Centre No.						Surname	Initial(s)
Candidate No.						Signature	

Paper Reference(s)

4400/4H

Examiner's use only

Team Leader's use only

London Examinations IGCSE

Mathematics

Paper 4H

Higher Tier

Tuesday 9 May 2006 – Morning

Time: 2 hours

Page Numbers	Leave Blank
3	
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14	
15	
Total	

Materials required for examination
Ruler graduated in centimetres and millimetres, pen, HB pencil, eraser, calculator.
Tracing paper may be used.

Items included with question papers
Nil

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname, initial(s) and signature.
The paper reference is shown at the top of this page. Check that you have the correct question paper.
Answer **ALL** the questions in the spaces provided in this question paper.
Show all the steps in any calculations.

Information for Candidates

There are 16 pages in this question paper. All blank pages are indicated.
The total mark for this paper is 100. The marks for parts of questions are shown in round brackets: e.g. **(2)**.
You may use a calculator.

Advice to Candidates

Write your answers neatly and in good English.

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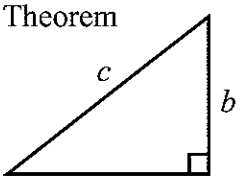
edexcel INTERNATIONAL

IGCSE MATHEMATICS 4400
FORMULA SHEET – HIGHER TIER

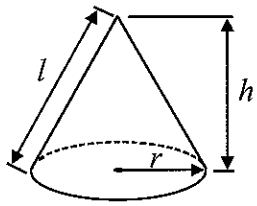
Pythagoras' Theorem



$a^2 + b^2 = c^2$

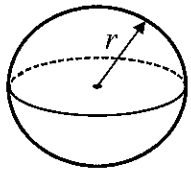
Volume of cone = $\frac{1}{3}\pi r^2 h$

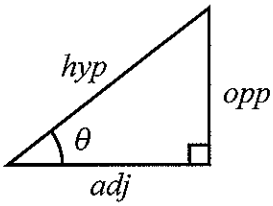
Curved surface area of cone = $\pi r l$



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

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





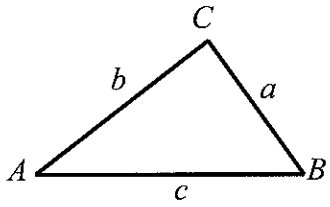
adj = hyp × cos θ
opp = hyp × sin θ
opp = adj × tan θ

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

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

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

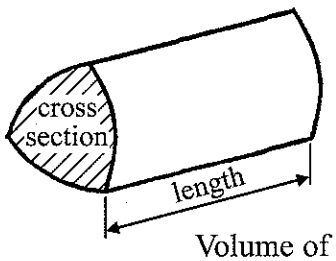
In any triangle ABC



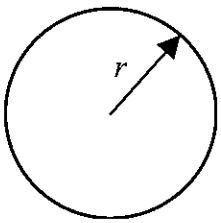
Sine rule $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

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

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



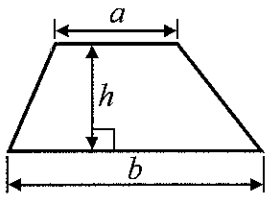
Volume of prism = area of cross section × length

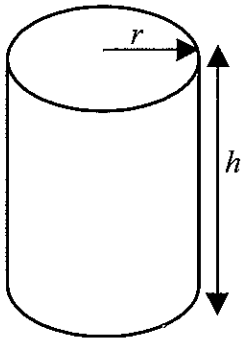


Circumference of circle = $2\pi r$

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 = $2\pi rh$

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

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

Leave blank

Answer ALL EIGHTEEN questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1. In the diagram, ABC and ADE are straight lines.
CE and BD are parallel.
$AB = AD$.
Angle $BAD = 38°$.

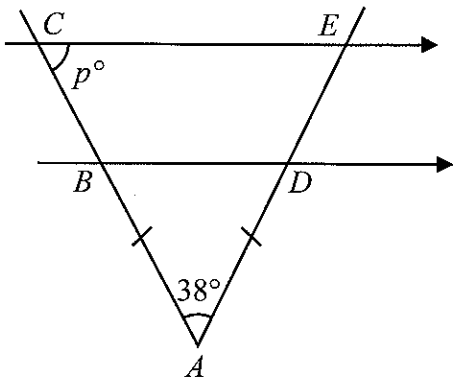


Diagram **NOT** accurately drawn

Work out the value of p.

Give a reason for each step in your working.

Q1

(Total 4 marks)

Leave blank

2. (a) Factorise $3x^2 - 2x$

.....

(1)

(b) Expand $y^3(y - 4)$

.....

(2)

(c) Here is a formula used in physics.

$$v = u + at$$

Find the value of t when $v = 30$, $u = 5$ and $a = 10$

$t =$ .....

(2)

Q2

(Total 5 marks)

3. Arul had x sweets.
Nikos had four times as many sweets as Arul.

(a) Write down an expression, in terms of x, for the number of sweets Nikos had.

.....

(1)

Nikos gave 6 of his sweets to Arul.
Now they both have the same number of sweets.

(b) Use this information to form an equation in x.

.....

(2)

(c) Solve your equation to find the number of sweets that Arul had at the start.

.....

(2)

Q3

(Total 5 marks)

Leave blank

4. (a) The diagram shows triangle PQR.
$PQ = 4$ cm.
$PR = 8$ cm.
Angle $PQR = 90°$.

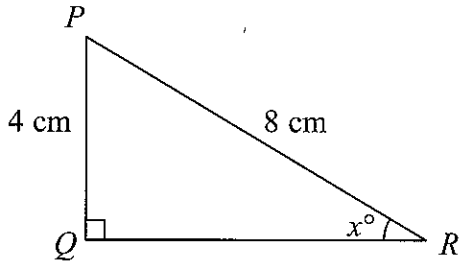


Diagram **NOT** accurately drawn

Calculate the value of x.

$x =$ .....

(3)

(b) The diagram shows triangle LMN.
$MN = 12$ cm.
Angle $LMN = 32°$.
Angle $MLN = 90°$.

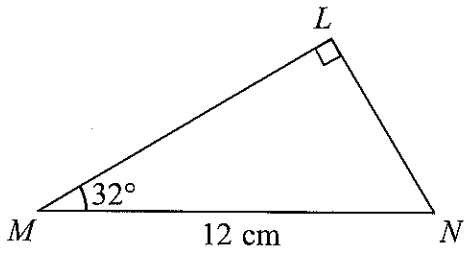


Diagram **NOT** accurately drawn

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

..... cm

(3)

Q4

(Total 6 marks)

Leave blank

5. (a) A = {Quadrilaterals with two pairs of parallel sides}
B = {Quadrilaterals with at least one right angle}

Write down the mathematical name for the quadrilaterals in

(i) A, ...

(ii) $A \cap B$. .....

(2)

(b) The universal set $\mathscr{E}$ = {Positive whole numbers}
P = {Multiples of 3 less than 11}
Q = {Multiples of 5 less than 11}

(i) What is $P \cap Q$?

.....

(ii) Is it true that $10 \in P \cup Q$?

.....

Explain your answer.

.....

.....

(2) **Q5**

(Total 4 marks)

6.

Symbols
+ − × ÷ ( )

Using only symbols from the box, make the following into true statements.

(a) 2 3 4 = 14

(1)

(b) 2 3 4 = 1.25

(1)

(c) 2 3 4 = $2\frac{2}{3}$

(1) **Q6**

(Total 3 marks)

Leave blank

7. (a) Four numbers have a mean of 6
Three of the numbers are 3, 7 and 10
Find the other number.

.....
(2)

(b) Three numbers have a mode of 5 and a mean of 6
Find the three numbers.

.....
(2)

(c) Find four numbers which have a mode of 7 and a median of 6

.....
(2)

Q7

(Total 6 marks)

8. (a) Solve $3(x + 4) = 27$

$x =$ .....
(3)

(b) Solve $y^2 - 2y - 120 = 0$

$y =$ .....
(3)

Q8

(Total 6 marks)

Leave blank

9. (a) A farmer arranges 90 m of fencing in the form of an isosceles triangle, with two sides of length 35 m and one side of length 20 m.

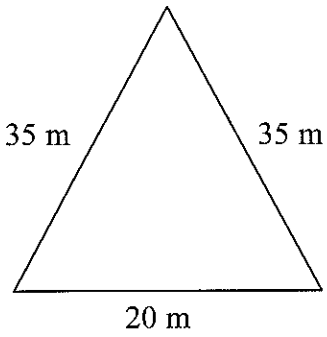


Diagram **NOT** accurately drawn

Calculate the area enclosed by the fencing.
Give your answer correct to 3 significant figures.

..... m^2

(4)

(b) Later, the farmer moves the fencing so that it forms a different triangle, *ABC*.

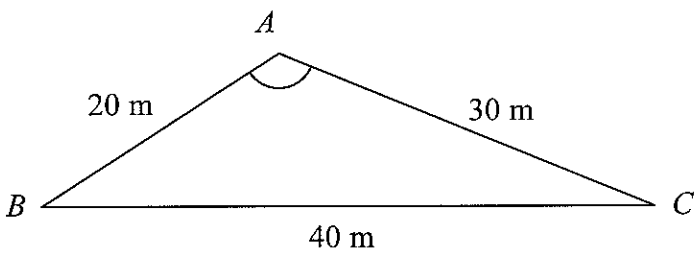


Diagram **NOT** accurately drawn

AB = 20 m *BC* = 40 m *CA* = 30 m

Calculate the size of angle *BAC*.
Give your answer correct to 1 decimal place.

°

.....

(3)

Q9

(Total 7 marks)

Leave blank

10. A mobile phone company makes a special offer.
Usually one minute of call time costs 5 cents.
For the special offer, this call time is increased by 20%.

(a) Calculate the call time which costs 5 cents during the special offer.
Give your answer in seconds.

..... seconds
(2)

(b) Calculate the cost per minute for the special offer.

..... cents
(2)

(c) Calculate the percentage decrease in the cost per minute for the special offer.

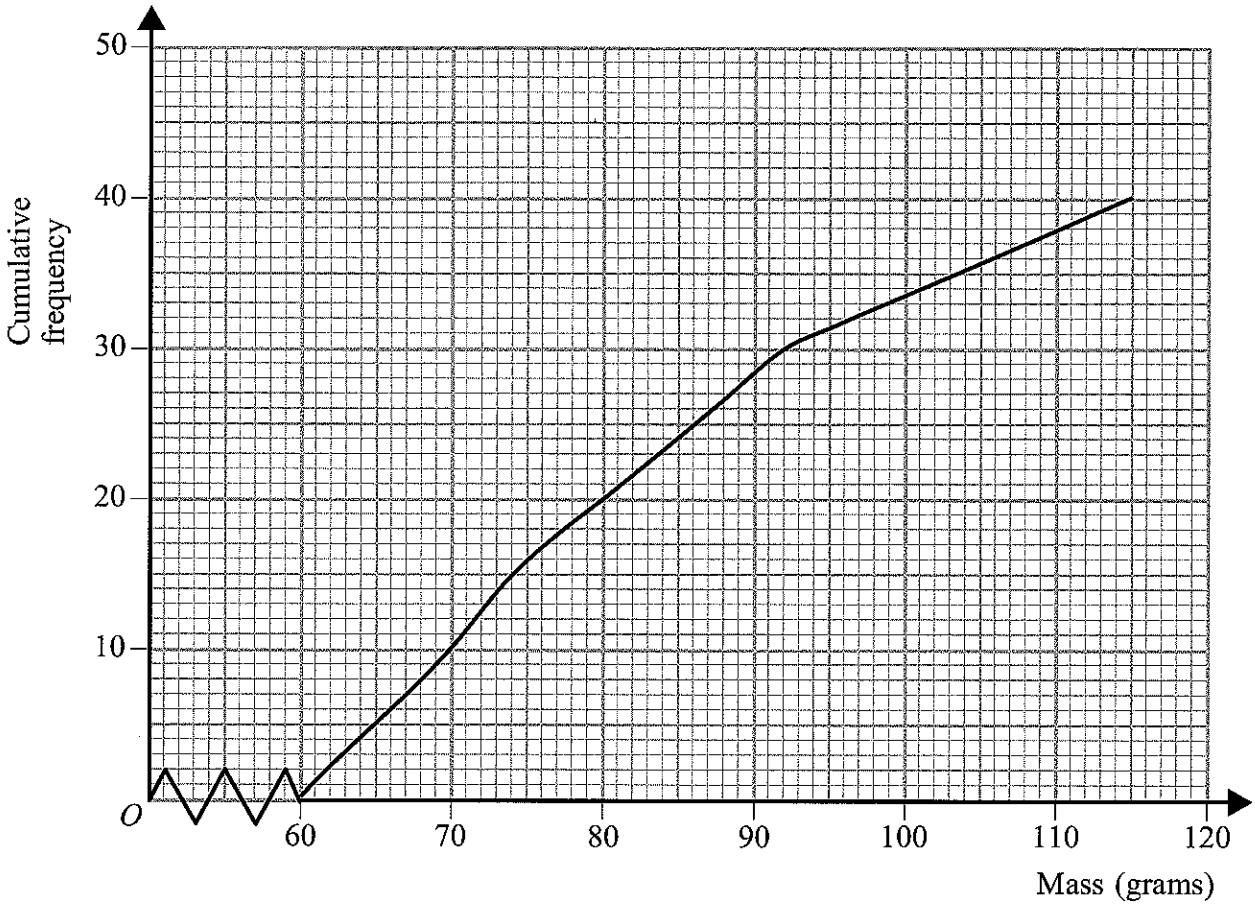
.....%
(3)

Q10

(Total 7 marks)

Leave blank

11. A sample of 40 stones was collected.
The cumulative frequency graph gives information about their masses.



(a) Find an estimate of the median mass.

..... g
(1)

(b) Find an estimate of the interquartile range of the masses.

..... g
(2)

(c) How many stones had masses between the lower quartile and the upper quartile?

.....
(1)

(d) Find an estimate of the number of stones which had masses of more than 100 grams.

.....
(2) **Q11**

(Total 6 marks)

Leave blank

12. (a) Factorise completely $10x^2 - 2x$

.....

(2)

(b) Factorise $x^2 - 9$

.....

(1)

(c) Factorise $3x^2 - 13x + 4$

.....

(2) **Q12**

(Total 5 marks)

13. (a) Express $8^{\frac{1}{2}}$ as a power of 2

.....

(2)

(b) Express $\sqrt{3}$ as a power of 9

.....

(2)

(c) Express $\frac{1}{4\sqrt{2}}$ as a power of 2

.....

(3) **Q13**

(Total 7 marks)

Leave blank

14. $OABC$ is a parallelogram.

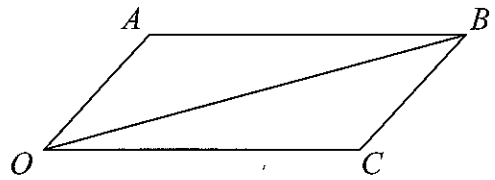


Diagram **NOT** accurately drawn

$\overrightarrow{OA} = \begin{pmatrix} 1 \\ 2 \end{pmatrix}$, $\overrightarrow{OC} = \begin{pmatrix} 4 \\ 0 \end{pmatrix}$.

(a) Find the vector $\overrightarrow{OB}$ as a column vector.

$\begin{pmatrix} \quad \\ \quad \end{pmatrix}$

.....

(1)

X is the point on OB such that $OX = kOB$, where $0 < k < 1$

(b) Find, in terms of k, the vectors

(i) $\overrightarrow{OX}$,

.....

(ii) $\overrightarrow{AX}$,

.....

(iii) $\overrightarrow{XC}$.

.....

(3)

(c) Find the value of k for which $\overrightarrow{AX} = \overrightarrow{XC}$.

.....

(2)

(d) Use your answer to part (c) to show that the diagonals of the parallelogram $OABC$ bisect one another.

.....

.....

.....

(2)

Q14

(Total 8 marks)

Leave blank

15. A ball is dropped from a tower.
After t seconds, the ball has fallen a distance x metres.

x is directly proportional to t^2.

When $t = 2$, $x = 19.6$

(a) Find an equation connecting x and t.

.....

(3)

(b) Find the value of x when $t = 3$

$x =$ .....

(2)

(c) Find how long the ball takes to fall 10 m.

..... seconds

(3)

Q15

(Total 8 marks)

Leave blank

16. The sides of a fair six-sided dice are numbered from 1 to 6
The dice is thrown three times.
Find the probability that it shows a 1 at least twice.

.....

Q16

(Total 4 marks)

17. Solve the equations

$$y = 2x + 1$$
$$x^2 + y^2 = 13$$

.....

Q17

(Total 6 marks)

Leave blank

18. A particle moves along a line.
For $t \geqslant 1$, the distance of the particle from O at time t seconds is x metres, where

$$x = \frac{20}{t}$$

Find an expression for the acceleration of the particle.

..... m/s^2 **Q18**

(Total 3 marks)

TOTAL FOR PAPER: 100 MARKS

END