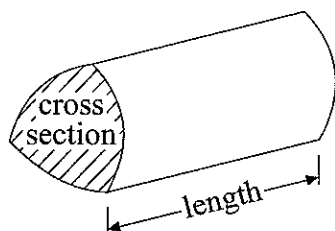


GCSE Mathematics 1387/8

Formulae: Higher Tier

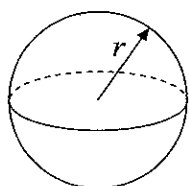
**You must not write on this formulae page.
Anything you write on this formulae page will gain NO credit.**

Volume of a prism = area of cross section \times length



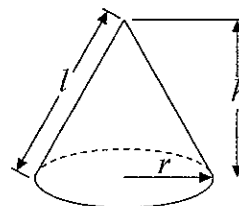
Volume of sphere = $\frac{4}{3}\pi r^3$

Surface area of sphere = $4\pi r^2$

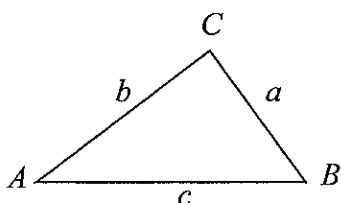


Volume of cone = $\frac{1}{3}\pi r^2 h$

Curved surface area of cone = $\pi r l$



In any triangle ABC



The Quadratic Equation

The solutions of $ax^2 + bx + c = 0$
where $a \neq 0$, are given by

$$x = \frac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}$$

Sine Rule $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine Rule $a^2 = b^2 + c^2 - 2bc \cos A$

Area of triangle = $\frac{1}{2} ab \sin C$



Answer ALL TWENTY questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

1. (a) Make t the subject of the formula $v = u + 5t$

$t = \dots\dots\dots$
(2)

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

$x = \dots\dots\dots$
(3)

(Total 5 marks)

Q1

2. Three women earned a total of £36
They shared the £36 in the ratio 7:3:2

Donna received the largest amount.

- (a) Work out the amount Donna received.

£.....
(3)

A year ago, Donna weighed 51.5 kg.
Donna now weighs $8\frac{1}{2}\%$ less.

- (b) Work out how much Donna now weighs.
Give your answer to an appropriate degree of accuracy.

..... kg
(4)

(Total 7 marks)

Q2



3. The equation

$$x^3 - 4x = 24$$

has a solution between 3 and 4.

Use a trial and improvement method to find this solution.

Give your answer correct to 1 decimal place.

You must show **all** your working.

$x = \dots\dots\dots$

(Total 4 marks)

Q3



4.

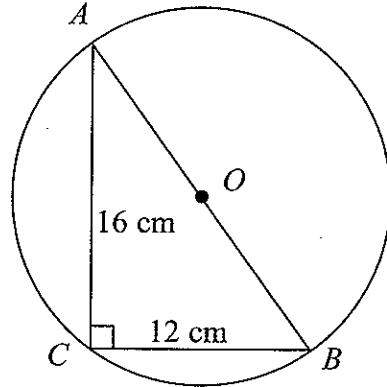


Diagram NOT accurately drawn

The diagram shows triangle ABC and a circle, centre O . A , B and C are points on the circumference of the circle. AB is a diameter of the circle.

$AC = 16$ cm and $BC = 12$ cm.

- (a) Angle $ACB = 90^\circ$.
Give a reason why.

..... (1)

- (b) Work out the diameter AB of the circle.

..... cm (3)

- (c) Work out the area of the circle.
Give your answer correct to 3 significant figures.

..... cm^2 (3)

(Total 7 marks)

Q4



5. The table shows information about the number of hours that 120 children used a computer last week.

Number of hours (h)	Frequency
$0 < h \leq 2$	10
$2 < h \leq 4$	15
$4 < h \leq 6$	30
$6 < h \leq 8$	35
$8 < h \leq 10$	25
$10 < h \leq 12$	5

(a) Work out an estimate for the mean number of hours that the children used a computer. Give your answer correct to two decimal places.

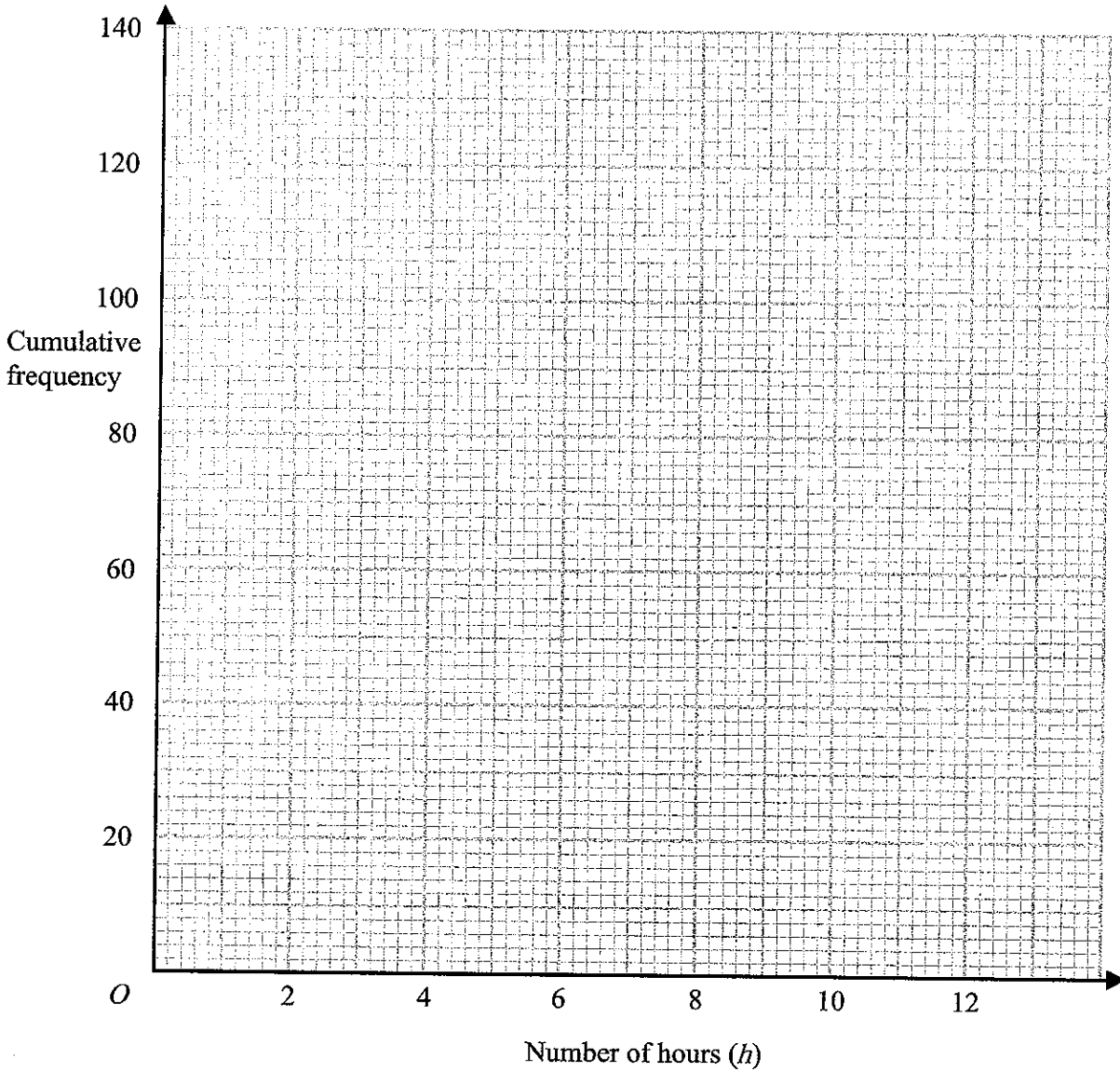
..... hours
(4)

(b) Complete the cumulative frequency table.

Number of hours (h)	Cumulative frequency
$0 < h \leq 2$	10
$0 < h \leq 4$	
$0 < h \leq 6$	
$0 < h \leq 8$	
$0 < h \leq 10$	
$0 < h \leq 12$	

(1)





- (c) On the grid, draw a cumulative frequency graph for your table. (2)
- (d) Use your graph to find an estimate for the number of children who used a computer for less than 7 hours last week.

.....
(2)
(Total 9 marks)

Q5



6. (a) Simplify $a^3 \times a^4$

.....
(1)

(b) Simplify $3x^2y \times 5xy^3$

.....
(2)

(c) Simplify $\frac{(x-1)^2}{x-1}$

.....
(1)

(d) Factorise $a^2 - 9b^2$

.....
(2)

(Total 6 marks)

Q6

7. In a sale, normal prices are reduced by 20%.

Andrew bought a saddle for his horse in the sale.
The sale price of the saddle was £220

SALE
20% OFF

Calculate the normal price of the saddle.

£

(Total 3 marks)

Q7



8. Solve

$$\begin{aligned}x + 2y &= 4 \\ 3x - 4y &= 7\end{aligned}$$

$x = \dots\dots\dots$

$y = \dots\dots\dots$

(Total 3 marks)

Q8

9. Work out $(3.2 \times 10^5) \times (4.5 \times 10^4)$
Give your answer in standard form correct to 2 significant figures.

$\dots\dots\dots$

(Total 2 marks)

Q9



10. 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 .

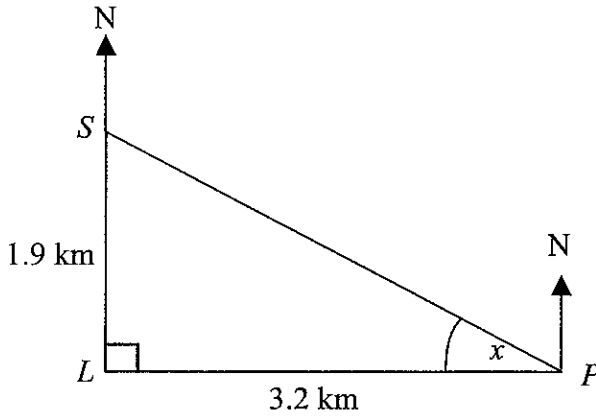


Diagram NOT accurately drawn

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

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

- (b) Find the bearing of the port, P , from the ship, S .
 Give your answer correct to 3 significant figures.

$\dots\dots\dots^\circ$
 (1)

(Total 4 marks)

Q10



11.

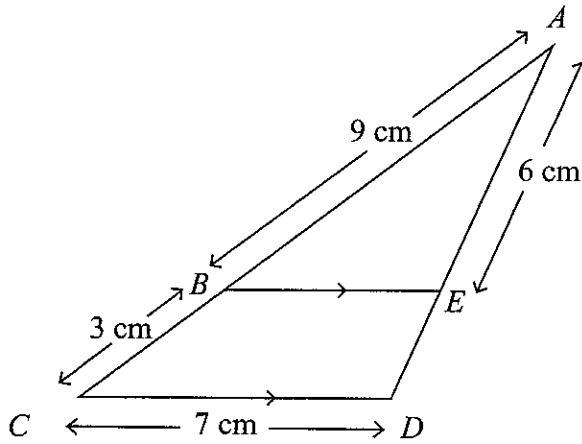


Diagram NOT accurately drawn

BE is parallel to CD .
 $AB = 9$ cm, $BC = 3$ cm, $CD = 7$ cm, $AE = 6$ cm.

(a) Calculate the length of ED .

..... cm
 (2)

(b) Calculate the length of BE .

..... cm
 (2)

(Total 4 marks)

Q11



12.

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

$$P = 84$$

$$r = 6.7$$

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

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

(3)

- (b) Make r the subject of the formula

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

$$r = \dots\dots\dots$$

(3)

(Total 6 marks)

Q12



13.

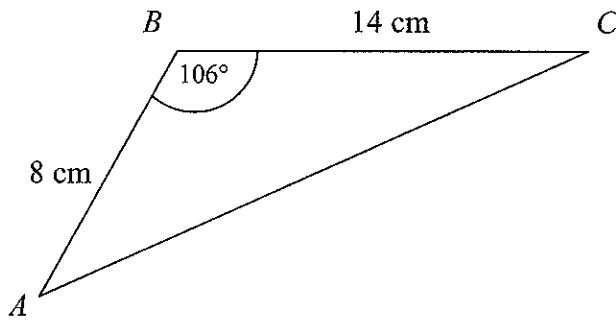


Diagram NOT accurately drawn

ABC is a triangle.
 $AB = 8 \text{ cm}$
 $BC = 14 \text{ cm}$
Angle $ABC = 106^\circ$

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

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

Q13



14. Bill invests £500 on 1st January 2004 at a compound interest rate of $R\%$ per annum.

The value, £ V , of this investment after n years is given by the formula

$$V = 500 \times (1.045)^n$$

(a) Write down the value of R .

$R = \dots\dots\dots$
(1)

(b) Use your calculator to find the value of Bill's investment after 20 years.

£ $\dots\dots\dots$
(2)

(Total 3 marks)

Q14



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

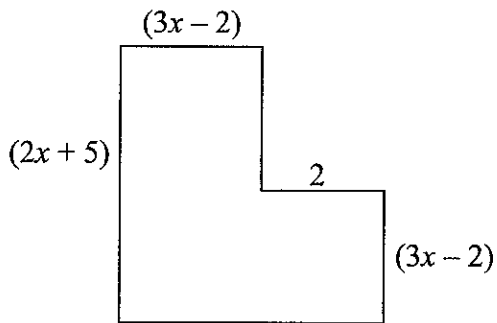


Diagram NOT accurately drawn

The area of the shape is 25 cm^2 .

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

(3)

- (b) (i) Solve the equation

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

$$x = \dots\dots\dots \text{ or } x = \dots\dots\dots$$

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

$\dots\dots\dots \text{ cm}$
 (4)

(Total 7 marks)

Q15



16. Jeremy designs a game for a school fair.

He has two 5-sided spinners.

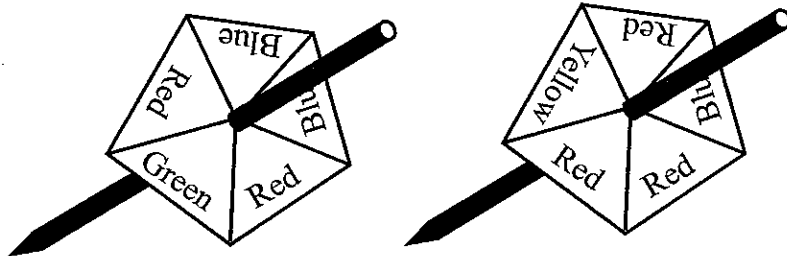
The spinners are equally likely to land on each of their sides.

One spinner has 2 red sides, 1 green side and 2 blue sides.

The other spinner has 3 red sides, 1 yellow side and 1 blue side.

(a) Calculate the probability that the two spinners will land on the same colour.

.....
(3)



The game consists of spinning each spinner once.

It costs 20p to play the game.

To win a prize both spinners must land on the same colour.

The prize for a win is 50p.

100 people play the game.

(b) Work out an estimate of the profit that Jeremy should expect to make.

£
(2)

(Total 5 marks)

Q16



17.

MAXIMUM LOAD
1200 kg

Weight 60 kg

Peter transports metal bars in his van.

The van has a safety notice "Maximum Load 1200 kg".
 Each metal bar has a label "Weight 60 kg".

For safety reasons Peter assumes that

1200 is rounded correct to 2 significant figures
 and 60 is rounded correct to 1 significant figure.

Calculate the greatest number of bars that Peter can **safely** put into the van if his assumptions are correct.

Q17

.....
 (Total 4 marks)

18. Simplify fully

(a) $(3xy^2)^4$

.....
 (2)

(b) $\frac{x^2 - 3x}{x^2 - 8x + 15}$

.....
 (3)

(Total 5 marks)

Q18



19. The diagram shows a pyramid. The apex of the pyramid is V .
Each of the sloping edges is of length 6 cm.

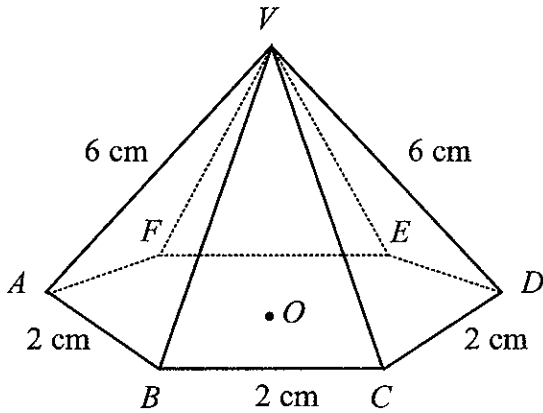


Diagram **NOT** accurately drawn

The base of the pyramid is a regular hexagon with sides of length 2 cm.
 O is the centre of the base.

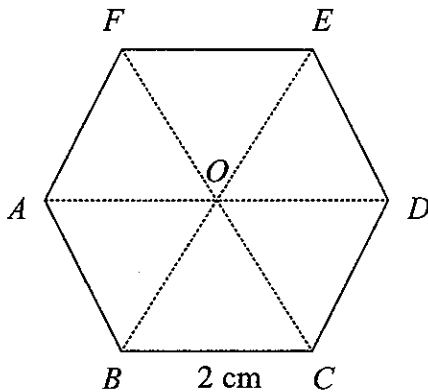


Diagram **NOT** accurately drawn

- (a) Calculate the height of V above the base of the pyramid.
Give your answer correct to 3 significant figures.

..... cm
(2)



- (b) Calculate the size of angle DVA .
Give your answer correct to 3 significant figures.

.....°
(3)

- (c) Calculate the size of angle AVC .
Give your answer correct to 3 significant figures.

.....°
(4)

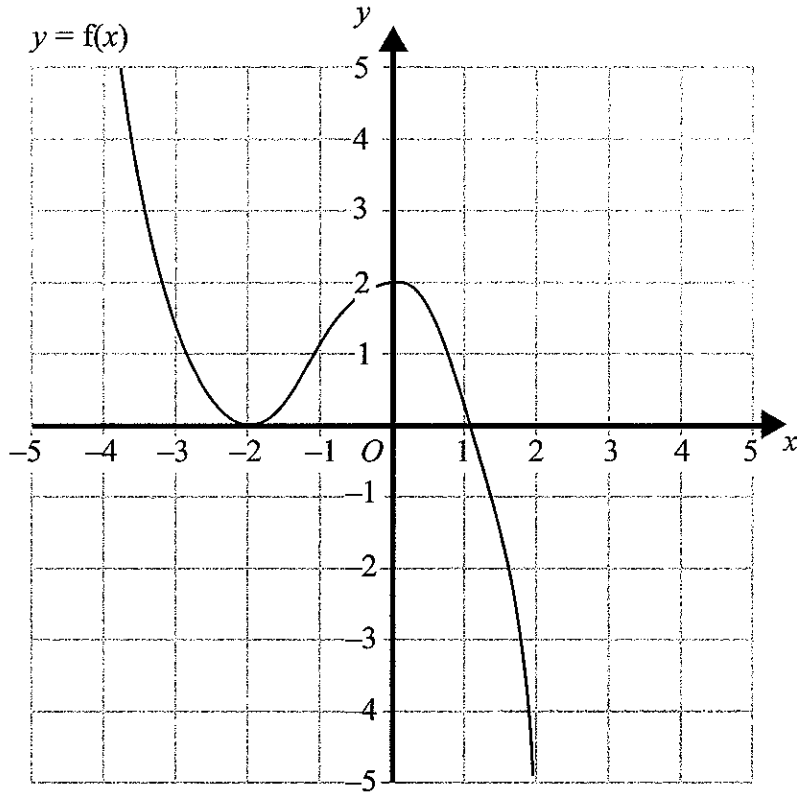
(Total 9 marks)

Q19



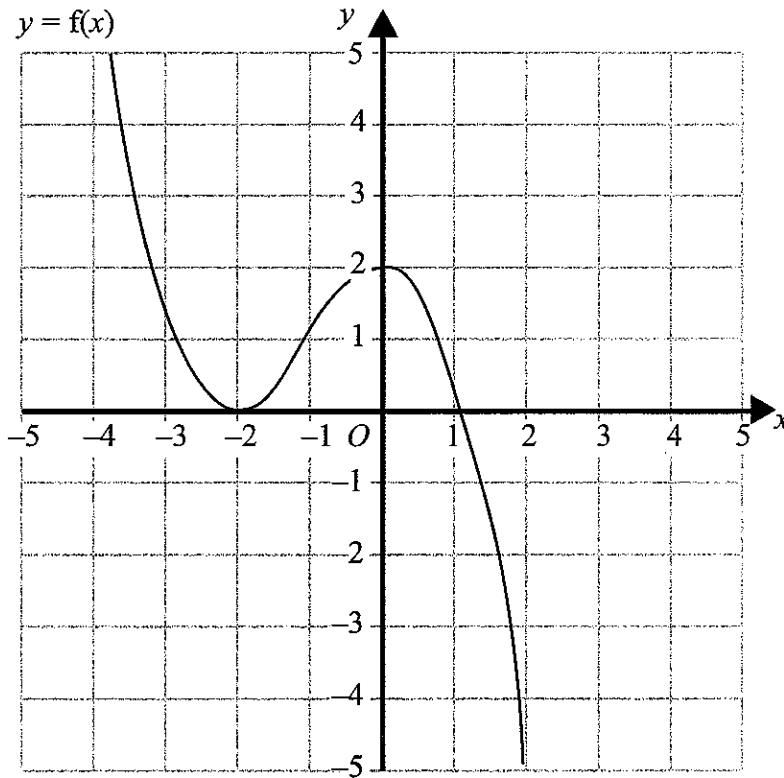
20. The graph of $y = f(x)$ is shown on the grids.

(a) On this grid, sketch the graph of $y = f(x-1)$



(2)

(b) On this grid, sketch the graph of $y = 2f(x)$



(2)

(Total 4 marks)

Q20

TOTAL FOR PAPER: 100 MARKS

END

