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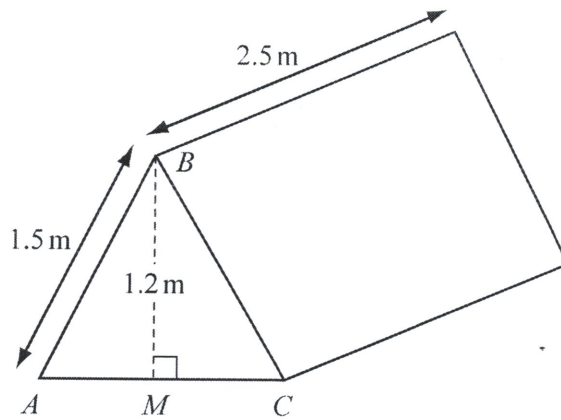
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MATHEMATICS -CORE

TOPIC- Surface area & Volume of
solids

0 16 Finn is going camping.
The diagram shows his tent.



For
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Use

NOT TO
SCALE

ABC is an isosceles triangle.
 M is the midpoint of AC .
 $AB = 1.5$ m and $BM = 1.2$ m.

(a) Show that $AM = 0.9$ m.

Answer(a)

[2]

(b) Use trigonometry to calculate angle ABM .

Answer(b) Angle $ABM = \dots\dots\dots$ [2]

- (c) The tent is a prism of length 2.5 m.
The area of triangle ABC is 1.08 m^2 .

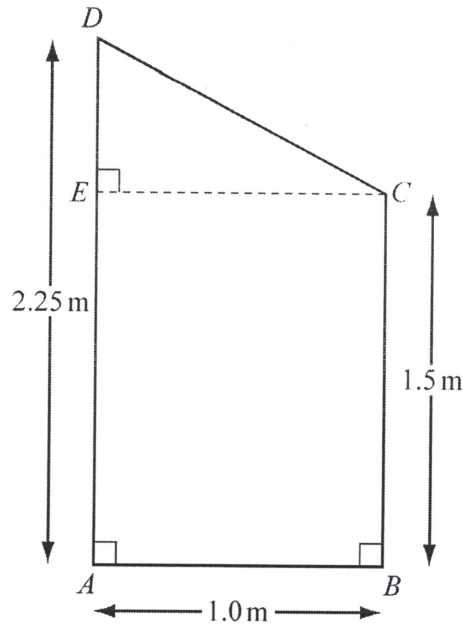
Calculate the volume of the tent.
Give the units of your answer.

Answer(c) [2]

- (d) Calculate the surface area of the tent, including the base.

Answer(d) m^2 [3]





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The diagram shows a trapezium $ABCD$.
 $AB = 1.0$ m, $AD = 2.25$ m, $BC = 1.5$ m and angle $DEC = 90^\circ$.

(a) Using trigonometry, calculate angle DCE .

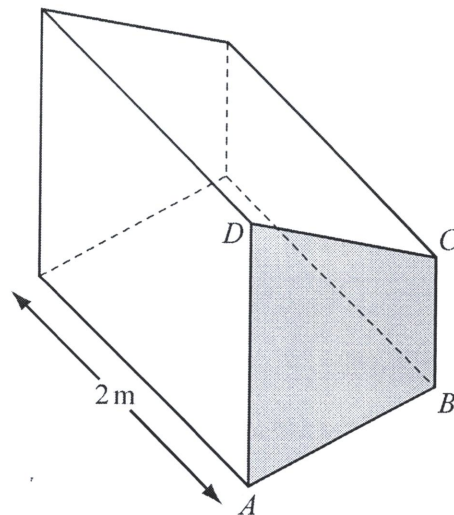
Answer(a) Angle $DCE = \dots\dots\dots$ [3]

(b) Calculate the area of the trapezium $ABCD$.

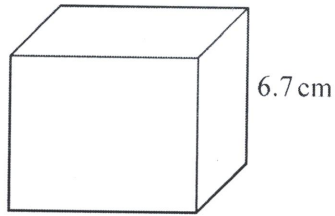
Answer(b) $\dots\dots\dots$ m² [2]

(c) $ABCD$ is the cross-section of a box.
 The box is 2 m long.

Calculate the volume of the box.



Answer(c) $\dots\dots\dots$ m³ [1]



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Each edge of this cube is 6.7 cm long.

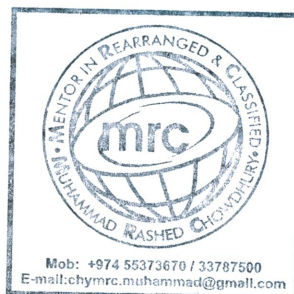
Work out

(a) the volume,

Answer(a) cm^3 [2]

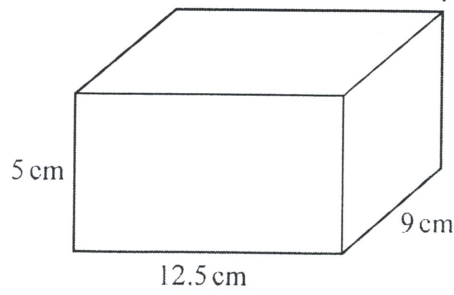
(b) the surface area.

Answer(b) cm^2 [2]

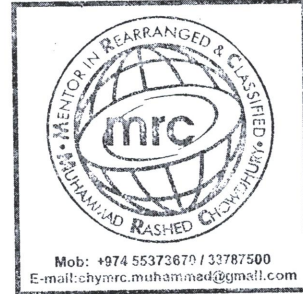


04

13-N-15



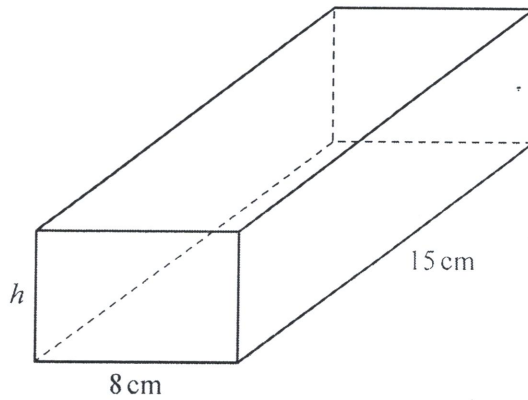
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Calculate the volume of this cuboid.
Give the units of your answer.

Answer [3]

05 The diagram shows a cuboid.



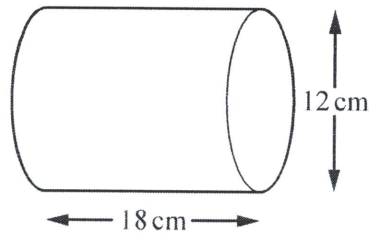
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The volume of this cuboid is 720 cm^3 .
The width is 8 cm and the length is 15 cm.

Calculate h , the height of the cuboid.

Answer $h =$ cm [2]

06 (a) A cylinder has diameter 12 cm and length 18 cm.



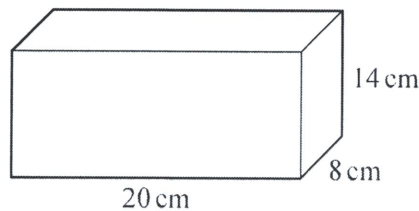
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Calculate the volume of the cylinder.

Answer(a) cm^3 [2]

(b)



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(i) Calculate the surface area of this cuboid.

Answer(b)(i) cm^2 [3]

(ii) Write your answer to part (b)(i) in square millimetres.

Answer(b)(ii) mm^2 [1]

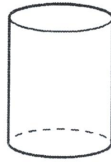
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07 Irina has some solid building blocks.

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



Answer(a) [1]

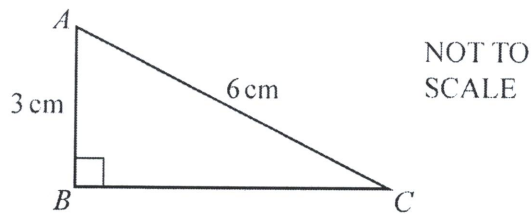
(b) Irina describes the shape of a different block.
She says:

It has 12 edges and 8 vertices. All the faces are the same shape.

Write down the mathematical name of this solid.

Answer(b) [1]

(c) The diagram shows the end face of another block.



(i) Show that $BC = 5.2$ cm, correct to 1 decimal place.

Answer(c)(i)

[3]



(ii) Find the area of triangle ABC .

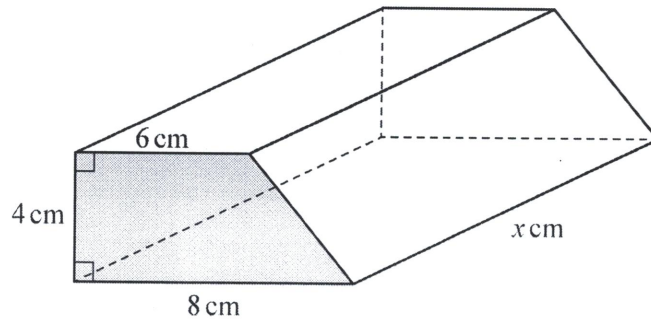
Answer(c)(ii) cm^2 [2]

(iii) This block is a triangular prism with length 8 cm.

Calculate the volume of the block.

Answer(c)(iii) cm^3 [1]

(d) The diagram shows another building block.



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(i) Calculate the area of the end face of this block.

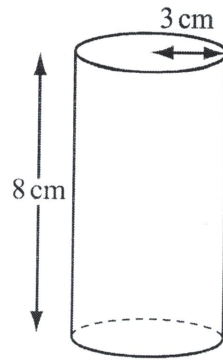
Answer(d)(i) cm^2 [2]

(ii) The volume of this block is 336 cm^3 .

Find the value of x .

Answer(d)(ii) $x =$ [1]

08 (a)



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A cylindrical drinking glass has radius 3 cm and height 8 cm.

- (i) Calculate the volume of water the glass holds when it is filled to the top.
Give the units of your answer.

Answer(a)(i) [3]

- (ii) Water is poured into a number of these glasses from a jug containing 1.5 litres.
Each glass has a horizontal line 2 cm from the top.

Calculate how many of these glasses can be filled up to the line from the jug.

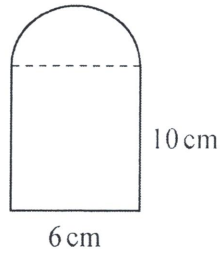
Answer(a)(ii) [4]

- (b) A cylindrical pipe has a circumference of 16 cm.

Calculate the diameter of the pipe.

Answer(b) cm [2]

09

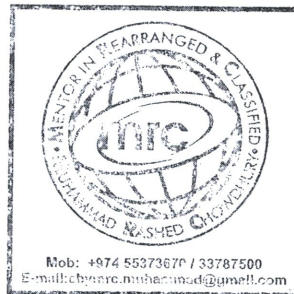


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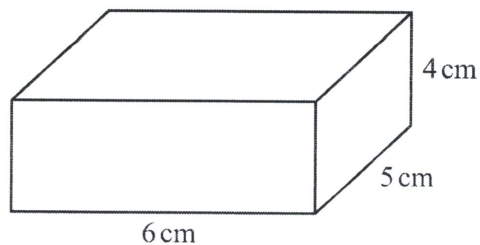
This shape is made from a rectangle and a semicircle.
The rectangle measures 10 cm by 6 cm.

Work out the area of the shape.

Answer cm² [3]



(c) A cuboid measures 6 cm by 5 cm by 4 cm.



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Work out the surface area of the cuboid.

Answer(c) cm^2 [3]

(d) 1m^3 of copper has a mass of m kg.
The volume of one copper sphere is v m^3 .

Write down an expression for

(i) the mass, in kilograms, of one sphere,

Answer(d)(i) kg [1]

(ii) the mass, in kilograms, of s spheres,

Answer(d)(ii) kg [1]

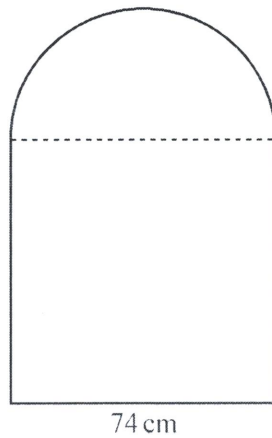
(iii) the mass, in grams, of s spheres.

Answer(d)(iii) g [1]



10 The diagram shows a notice board.

M-11-17



NOT TO SCALE

The board is in the shape of a semicircle joined to a square with side 74 cm.

(a) Calculate

(i) the perimeter of the board,

..... cm [3]

(ii) the area of the board.

.....cm² [3]

(b) The board is a prism that is 5 cm thick.

Calculate the volume of the board.

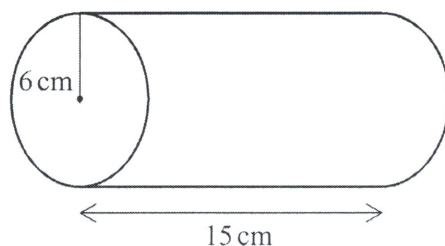
.....cm³ [1]

11 (a) Work out the area of a circle with radius 6 cm.

J-12-17

..... cm² [2]

(b) A solid cylinder has length 15 cm and radius 6 cm.



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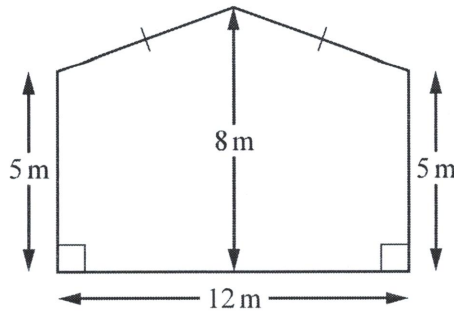
Calculate the total surface area of the cylinder.

..... cm² [4]

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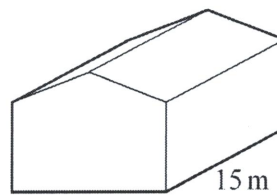
The diagram shows the front face of a barn.
 The width of the barn is 12 m.
 The height of the barn is 8 m.
 The sides of the barn are both of height 5 m.

(a) Work out the area of the front face of the barn.

Answer(a) m² [3]

(b) The length of the barn is 15 m.

Work out the volume of the barn.

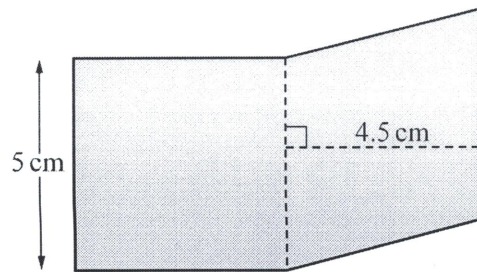


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Answer(b) m³ [1]



13 The shaded shape is made by joining a square and a rhombus.



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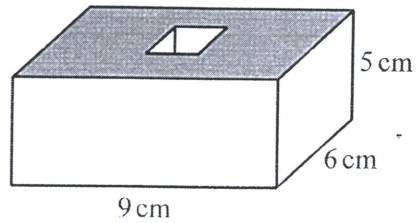
Work out

(a) the perimeter of the shaded shape,

..... cm [1]

(b) the area of the shaded shape.

..... cm² [2]

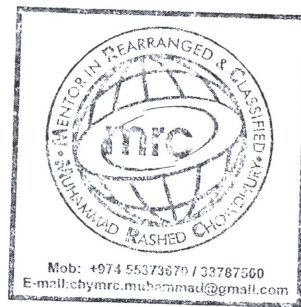


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The diagram shows a solid in the shape of a cuboid with a small cube removed.
The cuboid measures 9 cm by 6 cm by 5 cm.
Each edge of the small cube measures 2 cm.

Calculate the volume of the solid.

..... cm³ [3]

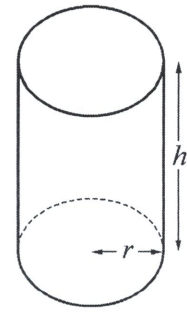


15

The diagram shows a cylindrical flower vase with radius, r , and height, h .

The volume, V , of the vase is $V = \pi r^2 h$.

The surface area, A , of the vase is $A = 2\pi r h + \pi r^2$.



NOT TO SCALE

(a) The vase has radius 4 cm and height 15 cm.

(i) Calculate the volume of the vase.
Write down the units of your answer.

..... [3]

(ii) Calculate the surface area of the vase.

..... cm² [2]

(b) Make h the subject of the formula $A = 2\pi r h + \pi r^2$.

$h =$ [2]

(c) Factorise completely.

$$2\pi r h + \pi r^2$$

..... [2]

(d) Another cylindrical flower vase has radius 6 cm and height 22.5 cm.

(i) For this vase and the vase in **part (a)** the ratio of the radii is 4 : 6
and the ratio of the heights is 15 : 22.5 .

Write these ratios in their simplest form.

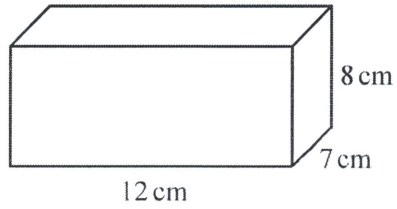
4 : 6 = :

15 : 22.5 = : [2]

(ii) Write down a mathematical word to complete the statement.

The ratios show that the two vases are [1]

16 (a)



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Calculate the volume of this cuboid.

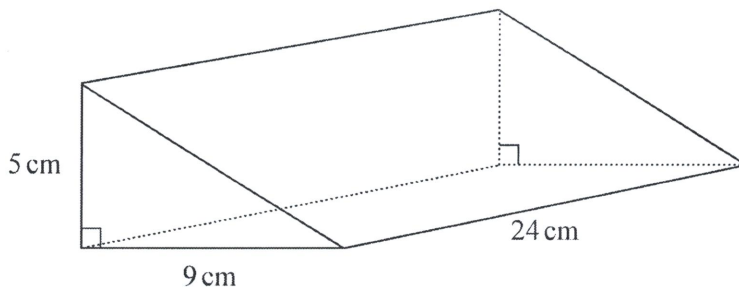
..... cm^3 [2]

(b) Another cuboid has width 6 cm, height 9 cm and volume 675 cm^3 .

Calculate the length of this cuboid.

..... cm [2]

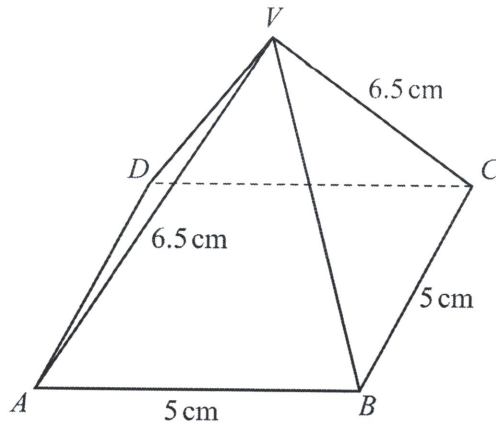
(c) The diagram shows a right-angled triangular prism.



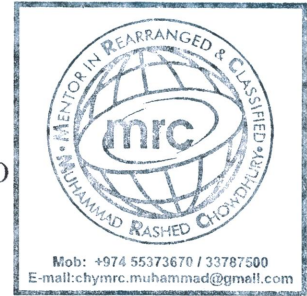
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Calculate the volume of this prism.

..... cm^3 [3]



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For Examiner's Use

The diagram shows a pyramid, $ABCDV$, on a square base. All the sloping faces are congruent triangles. $AB = 5$ cm and $VA = 6.5$ cm.

(a) Write down the mathematical name of triangle VAB .

Answer(a) [1]

(b) (i) Using a ruler and compasses only, construct the triangle VAB . Show your construction arcs.

[2]

(ii) By making any necessary measurements, calculate the area of triangle VAB .

Answer(b)(ii) cm^2 [3]

(iii) Calculate the total surface area of the pyramid, including the base.

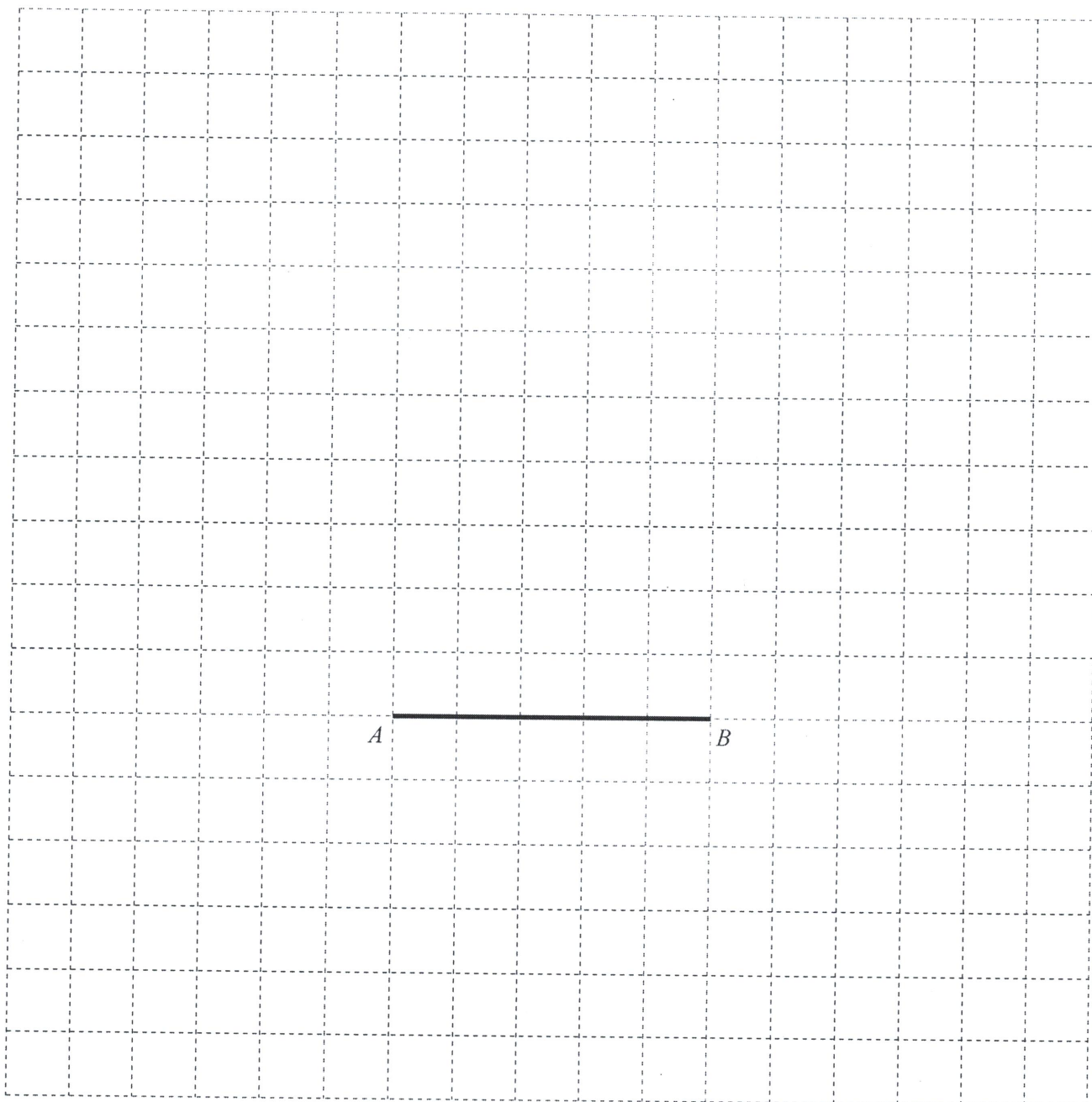
Answer(b)(iii) cm^2 [2]

(iv) Work out the total length of **all** the edges of the pyramid.

For
Examiner's
Use

Answer(b)(iv) cm [2]

(c) On the grid, draw an accurate net of the pyramid.
The line AB has been drawn.



[3]

Question 9 is printed on the next page.