

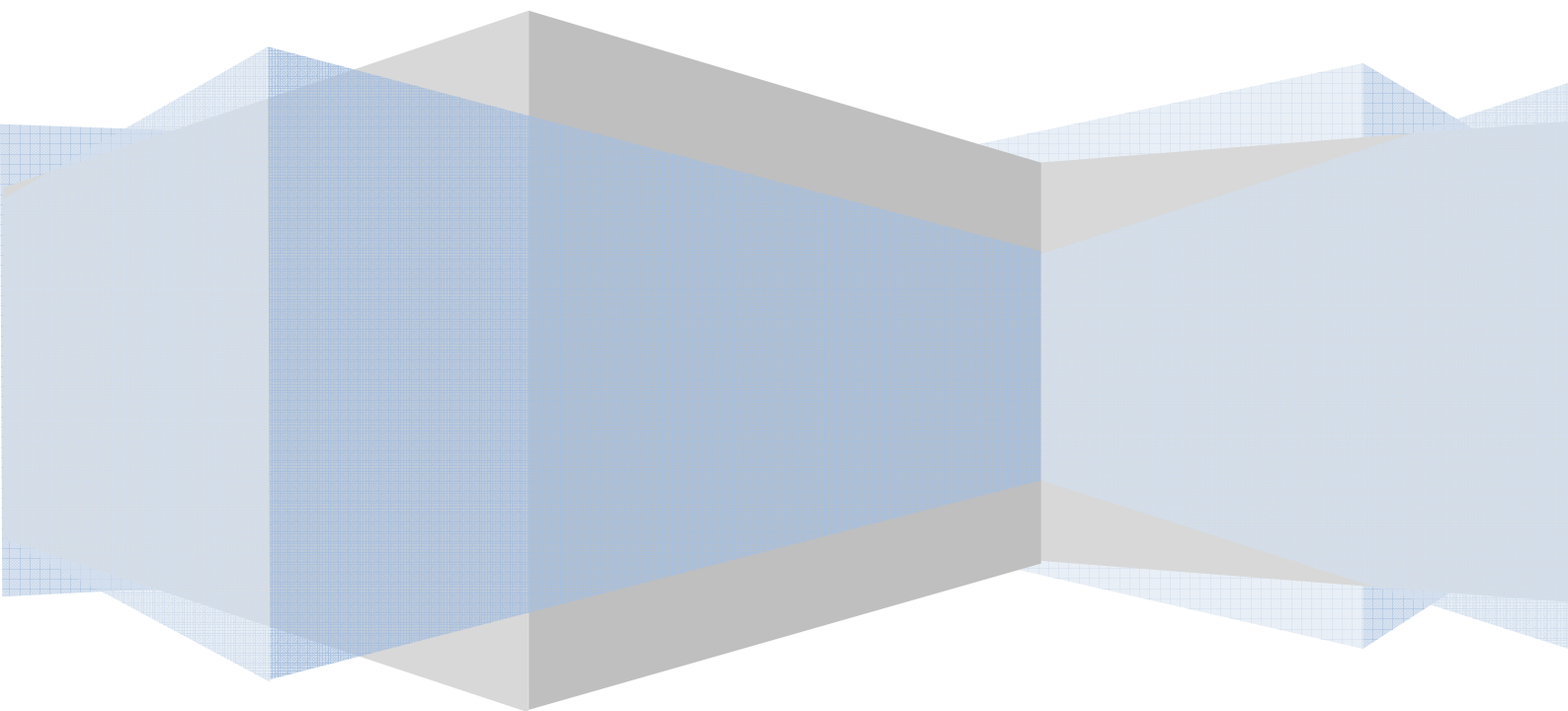
Edexcel Unit 3 Higher Calculator Questions

2003-2007 Papers

Number Questions 1 - 14

Algebra Questions 15 - 33

Shape Questions 34 - 66



1.

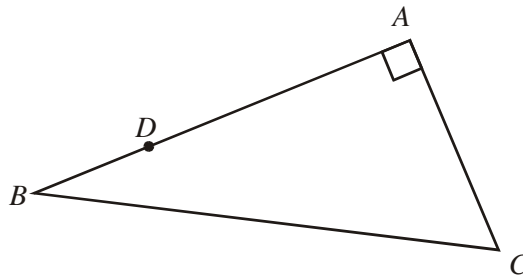


Diagram **NOT** accurately drawn

ABC is a right angled triangle.
 D is the point on AB such that $AD = 3DB$.
 $AC = 2DB$ and angle $A = 90^\circ$.

Show that $\sin C = \frac{k}{\sqrt{20}}$, where k is an integer.

Write down the value of k .

$k = \dots\dots\dots$
(Total 4 marks)

2. r is inversely proportional to t .
 $r = 12$ when $t = 0.2$

Calculate the value of r when $t = 4$.

$\dots\dots\dots$
(Total 3 marks)

3. In a sale, normal prices are reduced by 12%.
The sale price of a DVD player is £242.

Work out the normal price of the DVD player.

£

(Total 3 marks)

4. A clay bowl is in the shape of a hollow hemisphere.

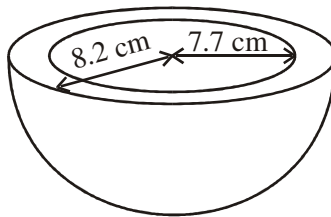


Diagram **NOT** accurately drawn

The external radius of the bowl is 8.2 cm.
The internal radius of the bowl is 7.7 cm.
Both measurements are correct to the nearest 0.1 cm.

The upper bound for the volume of clay is $k\pi\text{cm}^3$.
Find the exact value of k

$k = \dots\dots\dots$

(Total 4 marks)

5. A garage sells cars.
It offers a discount of 20% off the normal price for cash.
- Dave pays £5200 cash for a car.
- Calculate the normal price of the car.

£
(Total 3 marks)

6. y is inversely proportional to x^2 .
- Given that $y = 2.5$ when $x = 24$,
- (i) find an expression for y in terms of x

$y = \dots\dots\dots$

- (ii) find the value of y when $x = 20$

$y = \dots\dots\dots$

- (iii) find a value of x when $y = 1.6$

$x = \dots\dots\dots$
(Total 6 marks)

7. The weight of a piece of wire is directly proportional to its length.

A piece of wire is 25 cm long and has a weight of 6 grams.
Another piece of the same wire is 30 cm long.

Calculate the weight of the 30 cm piece of wire.

..... grams
(Total 2 marks)

8. 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)

9.

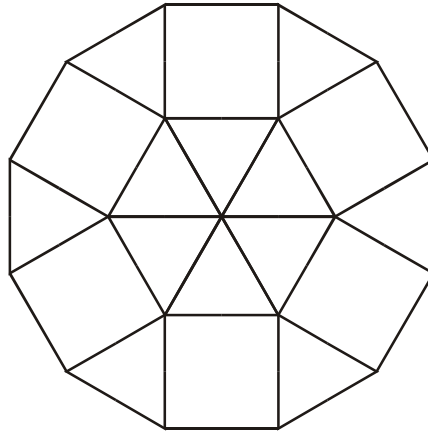


Diagram **NOT** accurately drawn

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.

..... m²
(Total 6 marks)

10. Write $\frac{\sqrt{18} + 10}{\sqrt{2}}$ in the form $p + q\sqrt{2}$, where p and q are integers.

$p = \dots\dots\dots$

$q = \dots\dots\dots$

(Total 2 marks)

11. In a sale, normal prices are reduced by 15%.
The sale price of a CD player is £102

Work out the normal price of the CD player.

£.....

(Total 3 marks)

12. Mario invests £2000 for 3 years at 5% per annum **compound** interest.

Calculate the value of the investment at the end of 3 years.

£.....

(Total 3 marks)

13. Work out $\frac{\sqrt{2.56 + \sin 57^\circ}}{8.765 - 6.78}$

(a) Write down all the figures on your calculator display.

.....

(2)

(b) Give your answer to part (a) to an appropriate degree of accuracy.

.....

(1)

(Total 3 marks)

14. 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)

15. Solve the simultaneous equations

$$3x - 4y = 11$$

$$5x + 6y = 12$$

$x =$

$y =$

(Total 4 marks)

16.

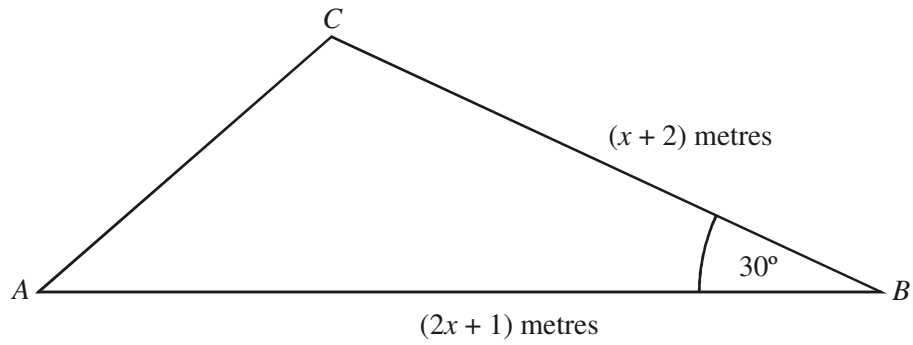


Diagram **NOT** accurately drawn

$AB = (2x + 1)$ metres.

$BC = (x + 2)$ metres.

Angle $ABC = 30^\circ$.

The area of the triangle ABC is 3 m^2 .

Calculate the value of x .

Give your answer correct to 3 significant figures.

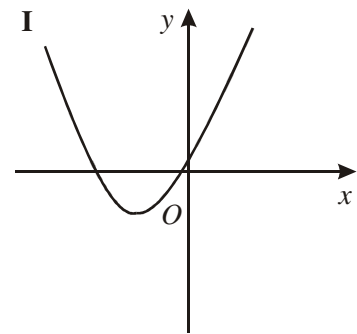
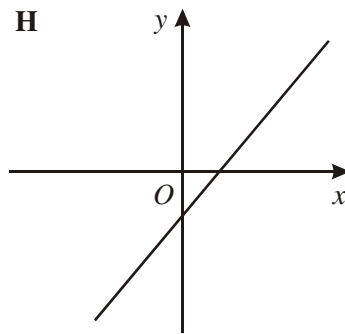
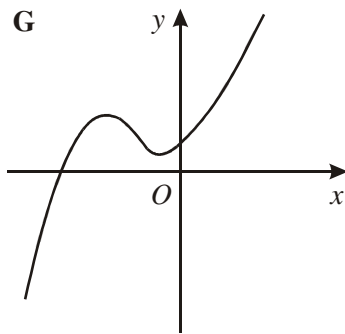
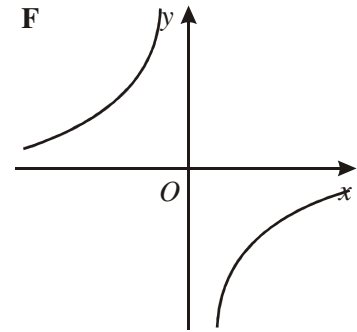
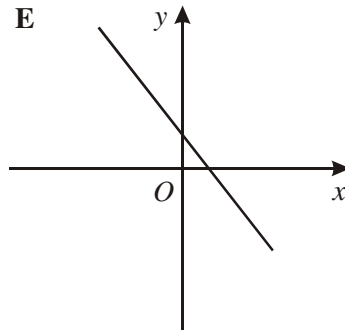
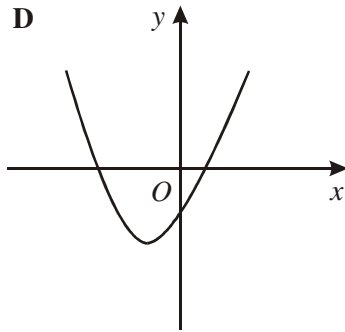
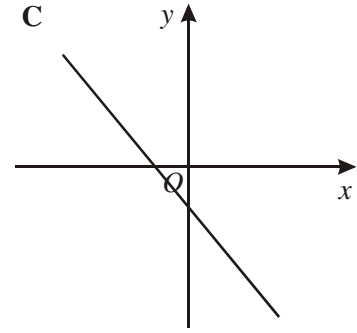
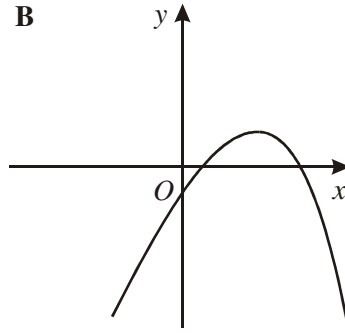
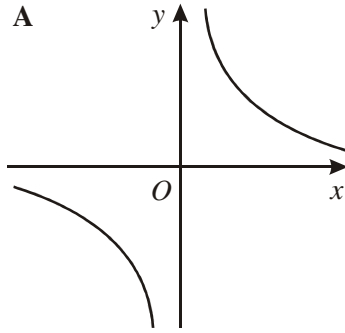
.....
(Total 5 marks)

17. Solve

$$\frac{x}{3} - 5 = 3(x - 2)$$

$x = \dots\dots\dots$
(Total 4 marks)

18.



Write down the letter of the graph which could have the equation

(i) $y = 3x - 2$

.....

(ii) $y = 2x^2 + 5x - 3$

.....

(iii) $y = \frac{3}{x}$

.....

(Total 3 marks)

19. Solve the simultaneous equations

$$x + y = 4$$

$$x^2 + y^2 = 40$$

$$x = \dots\dots\dots, y = \dots\dots\dots$$

or

$$x = \dots\dots\dots, y = \dots\dots\dots$$

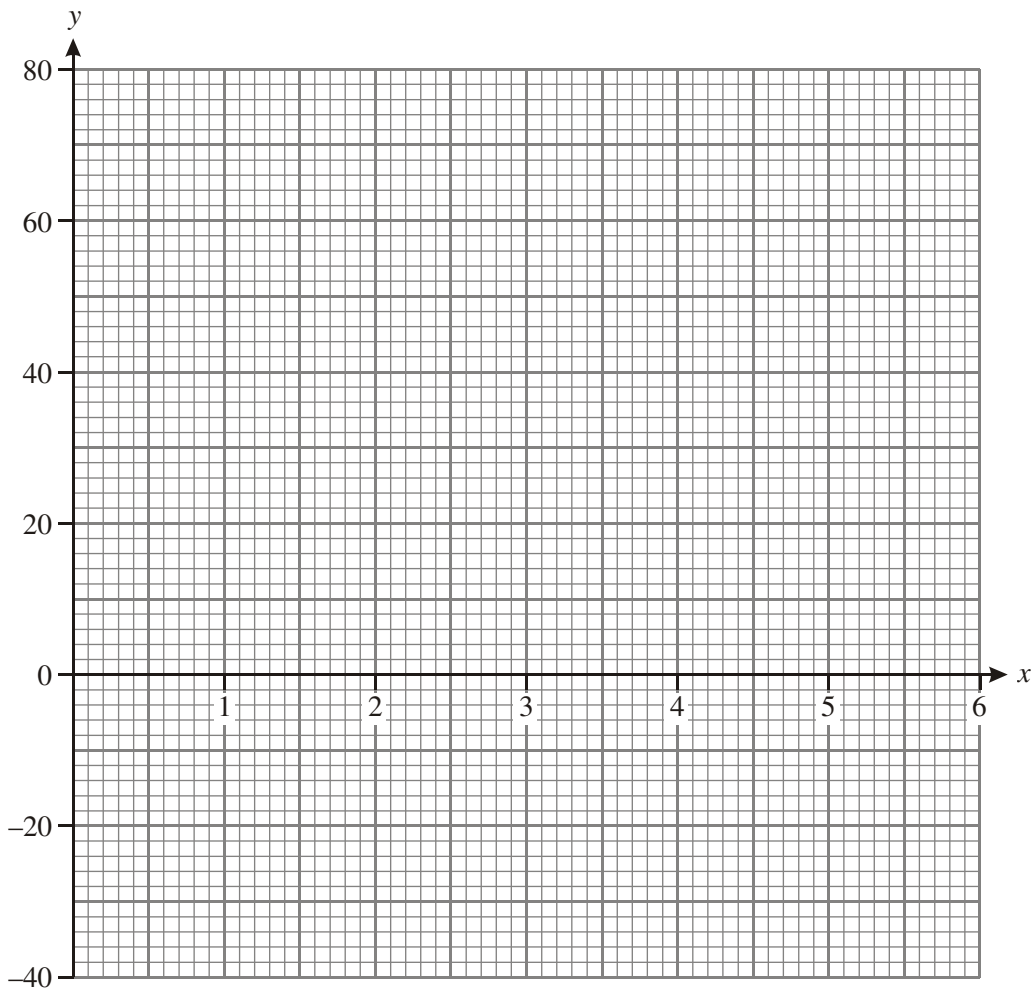
(Total 7 marks)

20. (a) Complete the table of values for the graph of $y = 4x(11 - 2x)$

x	0	1	2	3	4	5	6
y	0			60			-24

(2)

(b) On the grid, draw the graph of $y = 4x(11 - 2x)$



(2)

(c) Use your graph to find the maximum value of y .

.....

(1)

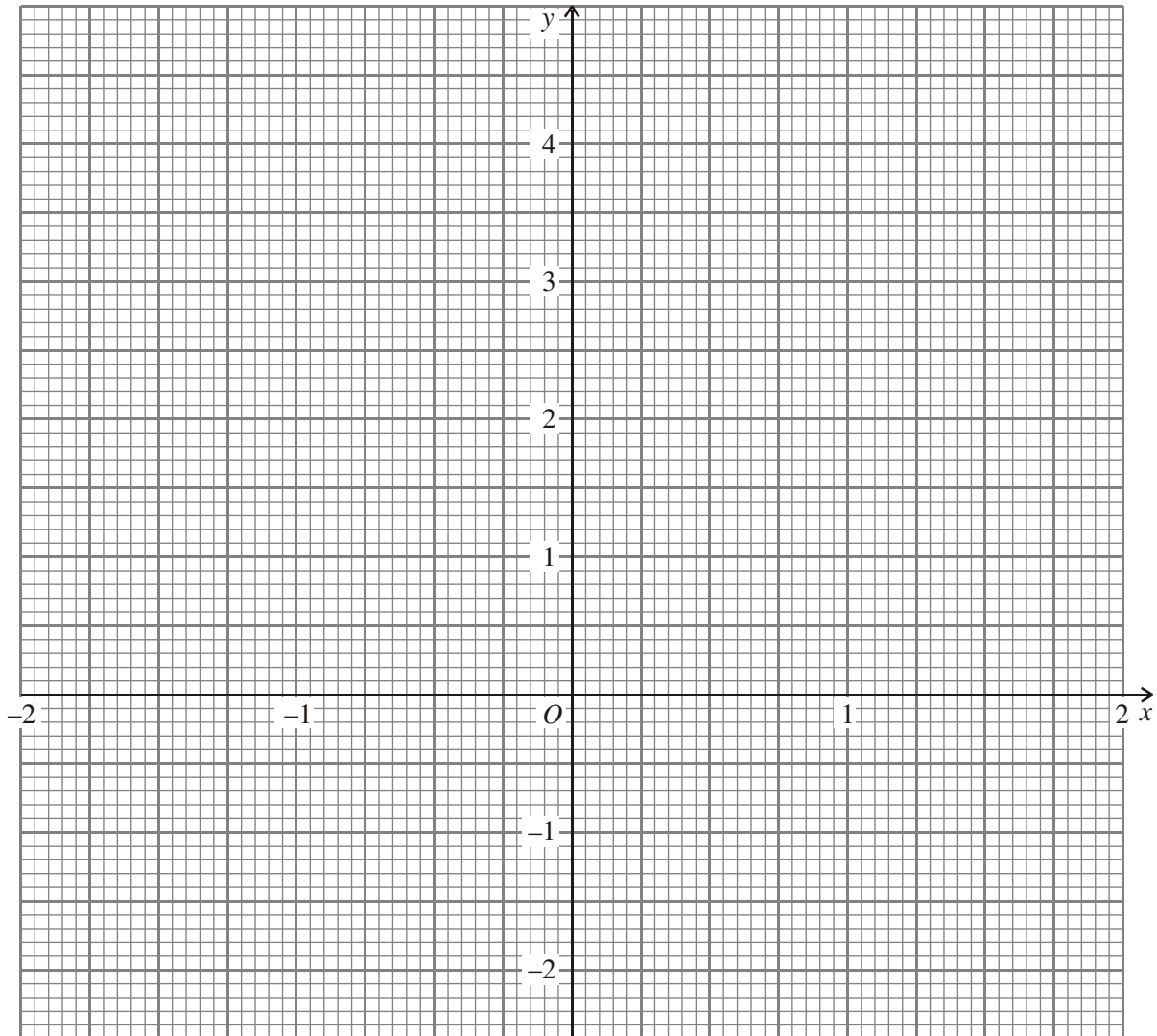
(Total 5 marks)

21. (a) Complete the table of values for $y = x^3 - 3x + 1$

x	-2	-1.5	-1	-0.5	0	0.5	1	1.5	2
y	-1		3	2.375	1	-0.375		-0.125	3

(1)

(b) On the grid, draw the graph of $y = x^3 - 3x + 1$ for $-2 \leq x \leq 2$



(2)

(Total 3 marks)

22. Solve $x^2 + 3x - 5 = 0$
Give your solutions correct to 4 significant figures.

.....
(Total 3 marks)

23.

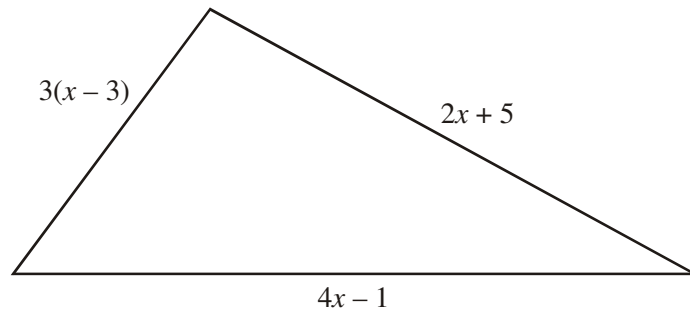


Diagram **NOT** accurately drawn

The lengths, in cm, of the sides of the triangle are $3(x-3)$, $4x-1$ and $2x+5$

- (a) Write down, in terms of x , an expression for the perimeter of the triangle.

..... cm
(1)

The perimeter of the triangle is 49 cm.

- (b) Work out the value of x .

$x =$
(2)
(Total 3 marks)

24.

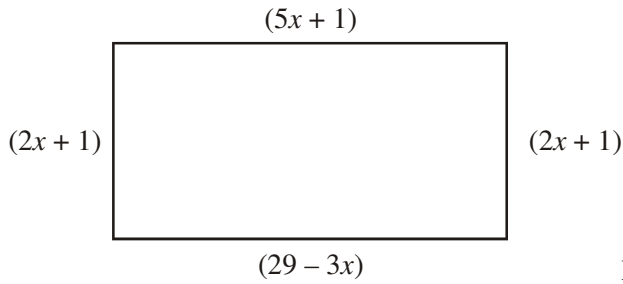


Diagram **NOT** accurately drawn

The diagram shows the length, in centimetres, of each side of the rectangle.
The perimeter of the rectangle is P cm.

Work out the value of P .

$P = \dots\dots\dots$
(Total 4 marks)

25. (a) Expand and simplify $(3x + 2)(4x + 1)$

$\dots\dots\dots$ (2)

(b) Factorise completely $3x^2 + 6xy$

$\dots\dots\dots$ (2)
(Total 4 marks)

26. Solve

$$5(x + 8) = \frac{7x - 4}{2}$$

$$x = \dots\dots\dots$$

(Total 4 marks)

27. $P = \pi r + 2r + 2a$

$$P = 84$$

$$r = 6.7$$

Work out the value of a .
Give your answer correct to 3 significant figures.

$$a = \dots\dots\dots$$

(Total 3 marks)

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

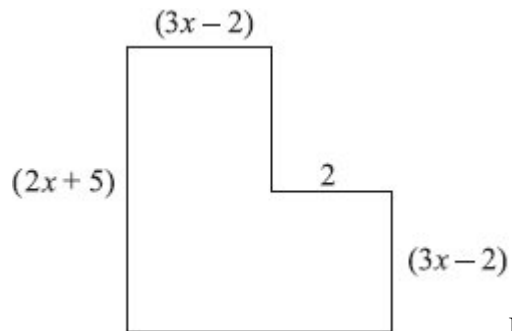


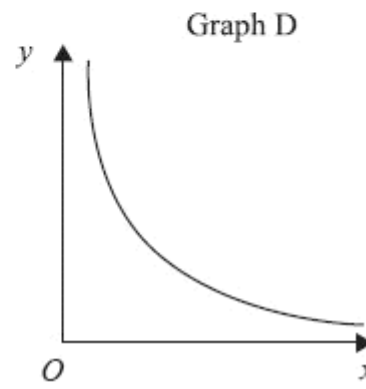
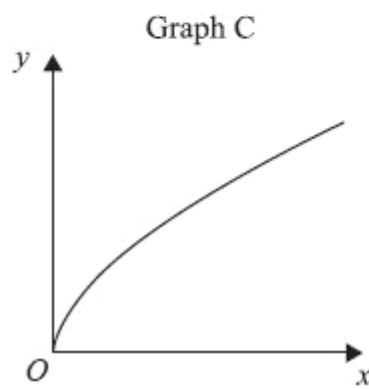
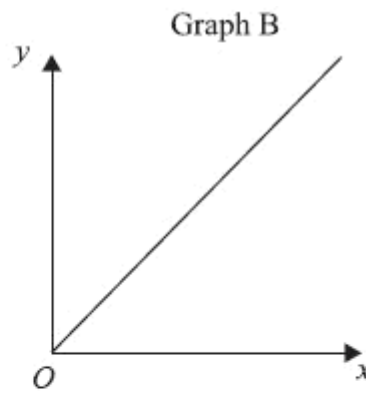
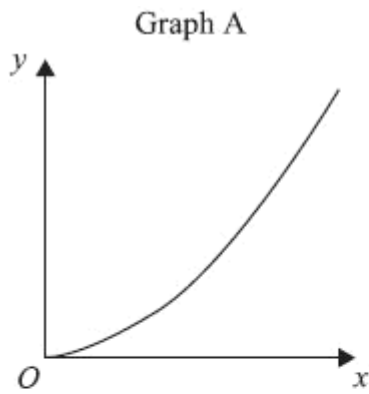
Diagram **NOT** accurately drawn

The area of the shape is 25 cm^2 .

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

(Total 3 marks)

29.



For $k > 0$ each graph matches with one of the equations,

$y = kx$ $y = k\sqrt{x}$ $y = \frac{k}{x}$ $y = kx^2$

Match each graph to its equation,

Equation	Graph
$y = kx$	
$y = k\sqrt{x}$	
$y = \frac{k}{x}$	
$y = kx^2$	

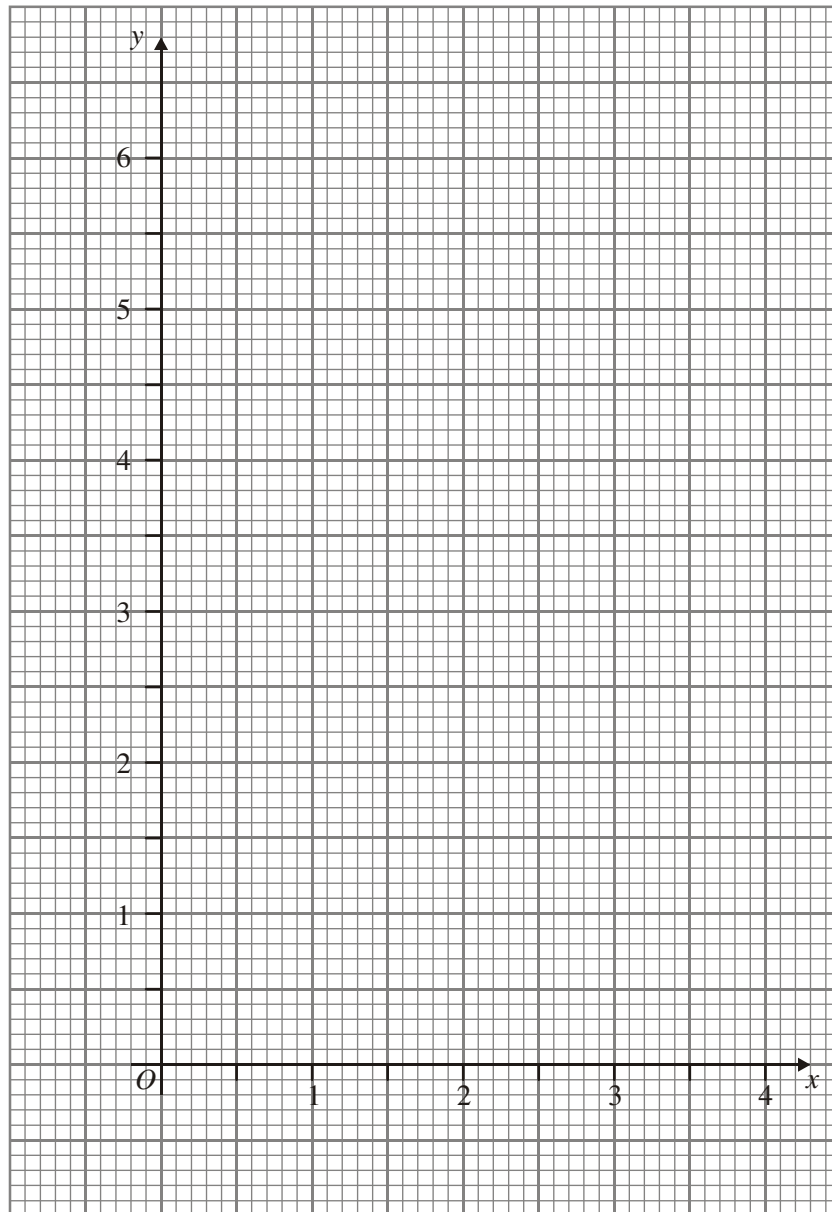
(Total 3 marks)

32. (a) Complete the table of values for $y = \frac{1}{x}$

x	0.2	0.4	0.8	1.0	2.0	4.0
y	5.0		1.25	1.0		

(2)

(b) On the grid, draw the graph of $y = \frac{1}{x}$ for $x > 0.2$



(2)
(Total 4 marks)

33. A straight line has equation $y = 5x - 3$

(i) Write down the gradient of this straight line.

.....

(ii) Write down the coordinates of the point where this straight line crosses the y axis.

(.....,))

(Total 2 marks)

34.

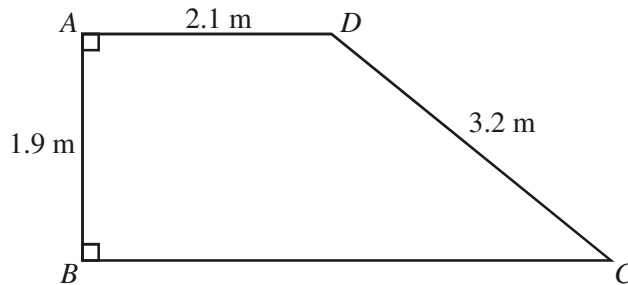


Diagram **NOT** accurately drawn

$ABCD$ is a trapezium.

AD is parallel to BC .

Angle $A =$ angle $B = 90^\circ$.

$AD = 2.1$ m, $AB = 1.9$ m, $CD = 3.2$ m.

Work out the length of BC .

Give your answer correct to 3 significant figures.

..... m

(Total 4 marks)

35.

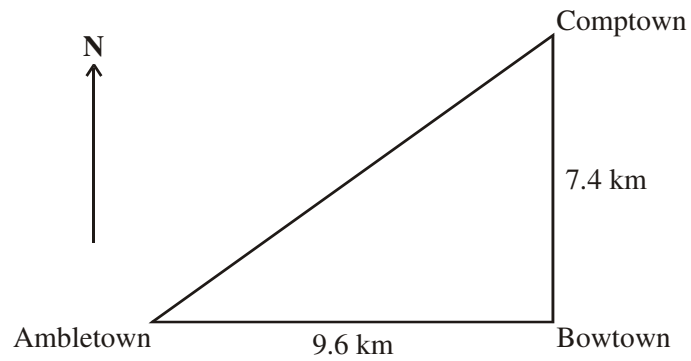


Diagram **NOT** accurately drawn

Ambletown, Bowtown and Comptown are three towns.

Ambletown is 9.6 km due west of Bowtown.

Bowtown is 7.4 km due south of Comptown.

Calculate the bearing of Ambletown from Comptown.

Give your answer correct to one decimal place.

.....°
(Total 4 marks)

36.

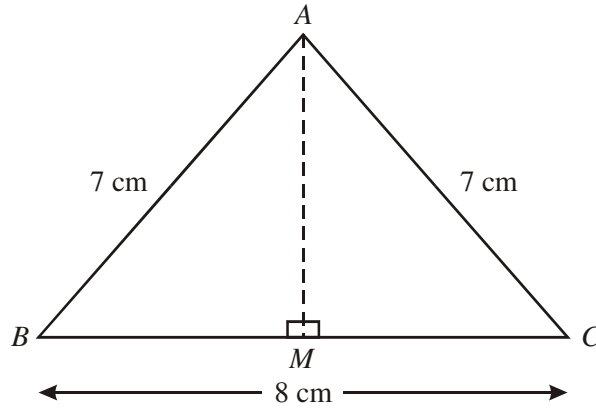


Diagram **NOT** accurately drawn

Work out the length, in centimetres, of AM .
Give your answer correct to 2 decimal places.

..... cm
(Total 3 marks)

37. R, S and T are points on the circumference of a circle, centre O .
 PS and PT are tangents to the circle.
 PSN and $TORN$ are straight lines.
 PO are parallel to SR .
 $SR = NR$.
Angle $OPT =$ angle OPS .

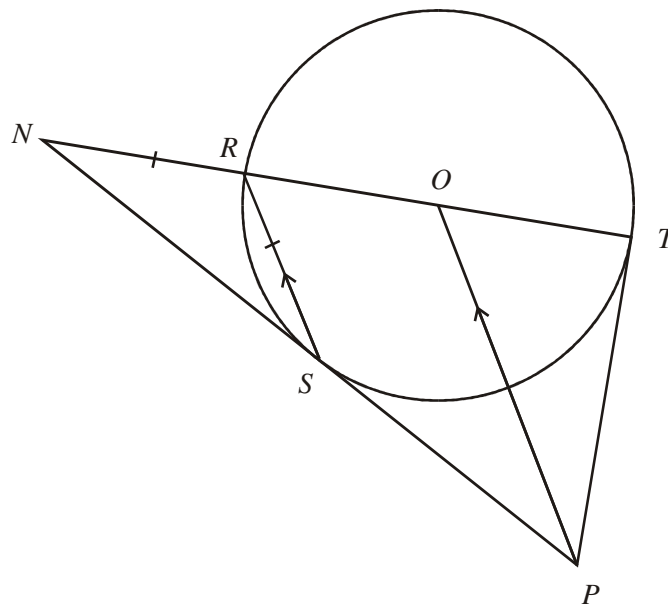


Diagram **NOT** accurately drawn

- (a) Work out the size of angle PNT .

.....°

(3)

- (b) Show that $PS = SN$.

(3)
(Total 6 marks)

38.

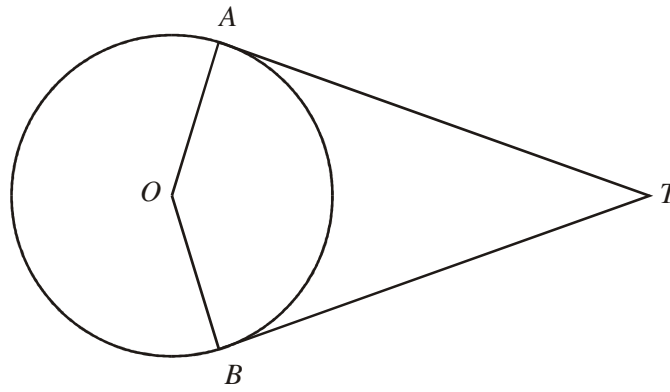


Diagram **NOT** accurately drawn

A and B are points on the circumference of a circle, centre O .
 TA and TB are tangents to the circle.

Calculate the size of the angle ATO when angle $AOT = 56^\circ$.
Give a reason for each stage in your working.

.....^o
(Total 3 marks)

39.

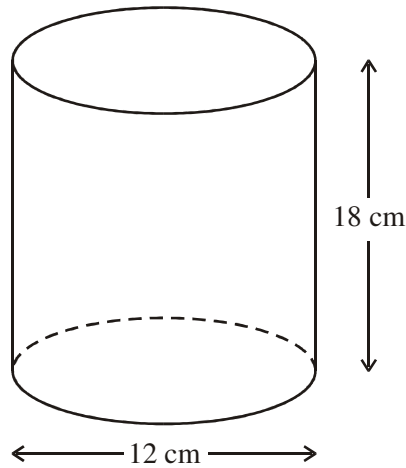


Diagram **NOT** accurately drawn

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.

..... cm²
(Total 4 marks)

40. Here are some expressions.

$(a + b)c$	$ac + b$	$2abc$	$\pi a^2 + \pi b^2$	$2\pi c$

The letters a , b , and c represent lengths. π and 2 are numbers that have no dimension.

Two of the expressions could represent areas.

Tick the boxes (✓) underneath these two expressions.

(Total 2 marks)

41.

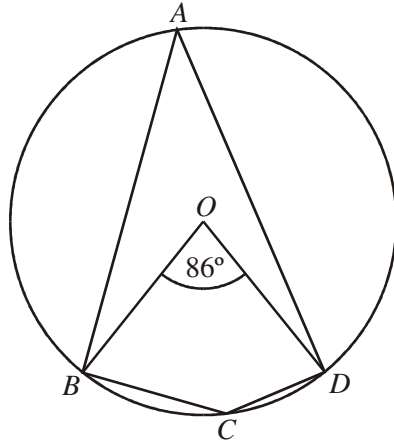


Diagram **NOT** accurately drawn

A, B, C and D are points on the circle, centre O .
Angle $BOD = 86^\circ$

(a) (i) Work out the size of angle BAD .

.....^o

(ii) Give a reason for your answer.

.....
.....

(2)

(b) Work out the size of angle BCD .

.....^o

(1)

(Total 3 marks)

42.

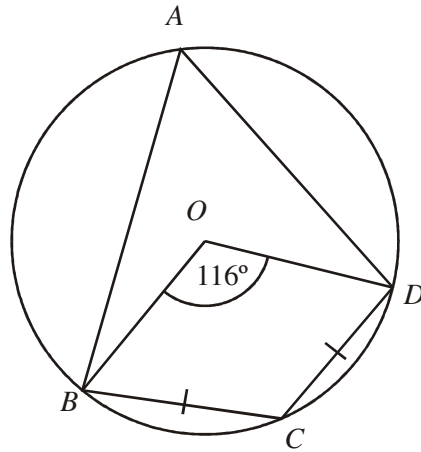


Diagram **NOT** accurately drawn

A, B, C and D are points on a circle, centre O .
Angle $BOD = 116^\circ$

(a) Calculate the size of angle BAD .

.....^o

(1)

$BC = CD$.

(b) Calculate the size of angle DBC .

.....^o

(2)

(Total 3 marks)

43.

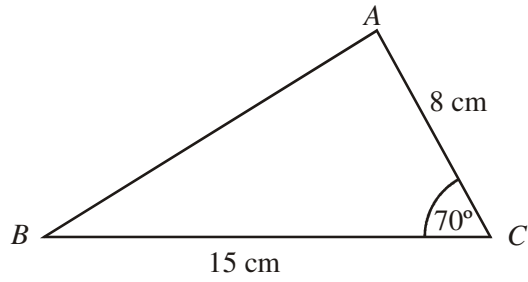


Diagram **NOT** accurately drawn

In triangle ABC ,
 $AC = 8$ cm,
 $BC = 15$ cm,
Angle $ACB = 70^\circ$.

- (a) Calculate the length of AB .
Give your answer correct to 3 significant figures.

..... cm

(3)

- (b) Calculate the size of angle BAC .
Give your answer correct to 1 decimal place.

.....°

(2)

(Total 5 marks)

44. Here is a regular polygon with 9 sides.

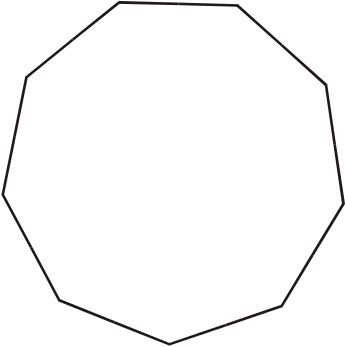


Diagram **NOT** accurately drawn

Work out the size of an exterior angle.

.....°
(Total 2 marks)

45.

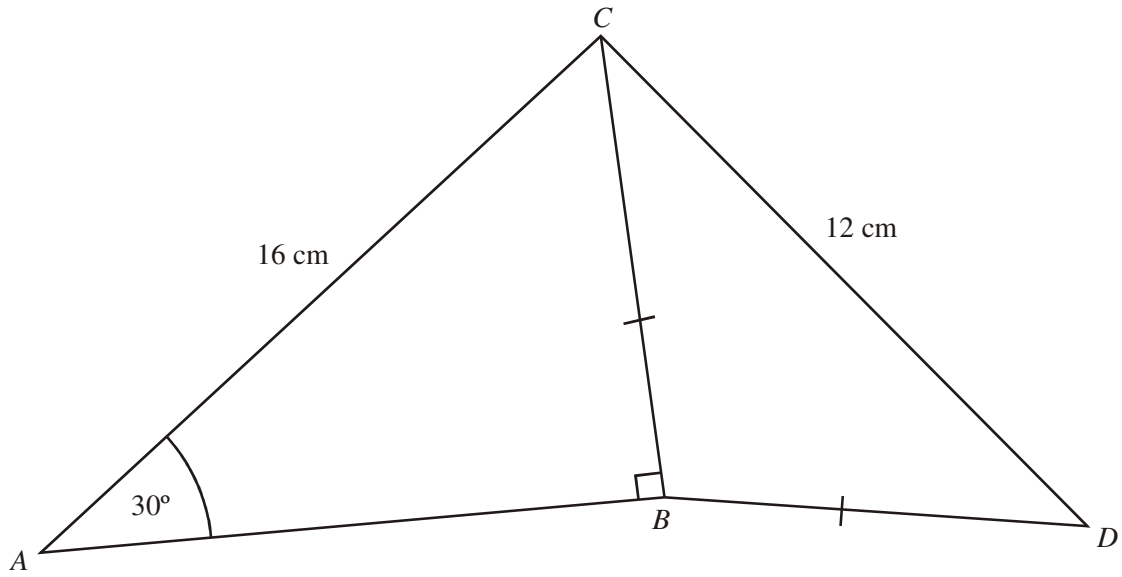


Diagram **NOT** accurately drawn

$AC = 16 \text{ cm}$
 $\text{Angle } ABC = 90^\circ$
 $\text{Angle } CAB = 30^\circ$

$BC = BD$
 $CD = 12 \text{ cm}$

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

..... cm^2
(Total 6 marks)

46.

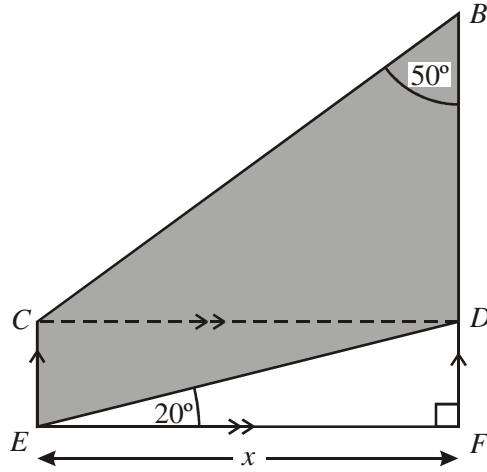


Diagram **NOT** accurately drawn

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)

47.

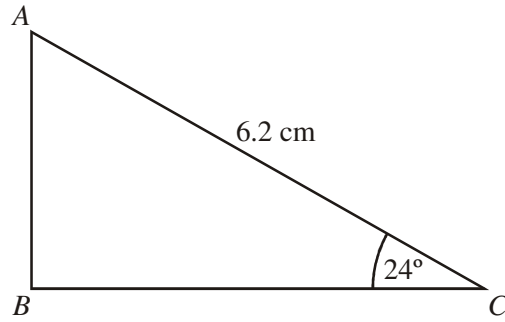


Diagram **NOT** accurately drawn

Angle $ABC = 90^\circ$.
Angle $ACB = 24^\circ$.
 $AC = 6.2$ cm.

Calculate the length of BC .
Give your answer correct to 3 significant figures.

..... cm
(Total 3 marks)

48.

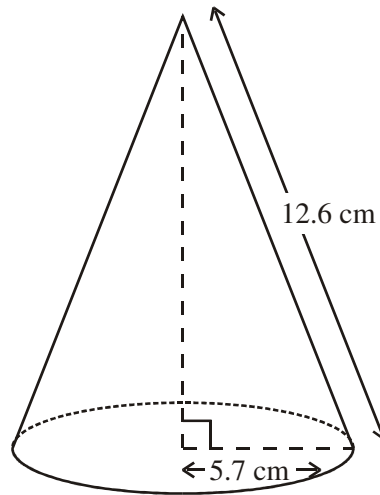


Diagram **NOT** accurately drawn

The radius of the base of a cone is 5.7 cm.
Its slant height is 12.6 cm.

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

..... cm³
(Total 4 marks)

49.

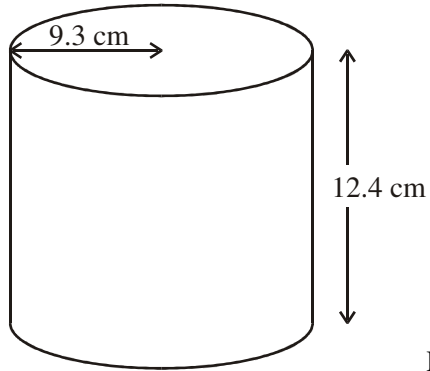


Diagram **NOT** accurately drawn

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.

..... cm²
(Total 3 marks)

50.

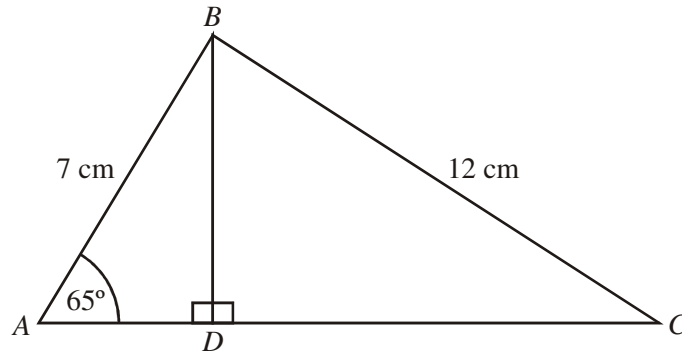


Diagram **NOT** accurately drawn

ABC is a triangle.
 ADC is a straight line with BD perpendicular to AC .
 $AB = 7$ cm.
 $BC = 12$ cm.
Angle $BAD = 65^\circ$.

Calculate the length of AC .
Give your answer correct to 3 significant figures.

..... cm
(Total 6 marks)

51.

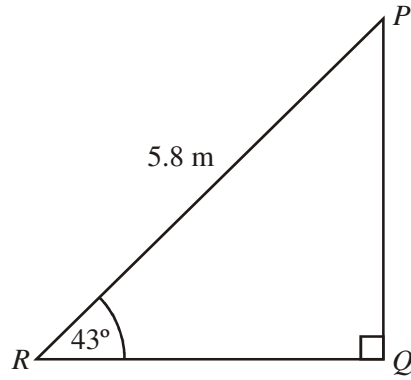


Diagram **NOT** accurately drawn

PQR is a triangle.
Angle $Q = 90^\circ$.
Angle $R = 43^\circ$.
 $PR = 5.8 \text{ m}$.

Calculate the length of QR .
Give your answer correct to 3 significant figures.

..... m
(Total 3 marks)

52.

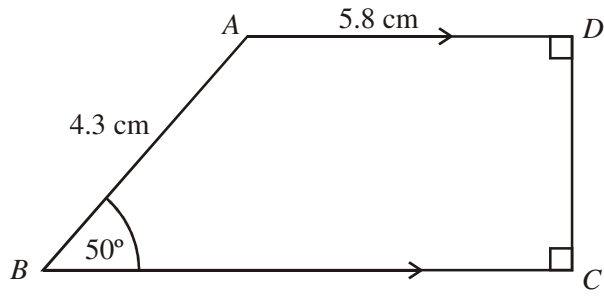


Diagram **NOT** accurately drawn

$ABCD$ is a trapezium.
 AD is parallel to BC .
Angle $C = \text{angle } D = 90^\circ$.
Angle $B = 50^\circ$.
 $AD = 5.8 \text{ cm}$.
 $AB = 4.3 \text{ cm}$.

Calculate the length of BC .
Give your answer, in centimetres, correct to one decimal place.

..... cm
(Total 4 marks)

53.

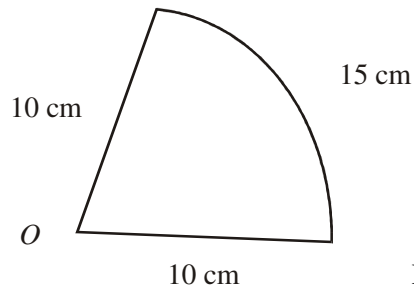


Diagram **NOT** accurately drawn

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)

54. A lighthouse, L , is 3.2 km due West of a port, P .
A ship, S , is 1.9 km due North of the lighthouse, L .

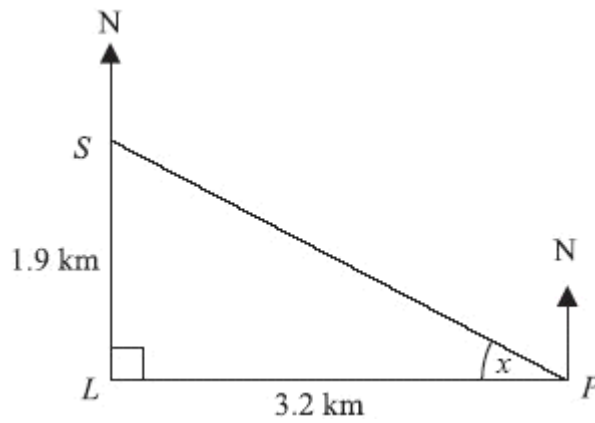


Diagram **NOT** accurately drawn

Calculate the size of the angle marked x .
Give your answer correct to 3 significant figures.

$x = \dots\dots\dots^\circ$
(Total 3 marks)

55.

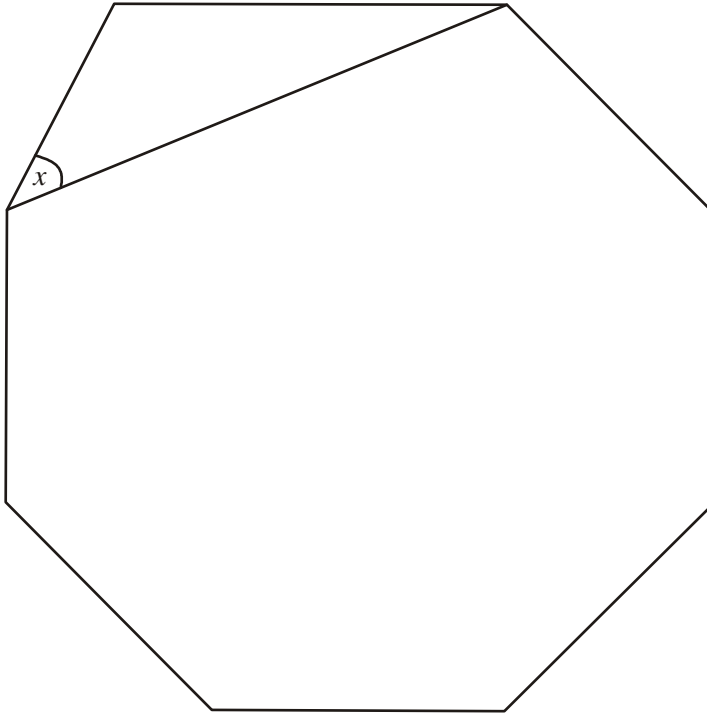


Diagram **NOT**
accurately drawn

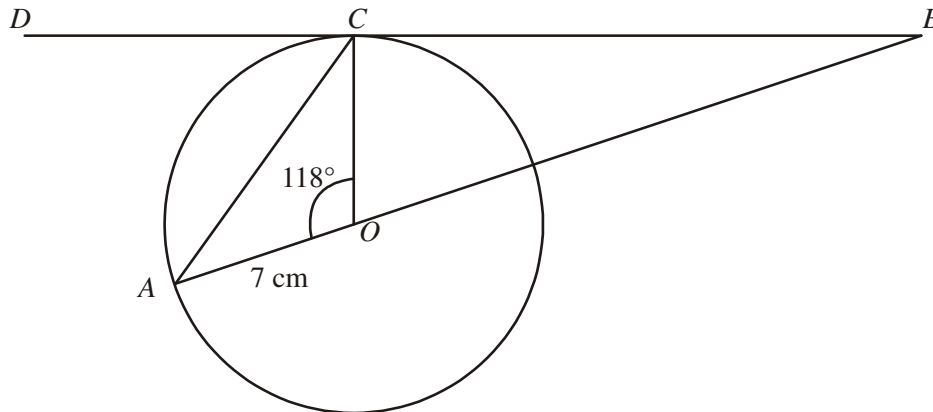
The diagram shows a regular octagon.

Work out the size of the angle marked x .

$x = \dots\dots\dots^\circ$
(Total 4 marks)

56.

Diagram **NOT**
accurately drawn



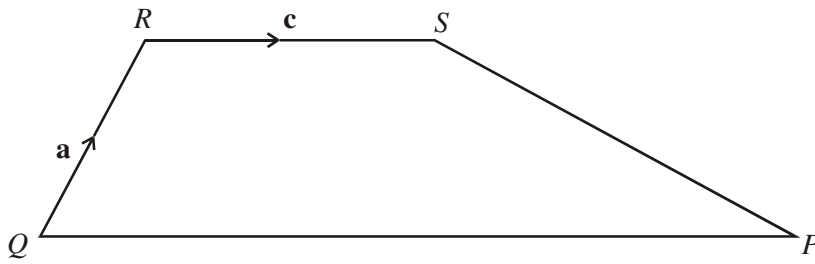
A and C are points on a circle, centre O .
 DCB is the tangent to the circle at C .
 AOB is a straight line.
 $OA = 7$ cm.
Angle $AOC = 118^\circ$.

Work out the length of OB .
Give your answer correct to 3 significant figures.

$OB = \dots\dots\dots$ cm
(Total 4 marks)

57.

Diagram NOT
accurately drawn



$PQRS$ is a trapezium.

QP is parallel to RS .

$QP = 3RS$.

$\overrightarrow{QR} = \mathbf{a}$, $\overrightarrow{RS} = \mathbf{c}$

Express in terms of \mathbf{a} and/or \mathbf{c}

(i) \overrightarrow{QP}

$\overrightarrow{QP} = \dots\dots\dots$

(ii) \overrightarrow{SP}

$\overrightarrow{SP} = \dots\dots\dots$

(Total 3 marks)

58.

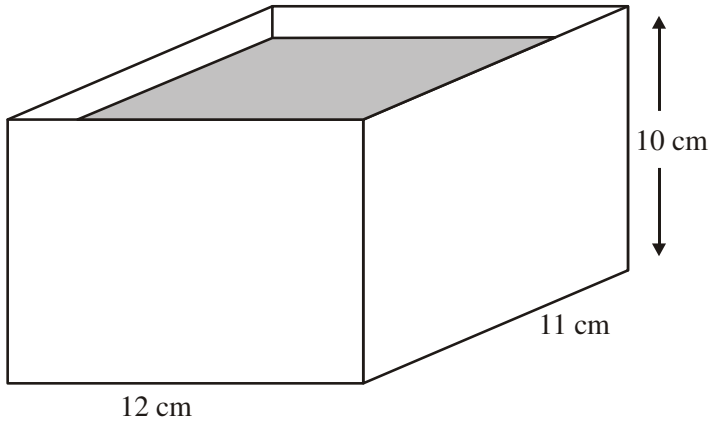
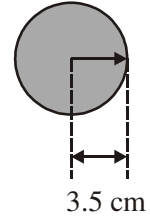


Diagram **NOT** accurately drawn



A rectangular container is 12 cm long, 11 cm wide and 10 cm high. The container is filled with water to a depth of 8 cm.

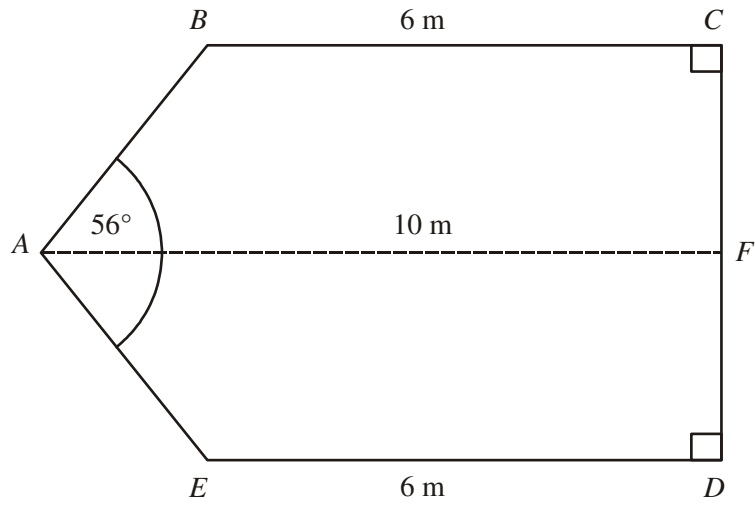
A metal sphere of radius 3.5 cm is placed in the water. It sinks to the bottom.

Calculate the rise in the water level.
Give your answer correct to 3 significant figures.

.....cm
(Total 4 marks)

59.

Diagram **NOT** accurately drawn



$ABCDE$ is a pentagon.

$BC = ED = 6\text{ m}$.

Angle $BCD = \text{angle } CDE = 90^\circ$.

Angle $BAE = 56^\circ$.

The point F lies on CD so that AF is the line of symmetry of the pentagon and $AF = 10\text{ m}$.

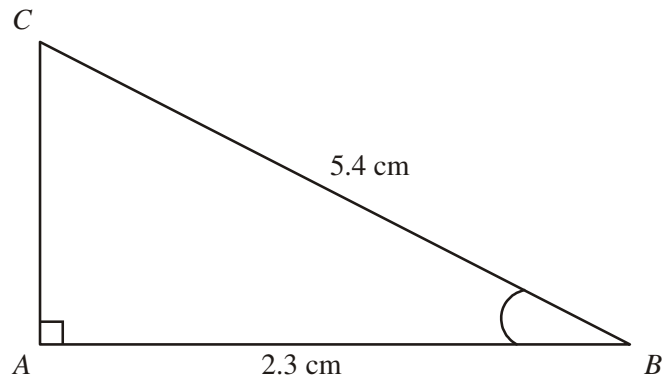
Calculate the perimeter of the pentagon.

Give your answer correct to 3 significant figures.

..... m
(Total 6 marks)

60.

Diagram **NOT** accurately drawn



ABC is a right-angled triangle.

Angle $A = 90^\circ$.

$AB = 2.3 \text{ cm}$.

$BC = 5.4 \text{ cm}$.

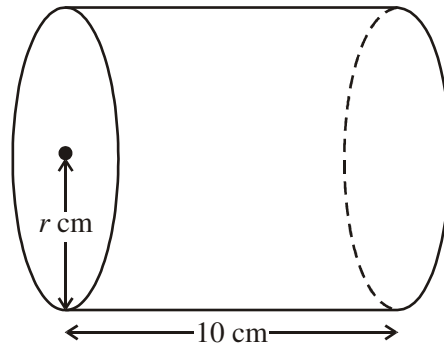
Work out the size of angle B .

Give your answer correct to 3 significant figures.

.....[°]
(Total 3 marks)

61.

Diagram **NOT** accurately drawn



The diagram shows a cylinder.
The radius of the cylinder is r cm.
The length of the cylinder is 10 cm.

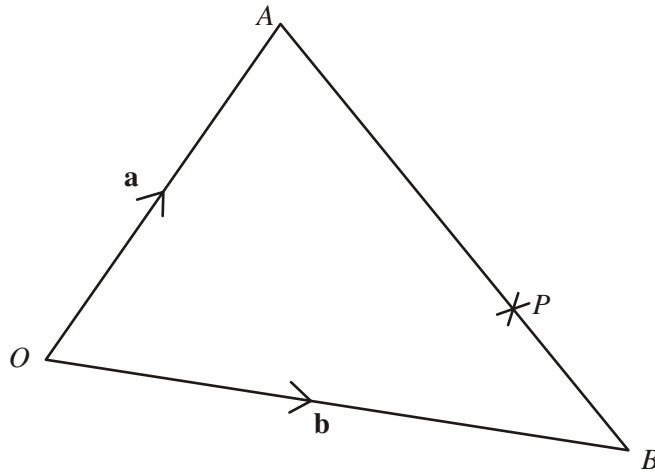
The volume of the cylinder is 140 cm^3 .

Work out the value of r .
Give your answer correct to 3 significant figures.

$r = \dots\dots\dots$
(Total 3 marks)

62.

Diagram **NOT** accurately drawn



OAB is a triangle.

$$\vec{OA} = \mathbf{a} \quad \vec{OB} = \mathbf{b}$$

P is the point on AB such that $AP : PB = 2 : 1$

Write \vec{OP} in terms of \mathbf{a} and \mathbf{b}

$$\vec{OP} = \dots\dots\dots$$

(Total 3 marks)

63. The table shows some expressions.

p , q and r represent lengths.
 π , 2, 3 and 4 are values that have no dimension.

Place a tick (\checkmark) in the appropriate column for each expression to show whether the expression can be used to represent a length, an area, a volume or none of these.

Expression	Length	Area	Volume	None of these
$3pqr$				
$4p + 2q$				
πr^2				

(Total 3 marks)

64. Calculate the length of the side marked x in this right-angled triangle.
Give your answer correct to 3 significant figures.

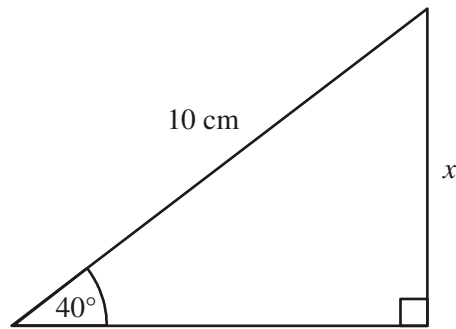


Diagram **NOT** accurately drawn

.....cm
(Total 3 marks)

- 65.

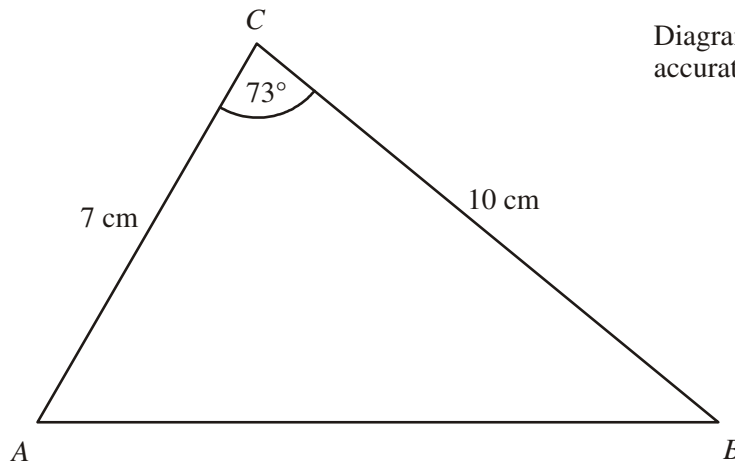


Diagram **NOT** accurately drawn

In triangle ABC ,
 $AC = 7$ cm,
 $BC = 10$ cm,
angle $ACB = 73^\circ$.

Calculate the length of AB .
Give your answer correct to 3 significant figures.

..... cm
(Total 3 marks)

66.

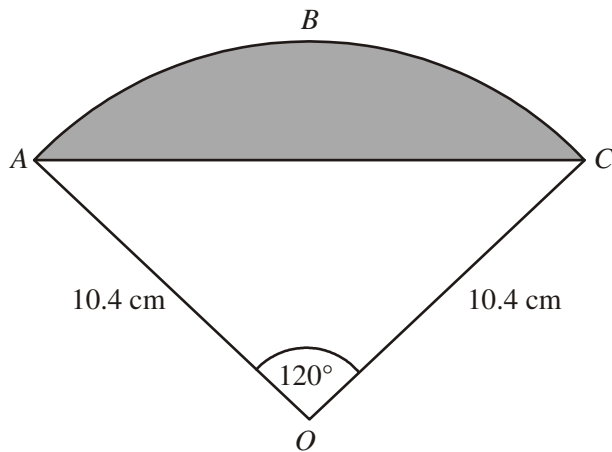


Diagram **NOT** accurately drawn

The diagram shows a sector $OABC$ of a circle with centre O .
 $OA = OC = 10.4\text{ cm}$.
Angle $AOC = 120^\circ$.

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

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