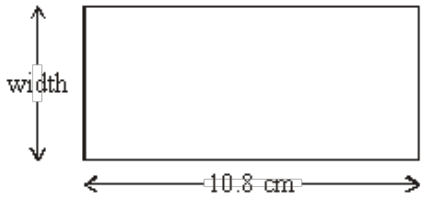
Q1. The length of a rectangle is 10.8 cm.
The perimeter of the rectangle is 28.8 cm.



Not to scale

Calculate the width of the rectangle.

.....

.....

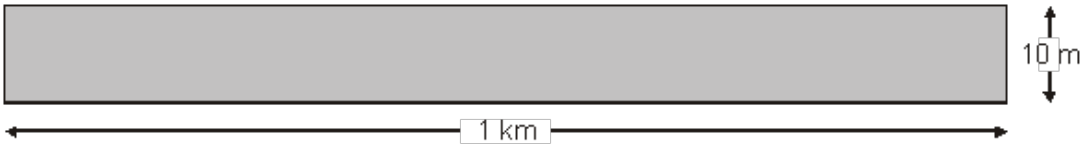
.....

Answer ..... cm

(Total 3 marks)

Q2. Large areas can be measured in hectares.

1 hectare is 10 000 m^2.



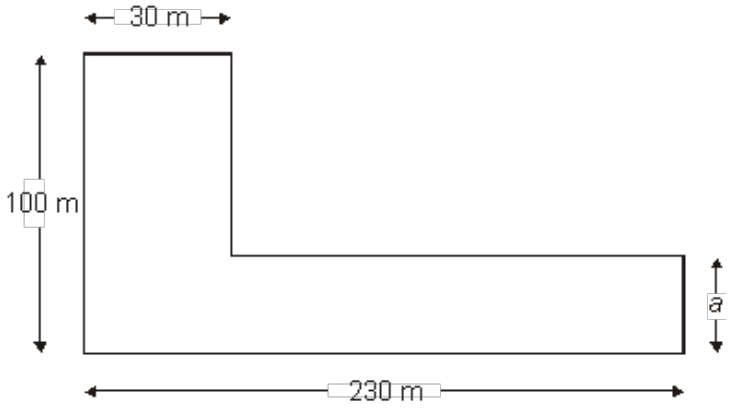
(a) Explain why the diagram represents 1 hectare.

.....

.....

(1)

(b) This L–shape has an area of one hectare.
All lengths are a whole number of metres.



Not drawn accurately

Work out the value of *a*.
Give your answer in metres.

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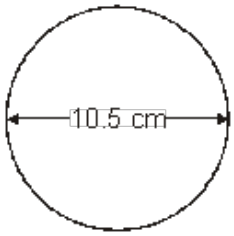
Answer ..... m

(3)
(Total 4 marks)

Q3. Work out the circumference of a circle of diameter 10.5 cm.



Not drawn accurately

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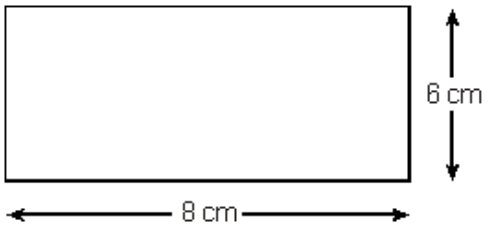
Answer ..... cm

(Total 2 marks)

Q4. (a) The diagram shows a rectangle.



Not drawn accurately

Work out the area of the rectangle.
State the units of your answer.

.....

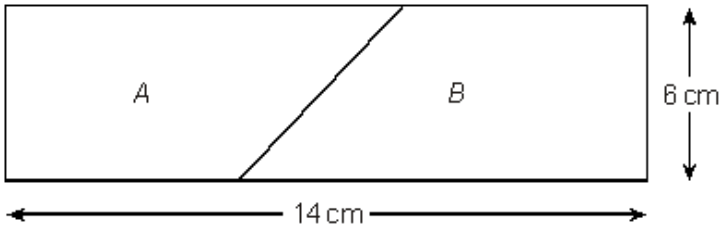
.....

.....

Answer .....

(3)

(b) The diagram shows a rectangle made from two congruent shapes *A* and *B*.



(i) Write down the mathematical name of shape *B*.

Answer .....

(1)

(ii) Explain how you could work out the area of shape *B*.

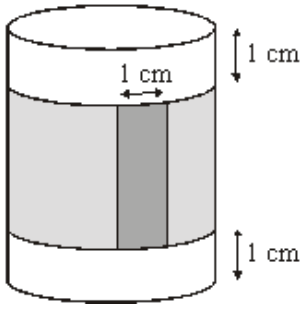
.....

.....

.....

(2)
(Total 6 marks)

Q5. A tin of diameter 7 cm and height_ 12 cm has a label around it.
The label is glued together using a 1 cm overlap.
There is a 1 cm gap between the label and the top and the bottom of the tin.



Not to scale

Find the length and the height_ of the label.

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.....

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.....

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.....

Answer Length = ... cm

Height = ... cm

(Total 4 marks)

Q6. A cuboid is made from centimetre cubes.

The area of the base of the cuboid is 5 cm^2.

The volume of the cuboid is 10 cm^3.

Work out the surface area of the cuboid.

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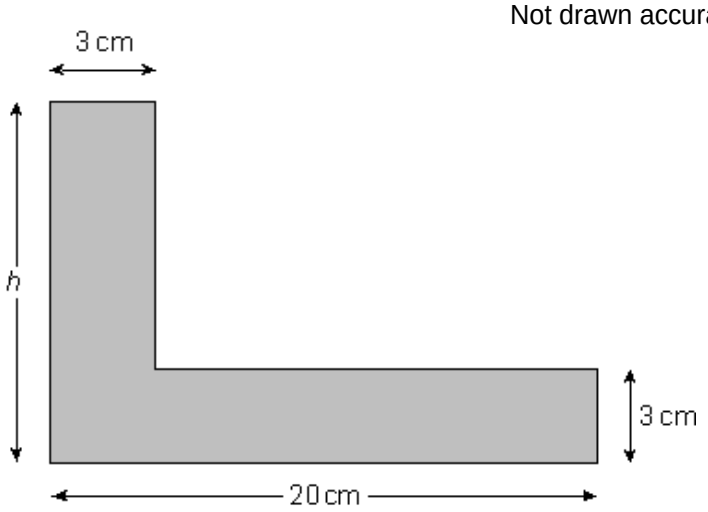
Answer ..... cm^2

(Total 3 marks)

Q7. This L-shape has measurements as shown on the diagram.

Not drawn accurately



The perimeter of the shape is 72 cm.

Find the length marked *h* on the diagram.

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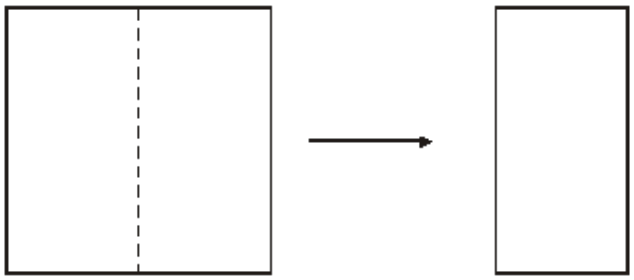
Answer ..... cm

(Total 3 marks)

Q8. You have a square piece of paper which is folded in half to form a rectangle as shown.



The perimeter of the rectangle is 39 centimetres.

What is the area of the square you started with?

.....

.....

.....

.....

.....

Answer ……..... cm^2

(Total 4 marks)

Q9. Is the statement below always true, sometimes true or never true?

Tick the correct box.

The circumference of a circle of diameter 10 cm is greater than the perimeter of a triangle with a base 10 cm.

☐ Always true ☐ Sometimes true ☐ Never true

Explain your answer

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.....

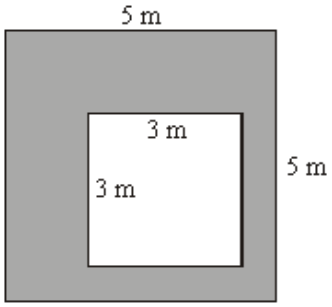
.....

.....

.....

(Total 2 marks)

Q10. What percentage of this shape is shaded?



Not to scale

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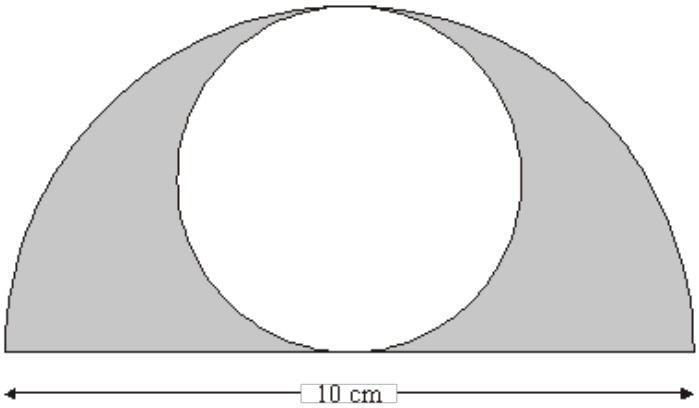
Answer ..... %

(Total 4 marks)

Q11. A circle fits inside a semicircle of diameter 10 cm as shown.



Not drawn accurately

Calculate the shaded area.

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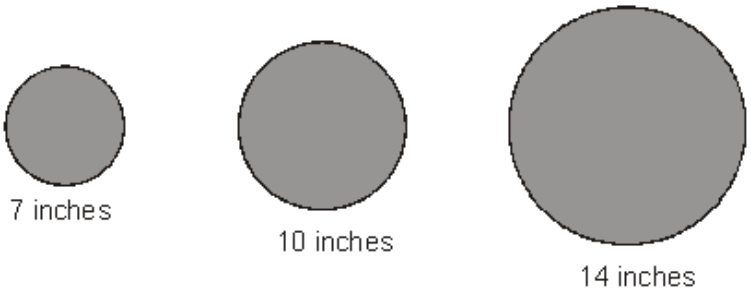
Answer ..... cm^2

(Total 3 marks)

Q12. A restaurant serves garlic bread.

All the garlic breads are circular and the same thickness.

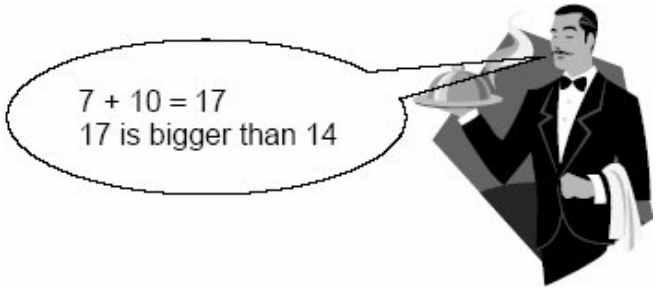
They can be made with different diameters as shown.



Robert is going to order a 14-inch garlic bread.

The restaurant has a special offer.

> *Special Offer*
>
> Get one 7-inch garlic bread **and** one 10-inch garlic bread for the same price as a 14-inch garlic bread.



Robert says that if he has the special offer he will get less garlic bread.

Is Robert correct?

You **must** show your working.

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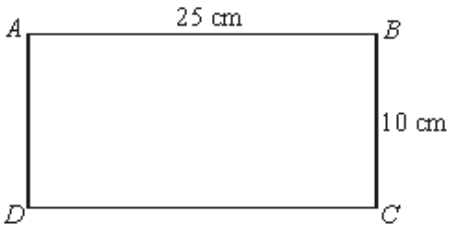
(Total 4 marks)

Q13. *ABCD* is a rectangle with length 25 cm and width 10 cm.



Not to scale

The length of the rectangle is increased by 10%.
The width of the rectangle is increased by 20%.
Find the percentage increase in the area of the rectangle.

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.....

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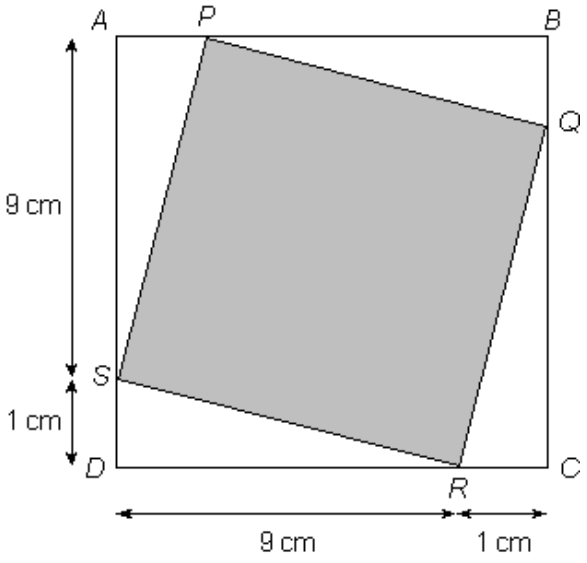
.....

Answer ..... %

(Total 3 marks)

Q14. *ABCD* is a square.
PQRS is a square with vertices on the sides of *ABCD*.
AS = *DR* = *CQ* = *BP* = 9 cm
PA = *SD* = *RC* = *QB* = 1 cm



What is the area of the shaded square *PQRS*?

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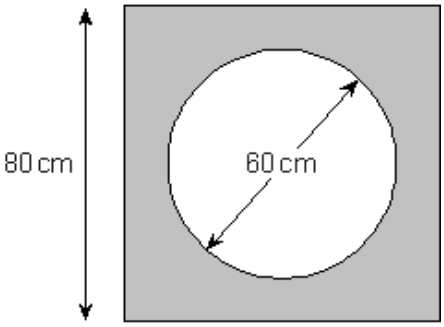
Answer ..... cm^2

(Total 3 marks)

Q15. A circle of diameter 60 cm is cut out of a square of side 80 cm.



Not drawn accurately

Calculate the shaded area.

.....

.....

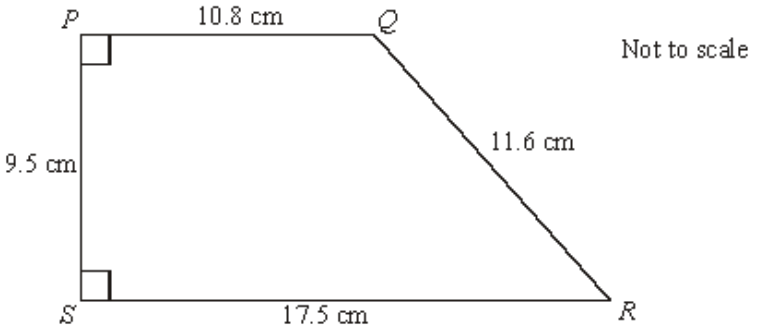
.....

.....

Answer .....cm^2

(Total 3 marks)

Q16. In the diagram below, PQ = 10.8 cm, QR = 11.6 cm, RS = 17.5 cm and PS = 9.5 cm.
The angles at P and S are 90°



Calculate the area of $PQRS$.

.....

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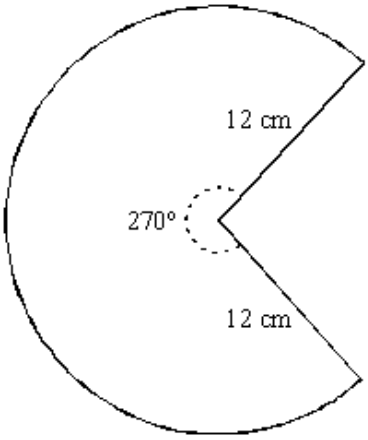
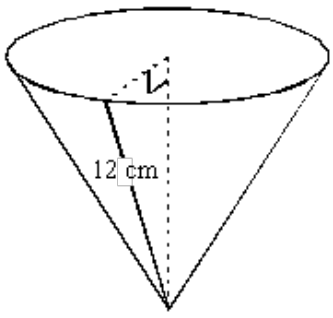
.....

Answer ..... cm^2

(Total 3 marks)

Q17. A firm makes cone shaped containers out of card.
The card is in the shape of a sector of a circle of radius 12 cm.
The angle of the sector is 270°.
The straight edges are brought together to make the cone.





(a) Find the arc length of the card used to make the cone.
Give your answer in terms of π.

.....

.....

Answer ..... cm

(2)

(b) Calculate the radius of the base of the cone.

.....

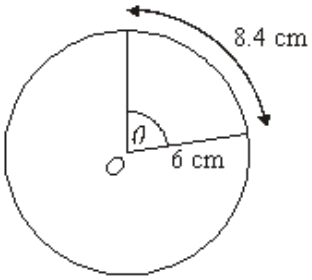
.....

Answer ..... cm

(2)

(Total 4 marks)

Q18. (a) A circle has a radius of 6 cm.
A sector has an arc length of 8.4 cm.
The angle at the centre of the sector is θ.



Not drawn accurately

Calculate the value of θ.

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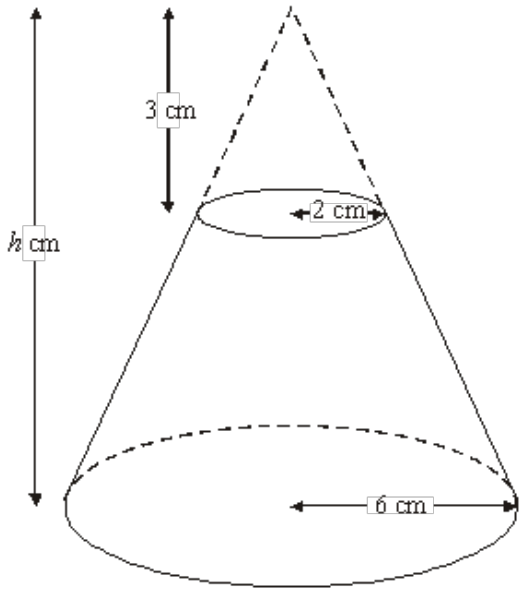
.....

.....

Answer ..... degrees

(3)

(b) A cone has base radius 6 cm and height_ *h* cm.
A smaller cone of base radius 2 cm and height_ 3 cm is cut from the top.
The remaining frustum has dimensions as shown.



Not drawn accurately

Calculate the volume of the frustum.

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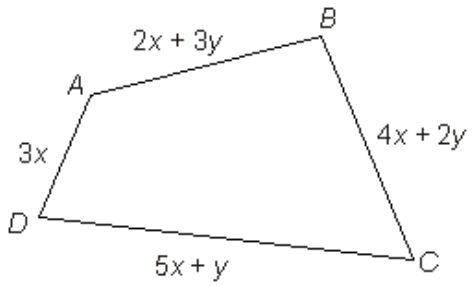
Answer ..... cm^3

(5)
(Total 8 marks)

Q19. *ABCD* is a quadrilateral.



Not drawn accurately

(a) Write down an expression for the perimeter of the quadrilateral in terms of x and y. Simplify your answer.

.....

.....

Answer .....

(2)

(b) When x = 4 cm, the perimeter of the quadrilateral is 68 cm.

Find the value of y.

.....

.....

.....

.....

Answer .....cm

(3)

(Total 5 marks)

M1. 28.8 ÷ 2

28.8 – 2 × 10.8

M1

Their 14.4 – 10.8

Their 7.2 ÷ 2

M1 dep

3.6

A1

[3]

M2. (a) 1 km = 1000 m **or**
area = 1000 × 10 = 10 000 m^2

B1

(b) 200 or 7000 seen

B1

7000 ÷ 200

M1

35

A1

[4]

M3. 3.14(1…) × 10.5

M1

32.9 to 33

A1

[2]

M4. (a) 8 × 6

Do not accept 8 × 6 ÷ 2

M1

48

A1

cm^2

Units mark

B1

(b) (i) Trapezium

B1

(ii) 14 × 6 ÷ 2 or
Area of rectangle ÷ 2
Half the area of both shapes

E1 For partial explanation

eg, area of rectangle – area of A
42 without working

E2

[6]

M5. C = π × 7

C = 2π × 3.5 Must substitute numbers.
C = πd or 2πr is M0 until used.
NB π × 3.5 is M0 as wrong method (πr)

M1

= 21.98 – 22

3.14 × 7 = 21.98, $\frac{22}{7}$ *× = 22*

A1

Length = 22.98 to 23

ft their 21.99 + 1 if M1 awarded.

A1 ft

Height = 10 cm

Allow answers transposed.

B1

[4]

M6. 1 by 5 by 2 identified

or height_ = 2 or base = 1 × 5

B1

2(1 × 5 + 1 × 2 + 2 × 5)

oe area of 6 faces attempted

M1

34

A1

[3]

M7. $h - 3$

$h + 20 + h + 20$ *oe*

B1

$2h + 40 = 72$

M1

($h =$) 16

A1

Alt 1

$72 - 43 = 29$

B1

$2h - 3 = 29$ or $2h = 32$

M1

($h =$) 16

M1

Alt 2

$72 - 43 = 29$

B1

$(29 - 3) \div 2$ or 13

M1

($h =$) 16

A1

[3]

M8. $39 \div 3$ or $39 \div 6$
or $19.5 \div 3$ or $19.5 \div 6$
oe

M1

13 or 6.5 seen

A1

13×13

M1

169

A1

[4]

M9. Sometimes true

B1

Valid explanation

eg, height_ of triangle can vary

B1

[2]

M10. 5 × 5 or 3 × 3

M1

5 × 5 – 3 × 3

or 9 ÷ 25 × 100 or 9 × 4 oe

M1

(their 16) ÷ (their 25) × 100 oe

or 16 × 4 or 100 – 36

M1 dep

64

SC3 36

A1

[4]

M11. Area semicircle – area circle

Accept $\pi \times 10^2 \div 2$ and/or $\pi \times 5^2$ for M1

M1

$\pi 5^2 \div 2 - \pi(2.5)^2$ (= 12.5π – 6.25π = 39.27 – 19.63)

Accept fractions, decimals or in terms of π

A1

19.6(....)(= 6.25π)

ft on one error only, e.g.
Accept fractions, decimals or in terms of π.
Use of π as 3.14 gives 19.625 Al
Common errors e.g.
$\pi \times 10^2 \div 2 - \pi \times 5^2 = 157.1 - 78.5 = 78.6$
= Ml,A0,A0ft.
$\pi \times l0^2 \div 2 - \pi \times 2.5^2 = 157.1 - 19.6 = 137.5$
= M1,AO,A1 ft
$\pi \times 5^2 \div 2 - \pi \times 5^2 = 39.3 - 78.5 = -39.3$
Ml, AO, AO (non-sensible answer)

A1 ft

[3]

M12. π × 3.5 × 3.5 or π × 5 × 5 or π × 7 × 7

12.25π or 25π or 49π

M1

π × 3.5 × 3.5 + π × 5 × 5

M1

47.25π **and** 49π

A1

He is correct

ft if both Ms awarded

A1 ft

[4]

M13. 27.5 × 12 – 250 (=80)

330/250 or 330/2.5 get M1

M1

cv/250 (×100)

For completion of method

DM1

32% increase

32% must be stated.
Special cases all get M1, DM1, A0
Misreads both as 10% => 21%
Misreads both as 20% => 44%
Misread both as decreases => 28%

A1

ALTERNATIVE

1.10 × 1.20

M1 for 110% × 120%

M1

= (their 1.32) – 1

A1 for 132% or equivalent

DM1

32% increase

A1 stating answer
Special cases above with equivalent values.

A1

[3]

M14. Area of triangle = $\frac{1}{2}$ × 9 × 1
or 4.5

Length of square = $\sqrt{(9^2 + 1^2)}$

M1

100 – 4 × their 4.5
$\sqrt{82}$

M1 dep

82

A1

[3]

M15. $\pi \times 30^2$ (2827)

M1

80 × 80 – 'Their 900π'

M1dep

3570 to 3574

A1

[3]

M16. 10.8 × 9.5 (= 102.6)
or 17.5 ×9.5

M1

$\frac{1}{2}$(17.5 – 10.8) × 9.5 (= 31.825)
or $\frac{1}{2}$*(6.7) ×9.5* *M1*
$\frac{1}{2}$*(10.8 + 17.5) 9.5 gets* *M2*

M1

134(.425)

A1

[3]

M17. (a) ¾ × (2 × π × 12)

M1

18π
Not π18, unless notation previously penalised
π × 18 is acceptable

A1

(b) $2 \times \pi \times r =$ their 18π

Or their $18\pi \div 2\pi$

M1

$r = 9$

$r = \frac{3}{4}$ of 12 = 9 scores 2 marks

A1 ft

[4]

M18. (a) $\frac{\theta}{360} \times 2\pi \times 6 = 8.4$

M1

$\theta = \frac{8.4 \times 360}{2\pi \times 6}$

A1

80.2(1...)

r= 12 giving 40.1 is Ml, Al, A0

r = 3 giving 160.4 is Ml, Al, A0

A1

(b) $\frac{h}{6} = \frac{3}{2}$

M1

$h = 9$ (cm)

h = 12 gives Ml, A0

A1

$\frac{1}{3}\pi \times 6^2 \times (\text{their } 9) - \frac{1}{3}\pi \times 2^2 \times 3$

Ml for difference of two cone volumes

Al if all correct

M1, A1

(V) = 327 or 326.7 .....(cm^3)

Accept 330 if working seen, ft their h if both M's awarded.

A1 ft

[8]

ALTERNATIVE

linear scale factor 1:3

Must be used. Just writing it down does not qualify as a method unless progress is made.

M1

Volume scale factor 1:27

A1

Volume small cone $\frac{1}{3}\pi \times 2^2 \times 3 = 12.566\ldots$

M1

Volume large cone 27 × (their 12.566)

339.292...

DM1

(V) = 327 or 326.7 .....(cm^3)

Accept 330 if working seen.

A1

Scs

12.566 only

B1

339.29 only

M1, A1, M1

$\frac{1}{3}\pi \times 36 \times h - \frac{1}{3}\pi \times 4 \times 3$

M1,A1

[8]

M19. (a) $2x + 3y + 4x + 2y + 3x + 5x + y$

14x or 6y seen

M1

$14x + 6y$

A1

(b) 'Their 14' × 4 + 'their 6' × y = 68

M1

'Their 6y' = 'their 12'

M1

(y =) 2

ft Their answer for (a) with 2 terms

A1ft

[5]

E1. **Foundation Tier**

The success rate on this using and applying question was disappointing. The context is not unfamiliar to candidates but many either simply divided the 10.8 by 2 giving a width of 5.4. or subtracted 10.8 from 28.8 giving 18 or 9 as their answer.

Intermediate Tier

Most scored well on this question with the usual efforts being 28.8 ÷ 10.8 or (28.8 – 10.8) ÷ 2.

E2.

This question is drawn from our specimen paper produced in advance of live examinations. As such, the question was not used in a live examination and therefore no Examiner's Remarks exist.

E3.

This question is drawn from our specimen paper produced in advance of live examinations. As such, the question was not used in a live examination and therefore no Examiner's Remarks exist.

E4. Part (a) was very well answered with most candidates obtaining the units mark for cm2. Only a few incorrectly found the perimeter. Most of the explanations in part (b)(ii) gained full marks but some split B into a triangle and a rectangle or used the formula for the area of a trapezium.

E5. **Intermediate Tier**

Most scored at least 2 marks. More used the correct formula here than in question 14. The usual error was to subtract the 1cm rather than add it on, but some did π(7 + 1) or made truncation errors. Most got the height_.

Higher Tier

This question was well done and often scored full marks. Common errors were to add the 1 cm to the diameter before calculating the circumference, adding 2 cm to the circumference for the overlap, or subtracting 1 cm from the circumference. Some also incorrectly rounded to 22.9 so lost an accuracy mark. It is worrying that a few candidates used the area formula. The height_ of 10 cm was almost always given correctly.

E6. **Intermediate Tier**

Only a handful of candidates managed to find the correct solution to this question. Some candidates scored 1 mark for finding the correct dimensions of the cube. A fairly common incorrect answer was 6 × 5 obtained by assuming that the cuboid was actually a cube.

Higher Tier

This question caused problems because many candidates did not realise that the height_ of the cuboid had to be 2 cm. Of those who did realise that $h = 2$, many then did not use the correct dimensions of 5 cm, 2 cm and 1 cm (2.5 × 2 × 2 being a popular misconception). Although there were follow through marks available it was often difficult to interpret candidates' efforts. Although about a quarter of all candidates scored full marks, the same number scored zero. Overall, the responses were disappointing for a question so early in the paper.

E7. This question was well done overall. The majority of candidates showed some indication of a valid method. Errors were mainly due to forgetting to include one of the sides (the horizontal side of 17 cm for example) or calculating the vertical height_ inside the L (13cm).

E8.

This question is drawn from our specimen paper produced in advance of live examinations. As such, the question was not used in a live examination and therefore no Examiner's Remarks exist.

E9.

This question is drawn from our specimen paper produced in advance of live examinations. As such, the question was not used in a live examination and therefore no Examiner's Remarks exist.

E10. This question exposed a basic weakness in the concept of expressing one value as a percentage of another. By far the majority of candidates could not progress correctly beyond finding and subtracting the areas of the two squares and of those who wrote the equivalent of $\frac{16}{25} \times 100$ many could not cope with the calculation. Some candidates scored 3 marks by calculating 36% from a version of $\frac{9}{25} \times 100$ but did not continue to work out 100 – 36. Some candidates gave 60% by incorrectly expressing 3 as a percentage of 5; this scored zero.

E11. The majority of candidates knew that the answer involved the difference between the area of the semicircle and the area of the circle. Errors were caused by use of an incorrect formula for area of a semicircle, using the wrong values for the radii, or by rounding too early in the calculations giving a common wrong answer of 19.7.

E12.

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E13. **Intermediate Tier**

This was poorly answered. Many got the new area as 330 but then did 250/330, or just gave an answer of 30 with no working, or stopped with an answer of 132%. There were Common misreads of both 10% or both 20% or both reductions.

Higher Tier

This question was well done by about 75% of candidates. The majority of errors were increasing both sides by 10 or 20% or by calculating a percentage increase of the final area of 330 cm^2.

E14. This question was poorly answered by the majority of candidates. Many assumed that the sides of the square were 9cm and gave an incorrect answer of 81cm^2. Other very common incorrect answers were 64 from 100 – 9 × 4 and 36 from 9 + 9 + 9 + 9. Those candidates who used Pythagoras' theorem usually had more success.

E15. The majority of candidates did not know the formula for the area of a circle. π × 60 was seen more often than the correct π × 302. Many candidates trivialised the question to 80 – 60 = 20.

E16. **Foundation Tier**

Very few candidates used the formula for the area of a trapezium even though it was given in the answer booklet. When breaking the trapezium into a rectangle and a triangle, few managed to find the area of the triangle because they failed to select the vertical height_ rather than the slant height_. Those who set out their working clearly gained a mark for finding the area of the rectangle.

Intermediate Tier

Only a small number of candidates used the formula for the area of a trapezium even though it was given in the answer booklet. When breaking the trapezium into a rectangle and a triangle, few managed to find the area of the triangle because they failed to select the vertical height_ rather than the slant height_. Those who set out their working clearly gained a mark for finding the area of the rectangle, however it was often unclear which sub-area was being calculated, which made it difficult to award method marks.

E17. This question was not as well done as it ought to have been. The concept of the circumference of the base of the cone coming from the arc length of the sector is standard at this level. Many who realised that the correct method was 3/4 × 2 × π × 12 failed to fully simplify this to 18π and so lost a mark. Poor notation (π18) was penalised. Common wrong answers were: using diameter = 12, using 1/4 × 2 × π × 12, and finding the area of the sector.

Part (b) could be done by using surface area methods as well as the more straightforward ones quoted in the mark scheme but attempts of any kind were rare and usually poor.

E18. This question was well done although it seemed to vary by centre. Many candidates did not know how to set up the initial relationship in part (a) or used the area of the circle. Premature rounding was a big problem in this part. For example, 8.4 is 22.28% of the circumference. This was rounded to 22% to give an answer of 79.2°. This lost a mark. In part (b) the main problem was a failure to find *h*, or to take *h* as 12. Some marks could still be scored if a clear method could be seen, so zero marks on this part were rare.

E19. Most candidates knew how to find the perimeter, in part (a), but made errors in the simplification. The correct answer of $14x + 6y$ was quite often simplified to $20xy$ or $7x + 3y$.

Despite the question being deliberately structured, few candidates used their answer to part (a) in part (b) and very few used an algebraic method. Most candidates totalled the x values to 56, found 68 – 56 and then gave the correct answer of $2.68 \div 4 = 17$ was often seen.