St. Patrick's High School, Keady

Mathematics Department

GCSE Mathematics Practice Booklet

M2

Topic 3 – Geometry and Measure 1

Perimeter

Area

Volume

Pythagoras' Theorem

Questions taken from CCEA Past Papers

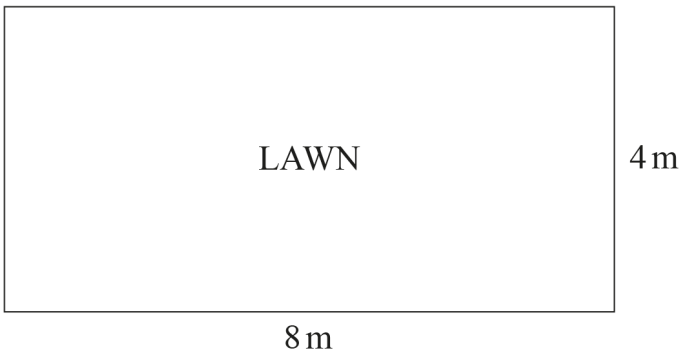
Mark Scheme included at the end of this booklet

Keady Maths

Q1

Jim, who runs a gardening business, cuts the grass on lawns.

The measurements of one lawn are shown in the diagram below.



Jim charges £2 per square metre for cutting grass.

How much does he charge to cut the grass on the lawn?

Answer £_____ [2]

Q2 A building firm needs to put fencing around the perimeter of a rectangular site.

The dimensions of the site are shown in the diagram.

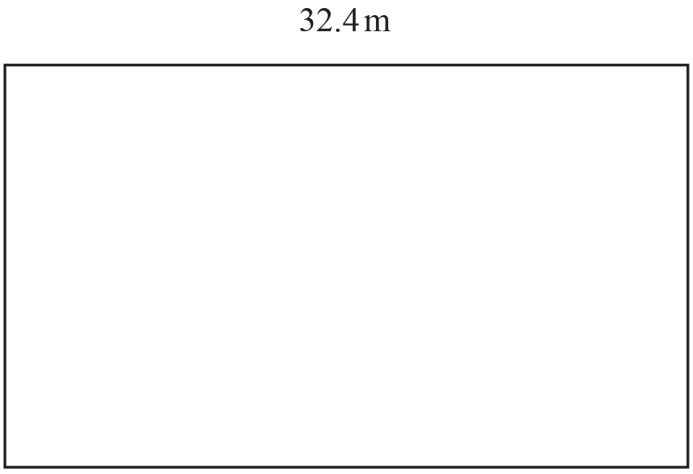


diagram not drawn accurately

(a) Calculate the total perimeter of the site.

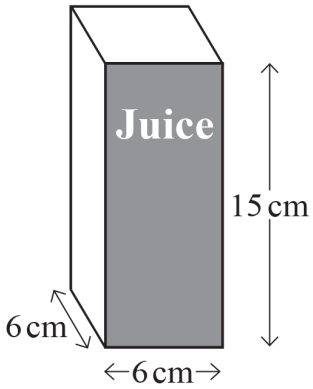
Answer _____ m [1]

(b) Each section of fencing is 180 cm wide.

How many sections are needed to go around the perimeter of the site?

Answer _____ [2]

Q3 A juice carton is in the shape of a cuboid, as shown in the diagram below.



(a) What is the area of the front face of the juice carton?

Answer _____ cm^2 [1]

(b) Calculate the volume of the juice carton.

Answer _____ cm^3 [2]

(c) John says "The carton will hold more than half a litre of juice."

Is he correct?

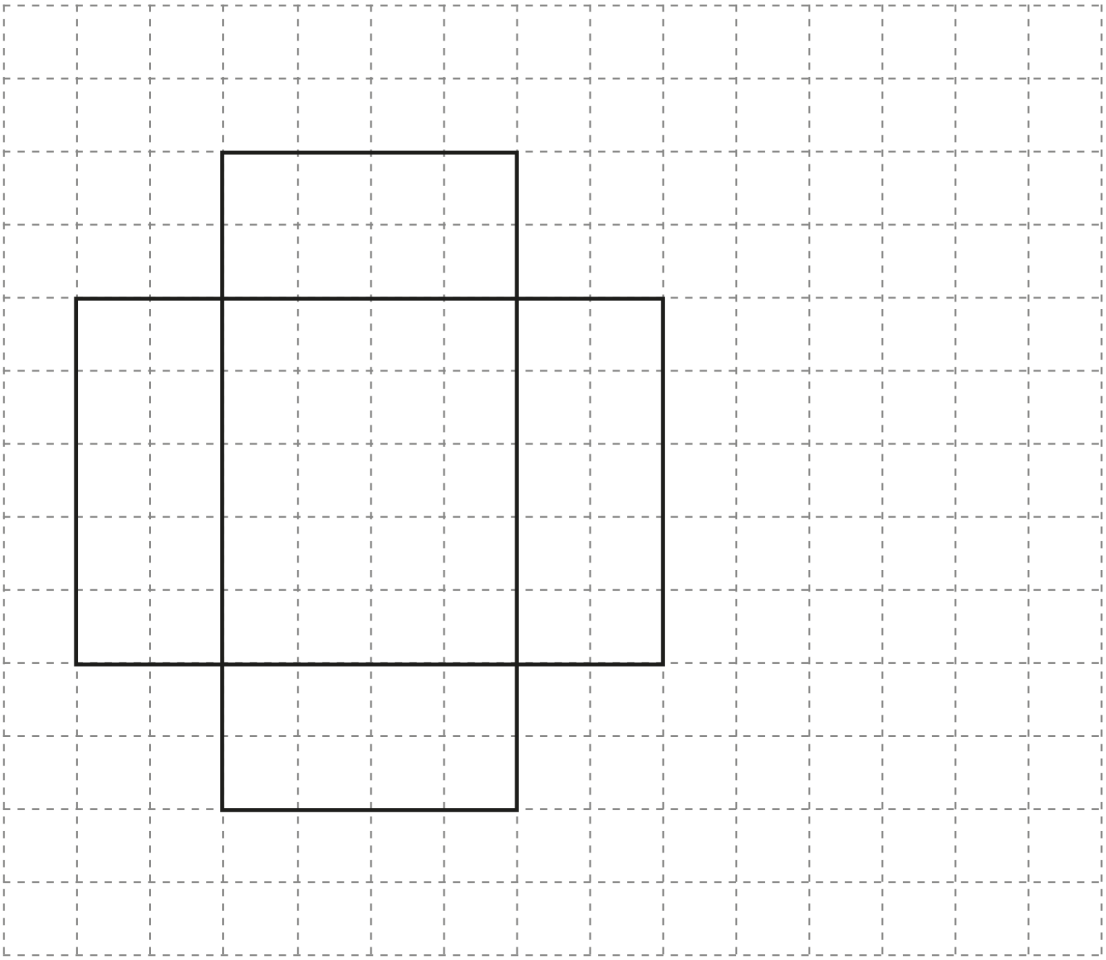
Explain your answer clearly.

Answer _____ because _____

_____ [1]

Q4 Part of the net of a cuboid is drawn on centimetre squared paper.

One face is missing.



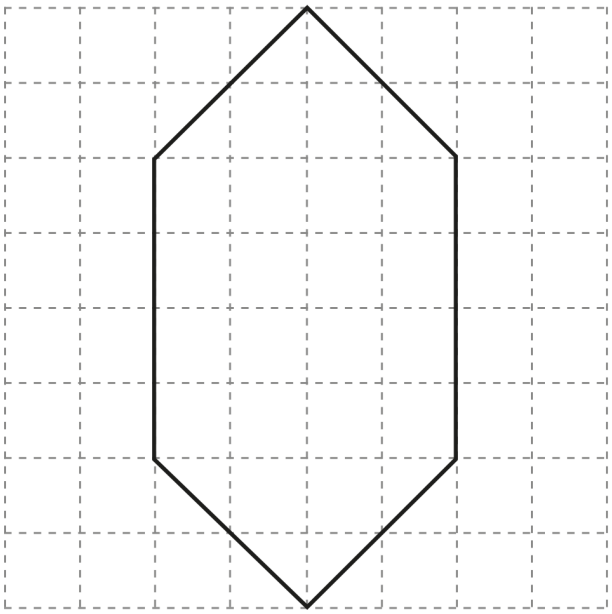
(a) Complete the net by drawing the missing face. [1]

(b) The net is folded up to make a cuboid.

Work out the volume of the cuboid.

Answer _____ cm^3 [3]

Q5 A shape is drawn on a centimetre squared grid as shown below.

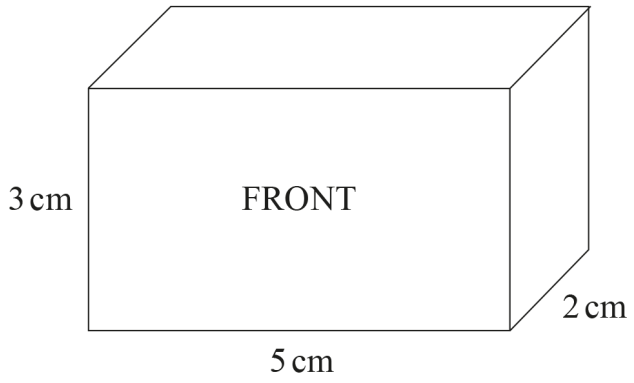


(a) Work out the area of the shape.

Answer _____ cm^2 [1]

(b) Draw all the lines of symmetry on the shape. [1]

Q6 Here is a cuboid.



(a) What is the area of the front face of the cuboid?

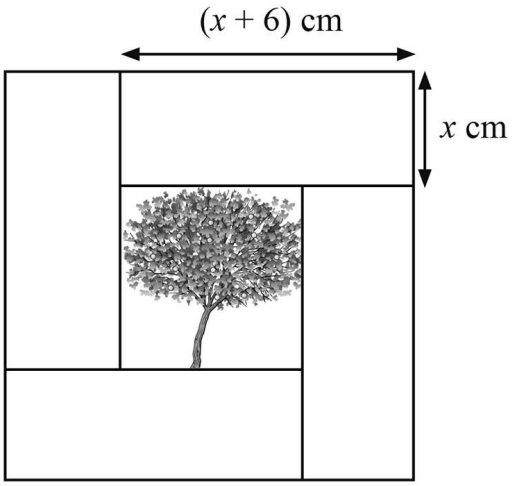
Answer _____ cm^2 [1]

(b) Work out the volume of the cuboid.

Answer _____ cm^3 [2]

Q7 Four identical rectangular tiles surround a picture as shown in the diagram to form a frame.

The sides of the rectangular tile are x cm and $(x + 6)$ cm.



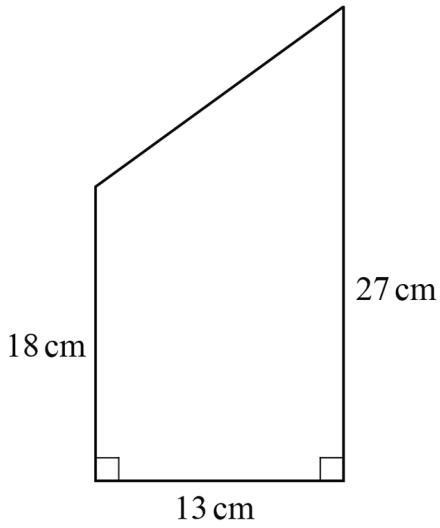
(a) Find a formula for the perimeter P of the frame in its simplest form.

Answer P = _____ [2]

(b) What is the area of the picture?

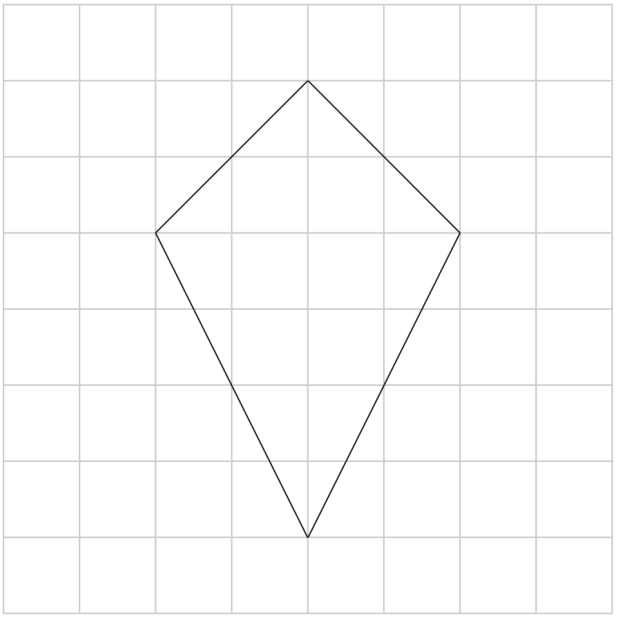
Answer _____ cm^2 [2]

Q8 Find the area of this trapezium.



Answer _____ cm^2 [2]

Q9 The diagram below shows a kite, drawn on a centimetre squared grid.



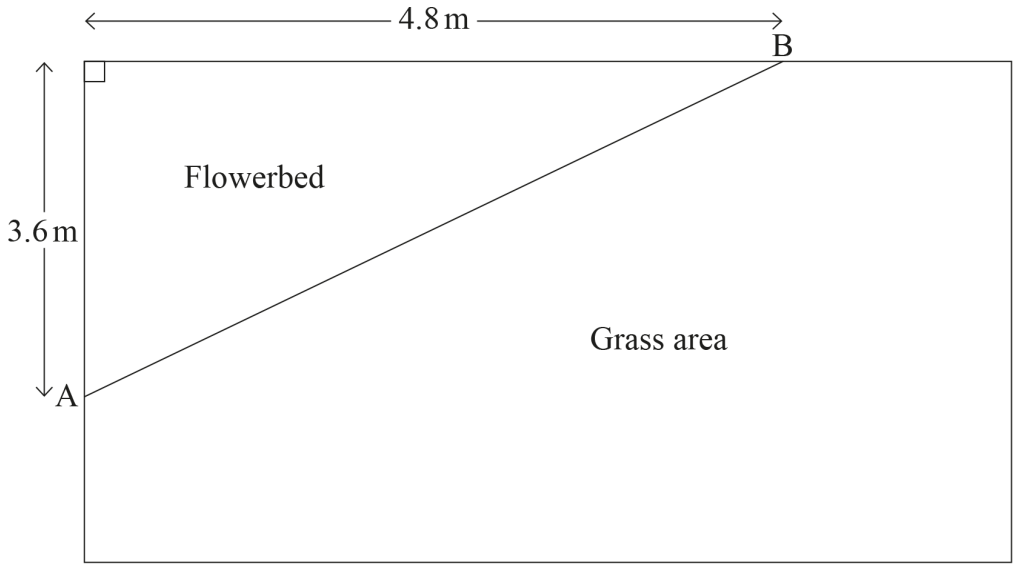
(a) Work out the area of the kite.

Answer _____ cm^2 [1]

(b) Draw a line of symmetry on the kite. [1]

Q10 A garden has a flowerbed in the corner.

A diagram of the garden is shown below.



(a) Calculate the area of the flowerbed.

Answer _____ m^2 [2]

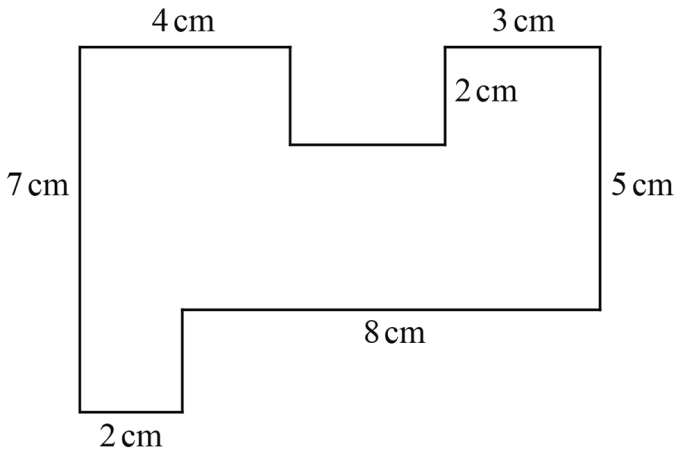
(b) There is a fence along the line AB separating the flowerbed from the grass area.

How long is the fence?

Answer _____ m [3]

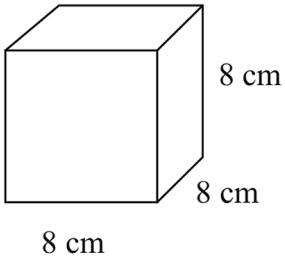
Q11 Calculate the area of the shape shown below.

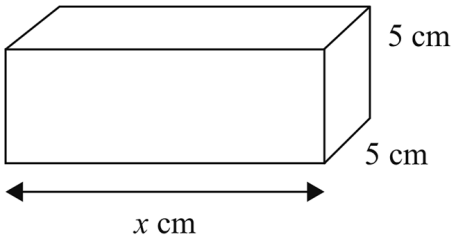
diagram not drawn to scale



Answer _____ cm^2 [3]

Q12



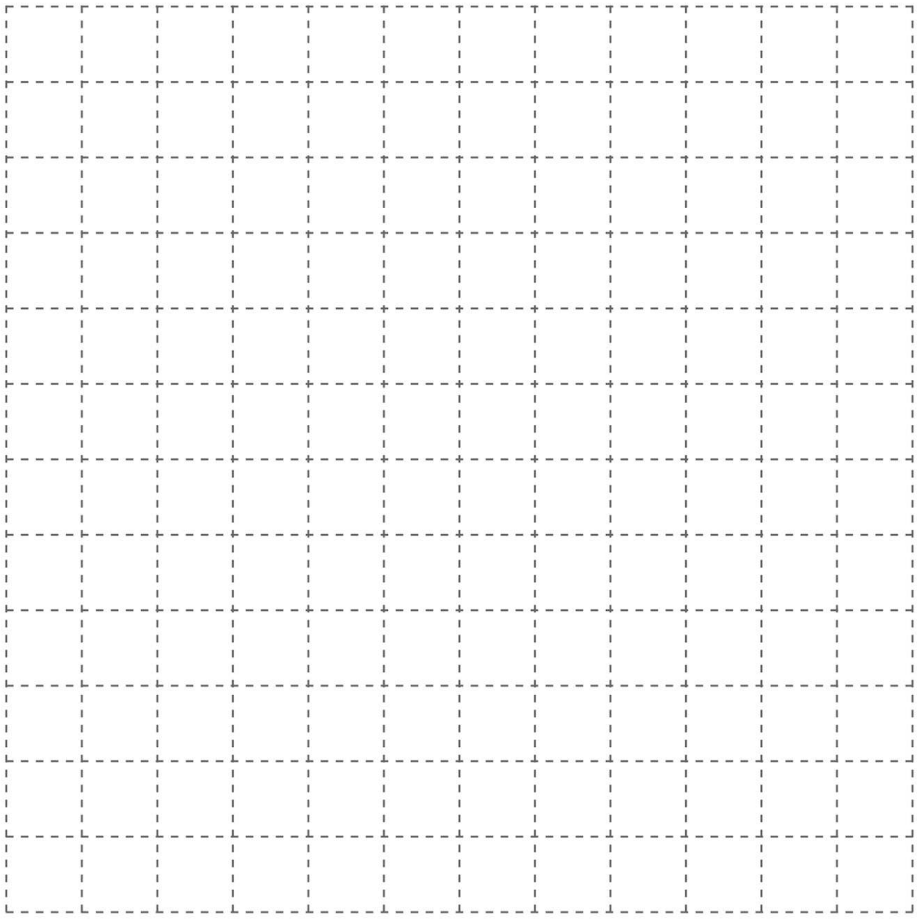


The surface area of a cube of side length 8 cm is the same as the surface area of the cuboid shown.
Find the value of the side marked x cm.

Answer _____ cm [4]

Q13

(a) On the grid below draw a rectangle with an area of 24 cm^2
Each small square is 1 cm^2

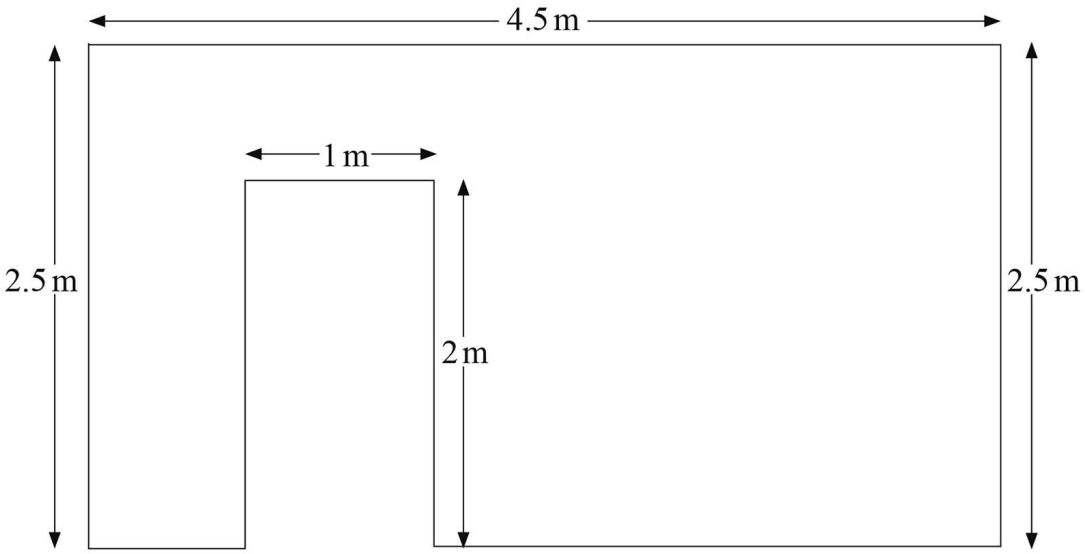


[2]

(b) Lisa drew a rectangle with an area of 24 cm^2 and a perimeter of 22 cm. What are the dimensions of Lisa's rectangle?

Answer length = _____ cm; breadth = _____ cm [1]

Q14



The diagram above represents a wall with an open entrance.

All the lines are either horizontal or vertical.

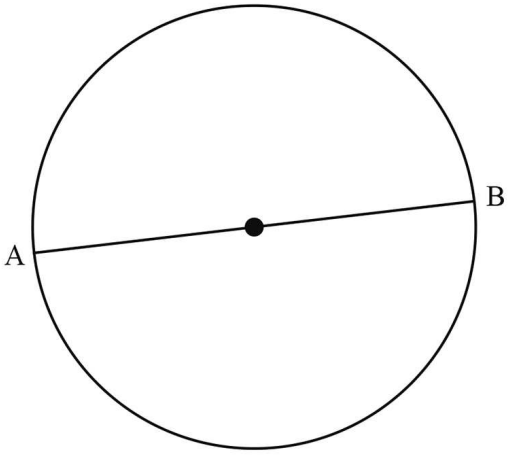
(a) Work out the perimeter.

Answer _____ m [1]

(b) Work out the area.

Answer _____ m^2 [2]

Q15

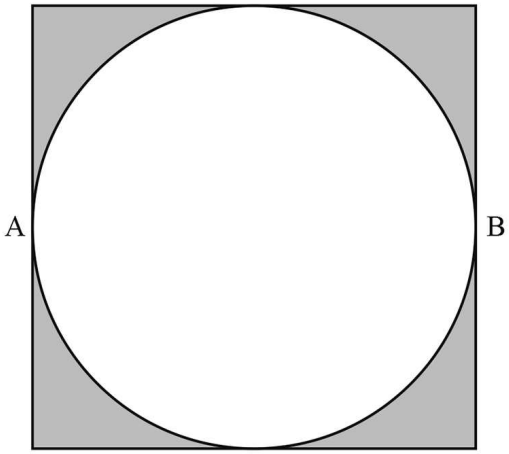


(a) AB is a diameter of the circle. AB is 13 cm.

Calculate the area of the circle.

Answer _____ [3]

(b) This circle is now set inside a square as shown. Find the shaded area.



Answer _____ [2]

Q16 **(a)** Calculate the circumference of a circle with diameter 2 m.

Answer _____ m [2]

(b) Hence calculate the perimeter of the window below, which is made up of a semicircle and a rectangle.

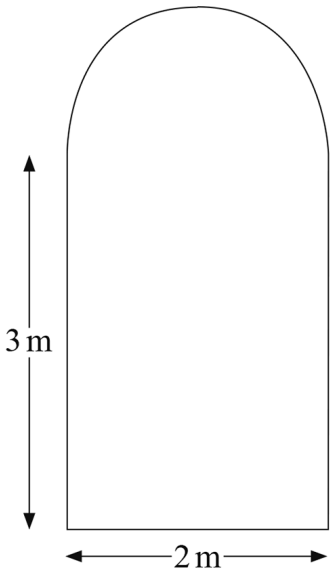


diagram not
drawn accurately

Answer _____ m [2]

Q17 Find the area of this triangle.

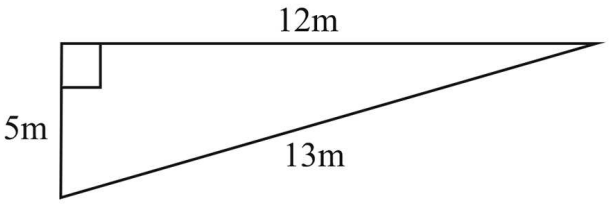
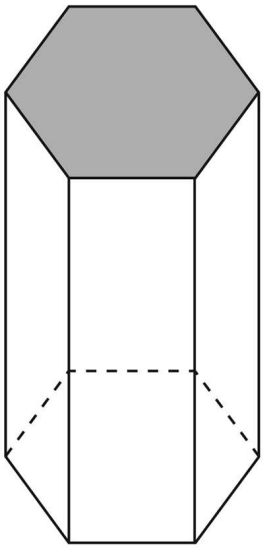


diagram not
drawn accurately

Answer _____ m^2 [3]

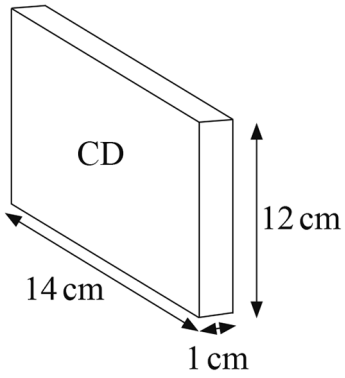
Q18 A pillar is in the shape of a hexagonal prism as shown below.



The area of the shaded cross section is $960\,cm^2$
The height of the pillar is 1.2 m.
Calculate the volume of the pillar.

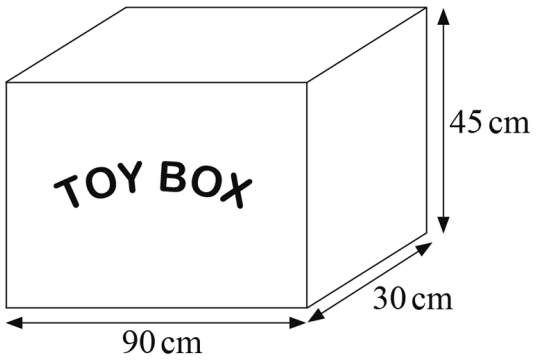
Answer _____ [3]

Q19 **(a)** Calculate the volume of this CD case.



Answer _____ [2]

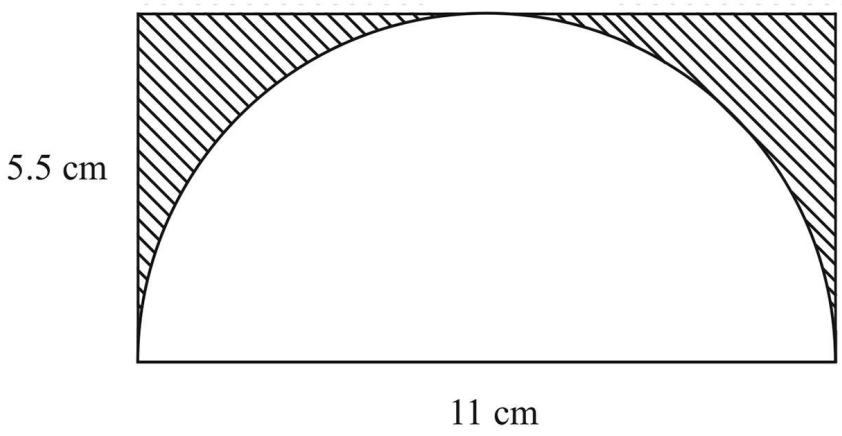
(b)



Calculate the total surface area of the **vertical** sides of this toy box, as shown.

Answer _____ cm^2 [2]

Q20 The diagram shows a semicircle inside a rectangle.



Work out the area of the shaded region.

Answer _____ cm^2 [3]

Q21

Find the area of the kite below.

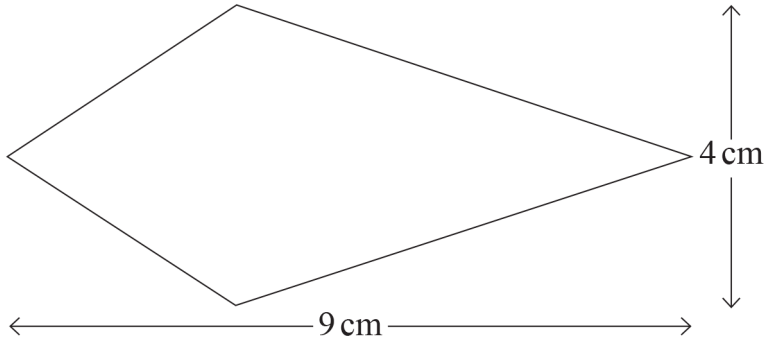


diagram
not drawn
to scale

Answer _____ cm^2 [2]

Q22 The front door of Martin's house is wooden.

The top of the door is a semicircle.

It has a window in the shape of a rhombus as shown in the diagram.

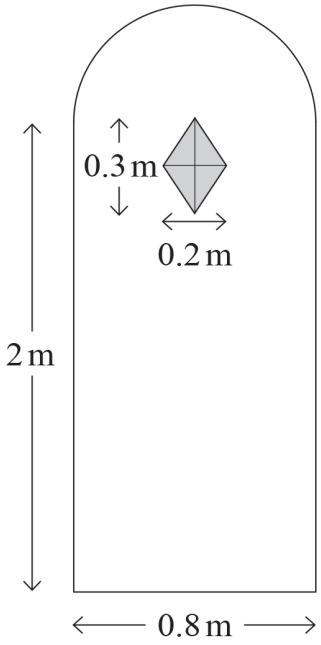
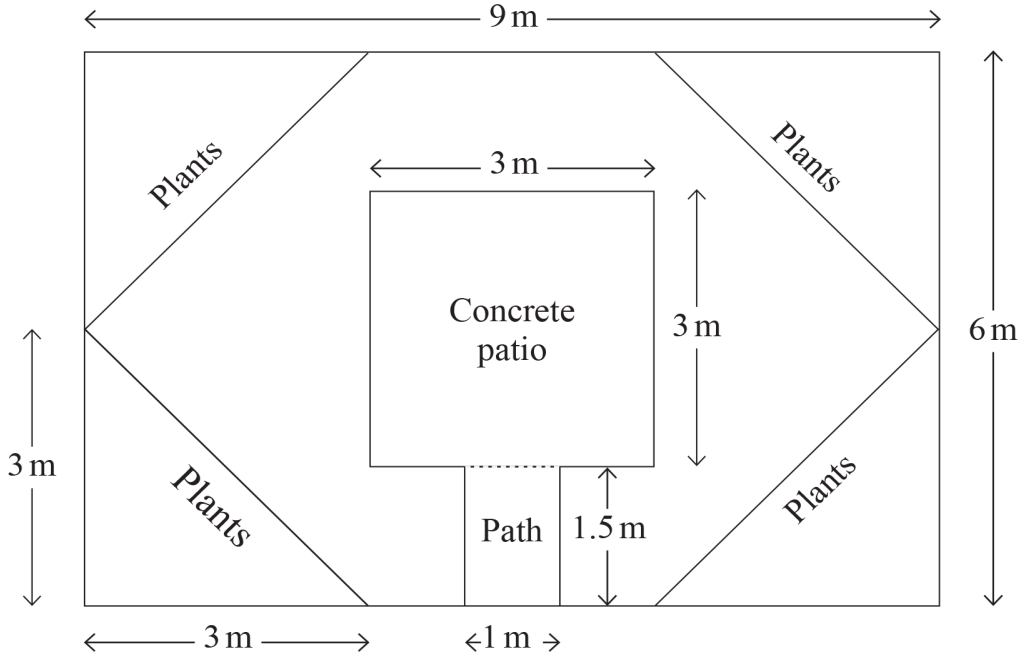


diagram
not drawn
accurately

What is the area of the wooden part of the door?

Answer _____ m^2 [5]

Q23 The diagram shows the layout of a rectangular garden.



There are four identical triangular sections of the garden covered with plants.

Calculate the area of one of these triangular sections.

You must include units with your answer.

Answer _____ [3]

The garden also has a rectangular path leading to a square concrete patio.

The remainder of the garden is covered by grass.

Calculate the total area of grass in the garden.

Answer _____ m^2 [3]

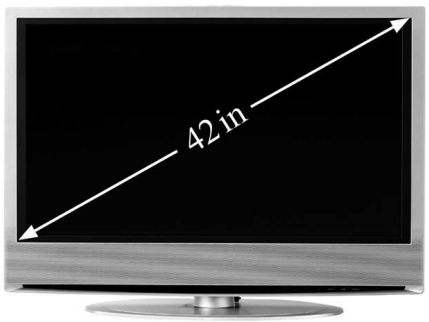
Q24

The size of a television is given as the length of the diagonal of the screen.

This television has a size of 42 inches.

The height of the screen is 20.4 inches.

What is the width of the screen?



Answer _____ inches [3]

Q25 The area of the right-angled triangle PQR is $24m^2$

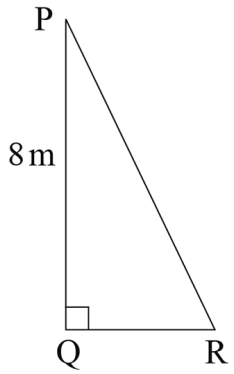


diagram not drawn accurately

Calculate the length of PR.

Show all your working.

Answer _____ m [4]

Q26

ABCD is a square of side 6 cm.

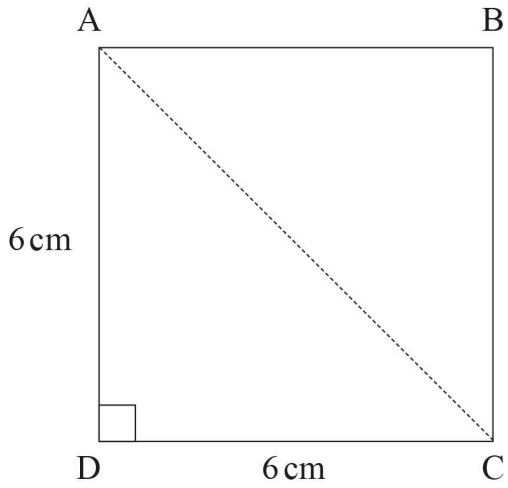


diagram not drawn accurately

How much longer is AC than AD?

You must show all your working.

Answer _____ cm [4]

Q27

Leah walks 4.7 m in a straight line.

She then turns 90° clockwise and walks 2.5 m in another straight line.

How far is Leah from where she started?

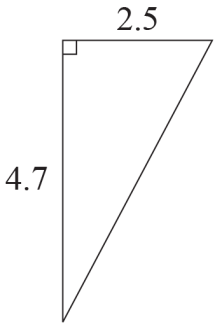


diagram not drawn accurately

Answer _____ m [3]

Q28

A sports referee trains by running diagonally across a rectangular pitch, as shown in the diagram below.

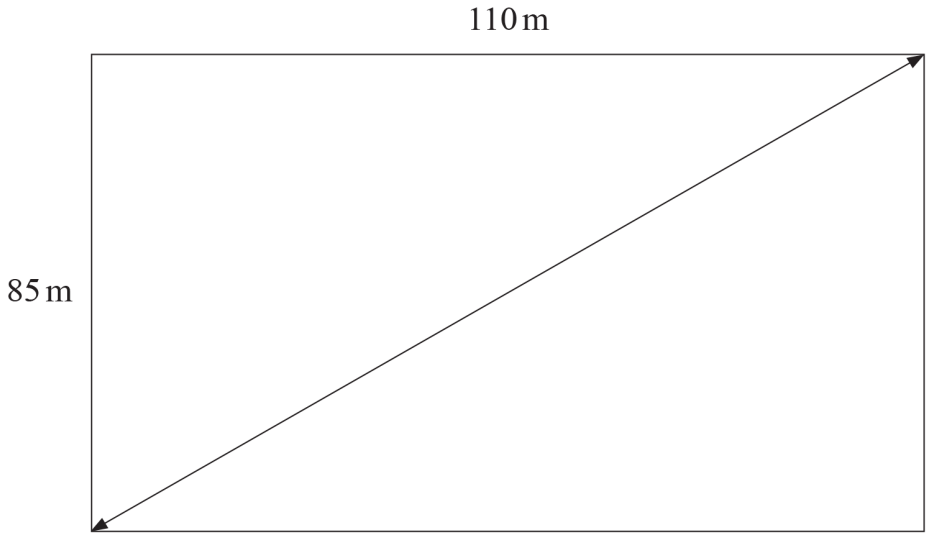


diagram not drawn to scale

The referee wants to run a distance of **at least** 1 km.

How many diagonal runs are needed?

Answer _____ [5]

1.

$8 \times 4 = 32\ (m^2)$		MA1
£64		A1

2.

(a)	110.4	A1
(b)	$110.4 \div 1.8 = 61.333.....$	MA1
	62	A1
	Alternative solution	
	$32.4 \div 1.8 = 18$, $22.8 \div 1.8 = 12.67$ need 13	MA1
	$18 + 18 + 13 + 13 = 62$	MA1

3.

(a)	90	A1
(b)	$6 \times 6 \times 15$	MA1
	540	A1
(c)	Yes because half a litre is 500ml/cm^3 which is less than 540	A1

4.

(a) Correct face drawn (rectangle 4 across and 5 down attached to right-hand edge) A1

(b) Evidence of 5, 2 and 4 MA1
$5 \times 2 \times 4$ MA1
40 A1

5.

(a) 24 A1

(b) 2 correct lines drawn (vertical and horizontal lines through middle of shape) A1

6.

(a) 15 A1

(b) $5 \times 2 \times 3$ M1
30 A1

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7. **(a)** $4(x + 6) + 4x = 8x + 24$ M1 A1

(b) $6 \times 6 = 36$ M1 A1

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8. $\frac{1}{2}(18 + 27) \times 13$ M1
292.5 A1

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9. **(a)** 12 A1

(b) correct vertical line drawn A1

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10. **(a)** $(3.6 \times 4.8) \div 2$ M1

8.64 A1

(b) $3.6^2 + 4.8^2$ MA1

36 M1

6 A1

11.

Identifying unknown lengths – horizontal 3 and vertical 2	A1
$(10 \times 7) - (3 \times 2) - (8 \times 2)$	MA1
$= 48$	A1

Alternatively

Identifying unknown lengths – horizontal 3 and vertical 2	A1
$(2 \times 4) + (2 \times 3) + (2 \times 2) + (10 \times 3)$	MA1
$= 48$	A1

12.

Surface area of cube $= 64 \times 6 = 384$	MA1
Surface area of cuboid $= 20x + 50$	MA1
$20x + 50 = 384 \quad 20x = 334$	MA1
$x = 16.7$cm	A1

13.

(a)	12×2, 8×3, 6×4 any listed rectangle	MA2
(b)	8 cm; 3 cm	A1

14.

(a)	18	A1
(b)	$(4.5 \times 2.5) - (2 \times 1)$	M1
	$11.25 - 2 = 9.25$	A1

15.

(a) Radius = 6.5 cm
Area = $\pi \times 6.5^2$ MA1
$= 132.7(32\ldots)\,\text{cm}^2$ A1, A1 (units)

(b) Area of square = $13^2 = 169$ MA1
Area between square and circle = 169 – 132.7 = 36.3 A1
Do not penalise for units in **(b)**

16.

(a) $\pi \times 2$ MA1

6.2(83185307) A1

(b) 3.14 + 3 + 2 + 3 MA1

11.14(1592654) A1

17.

$\frac{1}{2} \times 5 \times 12$ M1 A1

30 A1

18.

960×120 **or** 0.096×1.2 M1

$115\,200\,\text{cm}^3$ $0.1152\,\text{m}^3$ A1 A1 units

(an attempt to multiply 960 by 1.2 gains first mark only and no units mark)

19.

(a) $14 \times 12 \times 1 = 168\,\text{cm}^3$ MA1 A1 (units)

(b) $2\,(90 \times 45) + 2\,(30 \times 45) = 10\,800$ M1 A1

20.

$\pi \times 5.5^2 = 95.033$ or 60.5 MA1

$\frac{1}{2} \times \pi \times 5.5^2 = 47.5166$ MA1

$60.5 - 47.5166 = 12.98$ MA1

21.

$0.5 \times 9 \times 4$ MA1

18 A1

22.

Area $= 2 \times 0.8$ MA1

$+ \frac{1}{2} \times \pi \times 0.4^2$ MA2

$- \frac{1}{2} \times 0.2 \times 0.3$ MA1

$= 1.82(1327412)$ A1

23.

(a) $(3 \times 3) \div 2$ MA1

4.5 A1

m^2 A1

(b) $3 \times 3 = 9$, $1.5 \times 1 = 1.5$ MA1

$(9 \times 6 = 54)$, $54 - (4 \times 4.5) - 9 - 1.5$ MA1

25.5 A1

24.

$w^2 + 20.4^2 = 42^2$ **or** $w^2 = 42^2 - 20.4^2$ MA1

$w^2 = 1347.84$ A1

$w = 36.7$ (129405) A1

25.

$\frac{1}{2} \times \text{base} \times 8 = 24$

$\text{base} = 6$ MA1

$PR = 6^2 + 8^2$ M1

$PR = 100$ A1

$PR = \sqrt{100} = 10$ MA1

26.

$AC^2 = 6^2 + 6^2$	MA1
$AC^2 = 72$	
$AC = \sqrt{72}$	MA1
$AC = 8.485$	A1
$8.49 - 6 = 2.49\,\text{cm}$	MA1

27.

$x^2 = 4.7^2 + 2.5^2$	M1 A1
$x = 5.32(3532662)$	A1

28.

$85^2 + 110^2$	M1
$\sqrt{19325}$	MA1
139.014…..	A1
1000 ÷ 139.014….. = 7.193…..	MA1
8	A1
