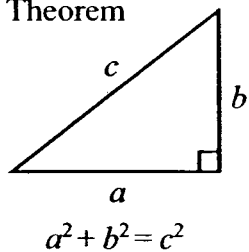


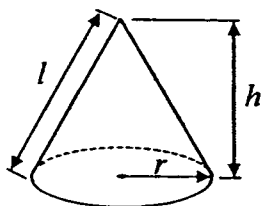
IGCSE MATHEMATICS 4400
FORMULA SHEET – HIGHER TIER

Pythagoras' Theorem



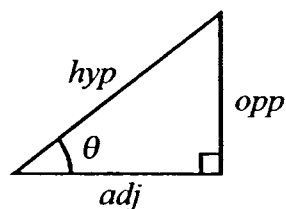
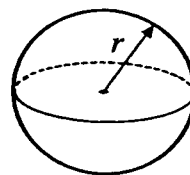
Volume of cone = $\frac{1}{3} \pi r^2 h$

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



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

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



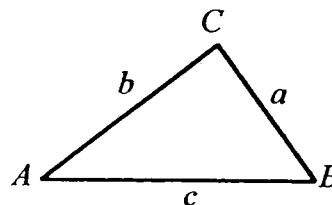
adj = hyp \times cos θ
opp = hyp \times sin θ
opp = adj \times tan θ

or $\sin \theta = \frac{\text{opp}}{\text{hyp}}$

$\cos \theta = \frac{\text{adj}}{\text{hyp}}$

$\tan \theta = \frac{\text{opp}}{\text{adj}}$

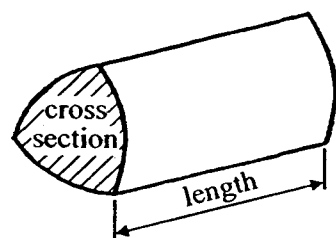
In any triangle ABC



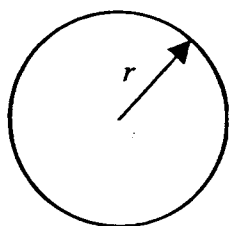
Sine rule $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

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

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



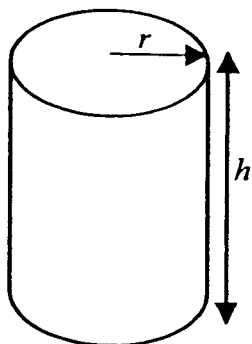
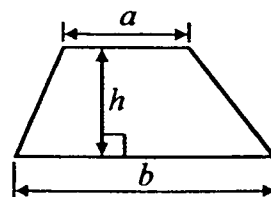
Volume of prism = area of cross section \times length



Circumference of circle = $2 \pi r$

Area of circle = πr^2

Area of a trapezium = $\frac{1}{2} (a + b) h$



Volume of cylinder = $\pi r^2 h$

Curved surface area of cylinder = $2 \pi r h$

The Quadratic Equation

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

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



Answer ALL TWENTY TWO questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

1. Use your calculator to work out the value of $\frac{9.5-3.7}{1.3 \times 2.4}$

Write down all the figures on your calculator display.

Q1

(Total 2 marks)

2. Solve $5(2x + 3) = 30$

$x =$

Q2

(Total 3 marks)



N 2 2 1 2 7 A 0 3 2 0

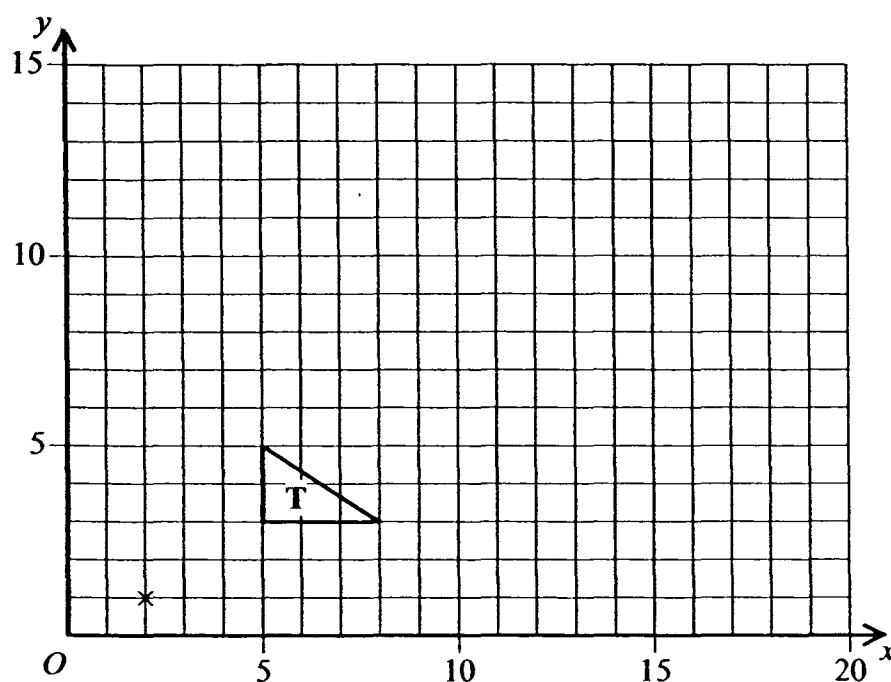
3. Work out $\frac{5}{6} - \frac{4}{9}$

Give your answer as a fraction in its simplest form.

.....
(Total 2 marks)

Q3

4.



On the grid, enlarge triangle T with a scale factor of 3 and centre (2, 1).

(Total 3 marks)

Q4



5. The probability that a person chosen at random has brown eyes is 0.45
 The probability that a person chosen at random has green eyes is 0.12

- (a) Work out the probability that a person chosen at random has either brown eyes or green eyes.

.....
 (2)

250 people are to be chosen at random.

- (b) Work out an estimate for the number of people who will have green eyes.

.....
 (2)

(Total 4 marks)

Q5

6. (a) Factorise $9p + 15$

.....
 (1)

(b) Factorise $q^2 - 4q$

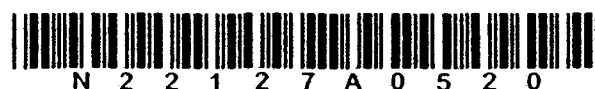
.....
 (1)

(c) Factorise $x^2 - 3x - 10$

.....
 (2)

(Total 4 marks)

Q6



7.

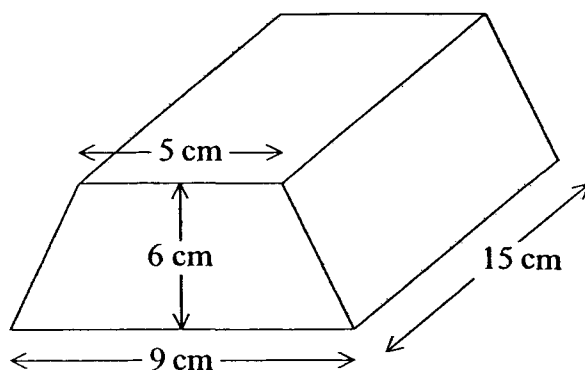


Diagram NOT accurately drawn

The diagram shows a prism.

The cross section of the prism is a trapezium.

The lengths of the parallel sides of the trapezium are 9 cm and 5 cm.

The distance between the parallel sides of the trapezium is 6 cm.

The length of the prism is 15 cm.

(a) Work out the area of the trapezium.

..... cm^2
(2)

(b) Work out the volume of the prism.

..... cm^3
(2)

(Total 4 marks)

Q7



8. In a sale at *Bargain Buys*, all the normal prices are reduced by 15%.
The normal price of a printer is £240

(a) Work out the sale price of the printer.

£.....
(3)

In the same sale, the sale price of a laptop computer is £663

(b) Work out the normal price of the laptop computer.

£.....
(3)

(Total 6 marks)

Q8

9. (a) Solve the inequality $2x - 3 < 5$

.....
(2)

(b) n is a positive integer.

Write down all the values of n which satisfy the inequality $2n - 3 < 5$

.....
(2)

(Total 4 marks)

Q9



N 2 2 1 2 7 A 0 7 2 0

10. The table gives information about the ages, in years, of the 80 members of a sports club.

Age (t years)	Frequency
$10 < t \leq 20$	8
$20 < t \leq 30$	38
$30 < t \leq 40$	28
$40 < t \leq 50$	4
$50 < t \leq 60$	2

(a) Work out an estimate for the mean age of the 80 members.

..... years
(4)

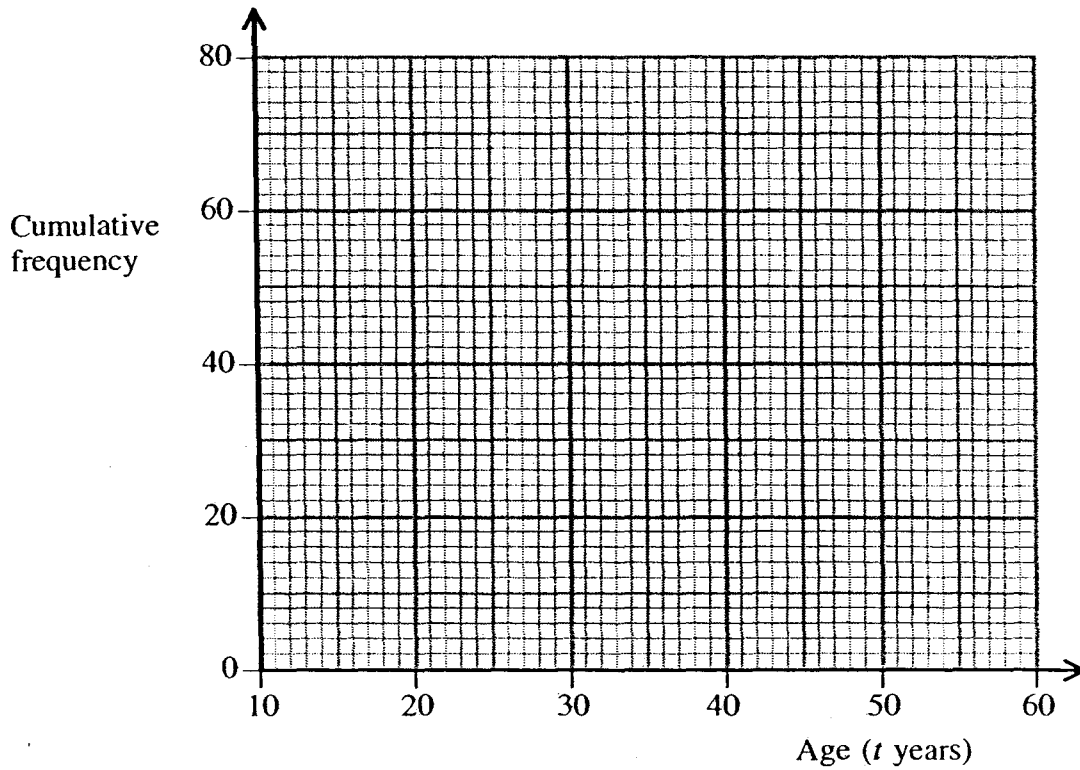
(b) Complete the cumulative frequency table.

Age (t years)	Cumulative frequency
$10 < t \leq 20$	
$10 < t \leq 30$	
$10 < t \leq 40$	
$10 < t \leq 50$	
$10 < t \leq 60$	

(1)



(c) On the grid, draw a cumulative frequency graph for your table.



(2)

(d) Use your graph to find an estimate for the median age of the members of the club. Show your method clearly.

..... years
(2)

(Total 9 marks)

Q10

11. Make W the subject of the formula $h = \sqrt{\frac{W}{I}}$

$W =$

(Total 2 marks)

Q11



N 2 2 1 2 7 A 0 9 2 0

12. The height of a hall is 12 m.
 A scale model is made of the hall.
 The height of the scale model of the hall is 30 cm.

(a) Express the scale of the model in the form $1:n$

.....
 (3)

The length of the scale model of the hall is 95 cm.

(b) Work out the real length of the hall.
 Give your answer in metres.

..... m
 (3)

(Total 6 marks)

Q12

13. The size of each exterior angle of a regular polygon is 18° .

(a) Work out how many sides the polygon has.

.....
 (2)

(b) Work out the **sum** of the interior angles of the polygon.

.....
 (2)

(Total 4 marks)

Q13



14. Solve $\frac{x-1}{2} + \frac{2x+3}{4} = 1$

$x = \dots\dots\dots$

(Total 4 marks)

Q14

15. (a) Express $\frac{10}{\sqrt{5}}$ in the form $k\sqrt{5}$ where k is an integer.

$\dots\dots\dots$
(2)

(b) Express $(5 + \sqrt{3})^2$ in the form $a + b\sqrt{3}$ where a and b are integers.

$\dots\dots\dots$
(2)

(Total 4 marks)

Q15



16.

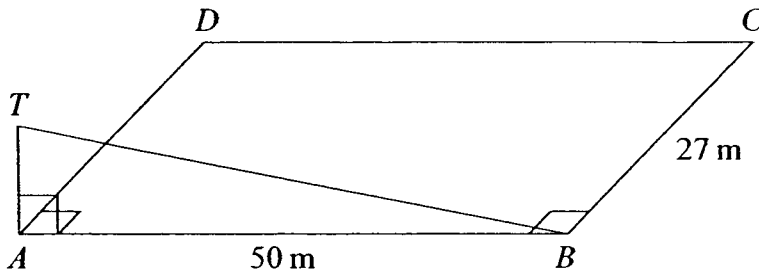


Diagram NOT accurately drawn

$ABCD$ is a horizontal rectangular field.

$AB = 50$ m.

$BC = 27$ m.

AT is a vertical mast.

- (a) The angle of elevation of T from B is 19° .
 Calculate the length of AT .
 Give your answer correct to 3 significant figures.

..... m
 (3)

- (b) Calculate the distance from C to T .
 Give your answer correct to 3 significant figures.

..... m
 (3)

(Total 6 marks)

Q16



17.

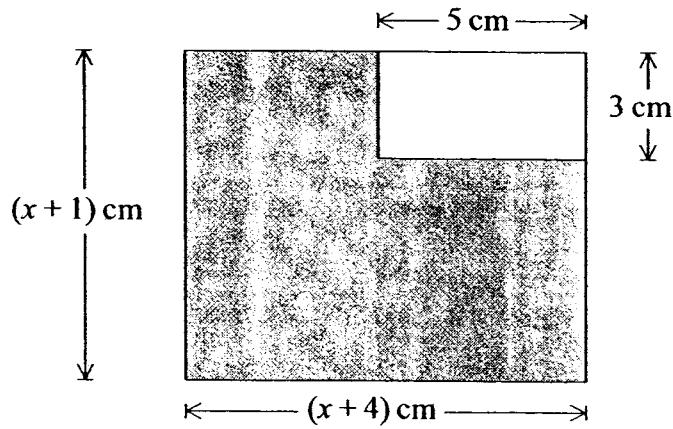


Diagram NOT accurately drawn

A rectangular piece of card has length $(x + 4)$ cm and width $(x + 1)$ cm.
 A rectangle 5 cm by 3 cm is cut from the corner of the piece of card.
 The remaining piece of card, shown shaded in the diagram, has an area of 35 cm^2 .

(a) Show that $x^2 + 5x - 46 = 0$

(3)

(b) Solve $x^2 + 5x - 46 = 0$ to find the value of x .
 Give your answer correct to 3 significant figures.

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

(Total 6 marks)

Q17



18.

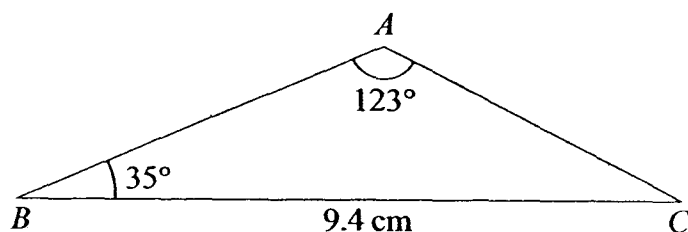


Diagram NOT accurately drawn

$BC = 9.4$ cm.
 Angle $BAC = 123^\circ$.
 Angle $ABC = 35^\circ$.

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

..... cm
 (3)

- (b) Calculate the area of triangle ABC .
 Give your answer correct to 3 significant figures.

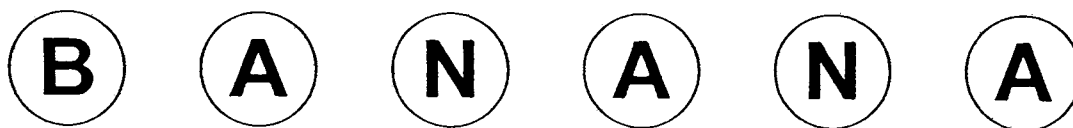
..... cm^2
 (3)

(Total 6 marks)

Q18



19. The diagram shows six counters.



Each counter has a letter on it.

Bishen puts the six counters into a bag.

He takes a counter at random from the bag.

He records the letter which is on the counter and replaces the counter in the bag.

He then takes a second counter at random and records the letter which is on the counter.

(a) Calculate the probability that the first letter will be A and the second letter will be N.

.....
(2)

(b) Calculate the probability that both letters will be the same.

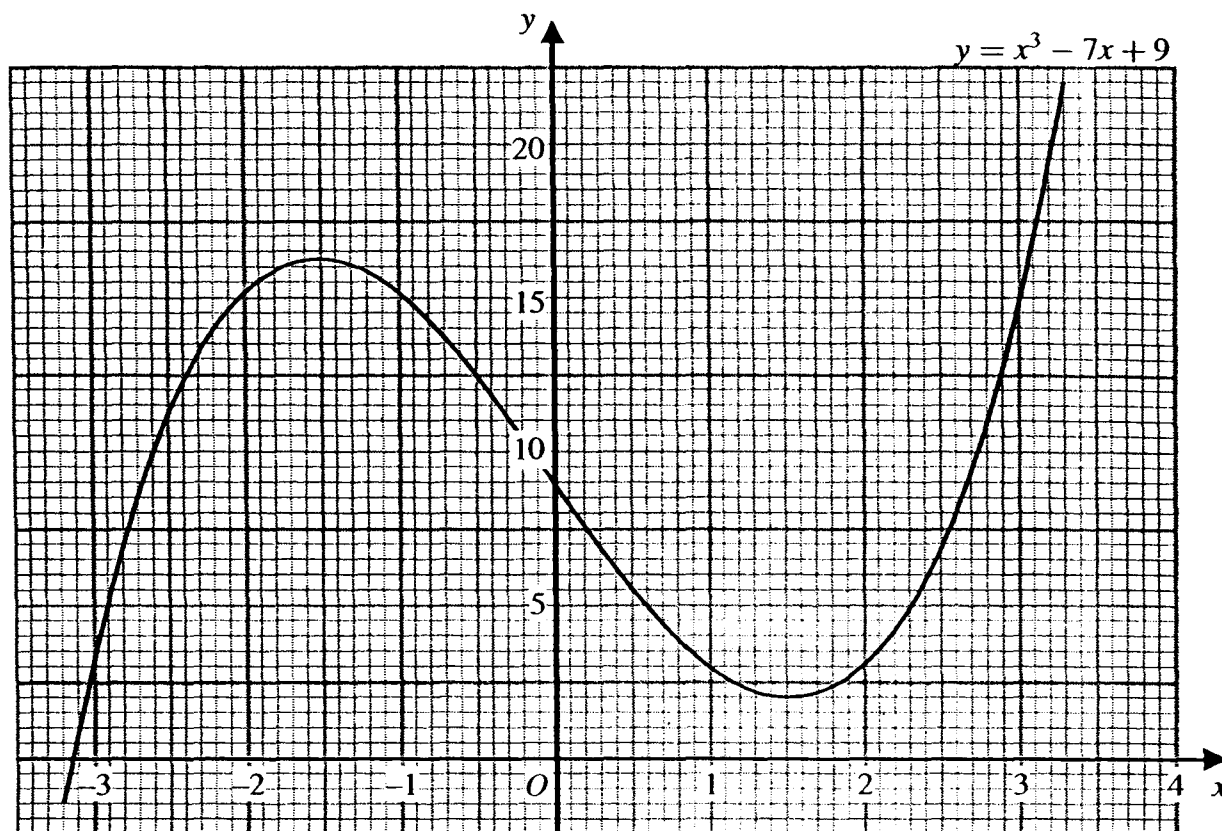
.....
(4)

(Total 6 marks)

Q19



20. Part of the graph of $y = x^3 - 7x + 9$ is shown on the grid.



The graph of $y = x^3 - 7x + 9$ and the line with equation $y = k$, where k is an integer, have 3 points of intersection.

(a) Find the greatest possible value of the integer k .

$k = \dots\dots\dots$
(1)



(b) By drawing a suitable straight line on the grid, find estimates of the solutions of the equation $x^3 - 6x - 2 = 0$.
Give your answers correct to 1 decimal place.

.....
(3)

Q20

(Total 4 marks)



21.

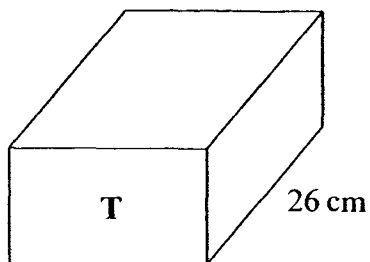
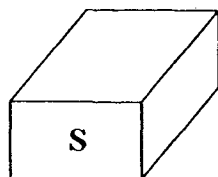


Diagram NOT accurately drawn

Two cuboids, S and T, are mathematically similar.
 The total surface area of cuboid S is 157 cm^2 and the total surface area of cuboid T is 2512 cm^2 .

- (a) The length of cuboid T is 26 cm.
 Calculate the length of cuboid S.

..... cm
 (3)

- (b) The volume of cuboid S is 130 cm^3 .
 Calculate the volume of cuboid T.

..... cm^3
 (2)

(Total 5 marks)

Q21



22. Simplify fully $\frac{2}{x-1} + \frac{x-11}{x^2+3x-4}$

Q22

.....
(Total 6 marks)**TOTAL FOR PAPER: 100 MARKS****END**

N 2 2 1 2 7 A 0 1 9 2 0