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

Paper Reference(s)

4400/3H

Examiner's use only

Team Leader's use only

London Examinations IGCSE

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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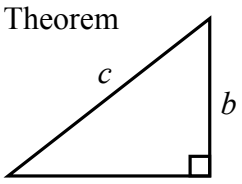
IGCSE MATHEMATICS 4400
FORMULA SHEET – HIGHER TIER

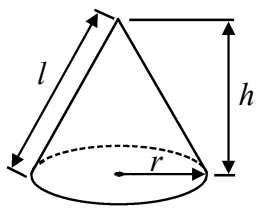
Pythagoras' Theorem



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

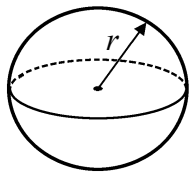
Volume of cone = $\frac{1}{3}\pi r^2 h$

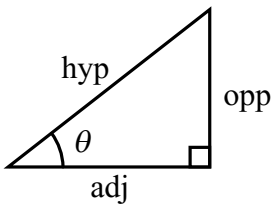
Curved surface area of cone = $\pi r l$



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

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





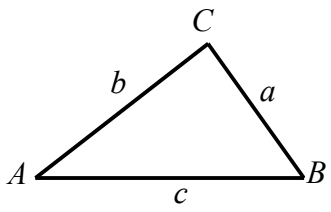
adj = hyp × cos θ
opp = hyp × sin θ
opp = adj × tan θ

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

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

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

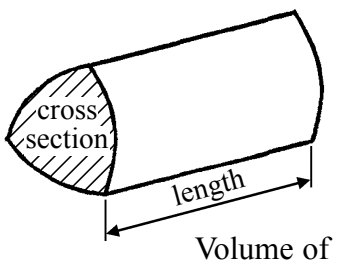
In any triangle ABC



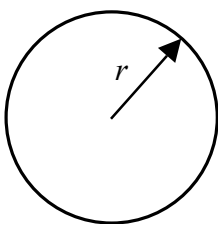
Sine rule: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

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

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



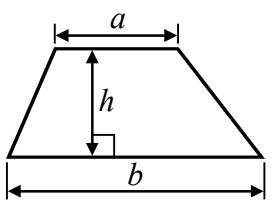
Volume of prism = area of cross section × length

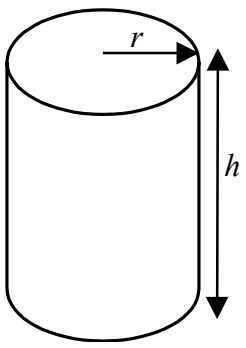


Circumference of circle = $2\pi r$

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 = $2\pi r h$

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

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

Leave blank

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.

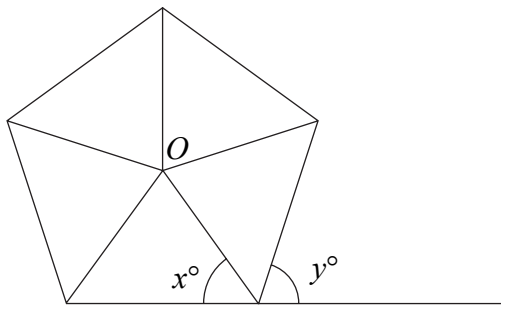


Diagram **NOT** accurately drawn

Work out the value of

(a) x,

$x =$ .....

(3)

(b) y.

$y =$ .....

(2) **Q1**

(Total 5 marks)

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.

.....

Q2

(Total 3 marks)

Leave blank

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

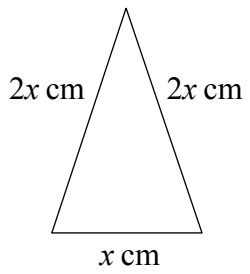


Diagram **NOT** accurately drawn

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

Leave blank

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^2
(2)

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

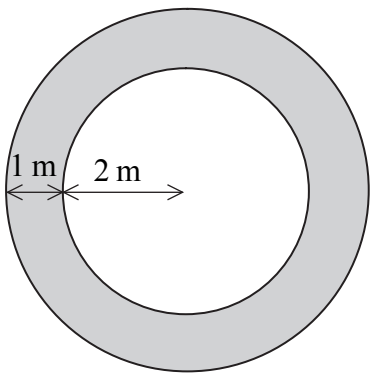


Diagram **NOT** accurately drawn

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

.....m^2
(2)

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

..... m
(2)

Q5

(Total 6 marks)

Leave blank

6.

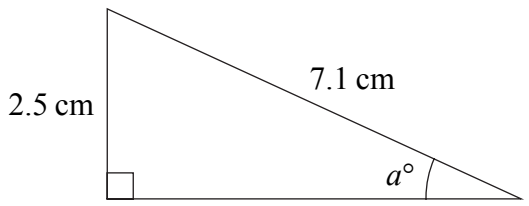


Diagram **NOT** accurately drawn

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

$a =$ .....

(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.

.....

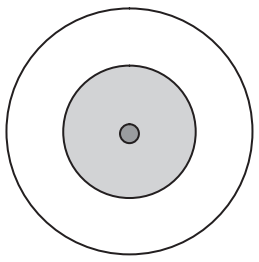
(2)

Q7

(Total 4 marks)

Leave blank

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.

.....

(Total 3 marks)

Q8

Leave blank

9. (a) Expand $4(v+3)$

.....

(1)

(b) Simplify $\dfrac{w^3 \times w^7}{w^2}$

.....

(2)

(c) Solve the equation $\dfrac{17-x}{7} = 3$

$x =$ .....

(3)

(d) Solve the inequality $4y - 5 < 6$

.....

(2) **Q9**

(Total 8 marks)

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	5.7×10^9
Africa	8.4×10^8
Russia	1.4×10^9
China	3.2×10^9

(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)

Leave blank

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

$x =$ .....

Q11

(Total 3 marks)

12.

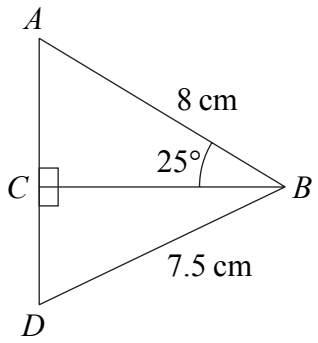


Diagram **NOT** accurately drawn

(i) Calculate the length of BC.

..... cm

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

..... 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) **Q13**

(Total 5 marks)

Leave blank

14. Solve the simultaneous equations

$$2x + 5y = 16$$
$$4x + 3y = 11$$

$x =$ .....

$y =$ .....

(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.

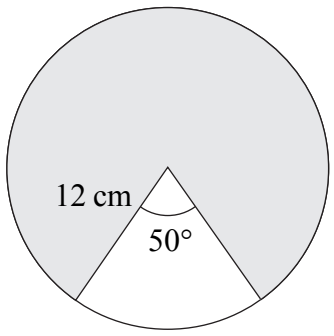


Diagram **NOT** accurately drawn

..... cm^2

Q15

(Total 4 marks)

16. Simplify

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

.....

(3)

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

.....

(3)

Q16

(Total 6 marks)

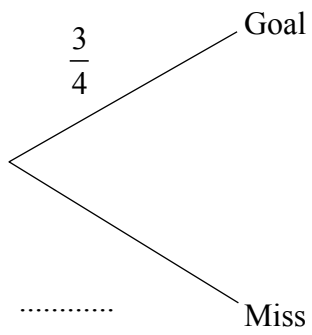
Leave blank

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.

First shot **Second shot**



(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)

Leave blank

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)

Q19

(Total 9 marks)

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)

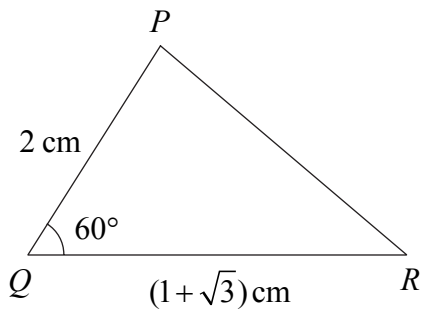


Diagram **NOT** accurately drawn

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

..... cm
(4)

(Total 6 marks)

Q20

PLEASE TURN OVER FOR QUESTION 21

Leave blank

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