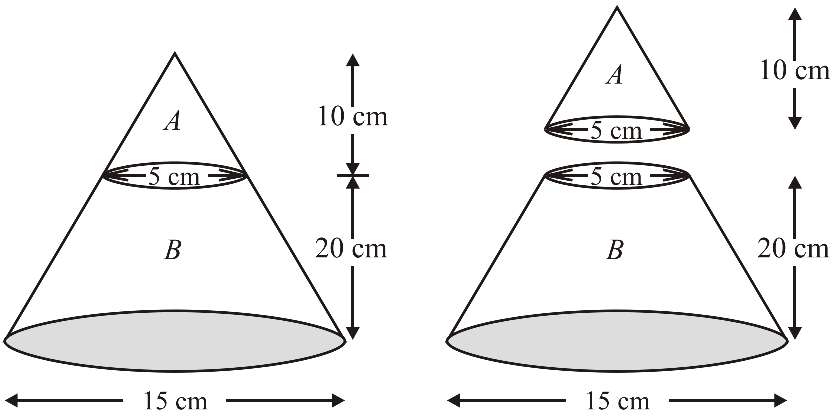
1.

Diagram **NOT** accurately drawn



The diagram represents a large cone of height 30 cm and base diameter 15 cm.

The large cone is made by placing a small cone *A* of height 10 cm and base diameter 5 cm on top of a frustum *B*.

(a) Calculate the volume of the frustum *B*.
Give your answer correct to 3 significant figures.

.........................cm^3

(3)

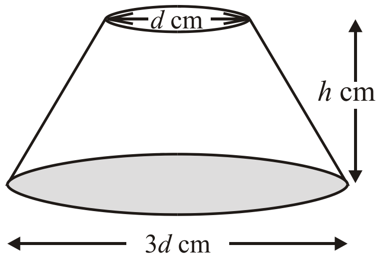


Diagram **NOT** accurately drawn

The diagram shows a frustum.
The diameter of the base is 3*d* cm and the diameter of the top is *d* cm.
The height of the frustum is *h* cm.

The formula for the curved surface area, S cm^2, of the frustum is

$$S = 2\pi d\sqrt{h^2 + d^2}$$

(b) Rearrange the formula to make *h* the subject.

h = ...

(3)

Two mathematically similar frustums have heights of 20 cm and 30 cm.

The surface area of the smaller frustum is 450 cm^2.

(c) Calculate the surface area of the larger frustum.

..........................cm^2

(2)

(Total 8 marks)

2.

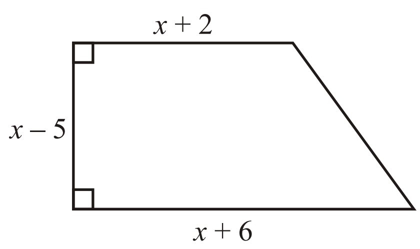


Diagram **NOT** accurately drawn

The diagram shows a trapezium.
The lengths of three of the sides of the trapezium are $x - 5$, $x + 2$ and $x + 6$.
All measurements are given in centimetres.

The area of the trapezium is 36 cm^2.

(a) Show that $x^2 - x - 56 = 0$

(4)

(b) (i) Solve the equation $x^2 - x - 56 = 0$

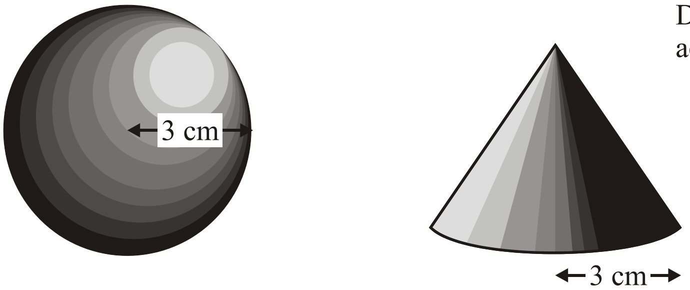
…………………………

(ii) Hence find the length of the shortest side of the trapezium.

…………………… cm

(4)
(Total 8 marks)

3.



The radius of a sphere is 3 cm.
The radius of the base of a cone is also 3 cm.
The volume of the sphere is 3 times the volume of the cone.

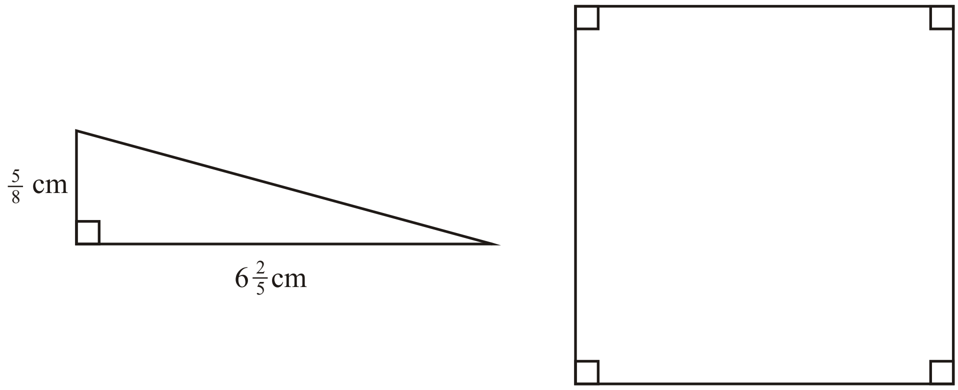
Work out the curved surface area of the cone.
Give your answer as a multiple of π.

.... cm^2

(Total 7 marks)

4.

Diagrams **NOT** accurately drawn



The area of the square is 18 times the area of the triangle.

Work out the **perimeter** of the square.

.... cm
(Total 5 marks)

5. (a) Find the value of $16^{\frac{1}{2}}$

....

(1)

(b) Given that $\sqrt{40} = k\sqrt{10}$, find the value of k.

....

(1)

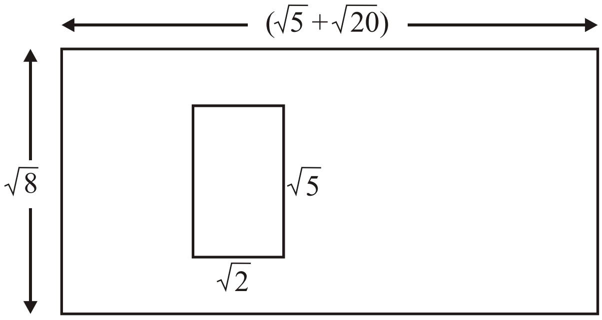


Diagram **NOT** accurately drawn

A large rectangular piece of card is ($\sqrt{5}+\sqrt{20}$) cm long and $\sqrt{8}$ cm wide.

A small rectangle $\sqrt{2}$ cm long and $\sqrt{5}$ cm wide is cut out of the piece of card.

(c) Express the area of the card that is left as a percentage of the area of the large rectangle.

..................................%

(4)

(Total 6 marks)

6. A cone has a volume of 10 m^3.

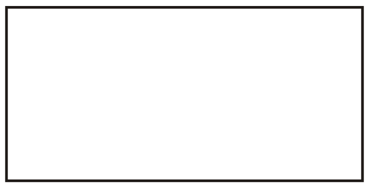
The vertical height of the cone is 1.5 m.

Calculate the radius of the base of the cone.
Give your answer correct to 3 significant figures.

.... m
(Total 3 marks)

7. The length of a rectangle is twice the width of the rectangle.
The length of a diagonal of the rectangle is 25 cm.

x



$2x$

Work out the area of the rectangle.
Give your answer as an integer.

.... cm^2
(Total 3 marks)

8. (a) Express $\frac{6}{\sqrt{2}}$ in the form $a\sqrt{b}$, where a and b are positive integers.

....
(2)

The diagram shows a right-angled isosceles triangle.

The length of each of its equal sides is $\frac{6}{\sqrt{2}}$ cm.

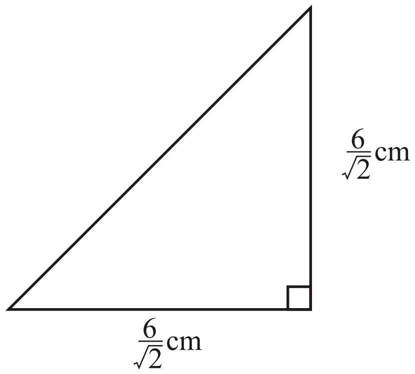


Diagram **NOT** accurately drawn

(b) Find the area of the triangle.
Give your answer as an integer.

.... cm^2
(2)
(Total 4 marks)

9. The diagram shows a sector of a circle with a radius of x cm and centre O.
PQ is an arc of the circle.
Angle $POQ = 120°$.

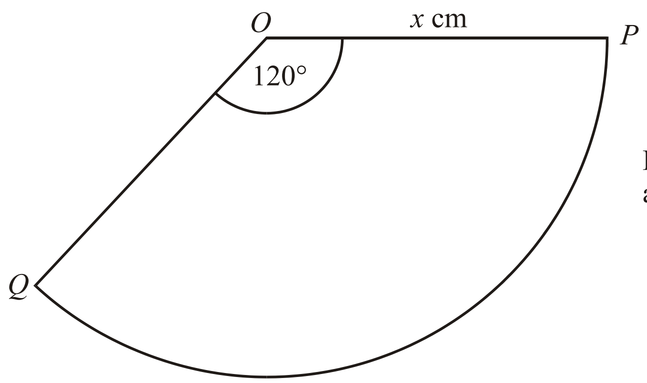


Diagram **NOT** accurately drawn

(a) Write down an expression in terms of π and x for

(i) the area of this sector,

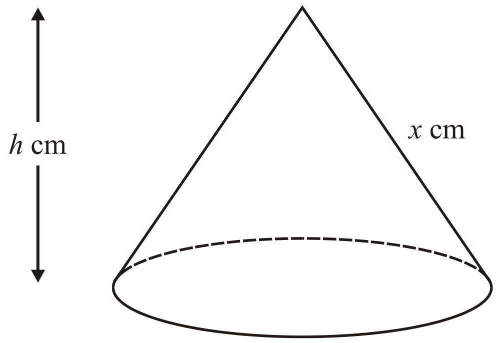
....

(ii) the arc length of this sector.

....

(2)

The sector is the net of the curved surface of this cone.
Arc PQ forms the circumference of the circle that makes the base of the cone.



The curved surface area of the cone is A cm^2.
The volume of the cone is V cm^3.
The height of the cone is h cm.

Given that $V = 3A$,

(b) find the value of h.

....
(3)
(Total 5 marks)

10.

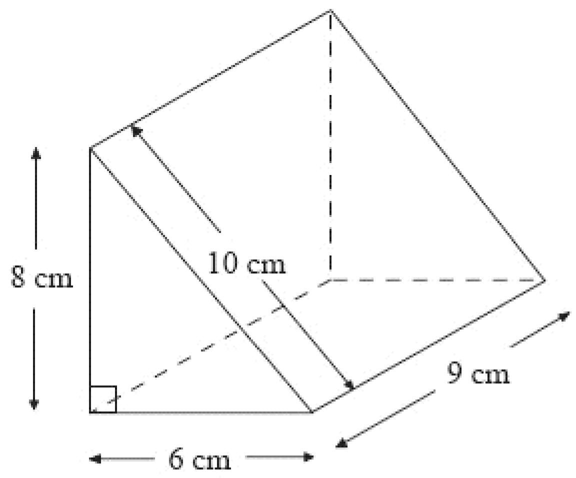


Diagram **NOT** accurately drawn

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

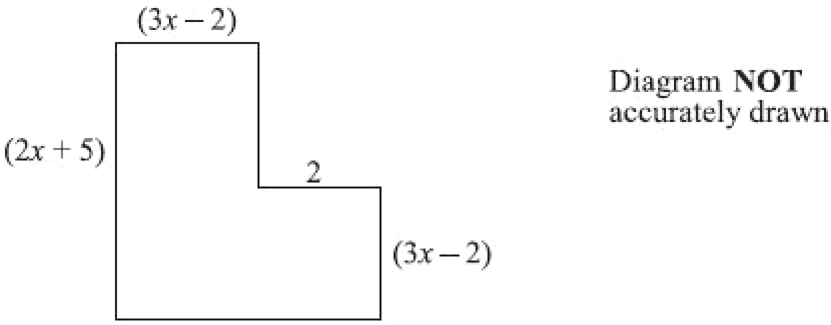
……………………….

(Total 4 marks)

11. The diagram below shows a 6-sided shape.

All the corners are right angles.

All measurements are given in centimetres.



The area of the shape is 25 cm^2.

(a) Show that $6x^2 + 17x - 39 = 0$

(3)

(b) (i) Solve the equation

$6x^2 + 17x - 39 = 0$

$x =$ …………… or $x =$ ……………

(ii) Hence work out the length of the longest side of the shape.

………………..cm

(4)
(Total 7 marks)

12.

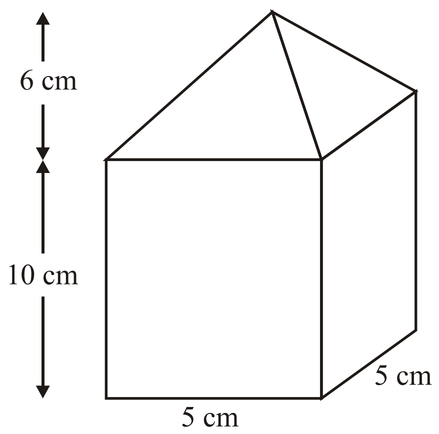


Diagram **NOT**
accurately drawn

The diagram shows a model.
The model is a cuboid with a pyramid on top.
The base of the model is a square with sides of length 5 cm.
The height of the cuboid in the model is 10 cm.
The height of the pyramid in the model is 6 cm.

(a) Calculate the volume of the model.

.... cm^3

(3)

The model represents a concrete post.
The model is built to a scale of 1:30
The surface area of the model is 290 cm^2.

(b) Calculate the surface area of the post.
Give your answer in square metres.

.... m^2

(3)
(Total 6 marks)

13. The length of a rectangle is 6.7 cm, correct to 2 significant figures.

(a) For the length of the rectangle write down

(i) the upper bound,

.....................................cm

(ii) the lower bound.

.....................................cm

(2)

The area of the rectangle is 26.9 cm^2, correct to 3 significant figures.

(b) (i) Calculate the upper bound for the width of the rectangle.
Write down all the figures on your calculator display.

.....................................cm

(ii) Calculate the lower bound for the width of the rectangle.
Write down all the figures on your calculator display.

.....................................cm

(3)

(c) (i) Write down the width of the rectangle to an appropriate degree of accuracy.

.....................................cm

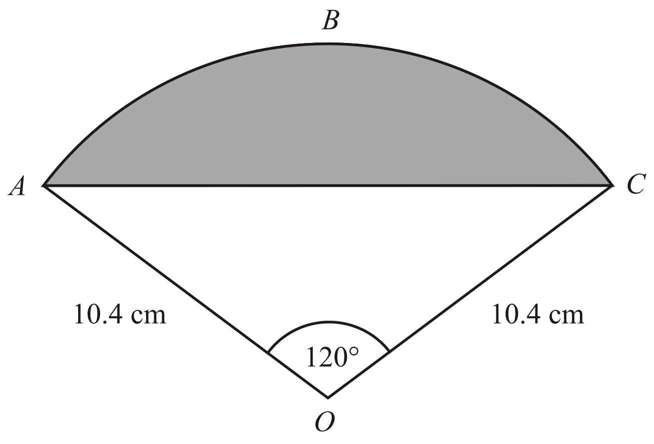
(ii) Give a reason for your answer.

....

(2)
(Total 7 marks)

14.

Diagram **NOT** accurately drawn



The diagram shows a sector *OABC* of a circle with centre *O*.
$OA = OC = 10.4$ cm.
Angle $AOC = 120°$.

(a) Calculate the length of the arc *ABC* of the sector.
Give your answer correct to 3 significant figures.

.....................................cm

(3)

(b) Calculate the area of the shaded segment *ABC*.
Give your answer correct to 3 significant figures.

.....................................cm^2

(4)
(Total 7 marks)

15.

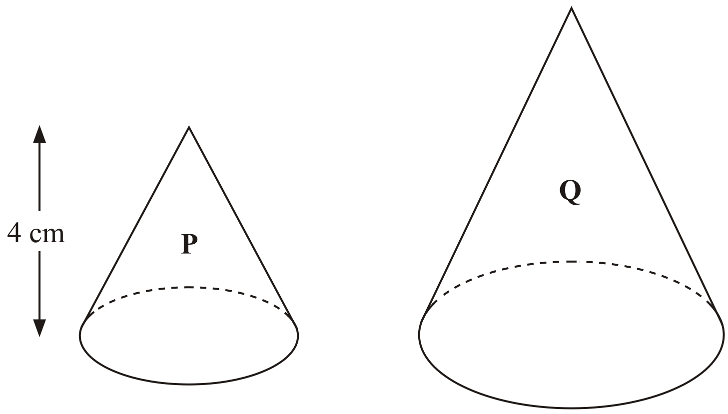


Diagram **NOT** accurately drawn

Two cones, **P** and **Q**, are mathematically similar.
The total surface area of cone **P** is 24 cm^2.
The total surface area of cone **Q** is 96 cm^2.
The height of cone **P** is 4 cm.

(a) Work out the height of cone **Q**.

.... cm

(3)

The volume of cone **P** is 12 cm^3.

(b) Work out the volume of cone **Q**.

.... cm^3

(2)

(Total 5 marks)

16.

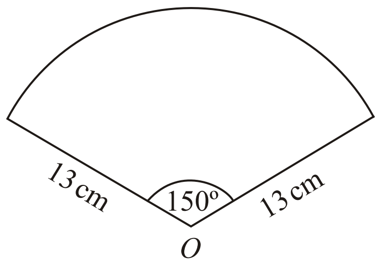


Diagram **NOT** accurately drawn

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.

.... cm^2
(Total 2 marks)

17.

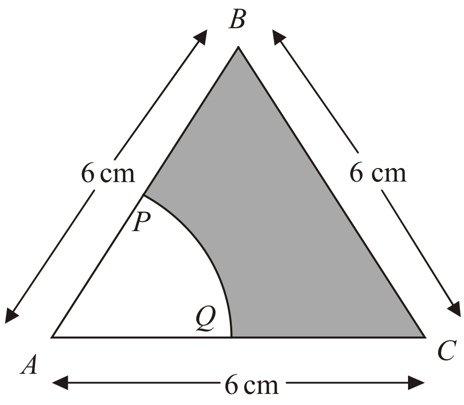


Diagram **NOT** accurately drawn

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.

.... cm^2
(Total 4 marks)

18.

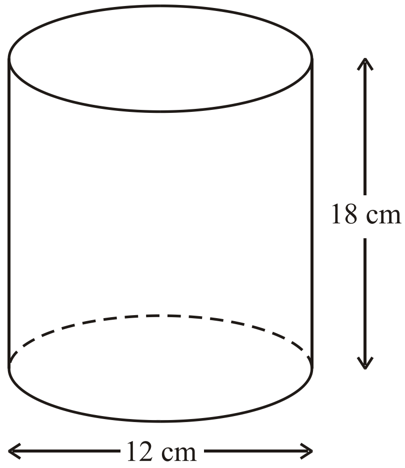


Diagram **NOT** accurately drawn

The diagram shows a solid cylinder.
The cylinder has a diameter of 12 cm and a height of 18 cm.

Calculate the **total** surface area of the cylinder.
Give your answer correct to 3 significant figures.

………………………… cm^2

(Total 4 marks)

19.

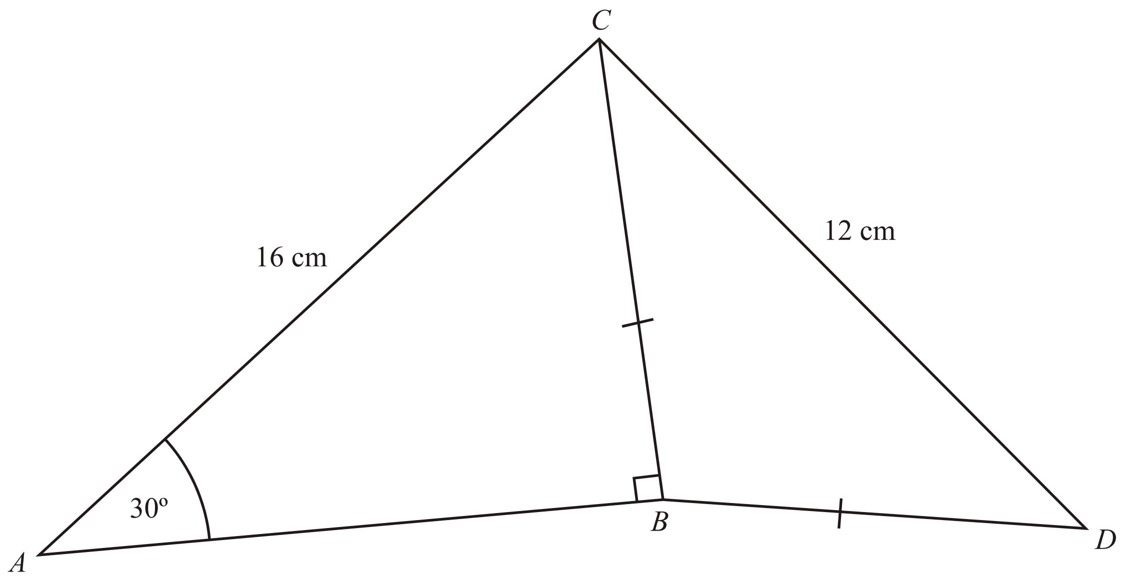


Diagram **NOT** accurately drawn

$AC = 16$ cm
Angle $ABC = 90°$
Angle $CAB = 30°$

$BC = BD$
$CD = 12$ cm

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

……………. cm^2
(Total 6 marks)

20.

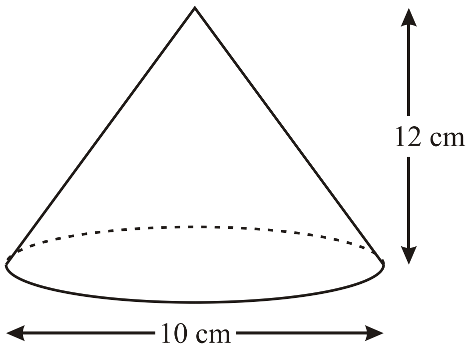


Diagram **NOT** accurately drawn

The diagram represents a cone.
The height of the cone is 12 cm.
The diameter of the base of the cone is 10 cm.

Calculate the curved surface area of the cone.
Give your answer as a multiple of π.

…………….. cm^2

(Total 3 marks)

21.

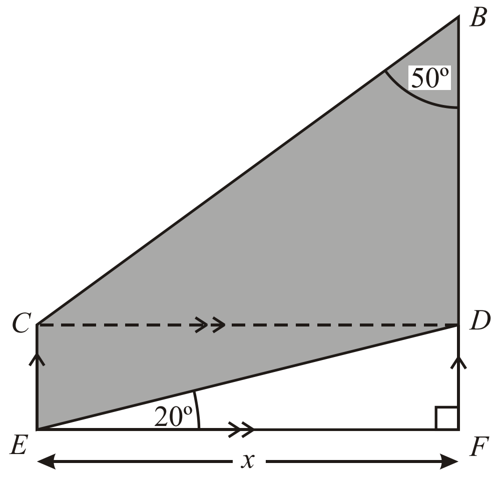


Diagram **NOT** accurately drawn

BCEF is a trapezium.
EC is parallel to *FDB*.
CD is parallel to *EF*.
Angle *CBD* = 50°. Angle *DEF* = 20°. Angle *EFD* = 90°.

EF = *x*.

(a) Express, in terms of *x*,

(i) the length of *DF*,

…………….

(ii) the area of triangle *DEF*.

…………….

(3)

(b) Work out the percentage of the trapezium *BCEF* that is **not** shaded.

……………. %

(4)

(Total 7 marks)

22. Correct to 2 significant figures, the area of a rectangle is 470 cm^2.
Correct to 2 significant figures, the length of the rectangle is 23 cm.

Calculate the upper bound for the width of the rectangle.

………………………. cm

(Total 3 marks)

23.

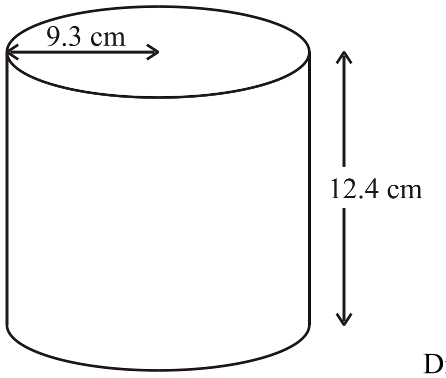


Diagram **NOT** accurately drawn

The diagram shows a solid cylinder.
The radius of the cylinder is 9.3 cm.
Its height is 12.4 cm.

Calculate the **total** surface area of the cylinder.
Give your answer correct to 3 significant figures.

.... cm^2
(Total 3 marks)

24.

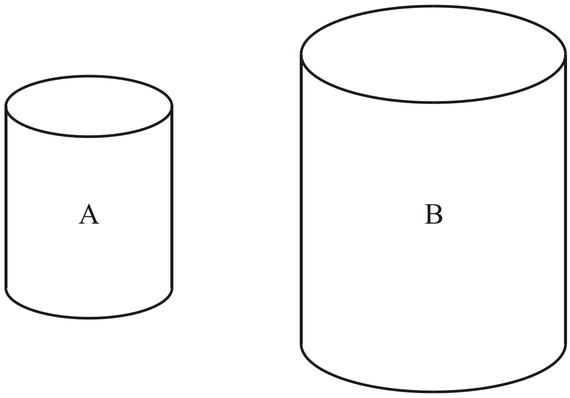


Diagram **NOT** accurately drawn

The two cylinders, A and B, are mathematically similar.
The height of cylinder B is twice the height of cylinder A.

The total surface area of cylinder A is 180 cm^2.

Calculate the total surface area of cylinder B.

....
(Total 3 marks)

25.

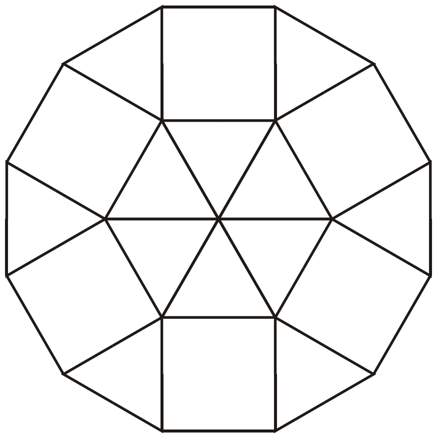


Diagram **NOT** accurately drawn

This 12-sided window is made up of squares and equilateral triangles.
The perimeter of the window is 15.6 m.

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

.... m^2

(Total 6 marks)

26.

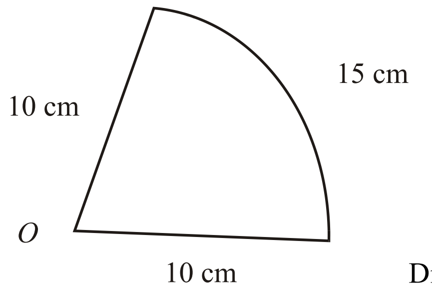


Diagram **NOT** accurately drawn

The diagram shows a sector of a circle, centre O, radius 10 cm.
The arc length of the sector is 15 cm.

Calculate the area of the sector.

.... cm^2
(Total 4 marks)

27. The diagram below shows a 6-sided shape.
All the corners are right angles.
All measurements are given in centimetres.

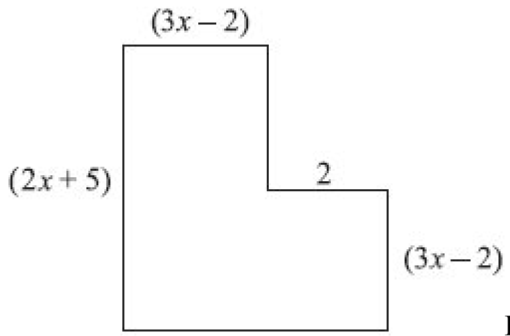


Diagram **NOT** accurately drawn

The area of the shape is 25 cm^2.

Show that $6x^2 + 17x - 39 = 0$

(Total 3 marks)

28. The length of a rectangle is 6.7 cm, correct to 2 significant figures.

(a) For the length of the rectangle write down

(i) the upper bound,

……………………cm

(ii) the lower bound.

……………………cm

(2)

The area of the rectangle is 26.9 cm^2, correct to 3 significant figures.

(b) (i) Calculate the upper bound for the width of the rectangle.
Write down all the figures on your calculator display.

……………………cm

(ii) Calculate the lower bound for the width of the rectangle.
Write down all the figures on your calculator display.

……………………cm
(3)

(c) Write down the width of the rectangle to an appropriate degree of accuracy.

……………………cm
(1)
(Total 6 marks)

29.

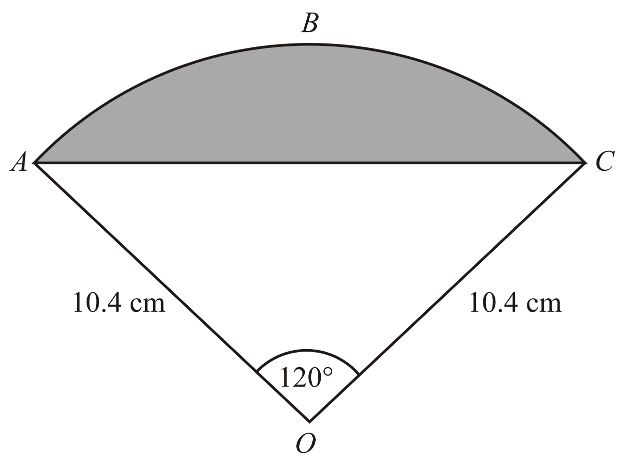


Diagram **NOT** accurately drawn

The diagram shows a sector *OABC* of a circle with centre *O*.
OA = *OC* = 10.4 cm.
Angle *AOC* = 120°.

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

…………………….cm^2
(Total 4 marks)

30. Here is a trapezium.

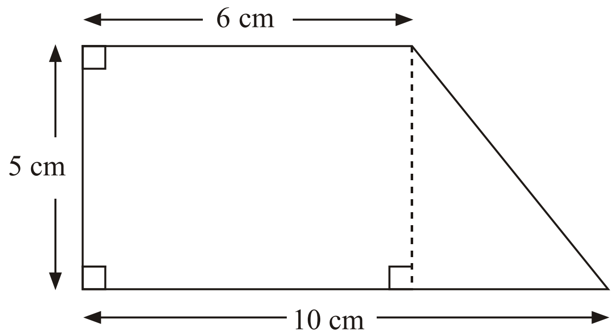


Diagram **NOT** accurately drawn

Work out the area of the trapezium.

.... cm^2
(Total 2 marks)

31.

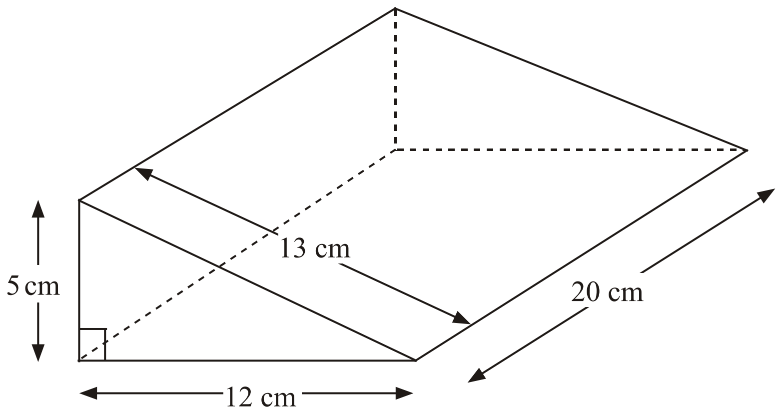


Diagram **NOT** accurately drawn

The diagram shows a right-angled triangular prism.

Work out the surface area of the triangular prism.

.... cm^2

(Total 3 marks)

32. The diagram shows a cuboid of dimensions 10cm × 8cm × 5cm.

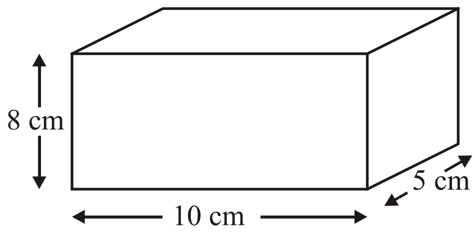


Diagram **NOT** accurately drawn

Work out the total surface area of the cuboid.

170cm^2	260cm^2	290cm^2	340cm^2	400cm^2
A	**B**	**C**	**D**	**E**

(Total 1 mark)

33.

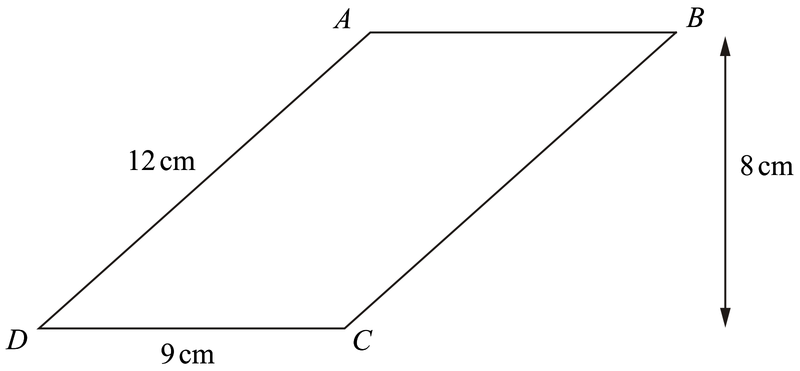


Diagram **NOT** accurately drawn

ABCD is a parallelogram.

AD = 12 cm.
DC = 9 cm.
The perpendicular distance of *AB* from *CD* is 8 cm.

What is the perpendicular distance of *AD* from *BC* ?

6 cm	7 cm	8 cm	9 cm	10 cm
A	**B**	**C**	**D**	**E**

(Total 1 mark)

1. (a) 1700 3

$$\pi \times 30 \times \frac{7.5^2}{3} - \pi \times 10 \times \frac{2.5^2}{3} = 1767 - 65$$

M1 for either $\pi \times 30 \times \frac{7.5^2}{3}$ *or* $\pi \times 10 \times \frac{2.5^2}{3}$
M1 (dep) for difference
A1 1700 – 170
***SC** B1 Using d instead of r, 6800 – 6808*

(b) $h = \sqrt{\dfrac{S^2 - 4\pi^2 d^4}{4\pi^2 d^2}}$ 3

$\dfrac{S}{2\pi d} = \sqrt{h^2 + d^2}$

$\left(\dfrac{S}{2\pi d}\right)^2 = h^2 + d^2$

M1 for correctly isolating $\sqrt{h^2 + d^2}$ or $h^2 + d^2$ or $h + d$ or kh^2 or kh
M1(indep) squaring both sides
A1

$h = \sqrt{\dfrac{S^2 - 4\pi^2 d^4}{4\pi^2 d^2}}, \quad h = \dfrac{\sqrt{S^2 - 4\pi^2 d^4}}{2\pi\pi}$

$h = \sqrt{\left(\dfrac{S}{2\pi\pi}\right)^2 - d^2}$

(c) 1012.5 2

$\left(\dfrac{30}{20}\right)^2 \times 450$ or $450 \div \left(\dfrac{20}{30}\right)^2$

M1 for sight of correct SF^2 including 4:9
A1 1010 to 1013

[8]

2. (a) Printed 4

$\left(\dfrac{x + 2 + x + 6}{2}\right)(x - 5)$

$(x + 4)(x - 5)$

$x^2 - 5x + 4x - 20$

$x^2 - x - 20 = 36$

B1 for $\left(\dfrac{x + 2 + x + 6}{2}\right)(x - 5)$ or any correct unsimplified form for the area
M1 for at least 3 terms correct in expansion of form $(x + a)(x + b)$ or $(2x + a)(x + b)$
A1 for area = $x^2 - 5x + 4x - 20$ or better
A1 for $x^2 - x - 56 (= 0)$ obtained convincingly

(b) (i) 8, –7 4

$(x - 8)(x + 7) = 0$

M1 for $(x \pm 8)(x \pm 7)$ or correct subst. into quadratic formula (condone sign errors)

A2 cao (B1 for either $x = -7$ or $x = 8$)

(ii) 3

B1 cao (the only value)

[8]

3. 15π 7

$\frac{4}{3}\pi \times 3^3$ $(= 36\pi)$

$\frac{4}{3}\pi \times 3^3 = 3 \times \frac{1}{3} \times \pi \times 3^2 \times h$ $h = 4$

$3^2 + h^2 = l^2$

$l = 5$

CSA = $\pi \times 3 \times 5$

M1 V sphere = $\frac{4}{3}\pi \times 3^3$ or for Vcone = $\frac{1}{3} \times \pi \times 3^2 \times h$

M1 for $\frac{4}{3}\pi \times 3^3 = 3 \times \frac{1}{3} \times \pi \times 3^2 \times h$ oe

A1 for $h = 4$

M1 for $3^2 + h^2 = l^2$

A1 ft for $l = \sqrt{9 + "4"^2}$ $(= 5)$ evaluated as a single term

M1 (dep) for CSA = $\pi \times 3 \times "5"$

A1 cao

[7]

4. 24 5

$6\frac{2}{5} = \frac{32}{5}$

Area of triangle = $\frac{1}{2} \times \frac{5}{8} \times 6\frac{2}{5}$ (= 2)

Length of a side of sq. = $\sqrt{18 \times "2"}$ (= 6)

Perimeter of square = 4 × 6

B1 for $6\frac{2}{5} = \frac{32}{5}$ *oe or* $3\frac{1}{5} = \frac{16}{5}$ *oe or* $\frac{30}{8} + \frac{2}{8}$ *oe (or implied by area of triangle = 2)*

M1 for $\frac{1}{2} \times \frac{5}{8} \times 6\frac{2}{5}$ *oe*

M1 for (area of square) = 18 × product of two lengths

A1 = $\sqrt{18 \times "2"}$

A1 for 24

[5]

5. (a) 4 1

B1 for 4 condone ± 4

(b) 2 1

B1 for 2 condone ± 2

(c) $\frac{500}{6}$ 4

$\sqrt{160} = 4\sqrt{10}$;

$\left[\frac{\sqrt{8}\left(\sqrt{5}+\sqrt{20}\right)-\sqrt{2}\times\sqrt{5}}{\sqrt{8}\left(\sqrt{5}+\sqrt{20}\right)}\right] \times 100$

$\left[\frac{6\sqrt{10}-\sqrt{10}}{6\sqrt{10}}\right] \times 100$

*B1 for **either*** $\sqrt{160} = 4\sqrt{10}$ *or* $\sqrt{8} = 2\sqrt{2}$ ***or*** $\sqrt{20} = 2\sqrt{5}$

M1 for $\left[\frac{\sqrt{8}\left(\sqrt{5}+\sqrt{20}\right)-\sqrt{2}\times\sqrt{5}}{\sqrt{8}\left(\sqrt{5}+\sqrt{20}\right)}\right]$ *oe (× 100)*

B1 for either $6\sqrt{10} - \sqrt{10}$ *or* $6\sqrt{10}$

A1 for $\frac{500}{6}$ *(accept 83.3 if no obvious earlier error)*

[6]

6. 2.52-2.54 3

$r^2 = \dfrac{3\times10}{\pi h} = \dfrac{3\times10}{\pi 1.5} = \dfrac{3\times10}{4.712..} = 6.36, 6.37$

$r = \sqrt{6.366\ldots}$

M1 for correct rearrangement to give $r^2 = \dfrac{3V}{\pi h}$

or 30 ÷ 4.712.. or 6.36 – 6.37

Allow 0.3, 0.33 for $\dfrac{1}{3}$

M1 (dep) for $\sqrt{}$

A1 cao 2.52 – 2.54

[3]

7. 250 cm² 3

$x^2 + (2x)^2 = 25^2$

$5x^2 = 625$

$x^2 = 125$

$x = \sqrt{125}$

$A = \sqrt{125} \times 2\sqrt{125}$

M1 for $x^2 + (2x)^2 = 25^2$ *or using Pythagoras with x and 2x or* $5x^2 = 625$

M1 for $x = \sqrt{125}$ *or for* A = "$\sqrt{125}$" × "$2\sqrt{125}$" *or* 2 × "125"

A1 for 250 cao

[3]

8. (a) $= \dfrac{3\times 10}{4.712..}\ \dfrac{3V}{\pi h}\ \dfrac{1}{3}$

$3\sqrt{2}$ 2

$\dfrac{6}{\sqrt{2}} \times \dfrac{\sqrt{2}}{\sqrt{2}} = \dfrac{6\sqrt{2}}{2} =$

M1 for sight of multiplying top and bottom by $\sqrt{2}$ *or* $\sqrt{\dfrac{36}{2}}$

A1 for $3\sqrt{2}$ *oe*

(b) 9 2

$\dfrac{1}{2} \times \dfrac{6}{\sqrt{2}} \times \dfrac{6}{\sqrt{2}} = \dfrac{36}{4} =$

M1 for $\dfrac{1}{2} \times \dfrac{"6"}{\sqrt{2}} \times \dfrac{"6"}{\sqrt{2}}$ *oe ft where* $\dfrac{6}{\sqrt{2}}$ *is in form* $a\sqrt{b}$ *where* $\sqrt{b}$ *is irrational*

A1 for 9 cao

[4]

9. (a) (i) $\dfrac{1}{3}\pi x^2$ 1

B1 for $\dfrac{1}{3}\pi x^2$ *oe*

(ii) $\dfrac{2}{3}\pi x$ 1

B1 for $\dfrac{2}{3}\pi x$ *oe*

(b) $h = 27$ 3

$1/3\pi \times (1/3x)^2 \times h = 3 \times 1/3\ \pi x^2$

$\dfrac{\pi h x^2}{27} = \pi x^2$

M1 for $\dfrac{1}{3}\pi r^2 h = 3\pi r x$

M1 for $2\pi\pi = \dfrac{2}{3}\pi x$ *or* $\pi r x = \dfrac{\pi x^2}{3}$ *or* $r = \dfrac{1}{3}x$

A1 for 27 cao

[5]

10. 264 cm^2 4

$2 \times \frac{1}{2} \times 6 \times 8$ or 48

$8 \times 9 + 6 \times 9 + 10 \times 9$

or $72 + 54 + 90$

M1 attempt to find the area of one face;

$\frac{1}{2} \times 6 \times 8$ or (8×9) or (6×9) or (10×9) or 72 or 54 or 90

or 24 or 48

M1 all five faces with an intention to add

A1 cao numerical answer of 264

B1 (indep) cm^2 with or without numerical answer

[4]

11. (a) $6x^2 + 11x - 10 + 6x - 4 = 25$

$6x^2 + 17x - 39 = 0$ 3

M1 for an expression for the area involving either

$(3x - 2)(2x + 5) + 2(3x - 2)$

or $3x(3x - 2) + (3x - 2)(7 - x)$

or $3x(2x + 5) - 2(7 - x)$

or $(3x - 2)^2 + 2(3x - 2) + (3x - 2)(7 - x)$

where in each case at least one of 2 or 3 product terms must be correct

M1 (indep) for one correct expansion involving x^2

A1 for simplification to final answer

(b) (i) $1.5, -\frac{13}{3}$ 4

$$x = \frac{-17 \pm \sqrt{17^2 - 4 \times 6 \times (-39)}}{2 \times 6}$$

$$= \frac{-17 \pm \sqrt{289 + 936}}{12}$$

$$x = +\frac{18}{12} \text{ or} - 4.33$$

$$x^2 + \frac{17}{6}x - \frac{39}{6} = 0$$

$$\left(x + \frac{17}{12}\right)^2 - \left(\frac{17}{12}\right)^2 - \frac{39}{6} = 0$$

$$\left(x + \frac{17}{12}\right)^2 = \left(\frac{17}{12}\right)^2 + \frac{39}{6}$$

M1 for $x = \frac{-17 \pm \sqrt{17^2 - 4 \times 6 \times (-39)}}{2 \times 6}$ *up to signs in b & c*

M1 for $x = \frac{-17 \pm \sqrt{1225}}{12}$

A1 x= 1.5 or – 4.33, or better

OR

M2 for (3x + 13)(2x – 3)

(M1 for (3x ± a)(2x ± b) with ab = ± 39

A1 x = 1.5 or – 4.33, or better

OR

M1 for $\left(x + \frac{17}{12}\right)^2$ *seen*

M1 $\left(x + \frac{17}{12}\right)^2 = \left(\frac{17}{12}\right)^2 + \frac{39}{6}$

A1 x = 1.5 or – 4.33, or better

SC:M1 for answer "1.5" with no working or T & I

(ii) 8

B1 cao length = 8

[7]

12.	(a)	$5 \times 5 \times 10 = 250$ $5 \times 5 \times 6 \div 3 = 50$ 300		3
			M1 for either $5 \times 5 \times 10$ or $5 \times 5 \times 6 \div 3$ *M1 (dep) for '$5 \times 5 \times 6 \div 3$' + '$5 \times 5 \times 10$'* *A1 cao*	
	(b)	Area scale factor is 30^2 $290 \times 30^2 = 261000\ \text{cm}^2$ $261000 \div 10000$ 26.1		3
			B1 for 30^2 or 900 *M1 for 290×30^2 or digits 261 seen* *A1 cao*	

[6]

13.	(a)	(i)	6.75		1
				B1 cao	
		(ii)	6.65		1
				B1 cao	
	(b)	(i)	$26.95 \div 6.65$ 4.05263		3
				M1 for "26.95" ÷ "6.65" where $26.9 <$ "26.95" ≤ 26.95 and $6.65 \le$ "6.65" < 6.7 *A1 for 4.05263 (....)*	
		(ii)	$26.85 \div 6.75$ 3.97778		
				If M1 not earned in (i), then M1 for '26.85'÷'6.75' where $26.85 \le$ '26.85' < 26.9 and $6.7 <$ '6.75' ≤ 6.75 *A1 for 3.9777 (.....)*	
	(c)	(i)	4		2
				B1 cao	
		(ii)	bounds agree to 1sf		
				B1 for appropriate reason for 4	

[7]

14. (a) $\frac{120}{360}$ or $\frac{1}{3}$

$\frac{120}{360} \times 2\pi \times 10.4$

21.7 – 21.8 3

B1 for $\frac{120}{360}$ *or* $\frac{1}{3}$ *seen*

M1 for $\frac{120}{360} \times 2\pi \times 10.4$

A1 for 21.7 – 21.8

(b) Area Sector = $\pi(10.4)^2 \div 3 = 113.26488$

Area Triangle = $\frac{1}{2}(10.4)(10.4)\sin 120°$

= 46.8346

Area segment = 66.43 ....

66.4 4

M1 for $\pi\,(10.4)^2 \div 3$ *or* $\pi(10.4)^2 \times \frac{120}{360}$ *oe*

M1 for $\frac{1}{2}(10.4)(10.4)\sin 120°$ *or any other valid method for area triangle OAC*

M1 (dep on at least 1 of the previous Ms) for area of sector – area of triangle OAC, providing the answer is positive.

A1 66.35 – 66.5

[7]

15. (a) $\frac{96}{24}$ or 4

$\sqrt{4}$ or 2 = 8 3

M1 for $\frac{96}{24}$ *or* $\frac{24}{96}$ *or 4 or* $\frac{1}{4}$ *oe*

M1 for $\sqrt{\frac{96}{24}}$ *or* $\sqrt{\frac{24}{96}}$ *or* $\sqrt{'4'}$ *or* $\frac{1}{\sqrt{'4'}}$ *or 2 or* $\frac{1}{2}$ *oe*

A1 cao

(b) $12 \times 2^3 = 96$ 2

M1 for '2'^{3} or 8

A1 cao

[5]

16. $\frac{150}{360} \times \pi \times 13^2 = 0.416 \times 530.9291585 = 221.22\ldots221$ 2

M1 for $\frac{150}{360} \times \pi\ 13^2$ or $\pi \times 13^2 \div 2.4$ oe

A1 220 – 222

[2]

17. $\frac{1}{2} \times 6 \times 6 \times \sin 60 - \frac{60}{360} \times \pi \times 3^2$

$= 15.588 - 4.712$

$10.8 - 10.9$ 4

M1 for $\frac{1}{2} \times 6 \times 6 \times \sin 60$ or for $0.5 \times 6 \times \sqrt{6^2 - 3^2}$ or

15.5 – 15.6 or 14.5 – 14.6 or ±5.48(65...)

M1 for $\frac{60}{360} \times \pi \times 3^2$ (= 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

[4]

18. 905 cm^2 4

$2\pi \times 6^2 + 2\pi \times 6 \times 18$

M1 for $\pi \times 6^2$ (= 113…)

M1 for $2\pi \times 6 \times 18$ (= 678.58…)

M1 for $2\pi \times 6^2 + 2\pi \times 6 \times 18$

A1 for $904.3 \le \text{answer} \le 905.3$

SC: B2 if candidate uses r = 12 in correct formula to get answer of 2260 to 3sf or 2262 to 4sf

[4]

19. 31.7.... 6

16 sin 30 = 8

$\sqrt{64-36}$

= 5.29....

½ × 12 × 5.29

M1 for $\sin 30 = \frac{x}{16}$ *oe*

A1 for 8

M1 ft for $l^2 + 6^2 =$ "8"^{2}

A1 ft for $l = \sqrt{"64"-36}$ *evaluated as a single term* $(=\sqrt{28})$

M1 (dep on 2nd M1) for ½ × 12 × "$\sqrt{28}$"

A1 $31.7 \le ans < 31.8$

Alternative Method:

M1 for $\sin 30 = \frac{x}{16}$ *oe*

A1 for 8

M1 ft. for correct sub. into cosine rule

A1 ft. for angle

M1 (dep on 2nd M1) for sub. into ½ ab sin C

A1 $31.7 \le ans < 31.8$

[6]

20. 65π 3

$l^2 = 5^2 + 12^2$

$l = 13$

$\pi \times 5 \times$ "13"

M1 for $5^2 + 12^2$

M1 dep for $\pi \times 5 \times \sqrt{5^2 + 12^2}$

A1 cao

[3]

21. (a) x tan20

$\frac{1}{2}x^2$ tan20 3

Area = $\frac{1}{2} \times x \times$"$x$ tan20"

M1 for $\tan 20 = \frac{DF}{x}$ *or* $\tan 70 = \frac{x}{DF}$

A1 for $x \tan 20$ *or* $\frac{x}{\tan 70}$

B1 ft $\frac{1}{2} \times x \times$"$x \tan 20$" *or* $\frac{1}{2} \times x \times$"$\frac{x}{\tan 70}$" *oe*

(b) 23.2% 4

Area BCEF = $\frac{1}{2}(x \tan 20 + x \tan 20 + x \tan 40)\, x$

Proportion = $\frac{\tan 20}{2\tan 20 + \tan 40} \times 100$

B1 for BD = x tan40 or $\frac{x}{\tan 50}$ oe

M1 (dep on B1) for correct expression for area of trapezium (ft from a(ii))

M1 (dep on 1st M1) ft for fraction $\frac{\text{area of DEF}}{\text{area of trap}}$

A1 for $23 \leq ans < 23.3$

[7]

22. 21.111… 3

475 ÷ 22.5

B1 for 475 or 22.5 seen

M1 for $\frac{A}{L}$ *where* $480 \geq A > 470$ *and* $22 \leq L < 23$

A1 for 21.1(111…)

[3]

23. 1270 3

$\pi \times 18.6 \times 12.4 + 2 \times \pi \times 9.3^2$

M1 for □ × 18.6 × 12.4 (Accept answer in the range 724 to 725 seen)
M1 for 2 × □ × 9.3^2 ((Accept answer in the range 543 to 544 seen)
A1 for 1270 or better (in range 1267 to 1270)

[3]

24. 720cm^2 3

180×2^2

M1 for scale factor 2^2
A1 for 720
B1 (indep) for cm^2

[3]

25. 18.9…. 6

Each side = 15.6 ÷ 12 = 1.3
$\text{“}1.3\text{”}^2$ $\text{“}0.65\text{”}^2 + h^2$
$h = \sqrt{(1.3^2 - 0.65^2)} = \sqrt{1.2675}$
Area Δ = ½ × “1.3” × “$\sqrt{1.2675}$“
= 0.73179…
6□ + 12Δ= “10.14” + “8.781…”
= 18.9215…

M1 for 15.6 ÷ 12 (= 1.3)
M1 for $\text{“}1.3\text{”}^2 = \text{“}0.65\text{”}^2 + h^2$ or $\sin 60 = \dfrac{h}{\text{"}1.3\text{"}}$ oe
or (h^2 =) $\text{“}1.3\text{”}^2 - \text{“}0.65\text{”}^2$
M1 (dep) for (h =) $\sqrt{(1.3^2 - 0.65^2)} = \sqrt{1.2675}$
or (h =) “1.3” × sin 60 (= 1.12583…)
M1 (dep) for area of triangle = ½ × “1.3” × “h”
M1 (indep) for 6 × “area of square” (= 10.14…) + 12 ×”area of triangle” (= 8.78…)
A1 for $18.9 \le \text{ans} \le 19.0$

[6]

26. 75 cm^2 4

$2\pi \times 10 \times \frac{x}{360} = 15$

$x = \frac{270}{\pi}$

$A = \pi \times 10^2 \times \frac{x}{360}$

M1 for $\pi \times 10^2$ (= 314…) or $2 \times \pi \times 10$ (= 62.8…)
M1 for $\frac{2 \times \pi \times r}{15}$ (= 4.18)
M1 for $\frac{\pi \times r^2}{\text{"4.18"}}$
A1 for $74.9 \le ans \le 75.1$
<u>Alternative method</u>
M1 for $\pi \times 10^2$ (= 314.1…) or $2 \times \pi \times 10$ (= 62.8…)
M1 for $\frac{15}{2 \times \pi \times r}$ (= 0.238…)
M1 for $\pi \times r^2 \times$ "0.238"
A1 for $74.9 \le ans \le 75.1$
<u>Alternative method</u>
M1 for $\pi \times 10^2$ (= 314.1…) or $2 \times \pi \times 10$ (= 62.8…)
M1 for $\frac{15 \times 360}{2 \times \pi \times r}$ (= 85.9)
M1 for $\frac{\text{"}x\text{"}}{360} \times \square \times r^2$
A1 for $74.9 \le ans \le 75.1$

[4]

27. $6x^2 + 11x - 10 + 6x - 4 = 25$
$6x^2 + 17x - 39 = 0$ 3

M1 for an expression for the area involving either
$(3x - 2)(2x + 5) + 2(3x - 2)$
or $3x(3x - 2) + (3x - 2)(7 - x)$
or $3x(2x + 5) - 2(7 - x)$
or $(3x - 2)^2 + 2(3x - 2) + (3x - 2)(7 - x)$
where in each case at least one of 2 or 3 product terms must be correct
M1 (indep) for one correct expansion involving x^2
A1 for simplification to final answer

[3]

28. (a) (i) 6.75 1

B1 cao

(ii) 6.65 1

B1 cao

(b) (i) 26.95 ÷ 6.65

4.05263 3

M1 for "26.95" ÷ "6.65" where 26.9 < "26.95" ≤ 26.95 and 6.65 ≤ "6.65" < 6.7

A1 for 4.05263 (....)

If M1 not earned in (i), then M1 for "26.85" ÷ "6.75" where 26.85 ≤ "26.85" < 26.9 and 6.7 < "6.75" ≤ 6.75

(ii) 26.85 ÷ 6.75

3.97778

A1 for 3.9777 (.....)

(c) bounds agree to 1sf

4 1

B1 cao

[6]

29. Area Sector = $\pi(10.4)^2 \div 3 = 113.26488$

Area Triangle = $\frac{1}{2}(10.4)(10.4)\sin 120°$

= 46.8346

Area segment = 66.43 ....

66.4 4

M1 for $\pi\,(10.4)^2 \div 3$ *or* $\pi(10.4)^2 \times \frac{120}{360}$ *oe*

M1 for $\frac{1}{2}(10.4)(10.4)\sin 120°$ *or any other valid method for area triangle OAC*

M1 (dep on at least 1 of the previous Ms) for area of sector - area of triangle OAC

A1 66.35 – 66.5

[4]

30. $6 \times 5 + ½ \times 4 \times 5 = 30 + 10$ 2
or $½ (6 + 10) \times 5$
or $(10 \times 5) – ½ \times 4 \times 5 = 50 – 10$
$= 40$

M1 for a complete correct method

A1 cao

[2]

31. $(2 \times ½ \times 12 \times 5) + 13 \times 20 + 12 \times 20 + 5 \times 20 = 660$ 3

M1 for ½ × 12 × 5 (= 30) ***or*** *13 × 20 (= 260)* ***or*** *12 × 20 (= 240)* ***or*** *5 × 20 (= 100)*
M1 for 2 × "30" + "260" + "240" + "100" (condone the omission of one face)
A1 cao

Some candidates are finding the volume instead of surface area. ½ × 12 × 5 × 20 will get M1 for ½ × 12 × 5, the area of the cross section.
30 × 20 seen without any previous working will get the first M1. This candidate is either finding the volume (30 being the area of the triangle) or they may be finding the sum of the area of 3 faces (30 being the perimeter of the triangle).
However an answer of 600 seen without working will get ***no credit.***

[3]

32. D

[1]

33. A

[1]

1. The first part was competently done with many candidates scoring full marks. Some thought they could take a short cut by using 20cm as the height.
Answers for part (b) varied considerably, but the general standard of algebra was poor.
Common errors were as follows:

$$\sqrt{h^2 + d^2} = h + d$$

$$S - 2\pi d = \sqrt{h^2 + d^2}$$

$$S^2 = 2\pi d(h^2 + d^2)$$

Some candidates produced a correct formula for h, but went on to 'simplify' the square root, writing

$$\sqrt{\frac{S^2}{(2\pi d)^2} - d^2} = \frac{S}{2\pi d} - d$$

Part (c) was poorly answered except by candidates who knew that the scale factor for areas was the square of the scale factor for lengths, or used the corresponding result for the areas of similar shapes.

2. **Paper 3**

Part (a) proved to be inaccessible to most candidates. Very few started with the formula for the area of a trapezium and substituted the expressions from the diagram. Of those that managed the first step, many failed to put brackets around 'x – 5' and their subsequent working indicated that they did not appreciate how to manipulate this expression. Many candidates simply substituted numbers into the given equation. Only a few correct factorisations were seen in part (b). Trial and improvement was often used and sometimes resulted in an answer of 'x = 8'. Those candidates who obtained '8' in part (i) were usually able to gain the final mark by correctly writing the length of the shortest side as '3' in part (ii).

Paper 5

As mentioned in the general comments, many candidates had problems obtaining the printed result in part (a). Some better attempts were spoilt by leaving out brackets or by assuming that the foot of the perpendicular from the top right vertex to the base was at a distance of (x + 4) from the acute-angled vertex. In part (b)(i) many candidates had some understanding on how to solve the quadratic equation but it was disappointing to see so many sign errors and also so many solutions using trial and improvement in which most were satisfied when they had just found one of the two solutions. In part (ii) some candidates just gave the answer "x – 5"; presumably they did not understand the meaning of 'hence'.

3. It was surprising to see a significant minority of candidates using a value for π in this non-calculator paper. Candidates should also be aware that quoting formulae from the formulae sheet cannot be awarded any credit until the formulae have been used. In this question candidates needed to substitute $r = 3$ and form an equation from the information given to get $h = 4$. Although grade A/B candidates generally failed to reach this stage, better candidates had no difficulty applying a correct method to obtain a numerical value for the height of the cone. Some common errors consisted of forming an equation which matched the information 'volume of the cone is 3 times the volume of the sphere' rather than that given in the question or using "$3^3 = 9$". Those candidates who found h correctly usually proceeded to apply Pythagoras Theorem to find the slant length and the curved surface area of the cone. A number of non-A* candidates assumed that because the volumes were in the ratio 3:1 then their surface areas would be as well. They merely worked out the surface area of the sphere and divided it by 3. Candidates should be aware of the mark allocation and expect to have to produce work accordingly.

4. **Mathematics A**

Paper 3

Most candidates found this question very difficult and numerous misconceptions were demonstrated. In many cases little care was taken over the presentation or structure of answers and working was often difficult to follow. Some candidates did manage to write $6\frac{2}{5}$ as $\frac{32}{5}$ but those who decided to write both lengths as decimals rarely did so correctly. Many used 'base × height' to find the area of the triangle and $6\frac{2}{5} \times \frac{5}{8}$ was often evaluated as $6\frac{10}{40}$. Candidates who got as far as multiplying their area by 18 were often unable to continue correctly. Few appreciated that it was necessary to find the square root of the area of the square and a common error was for the area to be divided by 4.

Paper 5

In this multi-step question on fractions and area/perimeter many of the grade B and higher grade candidates scored some credit but many made 'heavy work' of it. When multiplying $\frac{5}{8}$ by $6\frac{2}{5}$ the most common approach was to convert each to 40ths, (some even changing the 6 and the 2/5 each separately to 40ths) then use long multiplication generally getting lost in a mass of numbers before even considering multiplying the answer by 18. Another common mistake was to miss out the factor of ½ when finding the area of the triangle. Better candidates used correct formulae and direct cancelling methods to complete the whole question within a line, dealing directly with the expression $\sqrt{18 \times \frac{1}{2} \times \frac{32}{5} \times \frac{5}{8}} \times 4$.

Candidates who included a few words within their solution, for example "area of triangle =…….", "area of square = 18 ×….." were often more successful than those who just listed lots of calculations in random positions in the working space.

Mathematics B Paper 18

In general, this question produced a great deal of working from the majority of candidates. However, a fully correct solution was seen from only a minority of candidates. Of those candidates who successfully changed $6\frac{2}{5}$ into $\frac{32}{5}$, few then realised that cancelling fractions was the most efficient route to take. A significant number of candidates changed both fractions to obtain a common denominator before multiplying; this generally then led to arithmetical errors occurring. Some of the candidates that were successful in obtaining the correct length of one side of the square then failed to read the question carefully and gave the answer as 6cm instead of going on further to determine the perimeter.

5. Mathematics A Paper 5

This surds question was poorly answered with many not even able to answer parts (a) and (b) correctly. The most common wrong answers were 8 (from half of 16) and 4 (by ignoring the square roots) respectively. Part (c) was beyond the ability of most of the candidates although some excellent elegant solutions were seen. Those candidates who applied the idea of part (b) to part (c) generally gained some credit but for most, solutions consisted of ignoring the square root signs at the first opportunity or writing "$\sqrt{5}+\sqrt{20}=\sqrt{25}$ "

Mathematics B Paper 18

Part (a) was usually correct although there was little evidence of understanding or technique in part (b). A common error in (c) was to write $\sqrt{20}$ + $\sqrt{5}$ as $\sqrt{25}$ and $\sqrt{200}$ – $\sqrt{10}$ as $\sqrt{190}$. Only a very few candidates were able to write down a fully correct method. Even fewer candidates were able to simplify their expressions containing surds to give a fully correct solution.

6. Mathematics A Paper 6

This was not so well done as hoped. Many candidates could not do the arithmetic to get the expression for the radius *r*. Many candidates began by working out 10 – 1.5. They got no marks. Many candidates evaluated $\frac{10}{\frac{1}{3}\pi 1.5}$ as $\frac{10}{\frac{1}{3}\pi}$ × 1.5 or took the square root in the wrong order.

Also gaining no marks were starts which involved the wrong formula for the volume.

Mathematics B Paper 19

The majority of candidates struggled with making r the subject of the formula V = $\frac{1}{3}\pi r^2 h$.

Some left out π; others divided or even subtracted 3 rather than multiplying it. The general standard of algebra seen was poor.

7. This question was well understood but not well answered. About 40% of candidates gained at least one mark whilst the full solution was only given by 5% of candidates. It was disappointing to see that poor algebra was the greatest cause of candidates losing marks in this question where most candidates realised that they needed a statement of Pythagoras' theorem and wrote $x^2 + 2^2 = 25^2$ instead of $x^2 + (2x)^2 = 25^2$ and further compounded their error by writing $3x^2 = 625$. Partial credit was given on this occasion for recognising that Pythagoras' theorem was needed.

8. Only about 35% of candidates could fully rationalise the denominator in part (a) of this uncomplicated surd question with nearly 60% of candidates scoring no marks. In part (b) candidates were a little more successful with 40% gaining the correct solution and a further 24% able to write down an expression for the area of the triangle.

9. Candidates found this to be the most demanding question on the paper with only 3% able to give a fully correct solution to part (b). About 12% of candidates were able to write an expression in terms of x, r and h but then failed to write r in terms of x. (r being the radius of the base of the cone). It was gratifying to note however that about 50% of candidates were able to obtain both marks for part (a).

10. **Specification A**

Higher Tier

Many candidates were able to score at least half the marks for this question- one mark for working out the area of any face and one mark for giving the units. Common errors were due to simple arithmetic errors (such as'$9 \times 6 = 52$'), finding the area of only four of the faces, and finding the volume of the prism. Some candidates, taking a minimalist approach, simply calculated $\frac{1}{2} \times 6 \times 8 \times 9$.

Intermediate Tier

Weaker candidates confused volume with surface area, giving an answer of 216, whilst some merely added lengths of edges together. A predictable common error was in calculating the area of the triangular face as 8×6 (ignoring the 1/2). It was surprising to find some candidates still failed to give the units with their answer, even when prompted.

Specification B

A fully correct answer was rare, some failing to give the correct units but more often failing to find the area of each of the five faces. The most common mistake was an answer of 48 for the area of one triangle. Arithmetic errors were common (usually in working out 6×9 or 8×9) and some only considered four faces, usually omitting the base.
A small number of candidates found, or tried to find, the volume of the prism by mistake. These sometimes could be awarded one mark for correctly finding the area of the triangular cross section.
Many ignored the request for units, while for some this was their only mark gained.

11. This proved to be the first really challenging question for the candidates. There is still a minority of candidates who do not understand that in part (a) they are required to derive the quadratic equation from given information. They give themselves away by trying to solve the equation as their answer to part (a). The most commonly successful approach was to identify two rectangles of areas $(3x - 2)(2x + 5)$ and $2(3x - 2)$ respectively and then set the algebraic sum equal to 25. Further marks were then gained by using correct algebra to get to the given equation. Splitting the shape horizontally proved to be less successful as often the top rectangle was given the measurements $(3x - 2)$ and $(2x + 5)$. Other methods involved splitting into the sum of three parts and working on the difference between the area of the full rectangle $(2x + 5)$ by $3x$ and the small rectangle 2 by $(2x + 5) - (3x - 2)$ although in many cases the second term was not worked out correctly.
Part (b) was generally tackled by using the formula. The usual error of not spotting that $17^2 - 4 \times 6 \times (-39) = 289 - 936$ is incorrect was often seen. Other errors included a faulty evaluation of $\frac{-17 \pm 35}{12}$ as $-17 \pm 35 \div 12$ and 2 in the denominator rather than 12. Sometimes the negative sign was omitted from the second solution.
Some candidates realised that they could factorise the left hand side and often did so successfully. A minority once they had found the solutions reversed the signs.

12. Many candidates scored 2 out of the three marks available for part (a). The formula for the volume of a pyramid was not well known and the most common answer was 325 from $250 + 5 \times 5 \times 6 \div 2$. Part (b) tested both knowledge of area scale factors and of conversion of units. Candidates who saw the 30^2 generally went on to gain at least 2 out of the three marks.

13. Most candidates were able to identify the correct upper and lower bounds. There were a few 6.74s for (i) and also a few 6 974. □□s. Responses to part (b) were not generally correct, the main error being that candidates used 26.9 rather than the upper and lower bounds of the 26.9. Of these candidates that did recognise this, most were successful in pairing up the correct upper and lower bounds in the quotient.

14. Most candidates recognised that they had to find one third of something! Common errors were to use the formula for the area of a circle or to use 10.4 for the diameter of the circle in part (a). A few candidates assumed that the shaded region was a semicircle and calculated the length of the supposed diameter 18.0. Part (b) required the difference between the area of the sector and the area of the triangle *OCA*. Many candidates could do this correctly by using $\frac{1}{2}ab\sin C$ for the area of the triangle. Others made life more difficult for themselves by using the cosine rule to find the length of *AC*, followed by calculating the height of the triangle and then the area.

15. This question was not answered well. The vast majority of candidates that attempted this question were able to find the scale factor 4 of the enlargement, usually by dividing 96 by 24 or by ratios, but few of these knew how to proceed from this to the linear scale factor 2 in part (a) and the volume scale factor 8 in part (b). Most candidates simply multiplied the height by 4 to get 16cm in part (a), and multiplied the volume by 4 to get 48cm^3 in part (b).

Very few candidates attempted to use the area and volume formulae for a cone.

16. The most common successful approach was to multiply πR^2 by $\frac{150}{360}$, 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.

17. 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.

18. Some good attempts at this question were seen although many candidates found the volume of a cylinder rather than the total surface area. A number of candidates incorrectly used 12 × 18 for the area of the curved surface area.

19. The majority of candidates were able to make a start to this question by correctly calculating the length of *BC*. After this initial success many candidates then tried to use Pythagoras's theorem or trigonometry in triangle *BCD* rather than first constructing the perpendicular from *b* to *CD* and then using Pythagoras's theorem or trigonometry to calculate the height. It was pleasing to see a number of fully correct solutions to this question.

20. The vast majority of candidates were able to select the correct formula from the formula sheet but this, by itself, was not sufficient to gain any marks. Few candidates realised the need to first use Pythagoras's Theorem. Those who did appreciate the need to use Pythagoras's Theorem generally went on to score full marks although there was some evidence of poor arithmetic in answers to this question.

21. The combination of algebra and mensuration proved to be too daunting for nearly all students. In part (a), many candidates recognised the need to use tan, followed by the area formula. Very few could even get started on part (b). A minority of candidates were able to find an expression for *BD.* However, hardly any went further successfully.

22. It was common to find candidates carrying out a division before concerning themselves with bounds. Better candidates obtained a mark for a correct bound and quite often gained the method mark for an acceptable A/L. Those candidates who found more than one combination should be aware that it is up to them to convince the examiner which combination is appropriate. For example, two combinations one giving 21.11111 and the other giving 20.6666 then an answer of 21 on the answer line does not distinguish between the two combinations. In situations where a clear choice is given to the examiner then no marks can be awarded.

23. This question was very poorly answered with many candidates finding the volume of the cylinder by mistake. It was not unusual for 9.3×12.4 or 18.6×12.4 to be seen, sometimes with an attempt at the area of a circle (usually one end only)

24. The majority of candidates gained at least one mark in this question for including cm^2 with their answer. The common, incorrect answer given was 360 cm^2. Few candidates appreciated the need to multiply the surface area of cylinder *A* by 2^2 rather than the length scale factor of 2.

25. Just over 10% of candidates were able to give fully correct solutions to this question. Over 80% of candidates were able to score some marks generally for recognising that 15.6 needed to be divided by 12 and for adding together the area of six squares and twelve triangles. The most common error was to use 1.3 for both the base and height of the triangle (or assume incorrectly that the area of a triangle was half the area of a square) thus the most commonly seen answer to the question was 20.28 coming from this incorrect method. Some candidates used $\frac{1}{2}ab \sin C$ to find the area of one triangle. This method does not form part of the modular stage 1 specification but was awarded marks as a fully correct method. Of those candidates who recognised the necessity to find the height of the triangle, most used Pythagoras's theorem. The common error was then to forget to take the square root following the relevant subtraction.

26. Just over 40% of candidates were unable to gain any marks for this question. This was disappointing given that a mark was available for the correct expression for the area or circumference of the given circle. A number of different correct methods were seen but the most common method used was to find the fraction of the circumference using the given arc length and then apply this to the area. Some candidates found the angle of the sector and then used this successfully. There were some correct solutions seen coming from using the sector to make a cone and using the formula for the curved surface area of a cone.

27. There were a variety of approaches to this question; not all of them correct. A number of candidates simply attempted to solve the given equation rather than deduce it from the given information. This was not what was required and so gained no marks. The most successful candidates were those who drew a vertical line to split the given shape and so were able to use all the given sides to find the area of the shape. Candidates who split the shape up in a different way had to find an expression for the length of one of the sides. Attempts to do this often resulted in incorrect or lengthy expressions which were often incorrect, usually because of the omission of brackets. Approximately one quarter of candidates were able to derive the given equation correctly.

28. Part (a) was well answered although, as usual, candidates had more problems with the upper bound than the lower bound. Few candidates appreciated in part (b) that the area was given correct to 3 significant figures and so used the value given rather than the upper bound of the area in (bi) and the lower bound of the area in (bii).

29. Fully correct solutions were seen from about 30% of candidates. Those candidates that failed to gain full marks were generally able to pick up a mark for showing a correct method to calculate the area of the sector. The area of the triangle proved more problematic with many candidates giving the area of the triangle as $\frac{1}{2} \times 10.4^2$. The better candidates used $\frac{1}{2}ab \sin C$ for the area of the triangle. Some candidates took the long route of working out the length of AC and the height of the triangle and used these successfully to find the area of the triangle. Full marks were awarded for a solution using this method, provided that accuracy was maintained through to the final answer.

30. This proved to be a fair starter question with well over half the candidates scoring both available marks. Few used the formula for the area of a trapezium when attempting to find the area, preferring to divide the shape into a rectangle and a triangle. A common error was to forget to divide the 4×5 by 2 when calculating the area of the triangle. Others were not sure how to get the dimensions of the triangle.

31. The majority of candidates earned at least one mark in this question for a correct method to find the area of one face. Many then gained a second mark for finding the total area of at least four faces. Poor arithmetic or incorrect areas, often prevented the award of the final mark. Many candidates gave $5 \times 12 = 60$ as the area of the cross section of the prism. Many said that the base (12 by 20) was the same as the sloping face and found 2 times 13×20

A significant number of candidates found the volume of the prism instead of the surface area. These could get one mark for a correct method leading to the area of the cross section of the prism. A few stated that the area of the triangle was 30 from $5 + 12 + 13$.

32. No Report available for this question.

33. No Report available for this question.