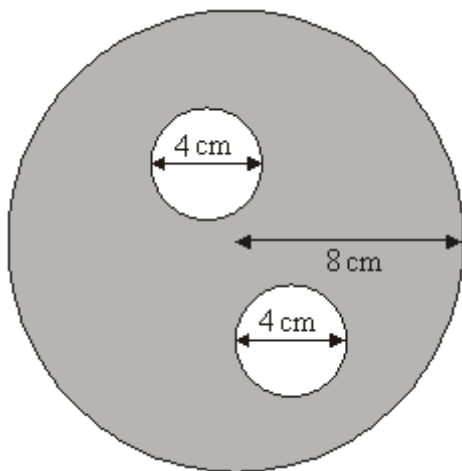**Q1.**

Diagram **NOT** accurately drawn

The diagram shows two small circles inside a large circle.
The large circle has a radius of 8 cm.

Each of the two small circles has a diameter of 4 cm.

(a)   Write down the radius of each of the small circles.

.... cm

(1)

(b)   Work out the area of the region shown shaded in the diagram.
        Give your answer correct to one decimal place.

.... cm²
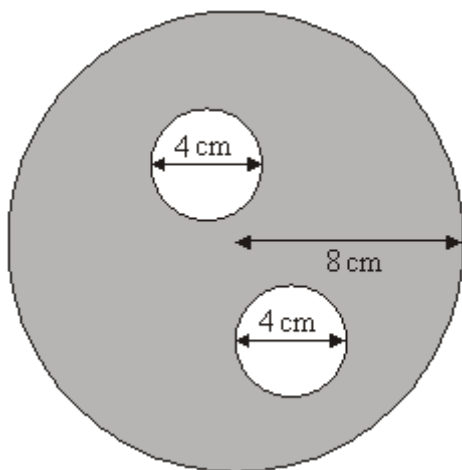
(4)
(Total 5 marks)

Q2.

Diagram **NOT** accurately drawn

The diagram shows two small circles inside a large circle.
The large circle has a radius of 8 cm.

Each of the two small circles has a diameter of 4 cm.

(a)   Write down the radius of each of the small circles.

.... cm

(1)

(b)   Work out the area of the region shown shaded in the diagram.
        Give your answer correct to one decimal place.

.... cm²
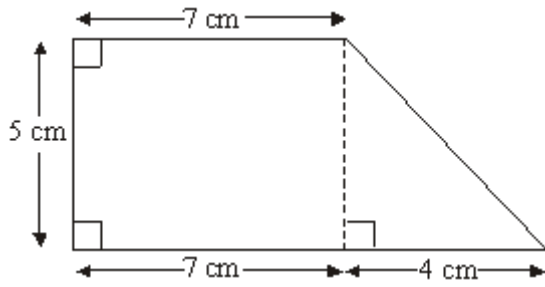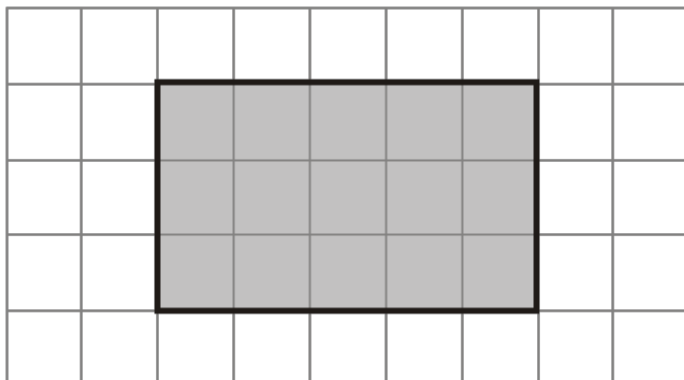
(4)
(Total 5 marks)

Q3.

Diagram **NOT** accurately drawn

Work out the area of the shape.

.... cm²

(Total 3 marks)

Q4.   Here is a shaded shape on a grid of centimetre squares.

(a)   Find the perimeter of the shaded shape.

.... cm

(1)

(b)   Find the area of the shaded shape.

.... cm^2

(1)

(c)   Write down the mathematical name of the shaded shape.

....

(1)
(Total 3 marks)

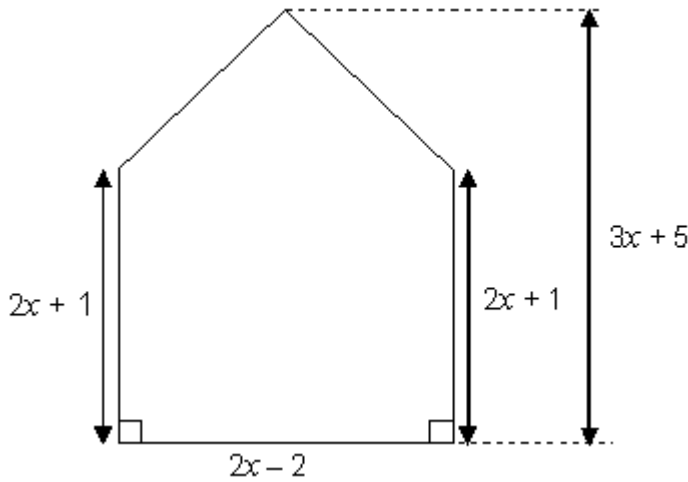**Q5.**   The diagram shows a pentagon.

Diagram **NOT** accurately drawn

All measurements are in centimetres.

Show that the area of this pentagon can be written as $5x^2 + x - 6$

(Total 4 marks)

Q6.   Mrs Kunal's garden is in the shape of a rectangle.
Part of the garden is a patio in the shape of a triangle.
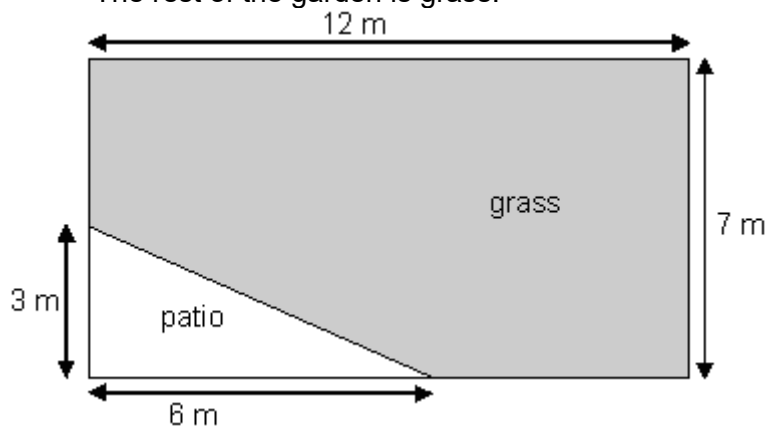The rest of the garden is grass.

Diagram **NOT** accurately drawn

Mrs Kunal wants to spread fertiliser over all her grass.

One box of fertiliser is enough for 32 m² of grass.

How many boxes of fertiliser will she need?
You must show your working.
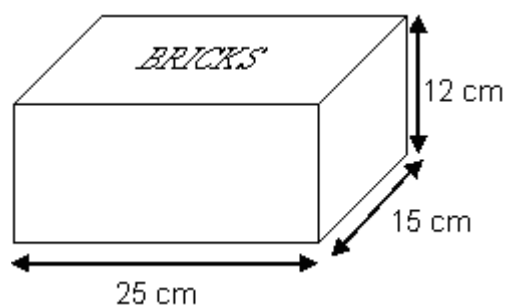
....

(Total 4 marks)

Q7.

A company makes building bricks for children.
The bricks are all 5 cm cubes.

The bricks are going to be packed in boxes.

John designs a box for the bricks.
The box is a cuboid.

The size of the box is 25 cm by 15 cm by 12 cm.

Will the box be big enough for 36 bricks?
You must give reasons for your answer.

(Total 4 marks)

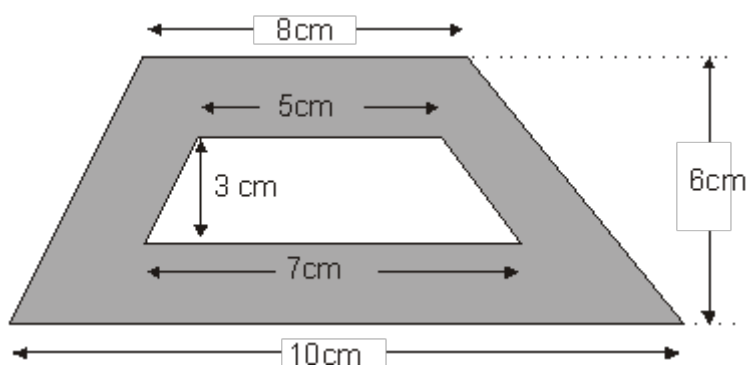**Q8.**   A piece of card is in the shape of a trapezium.

Diagram **NOT** accurately drawn

A hole is cut in the card.
The hole is in the shape of a trapezium.

Work out the area of the shaded region.

.... cm²
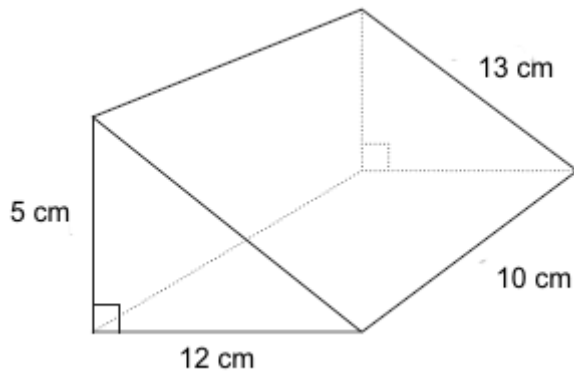
(Total 3 marks)

Q9.

Diagram **NOT** accurately drawn

Work out the total surface area of this triangular prism.

....

(Total 4 marks)

Q10.   Here is a solid cuboid.
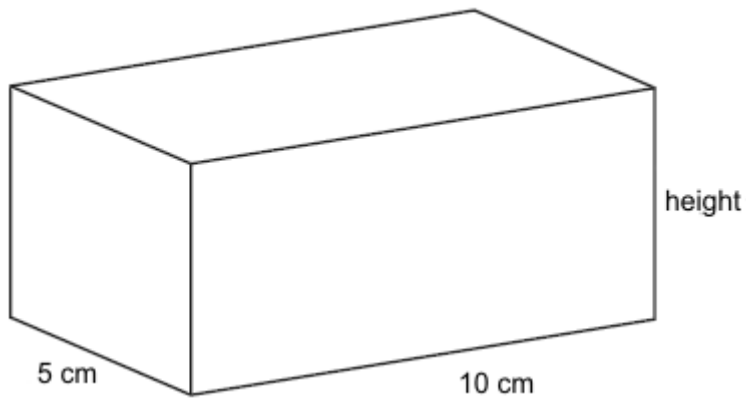
Diagram **NOT** accurately drawn

The cuboid has a width of 5 cm and a length of 10 cm.
The cuboid has a total surface area of 280 cm^2.

Work out the height of the cuboid.

.... cm

(Total 4 marks)

Q11.   The shaded isosceles right angled triangle is cut out of a large square of side 200

mm.
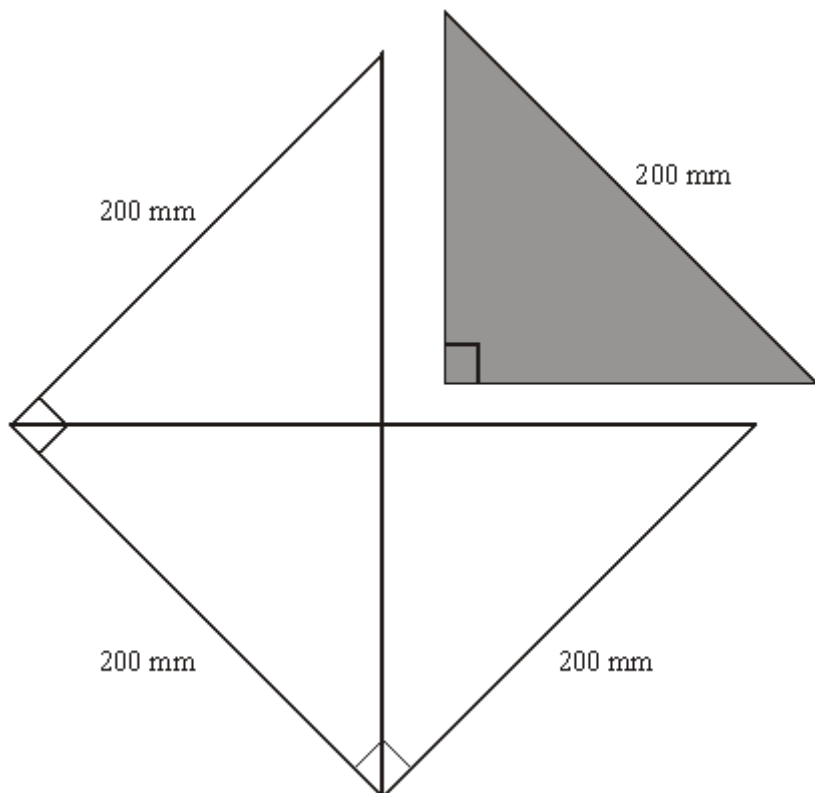
The squares are cut out of an A0 sized rectangular piece of paper which has dimensions 1189 mm by 841 mm.

More triangles are cut from the paper that is left after the squares have been cut out.

What is the greatest total number of these triangles that can be cut out of the large, rectangular sheet of paper?

.... triangles

(Total 5 marks)

Q12.

Diagram **NOT** accurately drawn
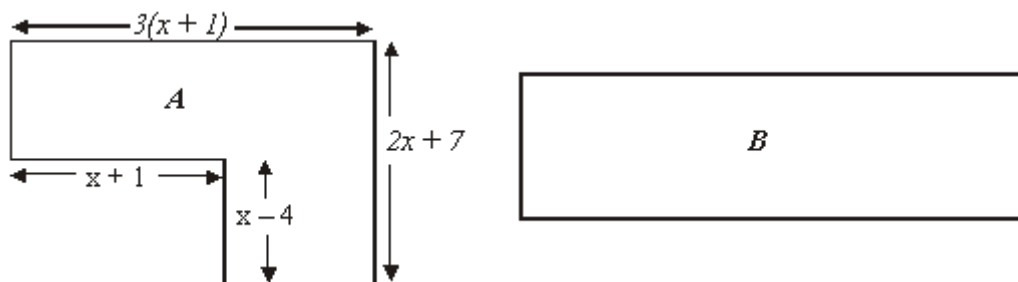
The diagram shows two shapes.
In shape *A*, all of the angles are right angles.
Shape *B* is a rectangle.
All the measurements are in centimetres.

The area of shape *A* is equal to the area of shape *B*.

Find an expression, in terms of *x*, for the length and an expression, in terms of *x*, for the width of shape *B*.

....

(Total 6 marks)

Q13.   The diagram shows a wall in Jenny's kitchen.
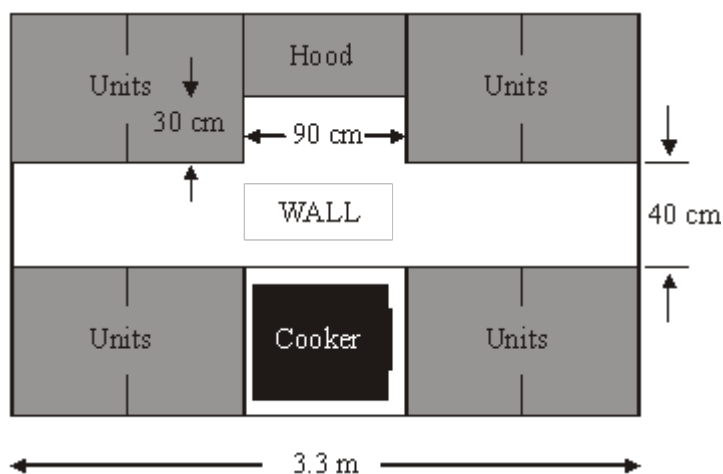
Diagram **NOT**
accurately drawn

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 cm × 10.5 cm × 21 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)

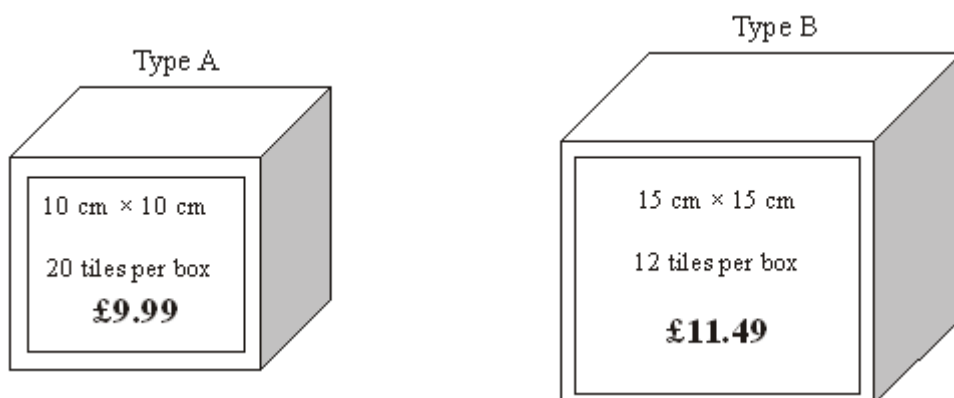**Q14.**   The diagram shows a wall in Jenny's kitchen.
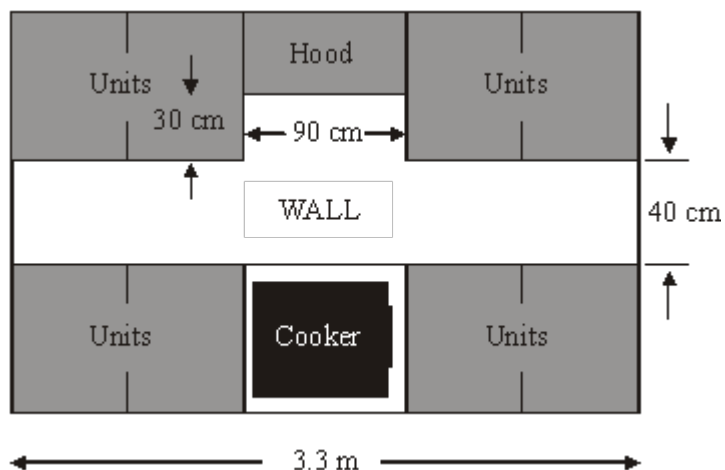
Diagram **NOT**
accurately drawn

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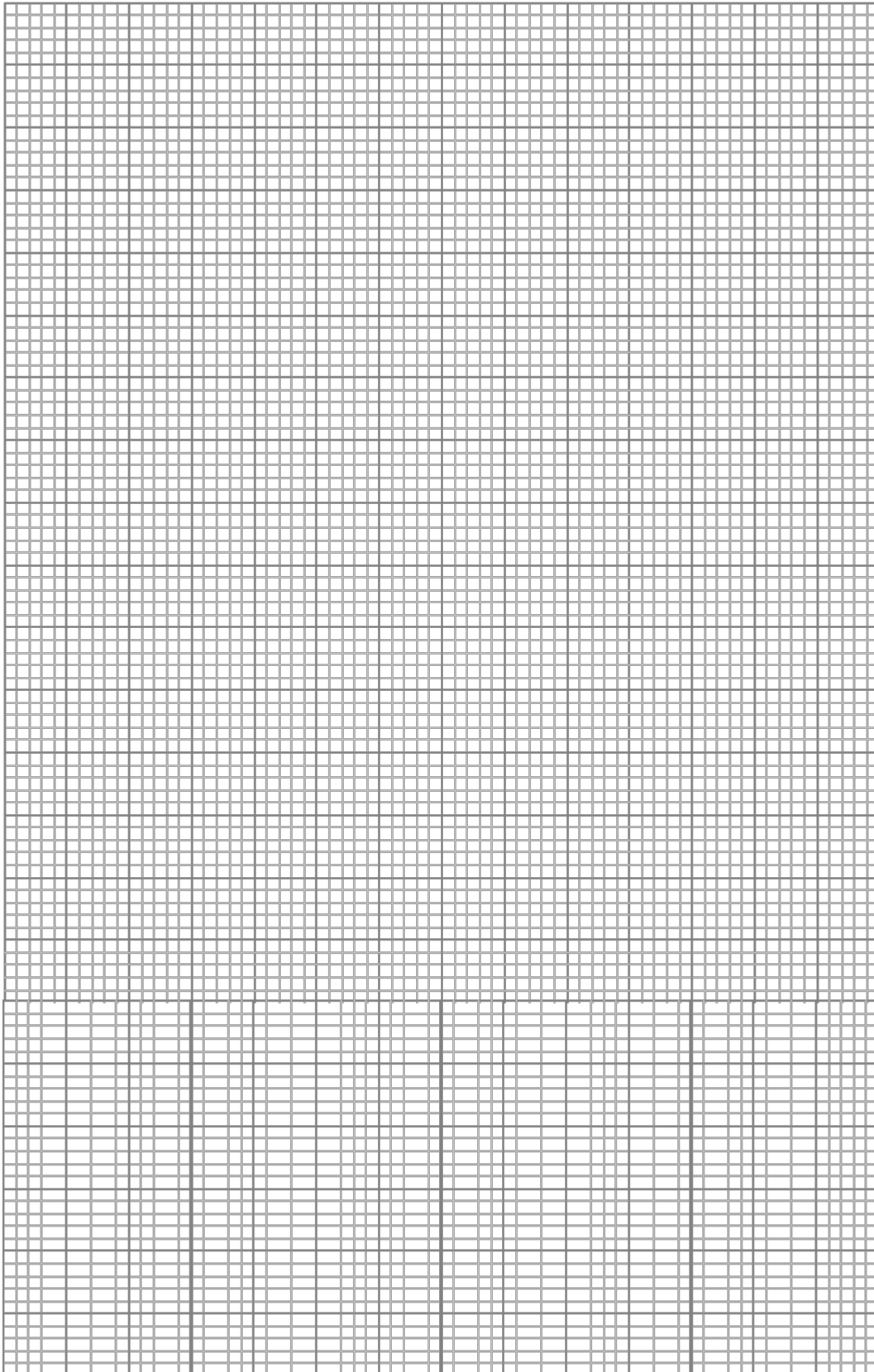She chooses between the two types of tile shown below.

Type A

10 cm × 10 cm

20 tiles per box
£9.99

Type B

15 cm × 15 cm

12 tiles per box

£11.49
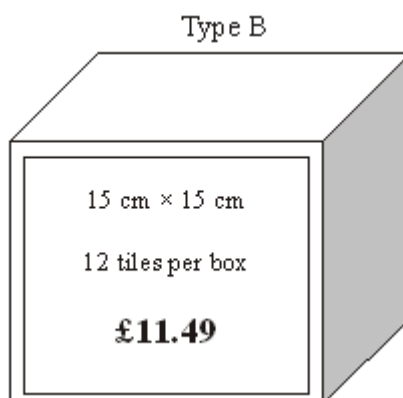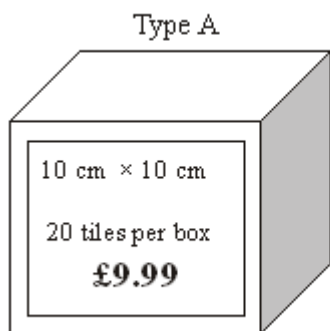
Which tiles should Jenny use to spend the least amount of money on tiling the wall?
You must show all of your working.

(Total 6 marks)

Q15.
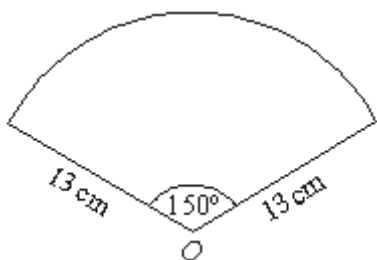
Diagram **NOT** accurately drawn

The diagram shows a sector of a circle, centre *O*.
The radius of the circle is 13 cm.
The angle of the sector is 150°.

Calculate the area of the sector.
Give your answer correct to 3 significant figures.

.... cm²

(Total 2 marks)

Q16.
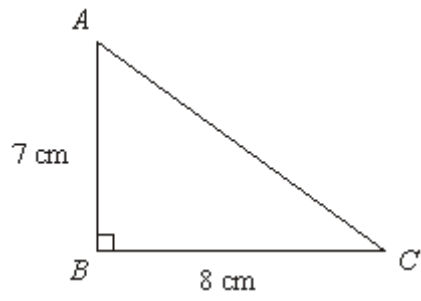
Diagram **NOT** accurately drawn

ABC is a right-angled triangle.
AB = 7 cm,
BC = 8 cm.

(a)   Work out the area of the triangle.

.... cm²

(2)

(b)   Work out the length of AC.
         Give your answer correct to 2 decimal places.

.... cm

(3)

32 mm

y

F

46 mm

E

D
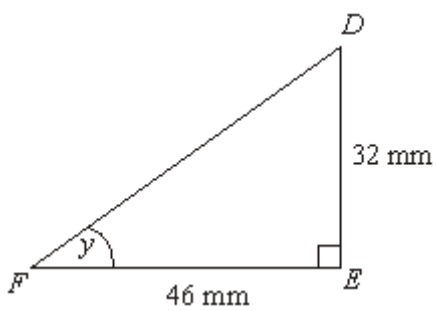
Diagram **NOT** accurately drawn

DEF is another right-angled triangle.
DE = 32 mm,
FE = 46 mm.

(c)   Calculate the size of angle y
        Give your answer correct to 1 decimal place.

.... °

(3)
(Total 8 marks)

Q17.
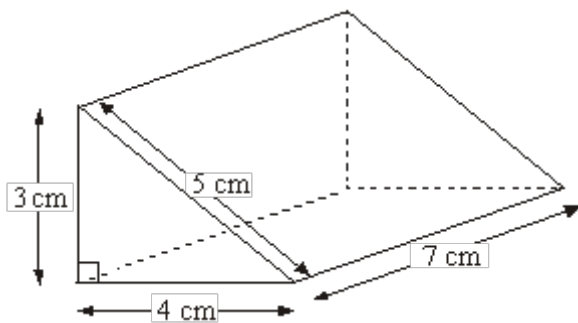
Diagram **NOT** accurately drawn

Work out the total surface area of the triangular prism.
Give the units with your answer.

....

(Total 4 marks)

Q18.   A shaded shape has been drawn on the centimetre grid.

(a)   Find the perimeter of the shaded shape.

.... cm

(1)
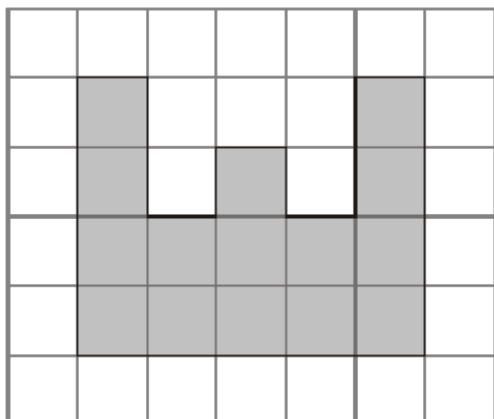
(b)   Find the area of the shaded shape.

.... cm^2

(1)

Here is a solid prism made from centimetre cubes.

(c)   Find the volume of this prism.

Diagram **NOT** accurately drawn
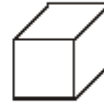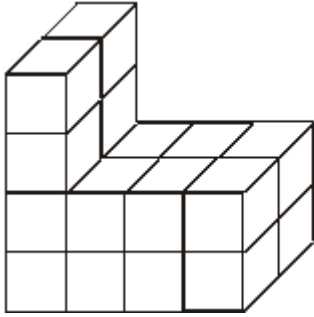
represents 1 cm³

.... cm³

(2)
(Total 4 marks)

Q19.
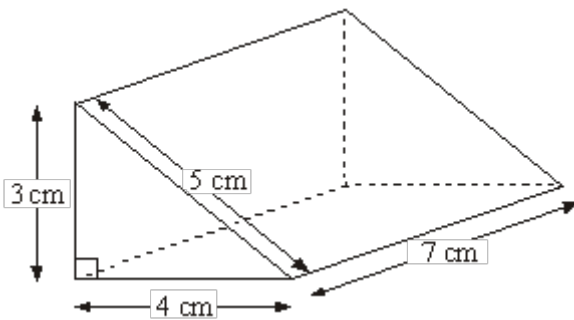
Diagram **NOT** accurately drawn

Work out the total surface area of the triangular prism.

.... cm^2

(Total 3 marks)

Q20.
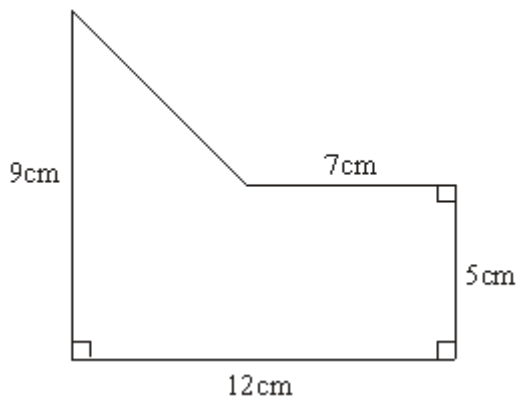
Diagram **NOT** accurately drawn

Work out the area of the shape.

.... cm^2

(Total 4 marks)

Q21.
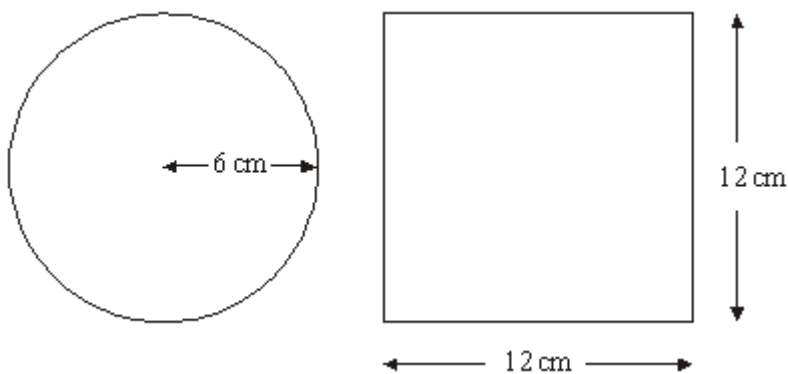
Diagram **NOT** accurately drawn

A circle has a radius of 6 cm.

A square has a side of length 12 cm.

Work out the difference between the area of the circle and the area of the square.
Give your answer correct to one decimal place.

.... cm²

(Total 4 marks)

Q22.   Here is a rectangle.
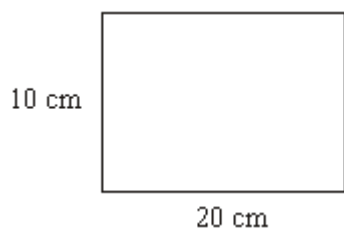
Diagram **NOT** accurately drawn

(a)   Work out the perimeter of the rectangle.

.... cm

(2)

(b)   Work out the area of the rectangle.

.... cm²

(2)
(Total 4 marks)

Q23.
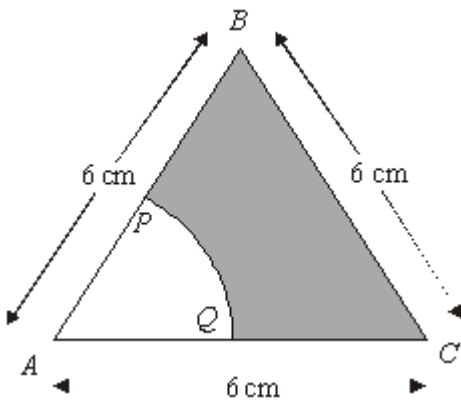
Diagram **NOT** accurately drawn

The diagram shows an equilateral triangle ABC with sides of length 6 cm.

P is the midpoint of AB.
Q is the midpoint of AC.
APQ is a sector of a circle, centre A.

Calculate the area of the shaded region.
Give your answer correct to 3 significant figures.

.... cm²

(Total 4 marks)

Q24.
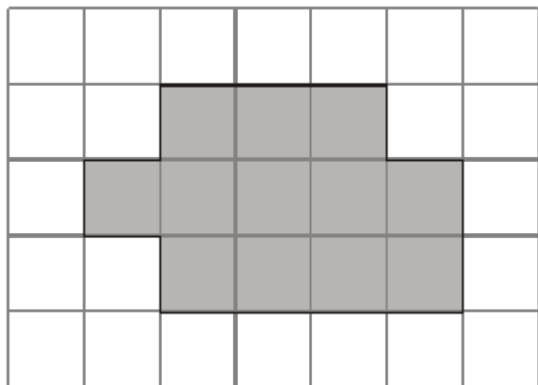
The diagram shows a shaded shape drawn on a centimetre grid.

(a)   Work out the perimeter of the shaded shape.

.... cm

(1)

(b)   Work out the area of the shaded shape.
        State the units of your answer.

....

(2)
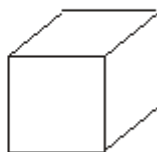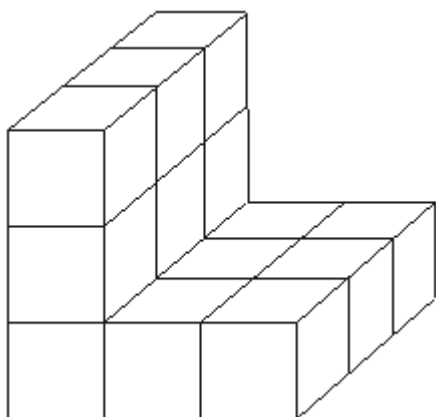
represents
1 cm^3

Diagrams **NOT** accurately drawn

Here is a solid prism made of centimetre cubes.

(c)   Find the volume of the solid prism.

.... cm^3

(2)
(Total 5 marks)

Q25.

Diagram **NOT**
accurately drawn
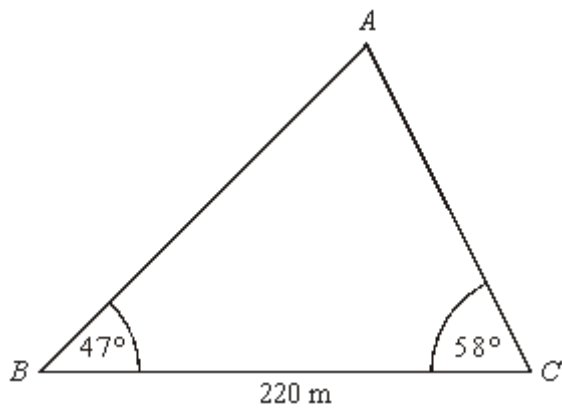
Angle *ABC* = 47°
Angle *ACB* = 58°
BC = 220 m

Calculate the area of triangle *ABC*.
Give your answer correct to 3 significant figures.

....

(Total 5 marks)

Q26.
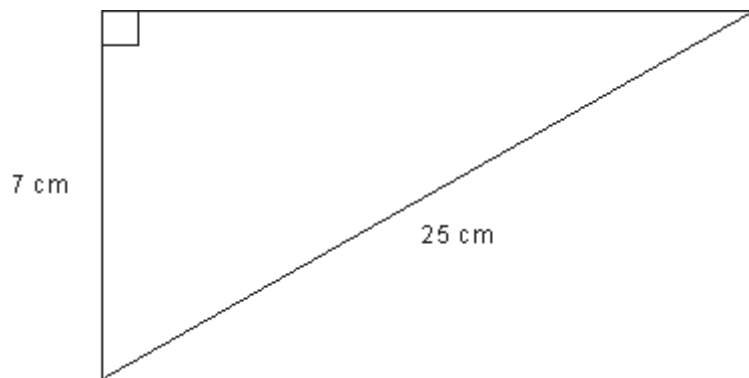
Diagram **NOT**
accuartely drawn

Calculate the area of this right-angled triangle.

....

(Total 4 marks)

Q27.

Diagram **NOT**
accurately drawn
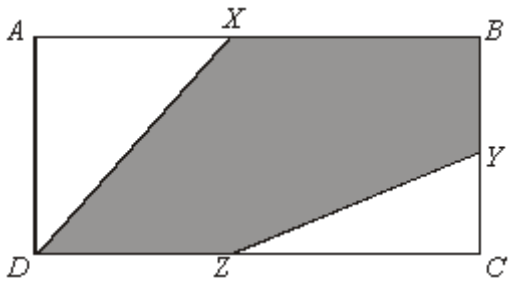
$ABCD$ is a rectangle.
X is the midpoint of AB.
Y is the midpoint of BC.
Z is the midpoint of CD.

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

Show clearly how you get your answer.

....
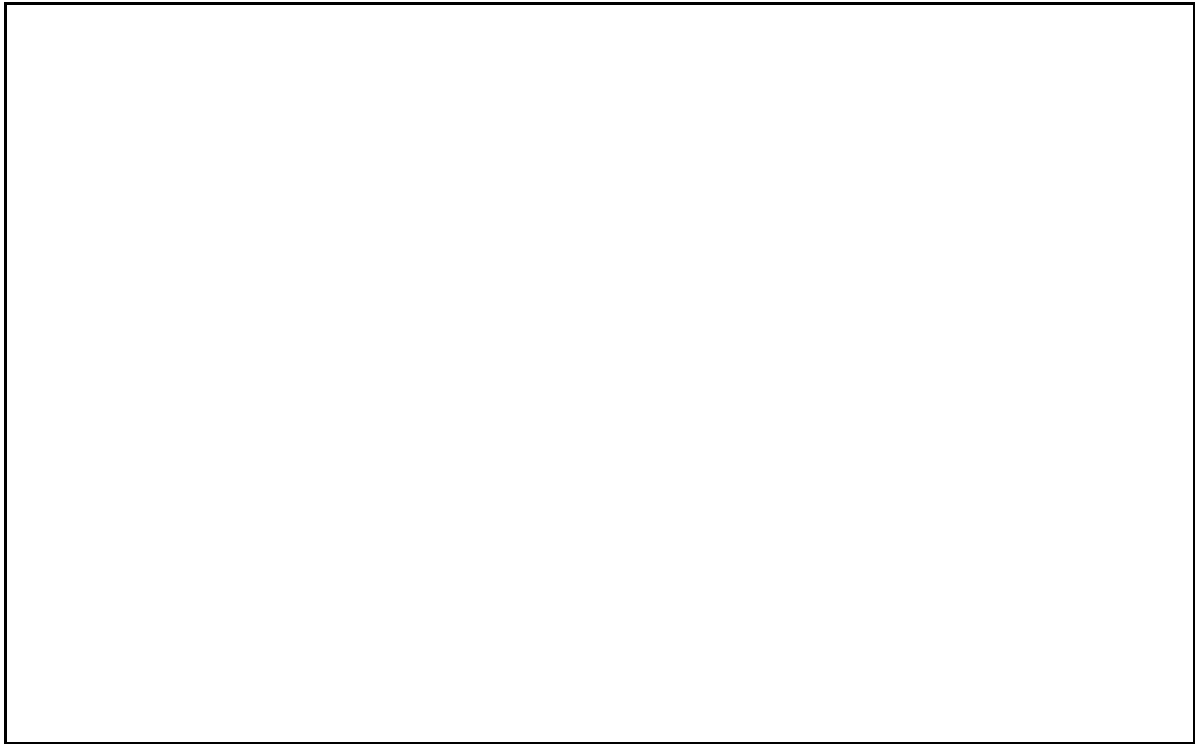
(Total 4 marks)

Q28.

Diagram **NOT**
accurately drawn

8 m

4 m

8 m

6 m
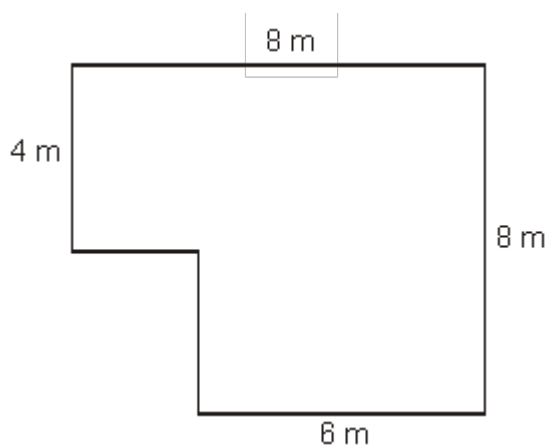
The diagram is a plan of the floor of Nikola's room.
All the angles are right angles.
Nikola is going to lay flooring to cover all the floor.

She can choose either carpet tiles or wood strips.

Carpet tiles come in packs of 32 and are square. They measure 50 cm by 50 cm.
Wood strips come in packs of 10 and are rectangular. They measure 2 m by 25 cm.

She only wants to use one type of flooring and buy as few packs as she can.
Which type of flooring should she choose?

....

(Total 6 marks)

Q29.   These triangles have been drawn on a centimetre grid.
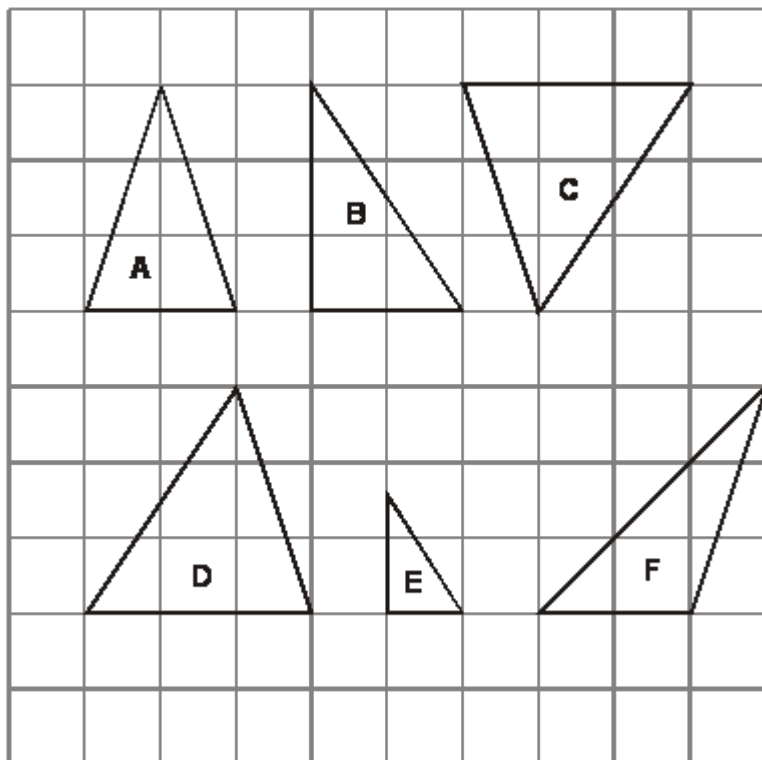
(a)   Write down the letters of the **two** triangles that are congruent.

.... 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)

M1.

	Working	Answer	Mark	Additional Guidance
(a)		2	1	**B1** cao
(b)	$\pi \times 8^2 - 2 \times \pi \times 2^2$	175.9	4	**M1** $\pi \times 8^2$ (= 201.06…) may be implied by 201 **M1** $\pi \times 2^2$ (= 12.566…) may be implied by 12.5 or 12.6 **M1**(dep on at least **M1**) for "201…" – 2 × "12.56..." **A1** 175.8 – 176
				Total for Question: 5 marks

M2.

	Working	Answer	Mark	Additional Guidance
(a)		2 cm^2	1	**B1** cao
(b)	$\pi \times 8^2 - 2 \times \pi \times 2^2$	175.9 cm	4	**M1** $\pi \times 8^2$ (= 201.06…) May be implied by 201 **M1** $\pi \times 2^2$ (= 12.566…) May be implied by 12.5 **or** 12.6 **M1** (dep on at least **M1**) "201…" – 2 × "12.56.." **A1** 175.8 – 176 inclusive
				Total for Question: 5 marks

M3.

Working	Answer	Mark	Additional Guidance
$5 \times 7 + \dfrac{1}{2} \times 4 \times 5$ $= 35 + 10 =$ or $\dfrac{5 \times (7 + 7 + 4)}{2} = \dfrac{5 \times 18}{2} =$	45	3	**M1** for 5×7 or for $\dfrac{1}{2} \times 4 \times 5$ **M1** for $5 \times 7 + \dfrac{1}{2} \times 4 \times 5$ **A1** for 45 cao Alt.: **M2** for $\dfrac{5 \times (7 + 7 + 4)}{2}$
			Total for Question: 3 marks

M4.

	Answer	Mark	Additional Guidance
(a)	16	1	**B1** for 16 cao
(b)	15	1	**B1** for 15 cao
(c)	rectangle	1	**B1** for rectangle, quadrilateral, trapezium, parallelogram or oblong
			Total for Question: 3 marks

M5.

Working	Answer	Mark	Additional Guidance

$(2x - 2)(2x + 1)$	Show	4	**M1** for correct expression for a single rectangle area $(2x - 2)(2x + 1)$ or $(2x - 2)(3x + 5)$ **M1** for correct expression for triangle

Total for Question: 4 marks

M6.

Working	Answer	Mark	Additional Guidance
$12 \times 7 = 84$ $84 - \dfrac{1}{2}(3 \times 6)$ $75 \div 32$	3	4	**M1** for 12×7 $(= 84)$ **M1** for $"84" - \dfrac{1}{2}(3 \times 6)$ $(= 75)$ **M1** for "area"÷ 32 or (32, 64,) 96 seen with "area" calculated. **A1** cao (dep on all M marks) **or** **M1** for 12×4 $(= 48)$ **M1** for $"48" + \dfrac{1}{2}(12 + 6) \times 3$ **M1** for "area"÷ 32 or (32, 64,) 96 seen with "area" calculated. **A1** cao (dep on all M marks) **M1** for $6 \times 3 + \dfrac{1}{2}(3 \times 6)$ $(= 27)$ **M1** for "27" + 12×4 **M1** for "area" ÷ 32 or (32, 64,) 96 seen with "area" calculated. **A1** cao (dep on all M marks)
			Total for Question: 4 marks

M7.

Working	Answer	Mark	Additional Guidance
25 ÷ 5 15 ÷ 5 12 ÷ 5 5 × 3 × 2	No	4	**M2** for 5, 3, 2 (could be on the diagram) (M1 for 25 ÷ 5 or 15 ÷ 5 or 12 ÷ 5) **C2** QWC: No as only 30 whole bricks will fit oe statement **or** No and dimensions of a possible box given **or** No as only 2 layers of 15 will fit oe (C1 for correct conclusion from candidate's working even if incorrect eg vol: 4500÷125=36 so yes)
			Total for Question: 4 marks

M8.

Working	Answer	Mark	Additional Guidance
½ × 6(10 + 8) − ½ × 3(7 + 5) = 54 − 18	36	3	**M1** for ½ × 6(10 + 8) or ½ × 3(7 + 5) oe **M1**(dep) for ½ × 6(10 + 8) − ½ × 3(7 + 5) oe **A1** cao
			Total for Question: 3 marks

M9.

Working	Answer	Mark	Additional Guidance
Triangular face:	360	4	**M1** for ½ × 5 × 12 (= 30) oe

½ × 5 × 12 = 30 Rectangular faces: (13 × 10), (12 × 10), (5 × 10) Area: 30 + 30 + 130 + 120 + 50 =	cm^2		**M1** for 2 + of (13 × 10) and (5 × 10) oe **A1** cao NB: No marks awarded for calculating volume **B1** (indep) units stated (cm^2)
			Total for Question: 4 marks

M10.

Working	Answer	Mark	Additional Guidance
Bottom / top is 5 × 10 = 50; 50 × 2 = 100; 280 – 100 = 180 Other dimensions: 10 + 10 + 5 + 5 = 30; 180 ÷ 30 =	6	4	**M1** recognition that the bottom/top is 5 × 10 (= 50), 50 seen **M1** for 280 – 2 × "50" (= 180) **M1** for "180" ÷ "other dimensions" or valid attempt to find height using these dimensions **A1** cao
			Total for Question: 4 marks

M11.

Working	Answer	Mark	Additional Guidance
1189 ÷ 200 or 891 ÷ 200 = 5 and 4 or 20 squares 200^2 ÷ 2	90	5	**M1** for attempt to divide 1189 ÷ 200 or 891 ÷ 200 **M1** for 200^2 ÷ 2 **M1** for √(200^2 ÷ 2**)**

= √(200^2 ÷ 2) = 141.4 Realising that another row of squares of side 141.4 fits or 891 ÷ 141.4 = 5 squares		**M1** for realising that another row of squares of side 141.4 fits or 891 ÷ 141.4 **A1** cao for 90 triangles
		Total for Question: 5 marks

M12.

Working	Answer	Mark	Additional Guidance
A = 3(x + 1)(2x + 7) − (x − 4)(x +1) = 3(2x^2 + 9x + 7) − (x^2 − 3x −4) = 5x^2 + 30x + 25 Factorising gives 5(x + 1)(x + 5) **OR** Splitting shape A into rectangles, area to be added: e.g. 3(x + 1)(x + 11) + (x − 4)(2x + 2) = 3(x^2 + 12x + 11) + (2x^2 − 6x − 8) = 5x^2 + 30x + 25 Factorising gives 5(x + 1)(x + 5)	5x + 5 by x + 5 or 5x + 25 by x + 1	6	**M1** for attempting to subtract the area of small rectangle from area of large rectangle in A **M1** for 3(x + 1)(2x + 7) − (x − 4)(x + 1) **A1** for 3(2x^2 + 9x + 7) and (x^2 − 3x −4) **A1** for 5x^2 + 30x + 25 **M1** for attempting to factorise "5x^2 + 30x + 25" to get dimensions of B **A1** for 5x + 5 by x + 5 or 5x + 25 by x + 1 **OR** **M1** for attempting to add the area of two (or more) rectangles that make up the shape A **M1** for 3(x + 1)(x + 11) + (x − 4)(2x + 2) oe equivalent **A1** for 3(x^2 + 12x + 11) and (2x^2 − 6x −8) **A1** for 5x^2 + 30x + 25 **M1** for attempting to factorise "5x^2 + 30x + 25" to get dimensions of B **A1** for 5x + 5 by x + 5 or 5x + 25 by x + 1
			Total for Question: 6 marks

M13.

		Working	Answer	Mark	Additional Guidance
QWC (i, ii, iii) **FE**	(a)	Wall area = 330 × 40 + 90 × 30 = 13200 + 2700 = 15900 cm² Tile A area = 10 × 10 = 100 cm² No of tiles = 15900 ÷ 100 = 159 No of boxes needed = 8 (20 × 8 = 160 tiles) £9.99 × 8 = £79.92 Tile B area = 15 × 15 = 225 cm² No of tiles = 15900 ÷ 225 = 70(225 × 70 = 15700) + 1 No of boxes needed = 6 (12 × 6 = 72 tiles) but some tiles will need to be cut, so 7 boxes needed £11.49 × 7 = £80.43 **OR** 330 ÷ 10 = 33 A tiles per long row 40 ÷ 10 = 4 long rows 33 × 4 = 132 tiles 90 ÷ 10 = 9 tiles per short row 30 ÷ 10 = 3 short rows 9 × 3 = 27 tiles 132 + 27 = 159 tiles No of boxes needed = 8 (20 × 8 = 160 tiles)	Tile A is the most economical	6	**M1** for either 330 × 40 or 90 × 30 or 10 × 10 or 15 × 15 **A1** for 15900 and (100 or 225) **M1** for 15900 ÷ 100 or 15900 ÷ 225 **A1** ft for 10 A boxes needed ('15900' ÷ '100') ÷ 20 rounded up to nearest whole number) or 7 B boxes needed ('15900' ÷ '225') ÷ 12 rounded up to nearest whole number) **B1** for answers or £79.92 and £80.43 to justify the choice **C1** for comment on the need to cut some Type B tiles **QWC: Decision must be stated, with all calculations attributable** **OR** **M1** for 330 ÷ 10 or 90 ÷ 10 or 330 ÷ 15 or 90 ÷ 15 **A1** for (33 and 9) or (22 and 6) **M1** for 33 × 4 + 9 × 3 or 22 × 3 + 6 × 2 **A1** ft for 10 A boxes needed ('33 × 4' ÷ '9 × 3') ÷ 20 rounded up to nearest whole number) or for 7A boxes needed ('22 × 3' ÷ '6 × 2') ÷ 12 rounded up to nearest whole number) **B1** for answers or £79.92 and £80.43 to justify the choice

		£9.99 × 8 = £79.92			**C1** for comment on the need to cut some Type B tiles **QWC: Decision must be stated, with all calculations attributable**
		330 ÷ 15 = 22 B tiles per long row			
		40 ÷ 15 = 3 long rows (1 row of tiles will be cut)			
		22 × 3 = 66 A tiles			
		90 ÷ 15 = 6 tiles per short row			
		30 ÷ 15 = 2 short rows			
		6 × 2 = 12 tiles			
		66 + 12 = 78 tiles			
		No of boxes needed = 7 (12 × 7 = 84 tiles)			
		£11.49 × 7 = £80.43			
	(b)	The carton can have dimensions 42 cm × 31.5 cm × 21 cm or 63 cm × 21 cm × 21 cm or 84 cm × 31.5 cm × 10.5 cm or 63 cm × 42 cm × 10.5 cm or 126 cm × 21 cm × 10.5 cm	Net	3	**B1** for quoting a correct set of dimensions (could be simply on the diagram) **M1** for a net showing 6 rectangles that could form a cuboid **A1** for an accurate scale drawing or lengths labeled accurately
					Total for Question: 9 marks

M14.

		Working	**Answer**	**Mark**	**Additional Guidance**
QWC **(ii, iii)** **FE**		330 ÷ 10 = 33 A tiles per long row 40 ÷ 10 = 4 long rows 33 × 4 = 132 tiles 90 ÷ 10 = 9 tiles per short row 30 ÷ 10 = 3 short rows 9 × 3 = 27 tiles	Tile A is the most economical	6	**M1** for 330 ÷ 10 or 90 ÷ 10 or 330 ÷ 15 or 90 ÷ 15 **A1** for (33 and 9) or (22 and 6) **M1** for 33 × 4 + 9 × 3

132 + 27 = 159 tiles
No of boxes needed
= 8 (20 × 8 = 160 tiles)
£9.99 × 8 = £79.92

330 ÷ 15 = 22 B tiles per long row
40 ÷ 15 = 3 long rows (1 row of tiles will be cut)
22 × 3 = 66 A tiles
90 ÷ 15 = 6 tiles per short row
30 ÷ 15 = 2 short rows
6 × 2 = 12 tiles
66 + 12 = 78 tiles
No of boxes needed
= 7 (12 × 7 = 84 tiles)
£11.49 × 7 = £80.43

OR

Wall area = 330 × 40 + 90 × 30 = 13200 + 2700 = 15900 cm²
Tile A area = 10 × 10 = 100 cm²
No of tiles = 15900 ÷ 100 = 159
No of boxes needed
= 8 (20 × 8 = 160 tiles)
£9.99 × 8 = £79.92
Tile B area = 15 × 15 = 225 cm²

No of tiles = 15900 ÷ 225 = 70(225 × 70 = 15700) + 1
No of boxes needed
= 6 (12 × 6 = 72 tiles) but some tiles will need to be cut, so 7 boxes needed
£11.49 × 7 = £80.43

or 22 × 3 + 6 × 2

A1 ft for 10 A boxes needed ('33 × 4' ÷ '9 × 3') ÷ 20 rounded up to nearest whole number) or for 7A boxes needed ('22 × 3' ÷ '6 × 2') ÷ 12 rounded up to nearest whole number)

B1 for answers or £79.92 and £80.43 to justify the choice

C1 for comment on the need to cut some Type B tiles **QWC: Decision must be stated, with all calculations attributable**

OR

M1 for either 330 × 40 or 90 × 30 or 10 × 10 or 15 × 15

A1 for 15900 and (100 or 225)

M1 for 15900 ÷ 100
or 15900 ÷ 225

A1 ft for 10 A boxes needed ('15900' ÷ '100') ÷ 20 rounded up to nearest whole number) or 7 B boxes needed ('15900' ÷ '225') ÷ 12 rounded up to nearest whole number)

B1 for answers or £79.92 and £80.43 to justify the choice

C1 for comment on the need to cut some Type B tiles **QWC: Decision must be stated, with all calculations attributable**

Total for Question: 6 marks

M15.

Working	Answer	Mark	Additional Guidance
$\frac{150}{360}$ × π × 13^2 = $0.41\dot{6}$ × 530.9291585 360 = 221.22…	221	2	**M1** for $\frac{150}{360}$ × π × 13^2 or π × 13^2 ÷ 2.4 oe **A1** 220 – 222
			Total for Question: 2 marks

M16.

	Working	Answer	Mark	Additional Guidance
(a)	½ × 7 × 8 = ½ × 56 = 28	28	2	**M1** ½ × 7 × 8 or – × 7 × 8 × sin 90° **A1** cao
(b)	8^2 + 7^2 64 + 49 = 113 √113 = 10.630145	10.63	3	**M1** 8^2 + 7^2 or 64+49 or 113 or 8^2 + 7^2 – 2 × 7 × 8 × cos90 **M1** √"(64 + 49)" or √"113" where it is clear that the 8 and 7 have been squared **A1** Any answer in 10.63 – 10.631 inclusive SC **B1** 10.6 with no working with or without a scale drawing
(c)	tan y = 32/46 = 0.6956 tan^{-1} 0.6956 = 34.82°	34.8	3	**M1** tan (y =) $\frac{32}{46}$ **M1** tan^{-1} 0.695(6) or tan^{-1} $\left(\frac{32}{46}\right)$ or tan^{-1} $\frac{32}{46}$ oe (e.g. 'shift tan' or 'inv tan' for tan^{-1}) **A1** 34.79° – 34.85° **Or** **M1** for √(32^2 + 46^2) (=56.03(5..)) and either $\frac{\sin 90}{56(0..)}$ = $\frac{\sin y}{32}$ or $\frac{56.(0..)}{\sin 90}$ = $\frac{32}{\sin y}$ (y =) $\sin^{-1}\left(\frac{32 \times \sin 90}{56.(0...)}\right)$ (= $\sin^{-1}$(0.571(06..)) **M1** **A1** 34.79° – 34.85° SC1 **B2** Radians 0.607-0.608 **B2** Gradians 38.65 – 38.7 (both using tan)

			Alternative methods using Pythagoras and then sin or cos must have a fully correct method for Pythagoras and sin/cos before they score the first M1. The trigonometry could be SOHCAHTOA or Sine rule/Cosine rule
			Total for Question: 8 marks

M17.

Working	Answer	Mark	Additional Guidance
$\frac{1}{2}$ (3 × 4) × 2 + (3 × 7) + (4 × 7) + (5 × 7) = 12 + 21 + 28 + 35	96 cm²	4	**M1** for $\frac{1}{2}$ (3 × 4) or 3 × 7or 5 × 7or 4 × 7 **M1** for attempt to add 5 faces which are areas **A1** for 96 **B1** (indep) for cm² (NB: 0 marks for calculating volume)
			Total for Question: 4 marks

M18.

	Answer	Mark	Additional Guidance
(a)	24	1	**B1** cao
(b)	15	1	**B1** cao
(c)	20	2	**B2** cao (**B1** for 10 or 16 or 15)

Total for Question: 4 marks

M19.

Working	Answer	Mark	Additional Guidance
$\frac{1}{2}$ (3 × 4) × 2 + (3 × 7) + (4 × 7) + (5 × 7) = 12 + 21 + 28 + 35	96	3	**M1** for $\frac{1}{2}$ (3 × 4) or 3 × 7or 5 × 7or 4 × 7 **M1** for attempt to add 5 faces which are areas **A1** for 96 cao NB: Zero marks for calculating volume
			Total for Question: 3 marks

M20.

Working	Answer	Mark	Additional Guidance
Splits up shape e.g. into rectangle and triangle 12 × 5 (=60) $\frac{1}{2}$ × 5 × 4	70	4	**M1** for splitting up shape by drawing straight lines or for two or more attempts to find the area of parts of the shape **M1** (dep) for a correct method to find area of one part, e.g. 12 × 5 or 60 **M1** for a correct method to find area of another part(s), e.g. $\frac{1}{2}$ × "5" × "4" or 10 **A1** cao
			Total for Question: 4 marks

M21.

Working	Answer	Mark	Additional Guidance
$\pi \times 6^2$ $12^2 - \pi \times 6^2$	30.9	4	**M1** for 12^2 or 144 seen **M1** for $\pi \times 6^2$ or 113. … seen **M1** (dep on **M2**) for "12^2" – "$\pi \times 6^2$" **A1** for 30.88 – 31
			Total for Question: 4 marks

M22.

	Working	Answer	Mark	Additional Guidance
(a)	10 + 20 + 10 + 20	60	2	**M1** for 10 + 20 + 10 + 20 **A1** cao
(b)	10 × 20	200	2	**M1** for 10 × 20 **A1** cao
				Total for Question: 4 marks

M23.

Working	Answer	Mark	Additional Guidance
$\frac{1}{2}$ × 6 × 6 × sin 60 $-\frac{60}{360}$ × π × 3² = 15.588 − 4.712	10.8 – 10.9	4	**M1** for $\frac{1}{2}$ × 6 × 6 × sin 60 or for 0.5 × 6 × $\sqrt{6^2-3^2}$ or 15.5 – 15.6 or 14.5 – 14.6 or ±5.48(65...) **M1** for $\frac{60}{360}$ × π × 3² (= 4.712…) **M1** (dep on 1 previous M1) for 'area of triangle' – 'area of sector' **A1** for 10.8 – 10.9 SC: **B3** for 10.1 – 10.2 or 9.84 – 9.85
			Total for Question: 4 marks

M24.

	Answer	Mark	Additional Guidance
(a)	16	1	**B1** cao
(b)	12 cm²	2	**B1** for 12 cao, **B1** (indep) for cm²
(c)	15	2	**M1** for 5 × 3 **A1** cao [SC: **B1** for 10, 13 or 14]
			Total for Question: 5 marks

M25.

Working	Answer	Mark	Additional Guidance

Angle *BAC* = 180º — 47º — 58º = 75º $$\frac{AC}{\sin 47} = \frac{220}{\sin 75}\left(= \frac{AB}{\sin 58}\right)$$ $$AC = \frac{220\sin 47}{\sin 75} = 166.57..$$ Area = $\frac{1}{2}$ × 220 × '166.57' × sin58 = 15538	15500 m²	5	**B1** for 75º

Total for Question: 5 marks

M26.

Working	Answer	Mark	Additional Guidance
$25^2 - 7^2 = 576$ $\sqrt{576} = 24$ $\frac{1}{2} \times 24 \times 7$	$84cm^2$	4	**M1** $25^2 - 7^2$ **M1** $\sqrt{25^2 - 7^2}$

Total for Question: 4 marks

M27.

Working	Answer	Mark	Additional Guidance

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 = area of $ABCD ÷ 4$

B1 area of CYZ = area of $ABCD ÷ 8$

A1 cao

OR

Diagram

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

Let $AB = x$, $AD = y$

Area of rectangle = xy

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

Total for Question: 4 marks

M28.

	Working	Answer	Mark	Additional Guidance
FE	Area of the room $= 4 \times 8 + 4 \times 6 = 56$ Area of a tile $= 0.5 \times 0.5 = 0.25$ Number of tiles $= 56 \div 0.25 = 224$ Cost $= 4 \times 224$ **OR** No of tiles around room $= 2 \times$ lengths of room $=$ 8, 16, 16, 12 Total number of tiles $= 8 \times 16 + 8 \times 12 = 224$ Cost $= 4 \times 224$	£ 896	6	**M1** for full method for finding the area of the room **A1** at least one area correct **B1** for area of tile $= 0.25m^2$ or 2500 cm^2 or 4 tiles $= 1m^2$ **M1** for area of room ÷ area of a tile **M1** for 4 × number of tiles **A1** cao **OR** **M1** for doubling each length to show number of tiles for each side **B1** for 8, 16, 16 and 12 **M1** for a full method of finding the number of tiles ($12 \times 16 + 8 \times 4$) **A1** for at least one 'section' correct **M1** for 4 × '224'

				A1 cao
				Total for Question: 6 marks

M29.

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

E1.   In part (a) most candidates were able to write down the correct radius although some wrote down '4' or worked out either the circumference or the area. In part (b) those candidates who knew the formula for the area of a circle were usually quite successful and many achieved the correct answer. A common error was for candidates to subtract the area of only one small circle from the area of the large circle. Some candidates worked out the circumference of each circle rather than the area. Many had little or no idea what was required and did not attempt to work out the area or tried to work it out without using π.

E2.   Apart from part (a) this question was not well answered. Problems included failure to recall the formula for calculating the area of a circle, substitution of the diameter rather than the radius, doubling rather than squaring, and subtraction of the area of a single small circle, rather two. There was also some premature rounding which placed otherwise correct answers outside the acceptable range. Consequently there were very few cases where full marks were awarded.

E3.   This question too was well understood but a surprising number of candidates forgot to use a ½ in the formula for the area of a triangle so consequently a number of solutions of 55 cm² could only score one mark if working for 7 × 5 was shown for the area of the rectangle. Very few candidates chose to use the formula for area of a trapezium.

E4.   A well understood question by most candidates; however a significant minority mixed up area and perimeter and some candidates found the area and perimeter of the grid on which the shaded shape was drawn. Almost all candidates wrote rectangle for the shape though some candidates did write quadrilateral, square or even kite.

##

The main problems candidates faced were due to a lack of brackets in their original expressions for area. This invariably led to incorrect multiplication of linear expressions and when dividing the area of the triangular section by 2. A few candidates were let down by errors with signs or arithmetical slips which meant they did not reach the final expression given for the total area. Here Quality of Written Communication was being assessed, a candidate's work needed to be set out in a logical fashion.

##

Many candidates gave a correct final answer of 3 supported by the required accurate working. There were some arithmetical errors with 12 × 7 and many did omit to divide 18 by 2 to get the correct triangle area. Although these errors did allow the correct final answer to be reached, candidates were penalised for their incorrect working. Sensible use was made of repeated addition or subtraction to find the number of boxes rather than attempts at formal division.

##

This was another QWC question. Candidates who adopted a practical approach to this question did well. Rather than moving straight to a volume calculation, which was the failing of many candidates, the best way was to consider lining up the cubes inside the box to find how many could be laid along each edge. But not only was the calculation needed, candidates then had to communicate a clear conclusion, which is why this question was flagged as being a QWC question. Many did, either by giving the maximum number of bricks that could be put in the box, giving the dimensions of a box that could fit them all, or suggesting that another layer was needed. Overall quite well answered. Centres need to be aware that practical approaches to Mathematics remain appropriate at KS4.

##

Nearly 40% of the candidates successfully provided an answer of 36 from correct working. Most candidates attempted to use the formula for the area of a trapezium. Although the formula is on the sheet, many tried their own incorrect versions, often omitting the ½ or multiplying the two lengths instead of adding.

The weakest answers seen included only adding lengths together or merely doing base multiplied by height. Some otherwise correct answers were spoilt by poor arithmetic eg 5 + 7 = 14. Those candidates who used a rectangle and two triangles to find the areas were seldom successful, almost invariably using a base of 2 for the triangle instead of 1.

##

Clear organisation of working helped the most successful candidates in this question. Nearly all candidates made an attempt at this question with nearly ¼ of the candidates scoring all 4 marks. A further 15% scored 3 marks, generally losing a mark for either incorrect units (or no units) or for missing out one area of one of the rectangular faces.

Some candidates found volume rather than area and a significant number performed more haphazard calculations involving the various side lengths. In these cases no method marks or accuracy marks could be awarded. Other candidates multiplied or added all the lengths together.

The triangular faces proved the most problematic. Many forgot to divide by 2 but most had made inroads into the question. Some students drew the net of the prism which helped them visualise the correct lengths of each side. This was encouraging and could perhaps be made more high profile in solving problems of this type.

Candidates appeared well prepared to give units and most doing so did provide the correct cm$_2$ for area.

##

This was almost always treated as if the 280 was volume. Some appeared to recognise that is 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.

E15.   The most common successful approach was to multiply πR^2 by 150/360, although a few candidates did the equivalent by dividing by 2.4. Common errors included assuming the sector was one third of a circle or just working out the area of a circle. Some candidates halved the given 13 and thought that the radius was 6.5 cm.

E16.   Part (a) was answered correctly by the overwhelming proportion of the candidature. There were a few 56s to be seen and some candidates took advantage of the formula

sheet to use $\frac{1}{2}ab\sin C$.

Part (b) was a standard Pythagoras question. Most candidates knew that they had to square and add. Some did not notice that the answer had to be given to correct to 2 decimal places, so 10.6 was not acceptable for full marks, unless a more accurate value were given in the working.

Part (c) caused more problems. A sizable proportion of candidates did not know where to start and tended to guess at an angle or to misuse the idea of tangent and write such things as $\tan = \frac{32}{46}$ or tan32 × 46. Some candidates evaluated the fraction $\frac{32}{46}$ as 0.7 and thus were not able to pick up the final accuracy mark for the size of the angle. A minority of candidates took advantage of the formula page and used Pythagoras to calculate the hypotenuse and then use the sin rule to calculate the angle. This can get full marks, but candidates tend to lose out through a lack of accuracy.

E17.   Only a minority of candidates were able to score full marks on this question but most were able to get a mark for finding the area of at least one face and a mark for giving the correct units cm². Common errors included finding and adding the areas of only the two visible faces, i.e. 6 + 35; finding and adding the areas of only four faces; adding the areas of repeated faces, typically 6 + 6 + 3 × 35; incorrectly working out the area of the triangle as 3 × 4. A significant number of candidates calculated the volume of the prism, but some of these, perhaps fortuitously in some cases, were able to score the independent mark for units.

E18.   It is disappointing to have to report that only slightly more than half of all candidates achieved the marks in any part of this question. Errors include confusion between area and perimeter, and errors in simple counting of lines, squares or cubes. Even more able candidates were found to have errors in this question.

E19. Most candidates attempted this question but it was answered very poorly. Many candidates did not seem to understand what is meant by surface area and attempted to work out either the volume of the prism or the total length of some or all of the edges. Many of those who tried to find the surface area worked out the area of the triangle incorrectly as 3 × 4 = 12. Some candidates failed to appreciate that the prism has five faces and it was not uncommon to see just the area of the 5 × 7 rectangle added to the area of one triangle. Others assumed that two or even all three of the rectangular faces were congruent.

E20. Most candidates recognised the need to split the shape into more regular shapes in order to find area. The most common approach was to calculate the area of the 12 by 5 rectangle and then the area of the remaining triangle. Unfortunately many failed to correctly work out the area of this triangle because of inaccurate dimensions. The most common attempt was 1/2 × 9 × 5 = 22.5, using an incorrect height of 9 cm instead of 4 cm.

Weaker candidates, perhaps those inappropriately entered, simply either found the sum of all the given dimensions or just worked out 12 × 9 and/or 7 × 5

E21. **Foundation**

There was a wide variety of incorrect answers to this question although most candidates were able to score at least one mark, generally for sight of 12 × 12 (although it was disturbing to note how many candidates wrote 12 × 12 = 48 even when they could use a calculator and that 42% of the candidates scored no marks at all!). 108 was a common incorrect answer from $144 - 6^2$. A significant number were not able to find the area of the square, let alone the area of the circle. Many candidates realised they had to use π for the area of the circle but then used the formula for the circumference of the circle. As a result it was not uncommon to see an answer of 106.3. Others squared π or used π in their attempt at finding the area of the square! However just over 20% of the candidates did score all 4 available marks which was pleasing to see.

Higher

Most students managed to correctly find the area of the square as 12squared or 12 × 12, a common error was to double 12 instead of squaring. Others found the perimeter rather

than the area. A significant number of candidates either used 6squared or 2 × pi × 6 for the area of the circle. For the final method mark, some candidates didn't realise they had to subtract. Most who gained the 3 method marks also gained the accuracy mark. The transcription error of 133(..) instead of 113(..) was frequently seen and led to some candidates losing the final accuracy mark. The correct answer was seen from about 57% of candidates.

E22.   Although some was seen, there seemed less confusion between perimeter and area than in the past. Part (a) was successfully answered by over 80% of candidates. Some candidates only added the two sides given and gave 30 as their answer. Examiners rarely saw any working in part (b). Over 60% of candidates gained both marks in this part of the question.

E23.   This question was reported by many as being a good discriminator.

The most efficient way to tackle the question was to realise that the angle of the sector was 60.This enabled the candidates to use the ½*ab* sin*C* formula for the triangle. However many candidates resorted to the cosine rule to find it or decided because it was a sixth of the circle they needed to use sin 6. A number of candidates were able to calculate one of the areas correctly; more frequently the sector, and then the subtraction carried out. The most common error was to use half base × height for the triangle area, using 6 as the height. Some did use Pythagoras to find the height but often made errors. Quite a few found one or other of the two areas and offered this as their answer.

E24.   In parts (a) and (b), many candidates were confused in distinguishing between perimeter and area. Many gave 12 as their answer to part (a). In part (b), the omission of units was common, even when the area was correct. In part (c), many candidates successfully found the correct volume by working out 5 × 3 or more usually by simply counting the cubes. The most common errors seen were either calculations of 3 × 3 × 3 (= 27) or mistakes in counting methods leading to answers of 13 and 14, which gained 1 mark, and sometimes 12 which gained no credit.