Paper Reference(s)

4400/3H

London Examinations IGCSE

Mathematics

Paper 3H

Higher Tier

Tuesday 2 November 2004 – Morning

Time: 2 hours

Materials required for examination
Ruler graduated in centimetres and
millimetres, protractor, compasses,
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 and 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 20 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.
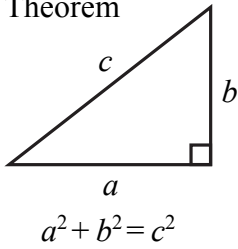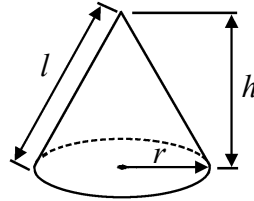
Turn over

edexcel
INTERNATIONAL

IGCSE MATHEMATICS 4400
FORMULA SHEET – HIGHER TIER
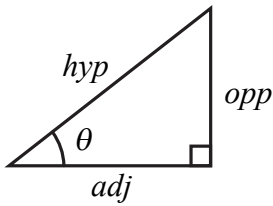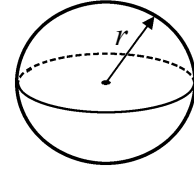
Pythagoras' Theorem

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

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

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

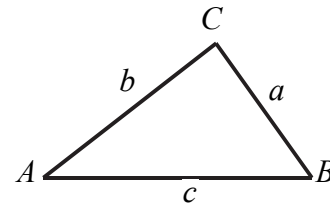Volume of sphere = $\frac{4}{3}\pi r^3$

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

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

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

$\cos\theta = \dfrac{\text{adj}}{\text{hyp}}$
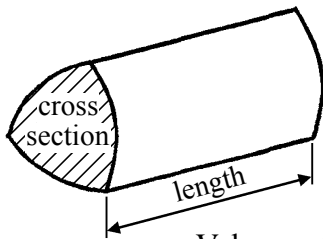
$\tan\theta = \dfrac{\text{opp}}{\text{adj}}$
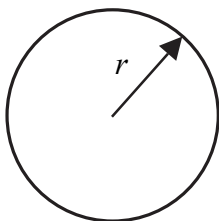
In any triangle ABC

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

Cosine rule: $a^2 = b^2 + c^2 - 2bc \cos A$
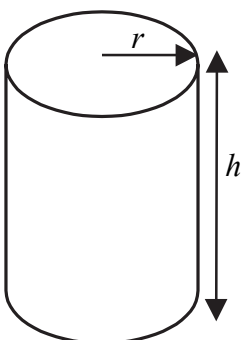
Area of triangle = $\frac{1}{2} ab \sin C$
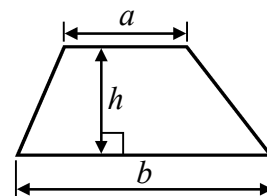

Volume of prism = area of cross section × length

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

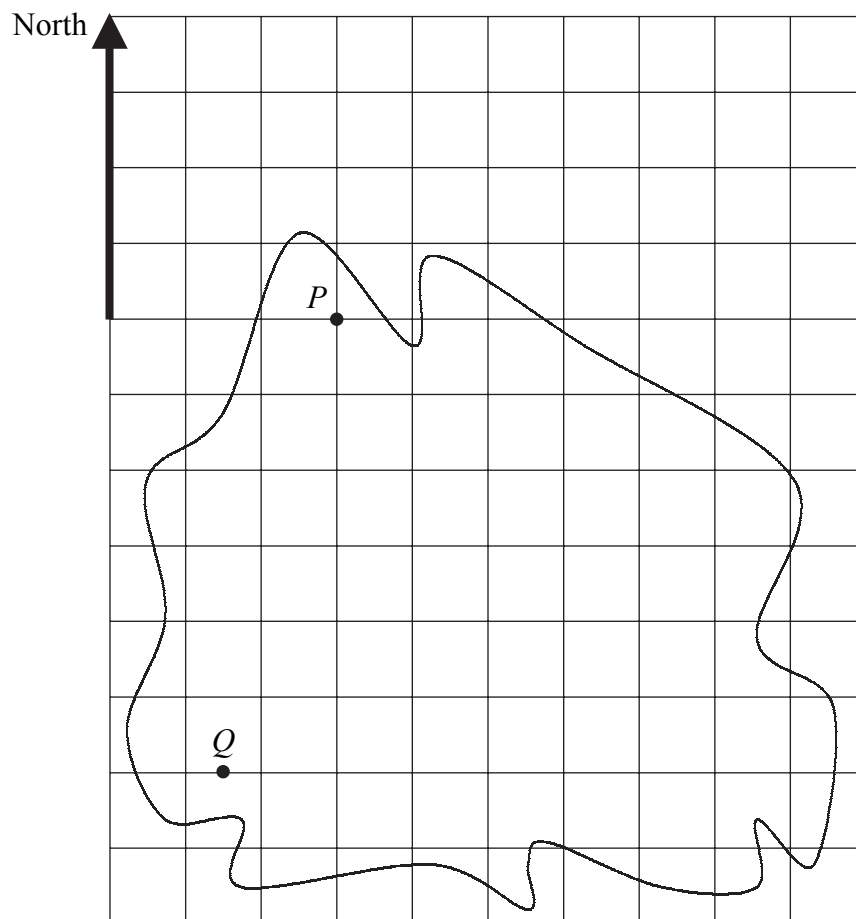$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

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TURN OVER FOR QUESTION 1

Answer ALL TWENTY questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

1. The diagram shows a map of an island.
   Two towns, *P* and *Q*, are shown on the map.

   North

   (a) Find the bearing of *Q* from *P*.

   .... °

   (2)

The scale of the map is 1 cm to 5 km.

(b) Find the real distance between *P* and *Q*.

.... km

(2)

Another town, *R*, is due East of *Q*.
The bearing of *R* from *P* is 135°.

(c) On the map, mark and label *R*.

(2)

Q1

(Total 6 marks)

2. The table shows the first three terms of a sequence.

Term number	1	2	3		
Term	2	5	10		

The rule for this sequence is

$$\text{Term} = (\text{Term number})^2 + 1$$

(a) Work out the next two terms of this sequence.

.............., ...

(2)

(b) One term of this sequence is 101.
Find the term number of this term.

....

(2) Q2

(Total 4 marks)

3. (a) Nikos drinks $\frac{2}{3}$ of a litre of orange juice each day.
How many litres does Nikos drink in 5 days?
Give your answer as a mixed number.

....

(2)

(b) (i) Find the lowest common multiple of 4 and 6.

....

(ii) Work out $3\frac{3}{4} + 2\frac{5}{6}$.
Give your answer as a mixed number.
You must show all your working.

....

(3) Q3

(Total 5 marks)

4. Toni buys a car for £2500 and sells it for £2775.
Calculate her percentage profit.

.... %

(Total 3 marks)

5. A straight road rises 60 m in a horizontal distance of 260 m.

60 m   Diagram **NOT**
accurately drawn

260 m
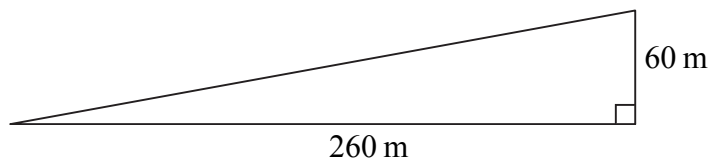
(a) Work out the gradient of the road.
Give your answer as a fraction in its lowest terms.

....

(2)

(b) Calculate how far the road rises in a horizontal distance of 195 m.

.... m

(2)

(Total 4 marks)

6.
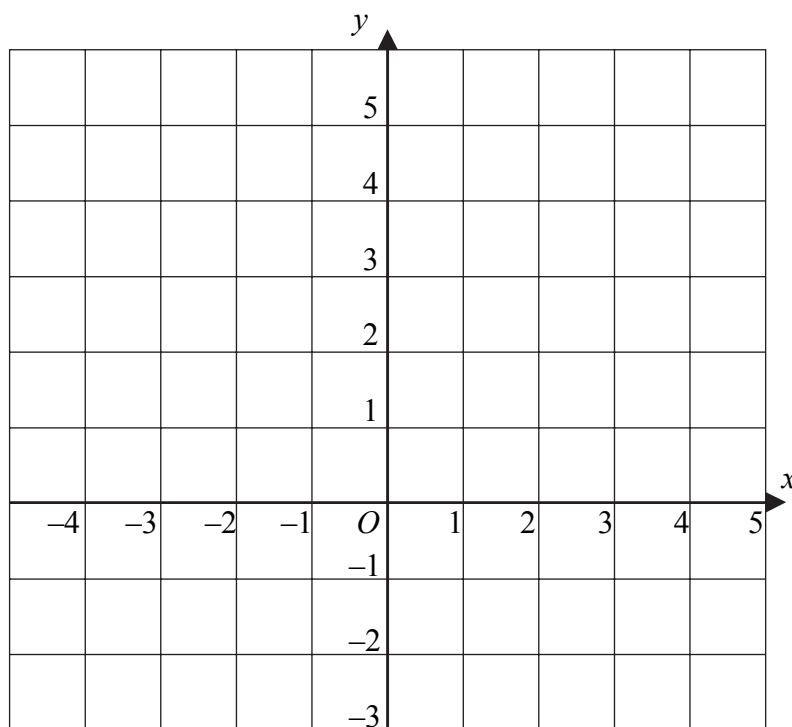
(a) On the grid, draw the line $x + y = 4$.

(1)

(b) On the grid, show clearly the region defined by the inequalities

$x + y \geq 4$

$x \leq 3$

$y < 4$

(4)   **Q6**

(Total 5 marks)

7. The diagram shows a circle, centre *O*.
   PTQ is the tangent to the circle at *T*.
   PO = 6 cm.
   Angle *OPT* = 40°.
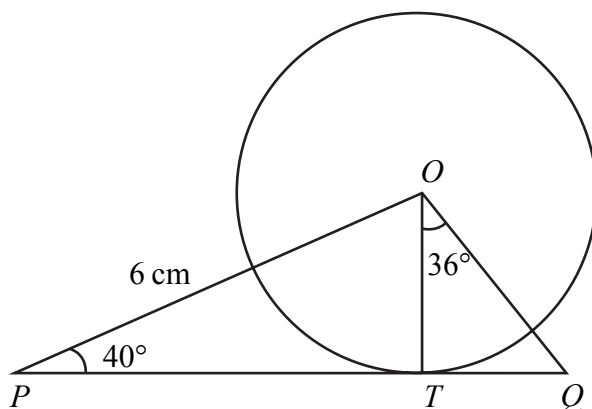
Diagram **NOT** accurately drawn

(a) Explain why angle *OTP* = 90°.

   ....

   ....

   (1)

(b) Calculate the length of *OT*.
   Give your answer correct to 3 significant figures.

   .... cm

   (3)

(c) Angle *QOT* = 36°.
   Calculate the length of *OQ*.
   Give your answer correct to 3 significant figures.

   .... cm

   (3)

(Total 7 marks)

Q7

8. The table shows information about the ages of 24 students.

Age (years)	Number of students
16	9
17	3
18	8
19	4

(a) (i) Write down the mode of these ages.

.... years

(ii) Find the median of these ages.

.... years

(iii) Calculate the mean of these ages.

.... years

(6)

Another student, aged 18, joins the group.

(b) (i) Without calculating the new mean, state whether the mean will increase or decrease or stay the same.

....

(ii) Give a reason for your answer to (i).

....

....

....
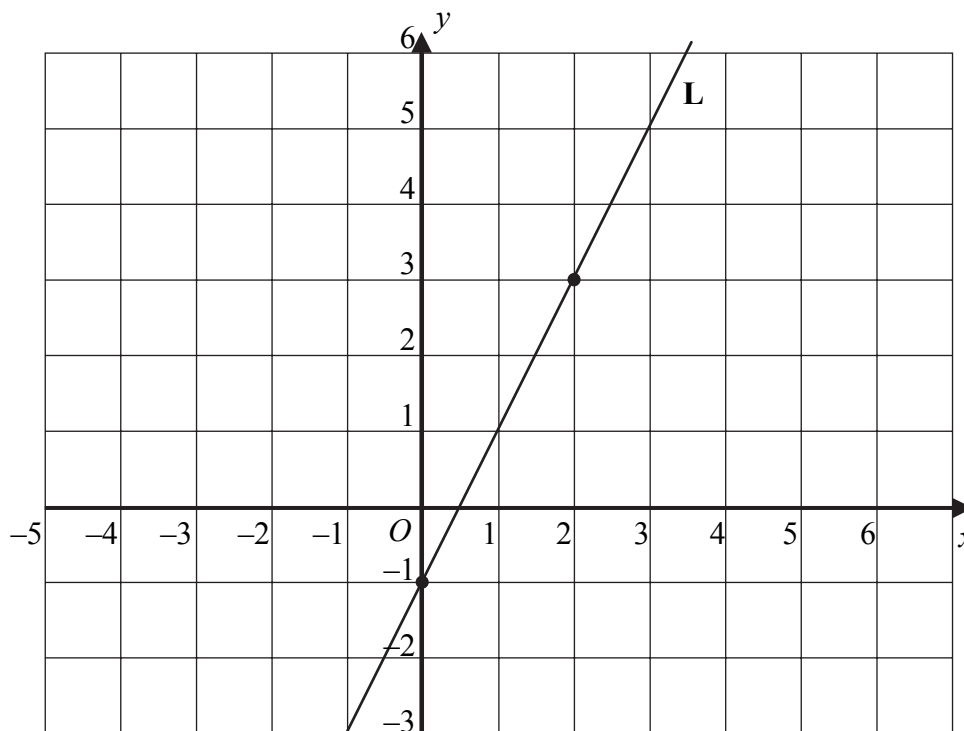
(2)

(Total 8 marks)

Q8

9. The straight line, **L**, passes through the points (0, −1) and (2, 3).

(a) Work out the gradient of **L**.

....

(2)

(b) Write down the equation of **L**.

....

(2)

(c) Write down the equation of another line that is parallel to **L**.

....

(1) Q9

(Total 5 marks)

10. The table shows the mean distances of the planets from the Sun.

Planet	Mean distance from the Sun (km)
Mercury	5.8×10^7
Venus	1.1×10^8
Earth	1.5×10^8
Mars	2.3×10^8
Jupiter	7.8×10^8
Saturn	1.4×10^9
Uranus	2.9×10^9
Neptune	4.5×10^9
Pluto	5.9×10^9

(a) Which planet is approximately 4 times as far from the Sun as Mercury?

....

(1)

(b) Find the ratio of the mean distance of Earth from the Sun to the mean distance of Neptune from the Sun. Give your answer in the form $1:n$
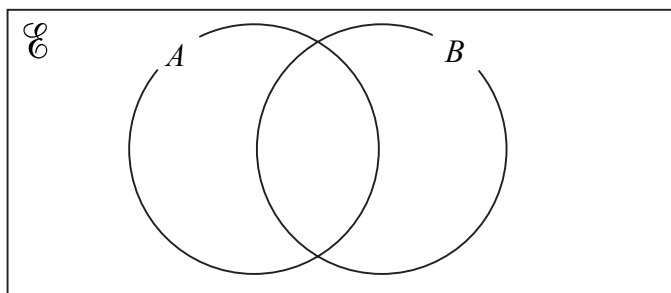
....

(2)

Q10

(Total 3 marks)

11. The universal set, $\mathscr{E}$ = {Whole numbers}

A = {Multiples of 5}

B = {Multiples of 3}

Sets A and B are represented by the circles in the Venn diagram.

(a) (i)   On the diagram, shade the region that represents the set $A \cap B'$.

    (ii) Write down **three** members of the set $A \cap B'$.

................, ..., ...

(2)

C = {Multiples of 10}.

(b) (i)   On the diagram draw a circle to represent the set C.

    (ii) Write down **three** members of the set $A \cap B \cap C'$

................, ..., ...

(2)

(Total 4 marks)

12. *A*, *B*, *C* and *D* are points on a circle.
   Angle *BAC* = 40°.
   Angle *DBC* = 55°.
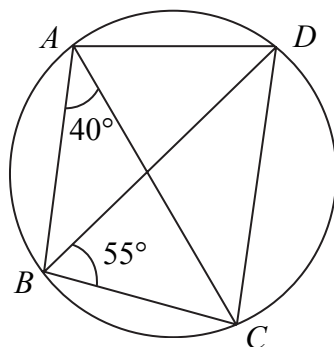
Diagram **NOT**
accurately drawn

(a) (i) Find the size of angle *DAC*.

.... °

(ii) Give a reason for your answer.

....

....

(2)

(b) (i) Calculate the size of angle *DCB*.

.... °

(ii) Give reasons for your answer.

....

....

....

....

(3)

(c) Is *BD* a diameter of the circle? ....

Give a reason for your answer.

....

(1)
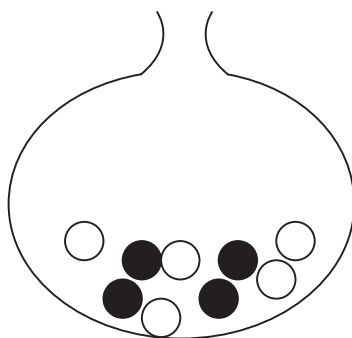
Q12

(Total 6 marks)
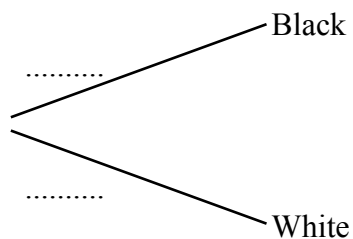
13. A bag contains 4 black discs and 5 white discs.

Ranjit takes a disc at random from the bag and notes its colour.
He then replaces the disc in the bag.
Ranjit takes another disc at random from the bag and notes its colour.

(a) Complete the probability tree diagram to show all the possibilities.

<u>First disc</u>   <u>Second disc</u>

.... Black

.... White

(4)

(b) Calculate the probability that Ranjit takes two discs of different colours.

....

(3)

(Total 7 marks)

14. Oil is stored in either small drums or large drums.
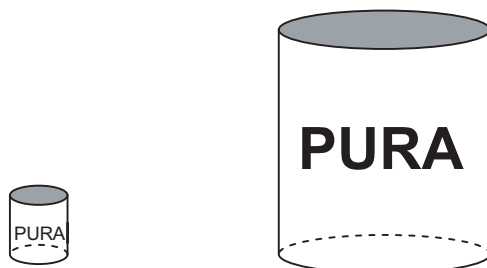The shapes of the drums are mathematically similar.

Diagram **NOT** accurately drawn

PURA

PURA

A **small** drum has a volume of 0.006 m³ and a surface area of 0.2 m².

The height of a **large** drum is 3 times the height of a small drum.

(a) Calculate the volume of a large drum.

.... m³

(2)

(b) The cost of making a drum is $1.20 for each m² of surface area.
A company wants to store 3240 m³ of oil in large drums.
Calculate the cost of making enough large drums to store this oil.

$ ....

(4)

Q14

(Total 6 marks)

15. Solve the equation $3x^2 + 2x - 6 = 0$
Give your answers correct to 3 significant figures.

....

(Total 3 marks)

16. (a) Factorise the expression $2x^2 + 5x - 3$

....
(2)

(b) Simplify fully $\dfrac{x^2 - 9}{x^2 - 9x + 18}$

....
(3)

(Total 5 marks)

17. A curve has equation $y = x^2 - 4x + 1$.

(a) For this curve find

(i) $\dfrac{\mathrm{d}y}{\mathrm{d}x}$,

....

(ii) the coordinates of the turning point.

....
(4)

(b) State, with a reason, whether the turning point is a maximum or a minimum.

....

....
(2)

(c) Find the equation of the line of symmetry of the curve $y = x^2 - 4x + 1$
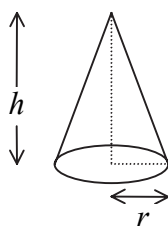
....
(2)

(Total 8 marks)

Q17

18. A cone has base radius r cm and vertical height h cm.

The volume of the cone is 12π cm^3.
Find an expression for r in terms of h.

$r =$ ....

(Total 3 marks)

Q18

19. Express $\sqrt{98}$ in the form $a\sqrt{b}$ where a and b are integers and $a > 1$.

....

(Total 2 marks)

Q19

20. A box contains 7 good apples and 3 bad apples.

Nick takes two apples at random from the box, **without** replacement.

(a) (i) Calculate the probability that both of Nick's apples are bad.

....

(ii) Calculate the probability that at least one of Nick's apples is good.

....
(4)

Another box contains 8 good oranges and 4 bad oranges.

Crystal keeps taking oranges at random from the box one at a time, **without** replacement, until she gets a good orange.

(b) Calculate the probability that she takes exactly three oranges.

....
(2)

(Total 6 marks)

TOTAL FOR PAPER: 100 MARKS

END