Write your name here

Surname

Other names

Edexcel IGCSE

Centre Number

Candidate Number

Mathematics A
Paper 4H

Higher Tier

Friday 10 June 2011 – Morning
Time: 2 hours

Paper Reference
4MA0/4H

Total Marks

You must have:
Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Without sufficient working, correct answers may be awarded no marks.
- Answer the questions in the spaces provided
  – *there may be more space than you need*.
- **Calculators may be used.**
- You must **NOT** write anything on the formulae page.
  Anything you write on the formulae page will gain NO credit.

Information

- The total mark for this paper is 100.
- The marks for **each** question are shown in brackets
  – *use this as a guide as to how much time to spend on each question.*

Advice

- Read each question carefully before you start to answer it.
- Check your answers if you have time at the end.

Turn over
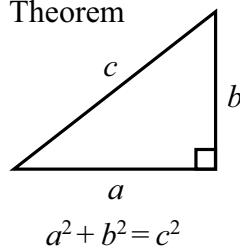
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IGCSE MATHEMATICS
## FORMULAE SHEET – HIGHER TIER

Pythagoras'
Theorem
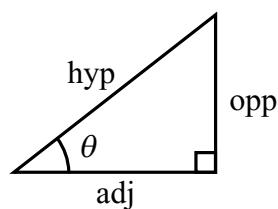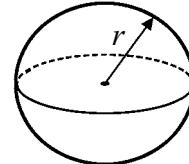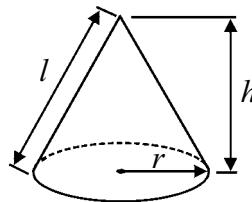
$a^2 + b^2 = c^2$

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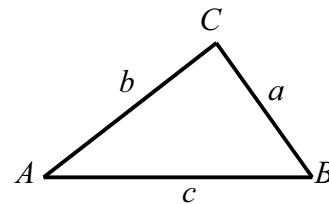
or $\quad \sin\theta = \dfrac{\text{opp}}{\text{hyp}}$

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

$\tan\theta = \dfrac{\text{opp}}{\text{adj}}$
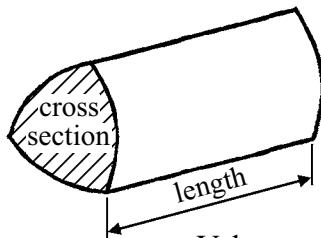
In any triangle ABC
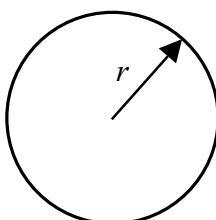
Sine rule: $\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$

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

Area of triangle = $\frac{1}{2} ab \sin C$
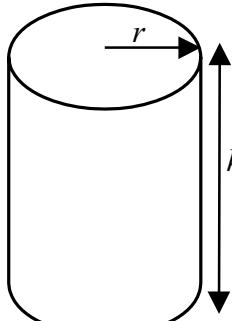
Volume of prism = area of cross section × length

Area of a trapezium = $\frac{1}{2}(a + b)h$

Circumference of circle = $2\pi r$
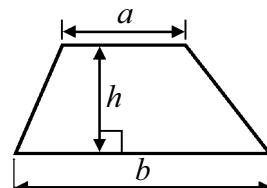
Area of circle = πr^2

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

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

Answer ALL TWENTY FOUR questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 In a sale, normal prices are reduced by 15%.
   The normal price of a television was $640

   Work out the sale price of the television.

   $ ....

   (Total for Question 1 is 3 marks)

2 John throws a biased coin 120 times.

   It shows heads 90 times.

   (a) John throws the coin once more.
      Work out an estimate for the probability that the coin shows **tails**.

      ....
      (2)

   Carly throws the same coin 200 times.

   (b) Work out an estimate for the number of times the coin shows **tails**.

      ....
      (2)

   (Total for Question 2 is 4 marks)

3 Here is a list of ingredients for making Apple and Raspberry Crumble for 6 people.

> **Apple and Raspberry Crumble**
>
> Ingredients for 6 people
>
> 120 grams   plain flour
> 230 grams   apples
> 200 grams   raspberries
> 160 grams   soft brown sugar
>   90 grams   butter

Sam wants to make Apple and Raspberry Crumble for 15 people.
She has enough plain flour, soft brown sugar and butter.

Work out the amount of apples and the amount of raspberries Sam needs.

apples .... grams

raspberries .... grams

(Total for Question 3 is 3 marks)

4 The length of Rachael's journey from her home to work is 72 km.
The journey takes 1 hour 20 minutes.

Work out her average speed in km/h.

.... km/h

(Total for Question 4 is 3 marks)

5 (a) Simplify

(i) $a \times a \times a \times a$,

....

(ii) $5a \times 6b$,

....

(iii) $q^8 \div q^2$.

....
(3)

(b) Solve $5 - 2y = 12$

$y = $...
(2)

(c) $v = w^2 - 2w$.

Work out the value of v when $w = 6$

$v = $...
(2)

(Total for Question 5 is 7 marks)

P 3 8 5 7 7 A 0 5 2 4

6 The diagram shows a trapezium *PQRS*.
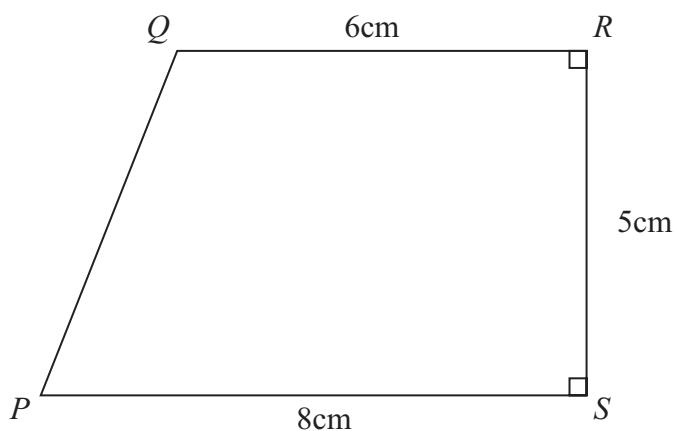
Diagram **NOT**
accurately drawn

(a) Calculate the area of the trapezium *PQRS*.

.... cm²
(2)

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

.... cm
(4)

(Total for Question 6 is 6 marks)

P 3 8 5 7 7 A 0 6 2 4

7   Six numbers have a mean of 5

Five of the numbers are

$$3 \qquad 2 \qquad 7 \qquad 6 \qquad 2$$

The other number is x.

Work out the value of x.

$x =$ ....

(Total for Question 7 is 3 marks)

Do NOT write in this space

8 Use compasses and a ruler only to construct the perpendicular bisector of the line *PQ*.
You must show all construction lines.

P ———————————————————————— *Q*

(Total for Question 8 is 2 marks)

9 The length of a fence is 137 metres, correct to the nearest metre.

Write down

    (i)   the lower bound for the length of the fence,

.... metres

    (ii) the upper bound for the length of the fence.

.... metres

(Total for Question 9 is 2 marks)

10 Express 126 as a product of its prime factors.

....

(Total for Question 10 is 3 marks)

11

L

9.3cm

Diagram **NOT**
accurately drawn

42º

M
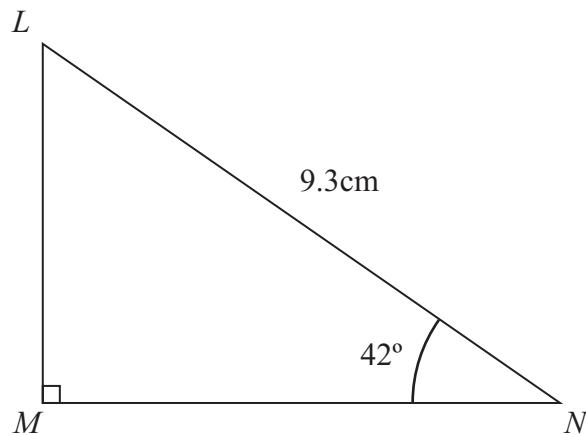
N

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

.... cm

(Total for Question 11 is 3 marks)

12 (i) Solve the inequality $2x + 13 \geqslant 6$

....

(ii) *n* is a **negative** integer.
Write down all the values of *n* which satisfy $2n + 13 \geqslant 6$

....

(Total for Question 12 is 4 marks)

13 The table gives the diameters, in metres, of four planets.

Planet	Diameter (metres)
Mercury	4.88×10^6
Venus	1.21×10^7
Earth	1.28×10^7
Mars	6.79×10^6

(a) Which planet has the largest diameter?

....

(1)

(b) Write 6.79×10^6 as an ordinary number.

....

(1)

(c) Calculate the difference, in metres, between the diameter of Venus and the diameter of Mercury.

Give your answer in standard form.
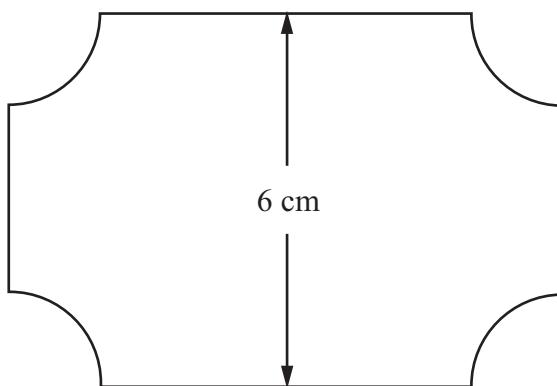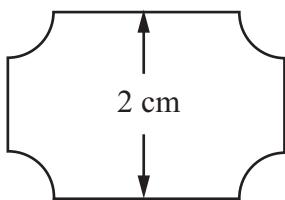
.... metres

(2)

(Total for Question 13 is 4 marks)

14 Here are two supermarket price tickets.

Diagrams **NOT** accurately drawn

2 cm

6 cm

The two supermarket price tickets are mathematically similar.

The area of the smaller ticket is 7 cm^2.
Calculate the area of the larger ticket.

.... cm^2

(Total for Question 14 is 2 marks)

Do NOT write in this space

15 (a) Simplify $\dfrac{8(x-3)^2}{4(x-3)}$

....
(2)

(b) Factorise $a^2 - 144$

....
(2)

(c) Make q the subject of the formula $p = \sqrt{q} - 5r$

$q = $ ....
(2)

(d) Solve $\dfrac{4}{y-4} = 5$
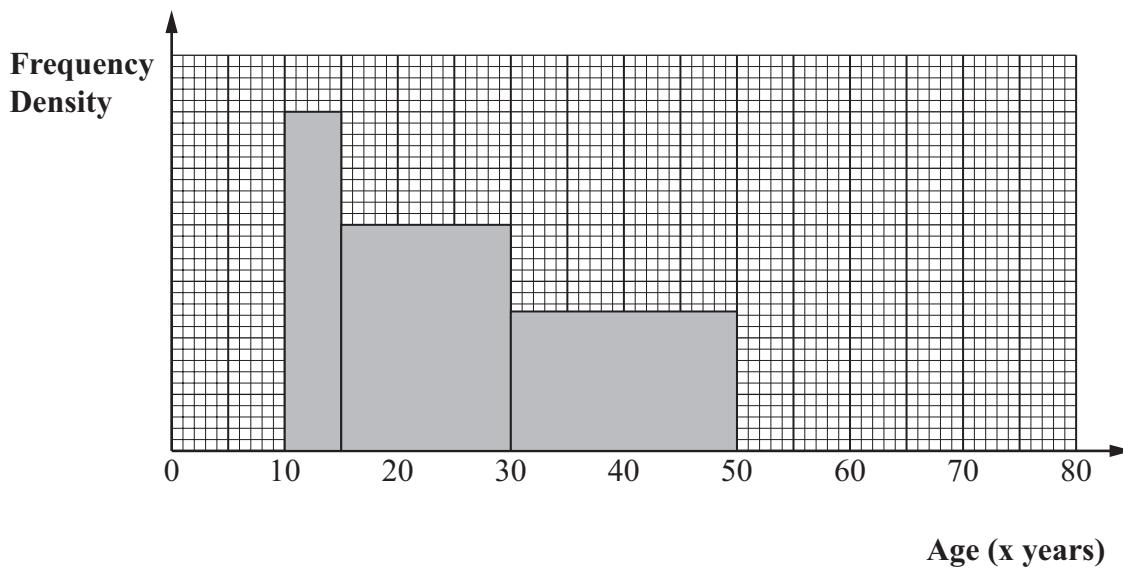
$y = $ ....
(3)

(Total for Question 15 is 9 marks)

16 The incomplete histogram and table give information about the ages of people living in a village.

Frequency Density

Age (x years)

Age (*x* years)	Frequency
$0 \leqslant x < 10$	100
$10 \leqslant x < 15$	60
$15 \leqslant x < 30$	
$30 \leqslant x < 50$	
$50 \leqslant x < 75$	50
$75 \leqslant x < 80$	20

(i)   Use the histogram to complete the table.

(ii) Use the table to complete the histogram.

(Total for Question 16 is 4 marks)

17 Alan has to attend a meeting on Monday and on Tuesday.
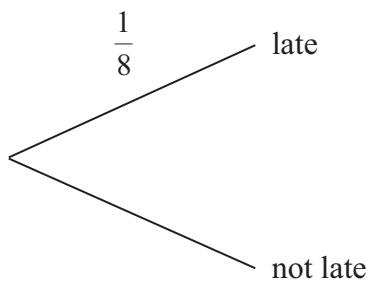
The probability that he is late for a meeting is $\frac{1}{8}$

(a) Complete the probability tree diagram.

(3)

Monday meeting   Tuesday meeting

$\frac{1}{8}$ ⟋ late

not late

(b) Calculate the probability that Alan is late for at least one of these meetings.

....

(3)

(Total for Question 17 is 6 marks)

Do NOT write in this space
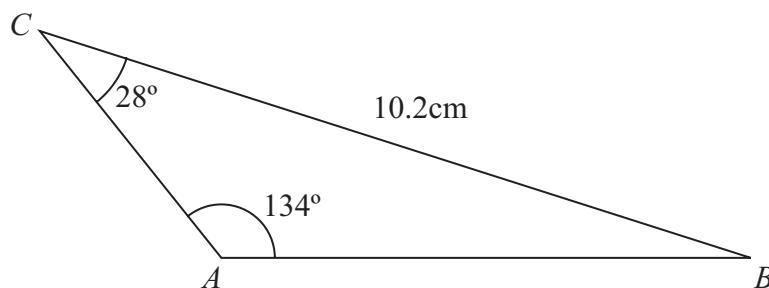
18 Show that the recurring decimal $0.\dot{3}9\dot{6} = \dfrac{44}{111}$

(Total for Question 18 is 2 marks)

19 The diagram shows triangle *ABC*.

Diagram **NOT**
accurately drawn

Angle *BCA* = 28°
Angle *CAB* = 134°
BC =10.2 cm.

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

.... cm

(Total for Question 19 is 3 marks)

20 $f(x) = \dfrac{2}{x}$

$g(x) = \dfrac{x+1}{x}$

(a) State which value of x cannot be included in the domain of f or g.

....
(1)

(b) Solve $gf(a) = 3$

$a = $ ....
(3)

(c) Express the inverse function g^{-1} in the form $g^{-1}(x)$

$g^{-1}(x) = $ ....
(3)

(Total for Question 20 is 7 marks)

21 Clare buys some shares for 50x$.
Later, she sells the shares for $(600 + 5x)$.
She makes a profit of x%

(a) Show that $x^2 + 90x - 1200 = 0$

(3)

(b) Solve $x^2 + 90x - 1200 = 0$
Find the value of x correct to 3 significant figures.

$x = $ ....

(3)
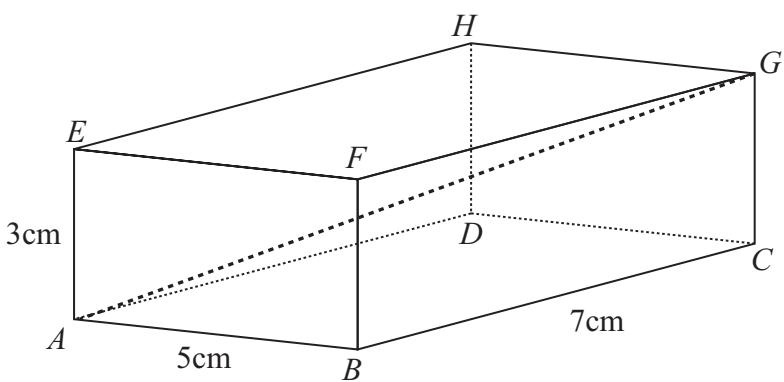
(Total for Question 21 is 6 marks)

22

Diagram **NOT**
accurately drawn

The diagram shows a cuboid *ABCDEFGH*.
AB = 5cm
BC = 7cm
AE = 3cm

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

.... cm

(3)

(b) Calculate the size of the angle between *AG* and the plane *ABCD*.
Give your answer correct to 1 decimal place.

....°

(2)

(Total for Question 22 is 5 marks)
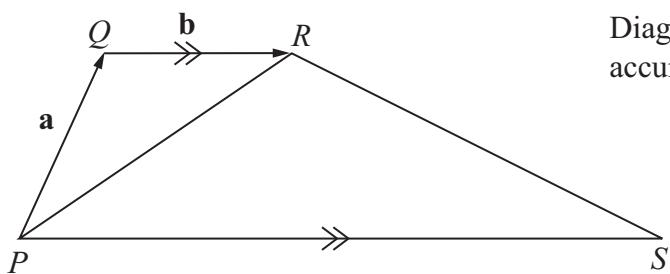
23 Express $\sqrt{48} + \sqrt{108}$ in the form $k\sqrt{6}$ where k is a surd.

....

(Total for Question 23 is 3 marks)

Do NOT write in this space

24

Diagram **NOT**
accurately drawn

The diagram shows a trapezium *PQRS*.
PS is parallel to *QR*.
PS = 4*QR*.

$\overrightarrow{PQ}$ = **a** $\overrightarrow{QR}$ = **b**

(a) Find, in terms of **a** and/or **b,**

(i) $\overrightarrow{PS}$

....

(ii) $\overrightarrow{PR}$

....

(iii) $\overrightarrow{RS}$.

....
(3)

The point *T* lies on the line *PR* such that *PT* : *TR* = 4 : 1

(b) Given that $\overrightarrow{TS}$ = *k* $\overrightarrow{QT}$, find the value of *k*.

k = ...
(3)

(Total for Question 24 is 6 marks)

TOTAL FOR PAPER IS 100 MARKS

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