Write your name here

Surname _____ Other names _____

Edexcel GCSE

Centre Number [   ][   ][   ][   ][   ]   Candidate Number [   ][   ][   ][   ]

Methods in Mathematics
Unit 2: Methods 2
For Approved Pilot Centres ONLY

Higher Tier

Thursday 17 November 2011 – Morning
Time: 1 hour 45 minutes

Paper Reference
5MM2H/01

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

Total Marks

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.
- Answer the questions in the spaces provided
  – *there may be more space than you need*.
- **Calculators may be used.**
- If your calculator does not have a π button, take the value of π to be 3.142 unless the question instructs otherwise.

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*.
- Questions labelled with an **asterisk** (*****) are ones where the quality of your written communication will be assessed.

Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ▶

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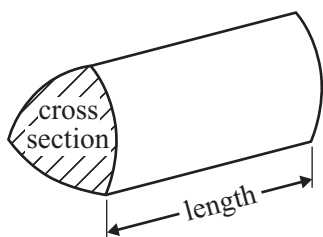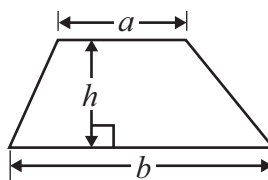
**You must not write on this formulae page.
Anything you write on this formulae page will gain NO credit.**
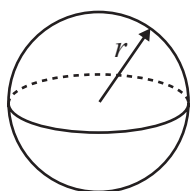
Volume of prism = area of cross section × length

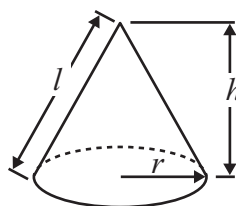**Area of trapezium** $= \frac{1}{2}(a+b)h$

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

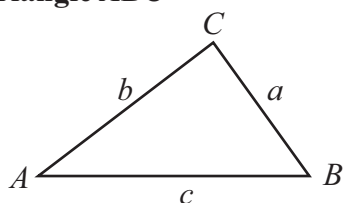**Surface area of sphere** $= 4\pi r^2$

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

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

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 $= \frac{1}{2}ab \sin C$

The Quadratic Equation

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

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

P40605A0224

Answer ALL questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

1 (a) Work out $\dfrac{1}{0.625}$

....

(1)

   (b) Work out $\sqrt{2.5^3 - 3}$

      Give your answer as a decimal correct to 3 significant figures.

....

(2)

(Total for Question 1 is 3 marks)

2 (a) 9 pens weigh 1161 grams.

      Work out the weight of 5 of these pens.

.... grams

(2)

   (b) Write 13 out of 20 as a percentage.

.... %
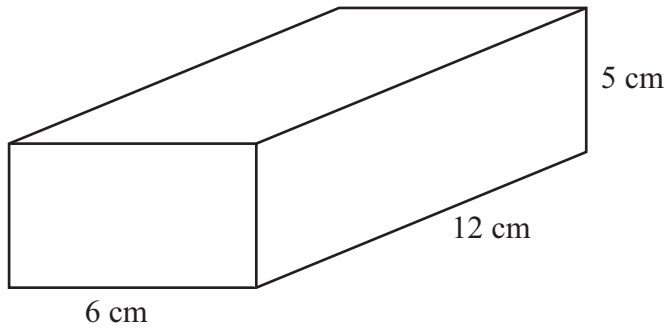
(2)

(Total for Question 2 is 4 marks)

3 Here is a cuboid.

Diagram **NOT** accurately drawn

5 cm

12 cm

6 cm

Work out the total surface area of the cuboid.

....
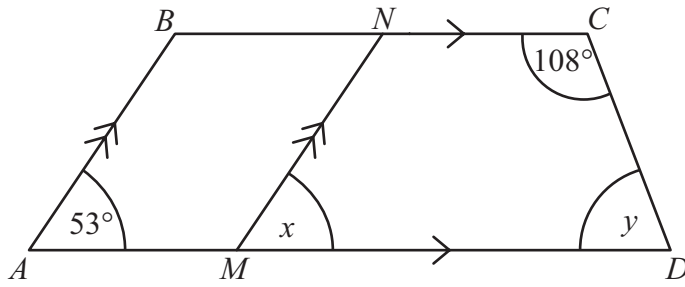
(Total for Question 3 is 4 marks)

4

Diagram **NOT** accurately drawn

In the diagram,
AB is parallel to *MN*.
BNC is parallel to *AMD*.
Angle *BAM* = 53°.
Angle *NCD* = 108°.

(a) (i)   Write down the size of angle *x*.

....°

   (ii) Give a reason for your answer.

....

(2)

(b) (i)   Work out the size of angle *y*.

....°

   (ii) Give a reason for your answer.

....

(2)

(Total for Question 4 is 4 marks)

5 Gary has 5 sticks.
The length of each of his sticks is x cm.

Sharmina has 7 sticks.
The length of each of her sticks is y cm.

The total length of Gary's and Sharmina's sticks is T cm.

Write down a formula for T in terms of x and y.

....

(Total for Question 5 is 3 marks)

6 There are a total of 120 counters in a box.

There are only red counters and blue counters in the box.
There are three times as many red counters as blue counters in the box.

Carl takes $\frac{1}{3}$ of the red counters from the box.

Kerry takes 80% of the blue counters from the box.

Work out the ratio of the number of red counters to the number of blue counters now in the box.
Give your ratio in its simplest form.

....

(Total for Question 6 is 5 marks)

7 (a) The input for this number machine is m.

$$m \longrightarrow \boxed{\times 2} \longrightarrow \boxed{-3} \longrightarrow \text{output}$$

Find an expression, in terms of m, for the output.

....

(2)

(b) The output for this number machine is n.

$$\text{input} \longrightarrow \boxed{\times 2} \longrightarrow \boxed{-3} \longrightarrow n$$

Find an expression, in terms of n, for the input.

....

(2)

(Total for Question 7 is 4 marks)

8 n is an integer and $-3 \leqslant n < 2$

(a) Write down all the possible values of n.

....

(2)

Here is a number line.
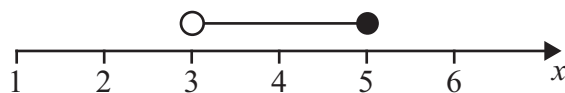
(b) Write down the inequality shown on the number line.

....

(2)

(c) Solve $4x + 3 \leqslant 18$

....

(2)

(Total for Question 8 is 6 marks)

Turn over ▶

9 The diagram shows a solid prism.

Diagram **NOT** accurately drawn

3 cm

5 cm

2 cm

4 cm

6 cm
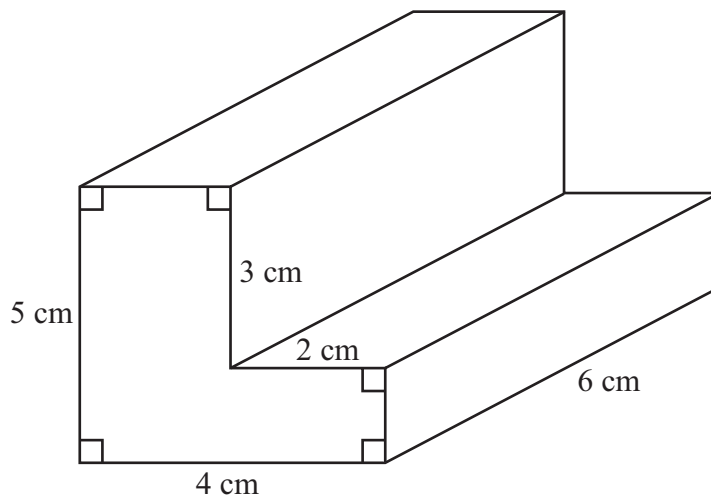
Work out the volume of the prism.

.... cm³

(Total for Question 9 is 4 marks)

10 (a) Work out the size of an exterior angle of a regular pentagon.

....°

(2)

(b) Work out the size of an interior angle of a regular pentagon.

....°

(2)

(Total for Question 10 is 4 marks)

11 When a number is reduced by 30% the answer is 17 920

What is the number?

....

(Total for Question 11 is 3 marks)

12 The diagram shows a circle inside a semicircle.

Diagram **NOT** accurately drawn
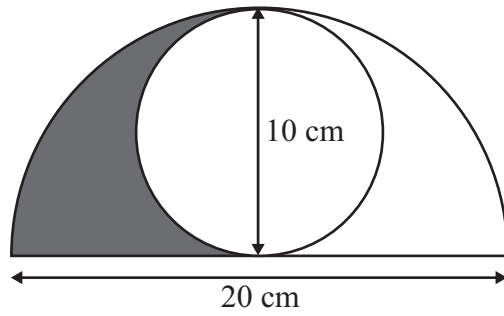
10 cm

20 cm

The circle has a diameter of 10 cm.
The semicircle has a diameter of 20 cm.

Work out the area shaded.
Give your answer correct to 1 decimal place.

.... cm²
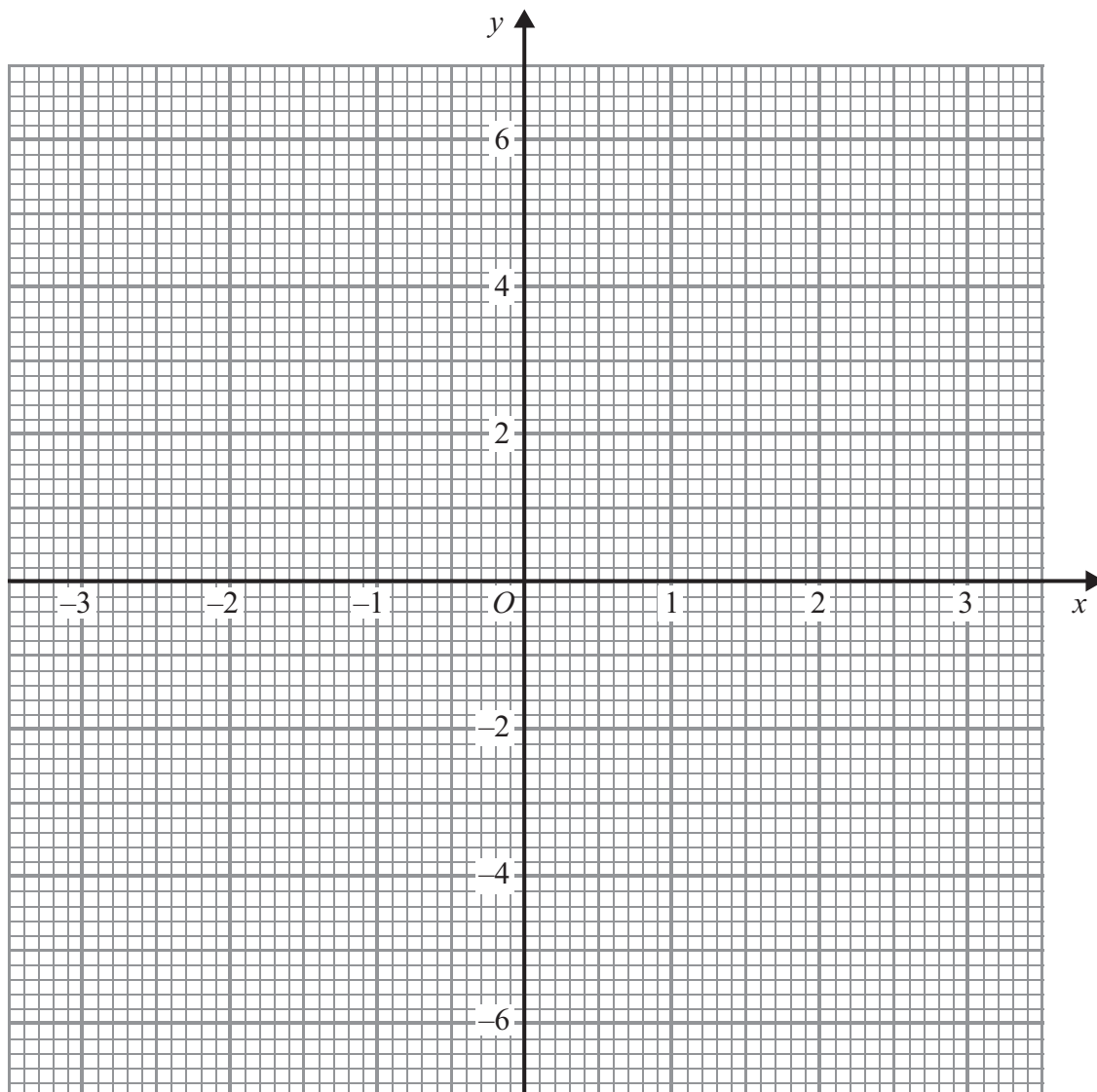
(Total for Question 12 is 5 marks)

13 (a) Complete the table of values for $y = x^2 - 3$

x	−3	−2	−1	0	1	2	3
y	6		−2		−2	1	

(2)

(b) On the grid, draw the graph of $y = x^2 - 3$ for values of x from −3 to 3

(2)

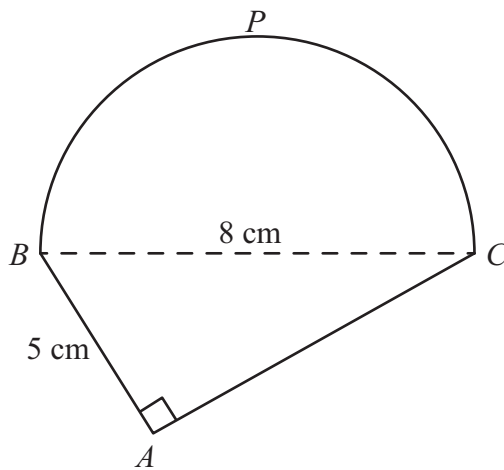(c) Use the graph to find estimates of the values of x when $x^2 - 3 = 0$

....

(2)

(Total for Question 13 is 6 marks)

14 Here is a shape.

P

Diagram **NOT** accurately drawn

8 cm

B

C

5 cm

A

BPC is a semicircle.
ABC is a right-angled triangle.
BC = 8 cm.
AB = 5 cm.

Work out the perimeter of the shape.
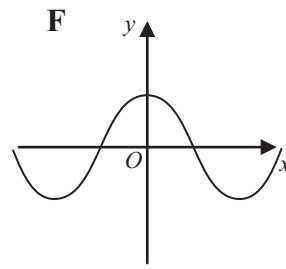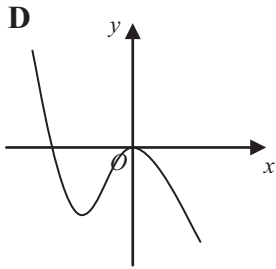Give your answer correct to 3 significant figures.

.... cm

(Total for Question 14 is 5 marks)

15 Here are some graphs.

A   B   C

D   E   F

G   H   I
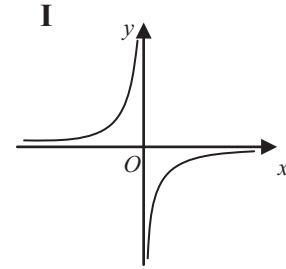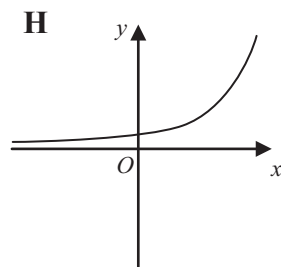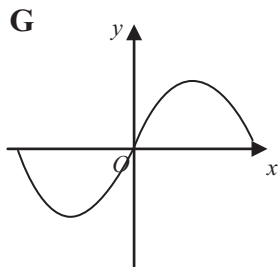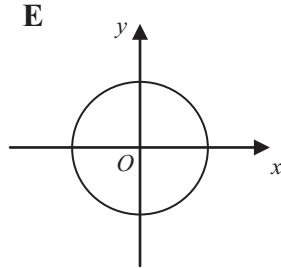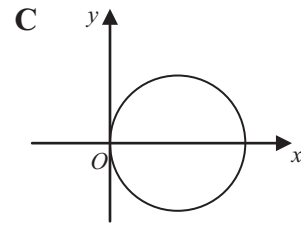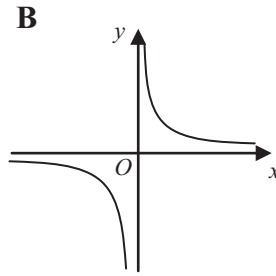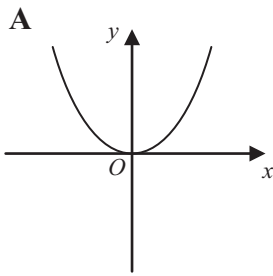
(i) Write down the letter of the graph that could have the equation $y = \dfrac{1}{x}$

....

(ii) Write down the letter of the graph that could have the equation $y = \sin x$

....

(iii) Write down the letter of the graph that could have the equation $x^2 + y^2 = 1$

....

(Total for Question 15 is 3 marks)

Turn over ▶

16 $A : B : C = x + 1 : 3 : x - 1$

$A + B + C = 60$

$B = 30$

Work out the value of x.

....

(Total for Question 16 is 5 marks)

17
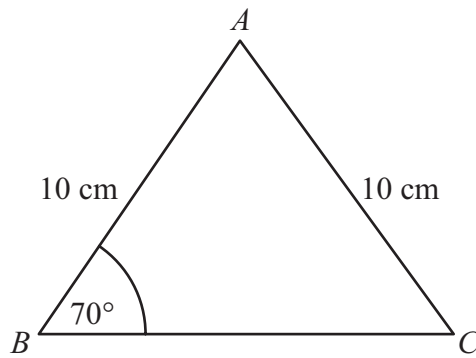
Diagram **NOT** accurately drawn

Triangle *ABC* is an isosceles triangle.
AB = *AC* = 10 cm.
Angle *ABC* = 70°.

Work out the length of *BC*.
Give your answer correct to 3 significant figures.

.... cm

(Total for Question 17 is 4 marks)

*18 $A = 1500$

B is 5% greater than A.
C is 5% greater than B.

Kim says

'C is 10% greater than A'.

Is she right?

(Total for Question 18 is 4 marks)

19
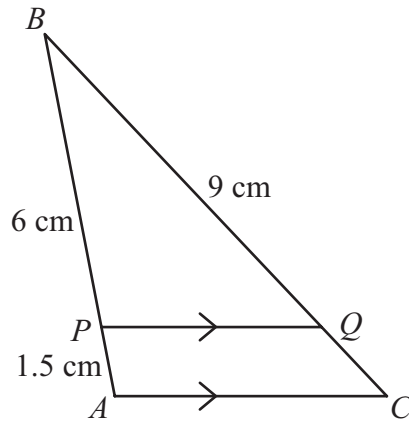
Diagram **NOT** accurately drawn

PQ is parallel to *AC*.
BP = 6 cm.
PA = 1.5 cm.
BQ = 9 cm.

(a) Work out the length of *QC*.

.... cm

(2)

Angle *PBQ* = 30°.

(b) Work out the area of triangle *PBQ*.

.... cm²

(2)

(Total for Question 19 is 4 marks)

Turn over ▶

20 $x = \dfrac{2ya}{y-a}$

$y = 2.5 \times 10^{-3}$
$a = 1.8 \times 10^{-3}$

(a) Calculate the value of x.
   Give your answer in standard form correct to 3 significant figures.

....
   (3)

(b) Make y the subject of the formula $x = \dfrac{2ya}{y-a}$

$y =$ ....
   (4)

(Total for Question 20 is 7 marks)

21 The line L passes through the point $(-1, 2)$ and is perpendicular to the line with equation $y = 2x + 3$

Find an equation of the line L.

....

(Total for Question 21 is 3 marks)

22 Solve the simultaneous equations

$$2x - 3y = 12$$
$$3x + 5y = -1$$

....

(Total for Question 22 is 4 marks)

23 P is inversely proportional to the square of x.

Given that $x = 5$ when $P = 6$,

find the value of P when $x = 8$
Give your answer correct to 2 decimal places.

$P = $ ....

(Total for Question 23 is 3 marks)

24
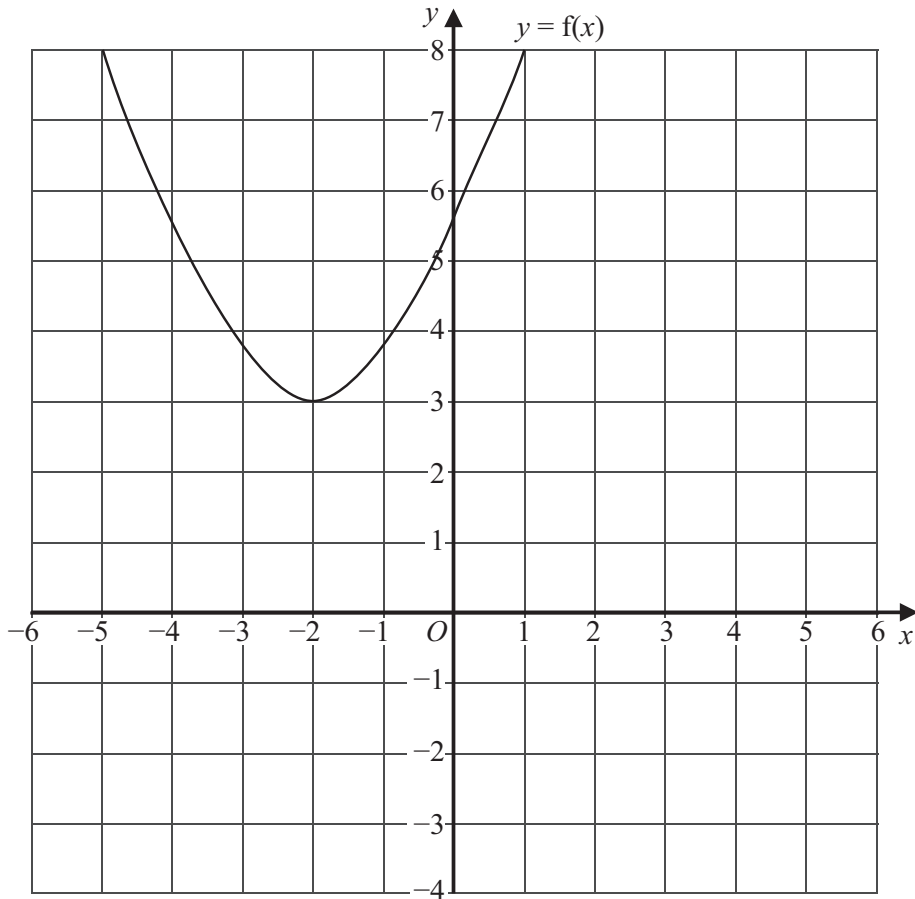
The diagram shows part of a curve with equation $y = f(x)$.
The coordinates of the minimum point of the curve are $(-2, 3)$.

Write down the coordinates of the minimum point of the curve with equation

(i) $y = f(x) - 2$

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

(ii) $y = f(2x)$

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

(iii) $y = f(-x)$

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

(Total for Question 24 is 3 marks)

TOTAL FOR PAPER IS 100 MARKS