

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

Paper Reference(s)

**4400/3H**

Examiner's use only

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**London Examinations IGCSE**

Team Leader's use only

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**Mathematics**

Paper 3H

**Higher Tier**

Monday 5 November 2007 – Afternoon

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, candidate number, your surname, initial(s) 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.

**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 21 questions in this question paper. The total mark for this paper is 100.

There are 20 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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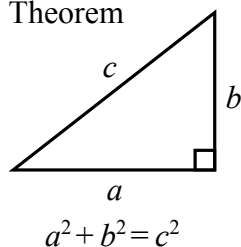


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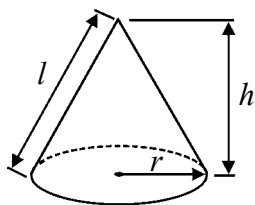
**IGCSE MATHEMATICS 4400  
FORMULA SHEET – HIGHER TIER**

Pythagoras' Theorem



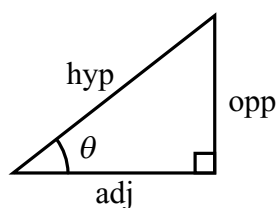
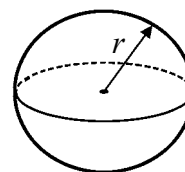
Volume of cone =  $\frac{1}{3} \pi r^2 h$

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



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

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



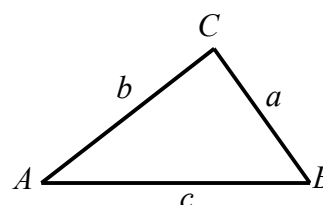
adj = hyp  $\times$  cos  $\theta$   
opp = hyp  $\times$  sin  $\theta$   
opp = adj  $\times$  tan  $\theta$

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

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

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

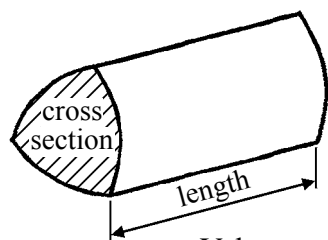
In any triangle ABC



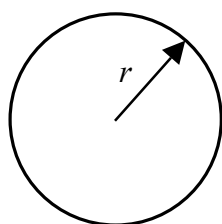
Sine rule:  $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

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

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



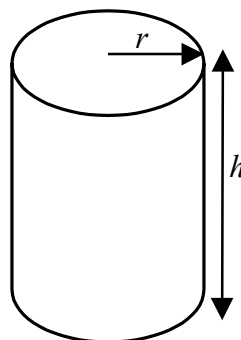
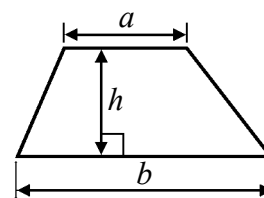
Volume of prism = area of cross section  $\times$  length



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 ONE questions.**  
**Write your answers in the spaces provided.**  
**You must write down all stages in your working.**

1. The diagram shows a regular 5-sided polygon, with centre  $O$ .

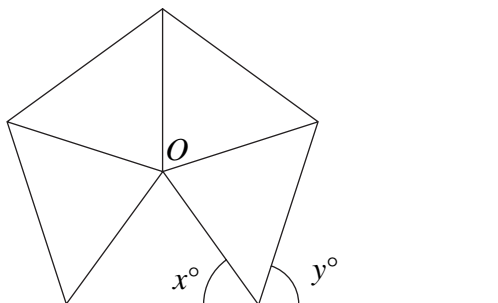


Diagram **NOT**  
accurately drawn

Work out the value of

- (a)  $x$ ,

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

- (b)  $y$ .

$y = \dots\dots\dots$   
(2)

(Total 5 marks)

Q1



N 2 4 5 7 8 A 0 3 2 0

Leave  
blank

2. The table shows information about the scores in a game.

Score	Frequency
1	5
2	8
3	3
4	4

Work out the mean score.

.....  
(Total 3 marks)

Q2



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3. A triangle has two equal sides of length  $2x$  cm and one side of length  $x$  cm.

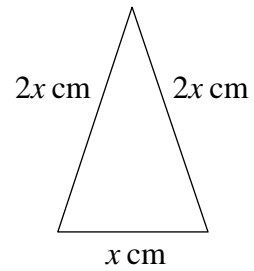


Diagram **NOT**  
accurately drawn

The perimeter of this triangle is 12 cm.

- (i) Use this information to write down an equation in  $x$ .

.....

- (ii) Solve your equation to find the value of  $x$ .

$x =$  .....

(Total 3 marks)

Q3



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4. The total number of students in Denton College is 280  
160 of the students in Denton College are in Year 1  
Express 160 as a percentage of 280  
Give your answer correct to 2 significant figures.

..... %

**(Total 2 marks)**

**Q4**



Leave blank

5. (a) Calculate the area of a circle of radius 2 m.  
Give your answer correct to 3 significant figures.

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

- (b) A circular pond has a radius of 2 m.  
There is a path of width 1 m around the pond.

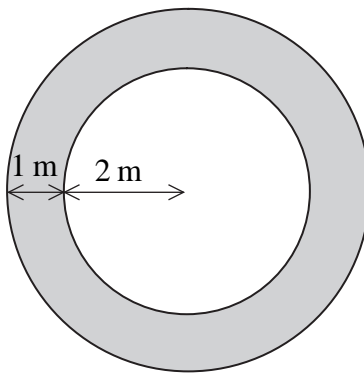


Diagram **NOT**  
accurately drawn

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

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

- (c) Calculate the outer circumference of the path.  
Give your answer correct to 3 significant figures.

..... m  
(2)

(Total 6 marks)

Q5



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6.

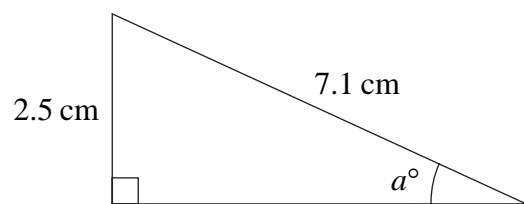


Diagram **NOT** accurately drawn

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

$a = \dots\dots\dots$

(Total 3 marks)

Q6

7. (a)  $A = \{1, 2, 3, 4\}$   
 $B = \{2, 4, 6, 8\}$

Write down the members of  $A \cup B$ .

.....  
(2)

- (b)  $\mathcal{E} = \{\text{Positive integers less than 10}\}$   
 $P = \{3, 4, 5, 6, 7, 8\}$   
 $P \cap Q = \emptyset$

Write down all the possible members of  $Q$ .

.....  
(2)

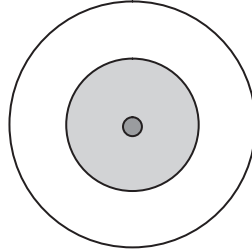
(Total 4 marks)

Q7





8. Jim fires an arrow at a target.



The table shows all the possible outcomes and the probabilities of three of these outcomes.

Result	Probability
Bull's Eye	
Inner Ring	0.3
Outer Ring	0.4
Miss	0.2

Work out the probability that Jim's arrow will hit either the Bull's Eye **or** the Inner Ring.

Leave  
blank

.....  
(Total 3 marks)

Q8



N 2 4 5 7 8 A 0 9 2 0

Leave  
blank9. (a) Expand  $4(v + 3)$ .....  
(1)(b) Simplify  $\frac{w^3 \times w^7}{w^2}$ .....  
(2)(c) Solve the equation  $\frac{17-x}{7} = 3$  $x =$  .....  
(3)(d) Solve the inequality  $4y - 5 < 6$ .....  
(2)

(Total 8 marks)

Q9



Leave  
blank

10. The table shows the carbon dioxide emissions, in tonnes, produced by each of four regions in 2001.

Country	Carbon dioxide emissions
USA	$5.7 \times 10^9$
Africa	$8.4 \times 10^8$
Russia	$1.4 \times 10^9$
China	$3.2 \times 10^9$

(a) Which of these regions produced the lowest carbon dioxide emissions?

.....  
(1)

(b) Work out the total carbon dioxide emissions produced by these four regions.  
Give your answer in standard form correct to 3 significant figures.

.....tonnes  
(2)

(c)  $1.4 \times 10^9 = k \times 8.4 \times 10^8$   
Calculate the value of  $k$ .

$k =$  .....  
(2)

Q10

(Total 5 marks)



11. Make  $x$  the subject of  $3x - y = x + 7$

Leave blank

$x = \dots\dots\dots$

**Q11**

**(Total 3 marks)**

12.

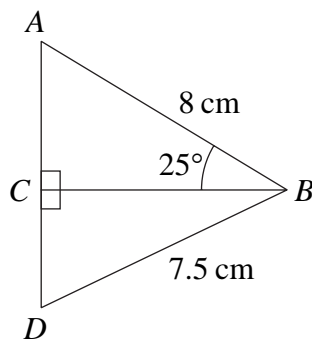


Diagram **NOT** accurately drawn

(i) Calculate the length of  $BC$ .

$\dots\dots\dots$  cm

(ii) Calculate the length of  $CD$ .  
Give your answer correct to 3 significant figures.

$\dots\dots\dots$  cm

**Q12**

**(Total 5 marks)**



Leave  
blank

**13. Factorise**

(a)  $x^2 - 100$

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

(b)  $x^2 - x - 12$

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

(c)  $3x^2 + 7x + 2$

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

**(Total 5 marks)**

**Q13**



Leave  
blank

**14.** Solve the simultaneous equations

$$2x + 5y = 16$$

$$4x + 3y = 11$$

$x = \dots\dots\dots$

$y = \dots\dots\dots$

**(Total 3 marks)**

**Q14**



Leave blank

15. Work out the area of the shaded sector of the circle.  
Give your answer correct to 3 significant figures.

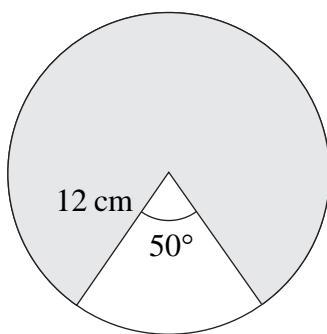


Diagram **NOT** accurately drawn

..... cm<sup>2</sup>

(Total 4 marks)

**Q15**

16. Simplify

(a)  $\frac{x^2 - 3x}{2x - 6}$

.....  
(3)

(b)  $\frac{2}{x-1} - \frac{3}{x}$

.....  
(3)

(Total 6 marks)

**Q16**

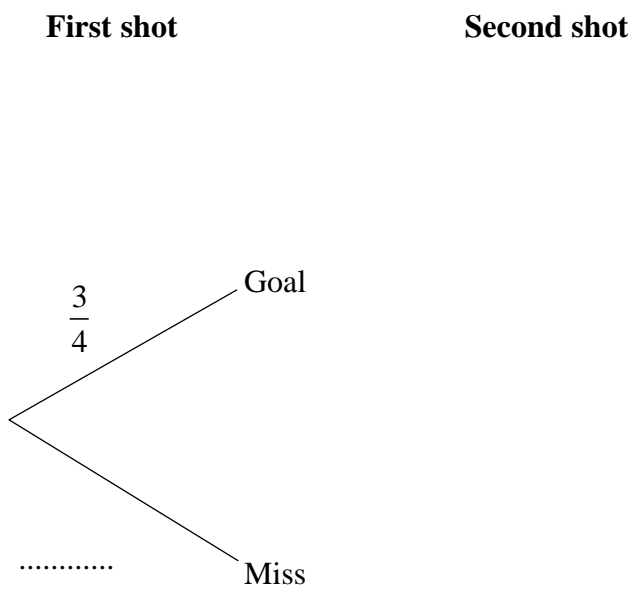


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17. Each time Nikos has a shot at goal, the probability that he will score a goal is  $\frac{3}{4}$

Nikos takes two shots.

(a) Complete the probability tree diagram.



(2)

(b) Calculate the probability that Nikos will score

(i) two goals,

.....  
(2)

(ii) exactly one goal.

.....  
(3)





Leave  
blank

Nikos now takes another three shots.

(c) Calculate the probability that he will score exactly 1 goal or exactly 2 goals.

.....  
(3)

Q17

(Total 10 marks)

**18.** Some cases have to be lifted by a crane.

Each case has a mass of 68 kg, correct to 2 significant figures.

(a) Write down the upper bound of the mass of a case.

..... kg  
(1)

A crane can lift safely a load of 1200 kg, correct to 2 significant figures.

(b) Find the greatest number of cases that the crane can lift safely in one load.

.....  
(3)

Q18

(Total 4 marks)



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19. A wind turbine generates a power of  $P$  kilowatts when the wind speed is  $w$  m/s.

$P$  is proportional to  $w^3$ .

$P = 300$  when  $w = 12$

(a) Find a formula for  $P$  in terms of  $w$ .

.....  
(3)

(b) Calculate the value of  $P$  when  $w = 7.5$   
Give your answer correct to 3 significant figures.

$P =$  .....  
(2)

(c) When the wind speed is  $x$  m/s, the wind turbine generates twice as much power as it does when the wind speed is 10 m/s.  
Calculate the value of  $x$ .  
Give your answer correct to 3 significant figures.

$x =$  .....  
(4)

(Total 9 marks)

Q19



Leave blank

20. (a) Expand  $(1 + \sqrt{3})^2$   
 Give your answer in the form  $a + b\sqrt{3}$  where  $a$  and  $b$  are integers.

.....  
 (2)

(b)

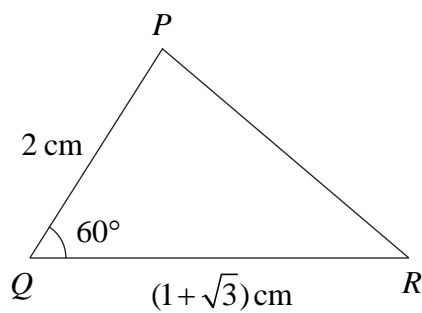


Diagram **NOT** accurately drawn

Calculate the exact length of  $PR$ .  
 Give your answer as a surd.

..... cm  
 (4)

(Total 6 marks)

Q20

PLEASE TURN OVER FOR QUESTION 21



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21. A coin is biased so that the probability that it shows heads on any one throw is  $p$ .  
The coin is thrown twice.

The probability that the coin shows heads exactly once is  $\frac{8}{25}$

Show that  $25p^2 - 25p + 4 = 0$

Q21

(Total 3 marks)

**TOTAL FOR PAPER: 100 MARKS****END**