

Centre No.						Paper Reference						Surname	Initial(s)	
Candidate No.						4	4	0	0	/	4	H	Signature	

Paper Reference(s)

**4400/4H**

**London Examinations IGCSE**

**Mathematics**

Paper 4H

**Higher Tier**

Wednesday 12 November 2008 – Morning

Time: 2 hours

Examiner's use only

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Team Leader's use only

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**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, candidate number, your surname, initials and signature. Check that you have the correct question paper.

Answer ALL the questions. Write your answers in the spaces provided in this question paper.

Without sufficient working, correct answers may be awarded no marks.

**You must NOT write on the formulae page. Anything you write on the formulae page will gain NO credit.**

If you need more space to complete your answer to any question, use additional answer sheets.

**Information for Candidates**

The marks for individual questions and the parts of questions are shown in round brackets: e.g. (2).

There are 22 questions in this question paper. The total mark for this paper is 100.

There are 24 pages in this question paper. Any blank pages are indicated.

You may use a calculator.

**Advice to Candidates**

Write your answers neatly and in good English.

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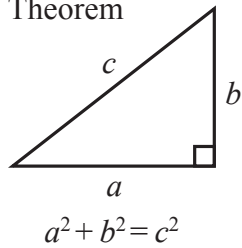


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**IGCSE MATHEMATICS 4400  
FORMULA SHEET – HIGHER TIER**

Pythagoras' Theorem

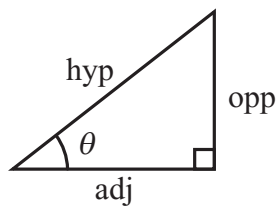
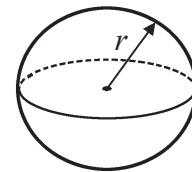
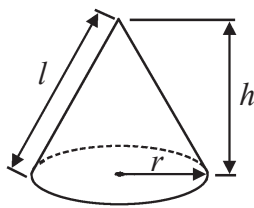


Volume of cone =  $\frac{1}{3} \pi r^2 h$

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

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

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



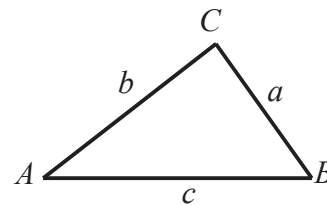
adj = hyp  $\times$  cos  $\theta$   
opp = hyp  $\times$  sin  $\theta$   
opp = adj  $\times$  tan  $\theta$

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

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

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

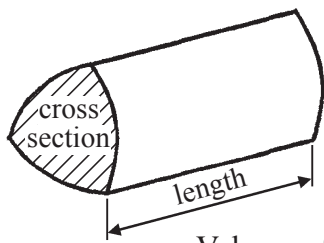
In any triangle ABC



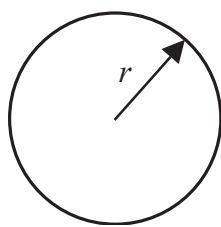
Sine rule:  $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

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

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



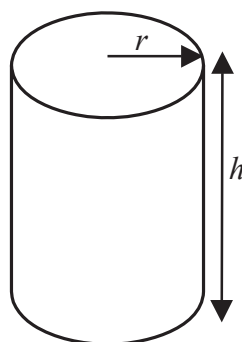
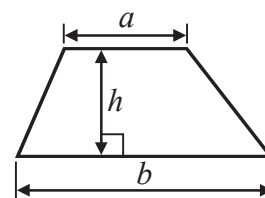
Volume of prism = area of cross section  $\times$  length



Circumference of circle =  $2\pi r$

Area of circle =  $\pi r^2$

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

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



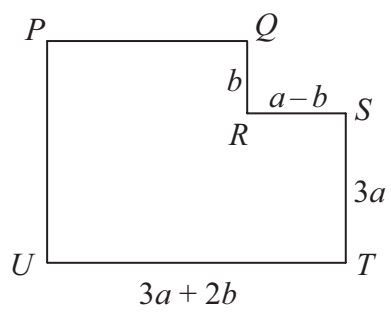
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Answer ALL TWENTY TWO questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1. The diagram shows a shape,  $PQRSTU$ .  
All the corners are right angles.  
The lengths of four of the sides are given in terms of  $a$  and  $b$ .



Find an expression, in terms of  $a$  and  $b$ , for

- (i)  $PU$ ,

.....

- (ii)  $PQ$ .

.....

(Total 3 marks)

Q1



N 3 1 4 9 5 A 0 3 2 4

2. (a) Philip and Nikos share some money in the ratio 3:4  
Nikos receives £24  
Work out how much Philip receives.

£ .....  
(2)

(b) James and Suki share £40 in the ratio 3:5  
Work out how much Suki receives.

£ .....  
(2)

(Total 4 marks)

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Q2



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3. The diagram shows a wall.

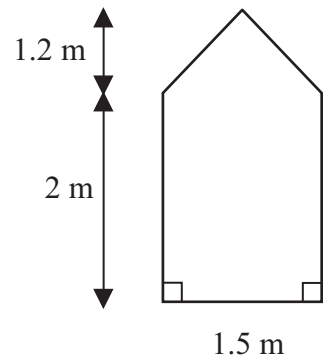


Diagram **NOT**  
accurately drawn

(a) Calculate the area of the wall.

..... m<sup>2</sup>  
(3)

(b) 1 litre of paint covers an area of 20 m<sup>2</sup>.  
Work out the volume of paint needed to cover the wall.  
Give your answer in millilitres.

..... ml  
(3)

(Total 6 marks)

Q3



<p>4. A train travels 165 km. Its average speed for the journey is 60 km/h. Work out the time that this journey takes. Give your answer in hours and minutes.</p> <p style="text-align: right;">..... hours ..... minutes</p> <p style="text-align: right;"><b>(Total 3 marks)</b></p>	<p>Leave blank</p> <p style="text-align: center;"><b>Q4</b></p> <input style="width: 20px; height: 20px;" type="text"/>
<p>5. When Peter goes to work, he can be early or on time or late. The probability that he will be early is 0.2 The probability that he will be late is 0.1</p> <p>(a) Work out the probability that he will be on time.</p> <p style="text-align: right;">.....</p> <p style="text-align: right;"><b>(2)</b></p> <p>(b) Peter will go to work 20 times next month. Work out an estimate for the number of times he will be <b>early</b> next month.</p> <p style="text-align: right;">.....</p> <p style="text-align: right;"><b>(2)</b></p> <p style="text-align: right;"><b>(Total 4 marks)</b></p>	<p style="text-align: center;"><b>Q5</b></p> <input style="width: 20px; height: 20px;" type="text"/>



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6. (a) Multiply out  $5(x - 2)$

.....  
(2)

(b) Solve the equation  $\frac{x}{4} + 3 = 10$

You must show sufficient working.

$x =$  .....  
(2)

(c) Solve the inequality  $5x - 6 > 2$   
You must show sufficient working.

.....  
(2)

Q6

(Total 6 marks)

7

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7.

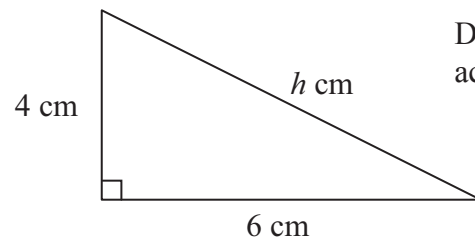


Diagram **NOT** accurately drawn

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

$h = \dots\dots\dots$

**Q7**

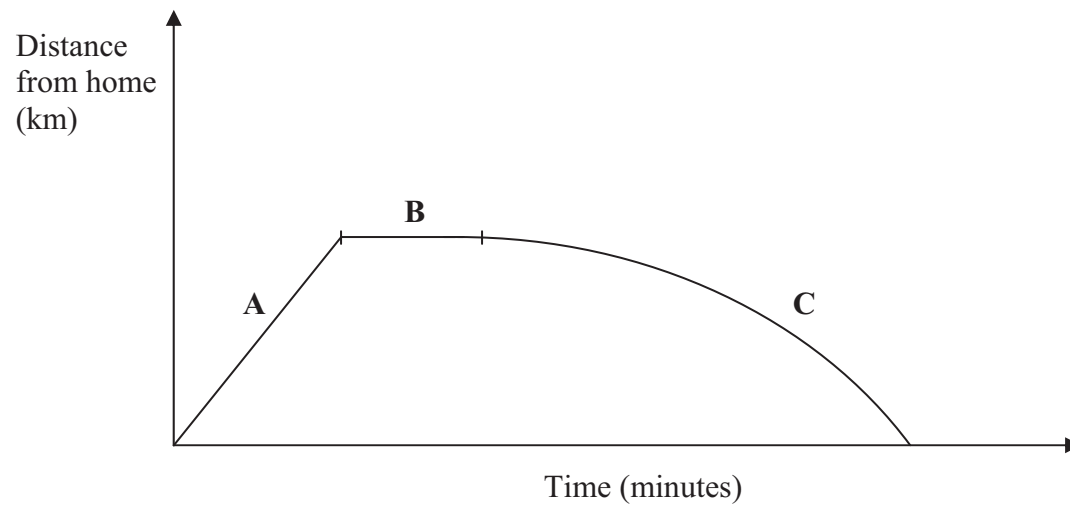
**(Total 3 marks)**





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8. John goes on a trip.  
Here is the travel graph for his trip.



The travel graph has three parts, **A**, **B** and **C**.

Here are four statements.

John is not moving.  
John is travelling at a steady speed.  
John's speed is increasing.  
John's speed is decreasing.

Choose the statement from the box that best describes

(i) part **A**, .....

(ii) part **B**, .....

(iii) part **C**, .....

(Total 3 marks)

Q8



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blank

9.  $\mathcal{E} = \{\text{Positive integers less than 11}\}$   
 $A = \{\text{Multiples of 3}\}$   
 $B = \{\text{Multiples of 2}\}$

(a) List the members of

(i)  $A$ ,

.....

(ii)  $A \cup B$ .

.....

(3)

- (b)  $\mathcal{E} = \{\text{Students in class 12Y}\}$   
 $P = \{\text{Students who study Mathematics}\}$   
 $Q = \{\text{Students who study History}\}$

(i) Describe the members of  $P \cap Q$ .

.....

(ii)  $R$  is also a set of students in class 12Y.

$$P \cap R = \emptyset$$

Use this information to write a statement about the students in set  $R$ .

.....

(3)

Q9

(Total 6 marks)



10. Express 132 as the product of its prime factors.

Leave  
blank

.....  
Q10

(Total 3 marks)

11

Turn over





Leave  
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12. (a)  $a$ ,  $b$  and  $c$  are positive numbers such that  $1 \leq ab < 10$  and  $1 \leq c < 10$

$$(a \times 10^4) \times (b \times 10^7) = c \times 10^m$$

(i) Write down the value of  $m$ .

$$m = \dots\dots\dots$$

(ii) Find an expression for  $c$  in terms of  $a$  and  $b$ .

$$c = \dots\dots\dots$$

**(2)**

(b)  $N = (3.2 \times 10^p) \times (4.5 \times 10^q)$ , where  $p$  and  $q$  are integers.  
Express  $N$  in terms of  $p$  and  $q$ .  
Give your answer in standard form.

$$N = \dots\dots\dots$$

**(2)**

**(Total 4 marks)**

**Q12**



Leave  
blank

13. (a) Solve  $x^2 + 2x - 1 = 0$   
Give your solutions correct to 3 significant figures.  
You must show sufficient working.

.....  
(3)

- (b) Solve  $\frac{2}{y+4} = 3$   
You must show sufficient working.

$y =$  .....  
(2)

(Total 5 marks)

Q13



14. (a)

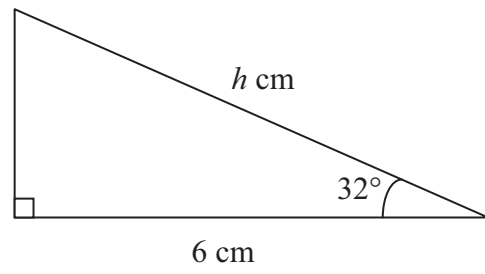


Diagram **NOT** accurately drawn

Calculate the value of  $h$ .  
Give your answer correct to 3 significant figures.

$h = \dots\dots\dots$  (3)

(b)

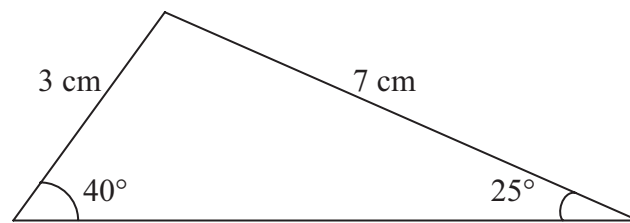


Diagram **NOT** accurately drawn

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

$\dots\dots\dots \text{ cm}^2$   
(3)

Q14

(Total 6 marks)



15. Solve the simultaneous equations

$$\begin{aligned}5x + 4y &= 3 \\ x - 2y &= 2\end{aligned}$$

You must show sufficient working.

$x = \dots\dots\dots$

$y = \dots\dots\dots$

(Total 3 marks)

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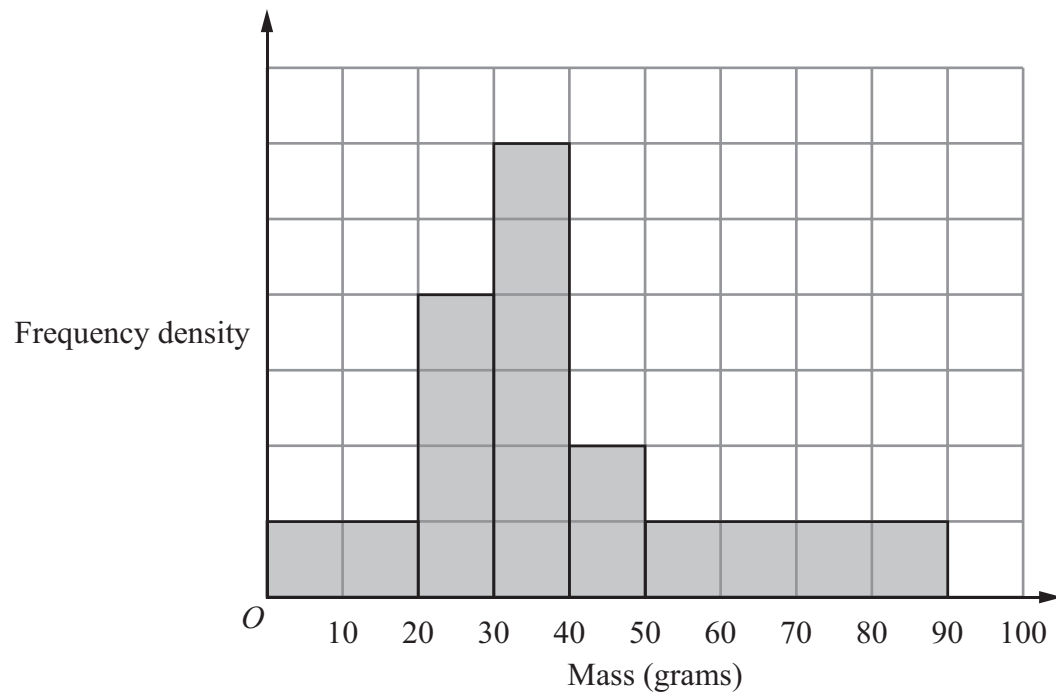
Q15





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16. The histogram shows information about the masses, in grams, of some stones.



There are 120 stones with masses less than 30 g.  
Calculate an estimate of the number of stones with masses between 35 g and 70 g.

.....

Q16

(Total 3 marks)

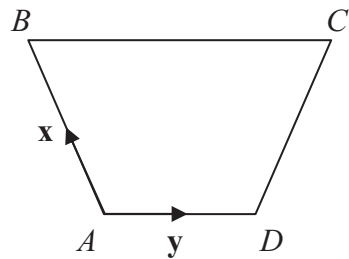


<p>17. (a) Factorise <math>2x^2 + 5x + 3</math></p> <p>..... (2)</p> <p>(b) Factorise <math>4y^2 - 9</math></p> <p>..... (2)</p> <p style="text-align: right;"><b>(Total 4 marks)</b></p>	<p>Leave blank</p> <p><b>Q17</b></p> <input type="text"/>
<p>18. (a) Find the value of <math>(9^{\frac{1}{2}})^4</math></p> <p>..... (1)</p> <p>(b) Express <math>5^{20}</math> as a power of 25</p> <p>..... (2)</p> <p>(c) Express <math>\sqrt{8}</math> as a power of 2</p> <p>..... (2)</p> <p style="text-align: right;"><b>(Total 5 marks)</b></p>	<p><b>Q18</b></p> <input type="text"/>



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19. The diagram shows a trapezium  $ABCD$ .



$$\vec{BC} = 2\vec{AD}.$$
$$\vec{AB} = \mathbf{x}, \quad \vec{AD} = \mathbf{y}.$$

(a) Find, in terms of  $\mathbf{x}$  and  $\mathbf{y}$ ,

(i)  $\vec{AC}$

.....

(ii)  $\vec{DC}$

.....

(2)

(b) The point  $E$  is such that  $\vec{AE} = \mathbf{x} + \mathbf{y}$ .  
Use your answer to part (a)(ii) to explain why  $AECD$  is a parallelogram.

.....

.....

(2)

Q19

(Total 4 marks)



Leave  
blank

20. (a) Differentiate with respect to  $x$

(i)  $3x^2 - x$

.....

(ii)  $\frac{1}{x}$

.....

(4)

(b) Find the coordinates of the points on the curve  $y = x^3$  where the gradient is 12

(....., .....) )

(....., .....) )

(3)

Q20

(Total 7 marks)



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blank

21. The function  $f$  is defined as

$$f(x) = \frac{1}{x+3}$$

(a) Find the value of  $f(2)$

.....  
(1)

(b) State which value(s) of  $x$  must be excluded from the domain of  $f$ .

.....  
(1)

(c) Given that  $f(a) = \frac{1}{10}$ , find the value of  $a$ .

$a =$  .....  
(1)

(d) The function  $g$  is defined as

$$g(x) = x + 2$$

Express the function  $gf$  in the form  $gf(x) = \dots$   
Give your answer as a single algebraic fraction in its simplest form.

$gf(x) =$  .....  
(2)

(Total 5 marks)

Q21

21

Turn over



22.

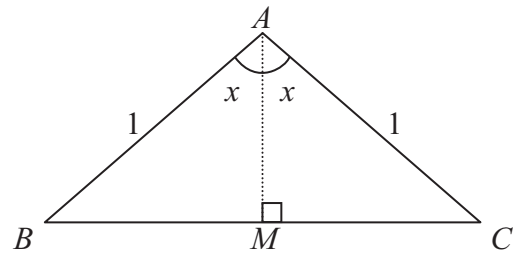


Diagram **NOT** accurately drawn

$ABC$  is an isosceles triangle.  
 $AB = AC = 1$   
 $M$  is the midpoint of  $BC$ .

(a) (i) Use trigonometry to find an expression, in terms of  $x$ , for  $BM$ .

.....

(ii) Hence write down an expression, in terms of  $x$ , for  $BC$ .

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

(b) Use the cosine rule to find an expression, in terms of  $\cos(2x)$ , for  $BC^2$ .

.....  
**(1)**

(c) Hence show that  $\cos(2x) = 1 - 2(\sin x)^2$

**(2)**

**Q22**

**(Total 5 marks)**

**TOTAL FOR PAPER: 100 MARKS**

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