe <b>B1</b> SC for (x, y, 3)  <b>Alternative mark scheme</b> <b>B1</b> for each coordinate correct.
<b>Total for Question: 4 marks</b>				

M3.

	Working	Answer	Mark	Additional Guidance
(a)	$5^3 - 5 \times 3 \times 3$ $125 - 45$ $(5 \times 5 - 3 \times 3) \times 5$ $(25 - 9) \times 5$ $16 \times 5$	80	2	<b>M1</b> for attempt to find volume of cube (e.g. $5 \times 5 \times n$ where $n \neq 6$ ) and subtract volume of the hole (e.g. $3 \times 3 \times n$ where $n \neq 6$ ) (needs to be dimensionally correct) <b>A1</b> cao <b>Alternative method</b> <b>M1</b> for attempt to find area of the cross section and multiply by the depth of the prism (depth $\neq 6$ ) <b>A1</b> cao
(b)	$64 \div 80$	0.8	2	<b>M1</b> ft $64 \div "80"$ <b>A1</b> ft (to 2 sf or better)
				<b>Total for Question: 4 marks</b>

M4.

Answer	Mark	Additional Guidance
correct net	3	<b>B3</b> for correct net <b>(B2</b> for 5 faces drawn, all correct or 6 faces drawn with 4 or 5 faces correct <b>(B1</b> for a fully correct net with 6 faces for any cuboid) Note: Accept outline only drawn
		<b>Total for Question: 3 marks</b>

M5.

Working	Answer	Mark	Additional Guidance
45	200 minutes	6	<p><b>M1</b> for <math>120 \times 20 \times 30 (= 7200)</math></p> <p><b>M1</b> for "72000" <math>\div 120</math></p> <p><b>A1</b> for 600 cm<sup>3</sup> min oe</p> <p><b>M1</b> for <math>\frac{1}{2} \times (120 + 80) \times 40 \times 30 (= 120000)</math></p> <p><b>M1</b> for "120000" <math>\div</math> "600"</p> <p><b>A1</b> for 200 minutes or 3 hours 20 mins oe</p> <p>SC B1 for 4 hours</p>
			<b>Total for Question: 6 marks</b>

M6.

Working	Answer	Mark	Additional Guidance
Bottom / top is $5 \times 10 = 50$ ; $50 \times 2 = 100$ ; $280 - 100 = 180$ Other dimensions: $10 + 10 + 5 + 5 = 30$ ; $180 \div 30 =$	6	4	<p><b>M1</b> recognition that the bottom/top is <math>5 \times 10 (= 50)</math>, 50 seen</p> <p><b>M1</b> for <math>280 - 2 \times "50" (= 180)</math></p> <p><b>M1</b> for "180" <math>\div</math> "other dimensions" or valid attempt to find height using these dimensions</p> <p><b>A1</b> cao</p>
			<b>Total for Question: 4 marks</b>

M7.

Working	Answer	Mark	Additional Guidance
	Correct front elevation	3	<b>B1</b> for rectangle of width 3 cm <b>B1</b> for rectangle of height 4 cm <b>B1</b> for hidden line shown dotted
<b>Total for Question: 3 marks</b>			

M8.

	Working	Answer	Mark	Additional Guidance
(a)		Regular hexagon	1	<b>B1</b> (accept hexagon)
(b)		D	1	<b>B1</b> cao
(c)		D and G	1	<b>B1</b> for both, in any order
<b>Total for Question: 3 marks</b>				

M9.

		Working	Answer	Mark	Additional Guidance
<b>QWC</b> (i, ii, iii)	(a)	Wall area = $330 \times 40 + 90 \times 30 = 13200 + 2700 = 15900 \text{ cm}^2$	Tile A is the most economical	6	<b>M1</b> for either $330 \times 40$ or $90 \times 30$ or $10 \times 10$ or $15 \times 15$

<b>FE</b>	<p>Tile A area = <math>10 \times 10 = 100 \text{ cm}^2</math></p> <p>No of tiles = <math>15900 \div 100 = 159</math></p> <p>No of boxes needed = 8 (<math>20 \times 8 = 160</math> tiles)</p> <p><math>\pounds 9.99 \times 8 = \pounds 79.92</math></p> <p>Tile B area = <math>15 \times 15 = 225 \text{ cm}^2</math></p> <p>No of tiles = <math>15900 \div 225 = 70</math> (<math>225 \times 70 = 15700</math>) + 1</p> <p>No of boxes needed = 6 (<math>12 \times 6 = 72</math> tiles) but some tiles will need to be cut, so 7 boxes needed</p> <p><math>\pounds 11.49 \times 7 = \pounds 80.43</math></p> <p><b>OR</b></p> <p><math>330 \div 10 = 33</math> A tiles per long row</p> <p><math>40 \div 10 = 4</math> long rows</p> <p><math>33 \times 4 = 132</math> tiles</p> <p><math>90 \div 10 = 9</math> tiles per short row</p> <p><math>30 \div 10 = 3</math> short rows</p> <p><math>9 \times 3 = 27</math> tiles</p> <p><math>132 + 27 = 159</math> tiles</p> <p>No of boxes needed = 8 (<math>20 \times 8 = 160</math> tiles)</p> <p><math>\pounds 9.99 \times 8 = \pounds 79.92</math></p> <p><math>330 \div 15 = 22</math> B tiles per long row</p> <p><math>40 \div 15 = 3</math> long rows (1 row of tiles will be cut)</p> <p><math>22 \times 3 = 66</math> A tiles</p> <p><math>90 \div 15 = 6</math> tiles per short row</p> <p><math>30 \div 15 = 2</math> short rows</p> <p><math>6 \times 2 = 12</math> tiles</p> <p><math>66 + 12 = 78</math> tiles</p> <p>No of boxes needed = 7 (<math>12 \times 7 =</math></p>	<p><b>A1</b> for 15900 and (100 or 225)</p> <p><b>M1</b> for <math>15900 \div 100</math> or <math>15900 \div 225</math></p> <p><b>A1</b> ft for 10 A boxes needed (<math>'15900' \div '100'</math>) <math>\div 20</math> rounded up to nearest whole number) or 7 B boxes needed (<math>'15900' \div '225'</math>) <math>\div 12</math> rounded up to nearest whole number)</p> <p><b>B1</b> for answers or <math>\pounds 79.92</math> and <math>\pounds 80.43</math> to justify the choice</p> <p><b>C1</b> for comment on the need to cut some Type B tiles <b>QWC: Decision must be stated, with all calculations attributable</b></p> <p><b>OR</b></p> <p><b>M1</b> for <math>330 \div 10</math> or <math>90 \div 10</math> or <math>330 \div 15</math> or <math>90 \div 15</math></p> <p><b>A1</b> for (33 and 9) or (22 and 6)</p> <p><b>M1</b> for <math>33 \times 4 + 9 \times 3</math> or <math>22 \times 3 + 6 \times 2</math></p> <p><b>A1</b> ft for 10 A boxes needed (<math>'33 \times 4' \div '9 \times 3'</math>) <math>\div 20</math> rounded up to nearest whole number) or for 7A boxes needed (<math>'22 \times 3' \div '6 \times 2'</math>) <math>\div 12</math> rounded up to nearest whole number)</p> <p><b>B1</b> for answers or <math>\pounds 79.92</math> and <math>\pounds 80.43</math> to justify the choice</p> <p><b>C1</b> for comment on the need to cut some Type B tiles <b>QWC: Decision must be stated, with all calculations attributable</b></p>
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		84 tiles) $£11.49 \times 7 = £80.43$			
	(b)	The carton can have dimensions 42 cm $\times$ 31.5 cm $\times$ 21 cm or 63 cm $\times$ 21 cm $\times$ 21 cm or 84 cm $\times$ 31.5 cm $\times$ 10.5 cm or 63 cm $\times$ 42 cm $\times$ 10.5 cm or 126 cm $\times$ 21 cm $\times$ 10.5 cm	Net	3	<b>B1</b> for quoting a correct set of dimensions (could be simply on the diagram) <b>M1</b> for a net showing 6 rectangles that could form a cuboid <b>A1</b> for an accurate scale drawing or lengths labeled accurately
					<b>Total for Question: 9 marks</b>

M10.

	Working	Answer	Mark	Additional Guidance
(a)		Trapezium	1	<b>B1</b> cao
(b)		AC	1	<b>B1</b> cao
(c)		4.5cm or 45mm	1	<b>B1</b> for B1 cao
(d)		56.3°	1	<b>B1</b> for an angle in the range 55 to 58 inc.
				<b>Total for Question: 4 marks</b>

M11.

Working	Answer	Mark	Additional Guidance
$\pi x^2(2x) = \frac{1}{3} \pi(x)^2 h$	$6x$	3	<p><b>M1</b> for a correct volume formula in terms of <math>x</math>, e.g.  <math>\pi x^2(2x)</math> or <math>\frac{1}{3} \pi x^2 h</math></p> <p><b>A1</b> for <math>\pi(2x) = \frac{1}{3} \pi h</math> or <math>3\pi x^2(2x) = \pi x^2 h</math> or  <math>x^2(2x) = \frac{1}{3} x^2 h</math> (or better)</p> <p><b>A1</b> for <math>6x</math> cao</p>
			<b>Total for Question: 3 marks</b>

M12.

	Answer	Mark	Additional Guidance
(a)	S	1	<b>B1</b> for S cao
(b)	(2, 1, 3)	1	<b>B1</b> for (2, 1, 3) cao
			<b>Total for Question: 2 marks</b>

M13.

Answer	Mark	Additional Guidance
Sketch	2	<p><b>B2</b> complete 3-D sketch  <b>(B1</b> for partial 3-D sketch e.g. pyramid or base only,  or a shape with a box and 2 pyramids either end)  NB: If more than one shape is shown:</p>

		For 2 marks there should be no choices or alternatives other than those also worth 2 marks; if there are several diagrams of which at least one is worth 1 or 2 marks, award <b>B1</b> . 2D diagrams get B0.
<b>Total for Question: 2 marks</b>		

**M14.**

	Answer	Mark	Additional Guidance
(i)	6	3	<b>B1</b> cao
(ii)	12		<b>B1</b> cao
(iii)	8		<b>B1</b> cao
<b>Total for Question: 3 marks</b>			

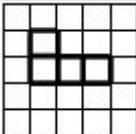
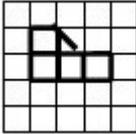
**M15.**

	Answer	Mark	Additional Guidance
(a)(i)	Trapezium	2	<b>B1</b> Trapezium. Accept misspelling as long as the word given is still recognisable.
(ii)	Parallelogram		<b>B1</b> Parallelogram. Accept misspelling as long as the word given is still recognisable.
(b)	Acute	1	<b>B1</b> cao
<b>Total for Question: 3 marks</b>			

M16.

Answer	Mark	Additional Guidance
(Net)	3	<b>B3</b> for fully correct net <b>(B2</b> for 3 or 4 out of 5 drawn faces (of 4 triangles and one quadrilateral) correct <b>OR</b> correct square and 4 isosceles triangles that together form the net of a pyramid) <b>(B1</b> for 1 or 2 out of 5 drawn faces correct)
<b>Total for Question: 3 marks</b>		

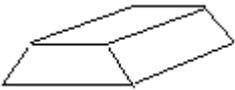
M17.

Answer	Mark	Additional Guidance
 OR 	2	<b>B2</b> For either answer <b>(B1</b> for an “L” shape with one dimension correct) Internal lines need not be drawn.  All 3-D drawings get B0
<b>Total for Question: 2 marks</b>		

M18.

	Answer	Mark	Additional Guidance
(i)	cone	1	<b>B1</b> for cone or alternative spellings only that sound like "cone".
(ii)	cylinder	1	<b>B1</b> for cylinder or alternative spellings only that sound like "cylinder". Accept circular based prism.
<b>Total for Question: 2 marks</b>			

M19.

	Answer	Mark	Additional Guidance
(a)		2	<b>M1</b> rectangle with either correct width or height or any square <b>A1</b> cao
(b)		2	<b>B2</b> for a correct sketch <b>(B1</b> any 3-D sketch of no more than 4 faces seen, with a trapezoidal face)
<b>Total for Question: 4 marks</b>			

M20.

	Answer	Mark	Additional Guidance
(a)	8	1	<b>B1</b> cao
(b)	<b>C</b>	1	<b>B1</b> for C or pyramid
<b>Total for Question: 2 marks</b>			

**M21.**

Working	Answer	Mark	Additional Guidance
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Let  $AB = x$ ,  $AD = y$

Area of rectangle =  $xy$

4

**M1** a full method to find the unshaded area and subtracting from 1

**B1** area of  $AXD = \text{area of } ABCD \div 4$

**B1** area of  $CYZ = \text{area of } ABCD \div 8$

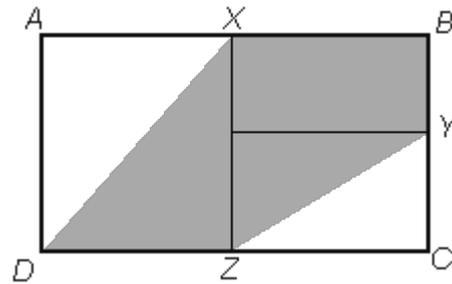
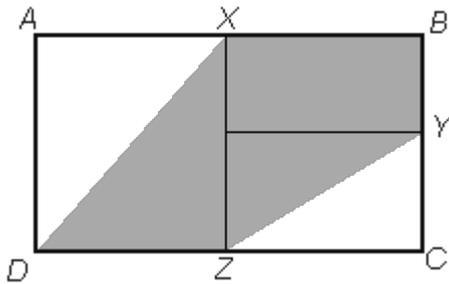
**A1** cao

**OR**

**Diagram**

**M1** for dividing left into 2 congruent triangles  
for dividing right into 4 congruent triangles

Total for Question: 4 marks



M22.

	Working	Answer	Mark	Additional Guidance
(a)		C and D	1	<b>B1</b> cao
(b)		B and E	1	<b>B1</b> cao
(c)		4.5 cm <sup>2</sup>	1	<b>B1</b> cao
<b>Total for Question: 3 marks</b>				

M23.

	Working	Answer	Mark	Additional Guidance
(a)		16 cm	1	<b>B1</b> cao (units included)
(b)		48 cm <sup>3</sup>	4	<b>M1</b> 3-D drawing or sketch

				<b>M1</b> $4 \times 4 \times 2$ and $2 \times 2 \times 4 / 4 \times 4 \times 4$ and $2 \times 2 \times 4$ <b>M1</b> adding or subtracting <b>A1</b> cao (units included)
				<b>Total for Question: 5 marks</b>

M24.

		Working	Answer	Mark	Additional Guidance
<b>FE</b>	(a)		cylinder	1	<b>B1</b> cao
	(b)		9	1	<b>B1</b> cao
	(c)		D, E	1	<b>B1</b> cao
	(d)(i)		Net	5	<b>B3</b> fully correct (B2 5 correct faces) (B1 a net of a cuboid)
	(ii)		14 cm × 18 cm		<b>B1, B1 ft</b> on d(i)
					<b>Total for Question: 8 marks</b>

- E1.** This question was well answered by all.
- E2.** Candidates realised what was required in this question but could not often carry out the execution of the task. In part (a) it was common to see a repetition of the coordinates of A whilst in (b) some candidates gained credit for realising that the z coordinate was in the same plane as  $ABCD$  and so gained a mark for using 3.
- E3.** Fully correct answers to this question were only given by 23% of candidates. In part (a) it was common to see the volume of the 5cm cube being given correctly but then incorrect calculations for the hole were frequently seen. Some candidates thought the hole was a 3 cm cube and not a square prism with length 5cm. Where candidates tried to subtract two sensible volumes they were awarded a mark, however it was quite common to see candidates try to subtract  $9\text{cm}^2$  away from  $125\text{cm}^3$  and therefore achieve no marks.
- In part (b) full marks were awarded for dividing the mass of 64 grams by the volume calculated in part (a) and 39% of candidates scored 2 marks usually for doing this. A large number of candidates divided volume by mass or multiplied mass and volume and so gained no credit. It was disappointing to see 39% of candidates gaining no marks at all in this question.
- E4.** Drawing an accurate net of the cuboid generally fell into two categories, those who produced a ruled accurate diagram and those who simply drew the same 2-D shape again on the squared outline provided. In between there were many nets with just five faces which were partially rewarded if the accuracy was there. Those candidates who ignored the given dimensions but drew an accurate net of a cuboid were awarded 1 mark. It was disappointing to note that nearly half the candidates failed to score any marks at all on this

question.

##

The most successful candidates structured their working clearly, often annotating the diagram to show different sections to match their calculations. Some identified that as the trough was a prism, it was not essential to consider volume but worked with the cross-section areas instead. Large numbers with zeros led to many arithmetical errors and many candidates did not recognise that they had to consider the rate of leakage. These errors along with problems converting between minutes and hours meant that many candidates presented final answers which were far too large. Candidates need to be encouraged to make use of estimation and consider the reasonableness of any answer reached. Perhaps most importantly, candidates need to practice solving unstructured problems and compare the efficiency of a variety of approaches so that they can select appropriate methods to use.

##

This was almost always treated as if the 280 was volume. Some appeared to recognise that it wasn't volume and they took the area from 280, but then reverted to volume. Some thought that the height must be the same as the width and gave the answer 5 cm. Very few correct answers.

**E11.** Many candidates were able to score one mark for writing a correct formula for the volume of the cone or the volume of the cylinder in terms of  $x$ , and some were able to equate two correct formulae, but few could rearrange the equation accurately to find  $h$

$$\frac{2x}{\left(\frac{1}{3}\right)} = \frac{2}{3}x$$

in terms of  $x$ . A common error here was  $\left(\frac{1}{3}\right)$ . A small number of candidates were able to compare the two volume formulae and simply write down the answer without working.

- E12.** About three quarters of the candidates were able to gain at least one mark on this question. In part (a), a common incorrect answer for the point with coordinates  $(2, 1, 0)$  was  $R$ , and in part (b), a common incorrect answer for the coordinates of  $P$  was  $(2, 3, 1)$ .

**E13. Foundation**

There were some very good attempts to draw a sketch of the 3D shape, with more than half the candidates gaining full marks. A minority attempted to draw nets or 2D diagrammatic representations of the shape. In some cases the sketch showed a shape where the sloping edges failed to meet at a single point, which in most cases was given 1 mark.

**Higher**

This question was answered very well. The majority of candidates gave a sort of isometric view of a square based tetrahedron surmounting a cuboid and gained their marks. A few candidates seemed to misunderstand the task and gave a repeat of the front or the side view. Some candidates took the cross sign on the plan literally (figuratively?) and drew a diagonal cross on the base of the cuboid part.

- E14.** Many candidates were unable to understand the terms “face”, “edge” or “vertex”. About half of candidates gained the mark in (i), but answers given to (ii) were many and varied, almost arbitrary.

- E15.** There were predictably many confused spellings associated with naming the shapes; examiners did not penalise incorrect spelling unless it led to ambiguity. Overall this question was not well answered, with many incorrect names given for the shapes. Part (b)

was better answered, with about  $\frac{2}{3}$  of the candidates naming the angle correctly. The most common error was in naming it as an obtuse angle.

**E16.** The key to gaining full marks in this question was to realise that the height of the four triangular faces was not 3 cm. Nevertheless those who drew 4 isosceles triangles, generally with the two equal sides being 3 cm each, were considered creditable and worthy of 2 marks. The positioning of the apex of the triangles centrally was not always well done and some candidates lost a mark for accuracy. Others used compasses to draw accurate triangles. Over a third of the candidates clearly did not understand the term 'net' as they proceeded to either draw some sort of 3-D diagram or drew the plan of the pyramid.

**E17. Foundation**

Over 60% of candidates were awarded both marks for a correct drawing. However, a significant proportion of candidates attempted to give a 3 dimensional representation and could not be given any credit for their answers.

**Higher**

Whilst the modal answer to this question was one of the correct ones, there were many alternative answers seen. Many offered 3-dimensional sketches which all gained no marks.

**E18. Specification A**

Poor spelling was not penalised as long as the word could be unambiguously associated

with the solid. Nevertheless it was disappointing that 20% of candidates were unable to name these common solids correctly.

### **Specification B**

Recognition of mathematical shapes and the use of the correct mathematical name was often evident with over 70% of the candidates scoring in each part. In part (i) the cone was often referred to as a pyramid or circular pyramid whilst in part (ii) the cylinder, with all its spelling variations, was sometimes referred to as a tube or a cuboid.

## **E19. Specification A**

### **Foundation**

The understanding of this topic is mixed. Clearly many candidates are confused with the terminology of side/front elevation and plan in part (a), very many simply copying one of the two elevations shown.

In part (b), attempts at a 3-D sketch were generally good and many candidates scored at least one mark in this part.

### **Higher**

The correct answer of a 2 by 2 square was drawn by about half of the candidates. A very common error was to draw a rectangle with either the correct width or the correct height. Some candidates reproduced the given plan whilst others reproduced the given front elevation.

Part (b) was answered quite successfully. Most candidates seemed to have a good understanding of what was required and appreciated that the shape should look like a prism. Some of the sketches were not too well drawn but the majority at least showed a trapezoidal face.

### **Specification B**

### **Foundation**

Many candidates were able to score at least 1 mark for this question.

In part (a), few candidates drew a  $2 \times 2$  square for the side elevation of the solid shape, but many were able to score a mark for a drawing an acceptable rectangle. In part (b), Many candidates were able to score at least 1 mark for an acceptable sketch of the solid shape.

Some had difficulty in maintaining the same perspective throughout the whole sketch. Common incorrect answers here include sketches of triangular prisms, cubes, cuboids and nets.

### Higher

There were many good answers to part (a) although some candidates thought the required elevation looked like the plan or like the front elevation.

Answers to part (b) were generally successful.

**E20.** Only one in three candidates was able to give the correct number of vertices of the cube; 6 and 12 being the most common mistakes. Part (b) was very well answered.