Write your name here

| Surname | Other names |
|---|---|
| | |

**Edexcel GCSE**

| Centre Number | Candidate Number |
|---|---|
| | |

# Methods in Mathematics

## Unit 1: Methods 1

***For Approved Pilot Centres ONLY***

**Higher Tier**

Tuesday 19 June 2012 – Afternoon
**Time: 1 hour 45 minutes**

Paper Reference
**5MM1H/01**

**You must have:** Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser. 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 must not be used.**

## 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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P 4 1 2 1 1 A 0 1 2 4

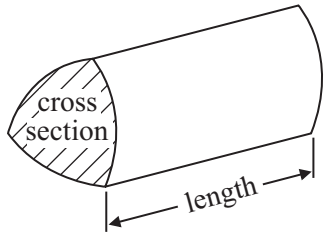
PEARSON

**GCSE Mathematics 2MM01**

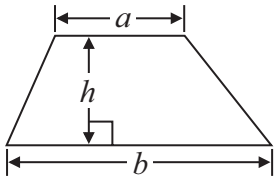
Formulae: Higher Tier

**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

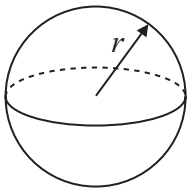



**Area of trapezium** = $\frac{1}{2}(a + b)h$



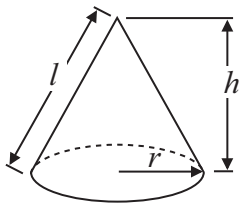

**Volume of sphere** = $\frac{4}{3}\pi r^3$

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

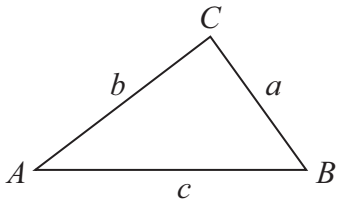



**Volume of cone** = $\frac{1}{3}\pi r^2 h$

**Curved surface area of cone** = $\pi rl$




**In any triangle *ABC***




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

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

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

**Answer ALL questions.**

**Write your answers in the spaces provided.**

**You must write down all stages in your working.**

**You must NOT use a calculator.**

**1** (a) Work out $-2 + 3 \times 8$

.....

**(1)**

(b) Using the information that $176 \times 28 = 4928$
write down the value of

(i) $2.8 \times 17.6$

.....

(ii) $4.928 \div 1.76$

.....

**(2)**

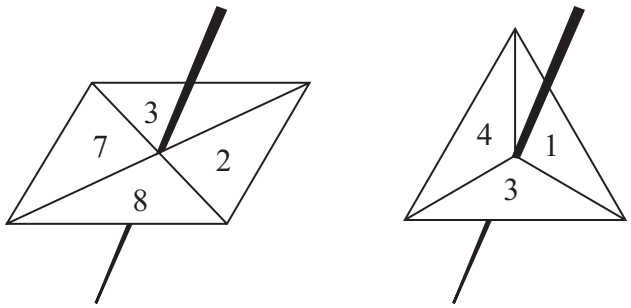
(c) Work out an estimate for the value of $\dfrac{197 \times 3.1}{58.62}$

.....

**(2)**

**(Total for Question 1 is 5 marks)**

**2** Here are two fair spinners.




Mylene spins each spinner once.
Each spinner lands on a number.

Mylene adds these two numbers together to get the total score.

(i) Work out the probability that the total score will be 6

.....

(ii) Work out the probability that the total score will be more than 9

.....

**(Total for Question 2 is 5 marks)**

**3** (a) Simplify fully $2(x + 6) + 5(2x - 3)$

.....

**(2)**

(b) Factorise fully $6xy - 9y^2$

.....

**(2)**

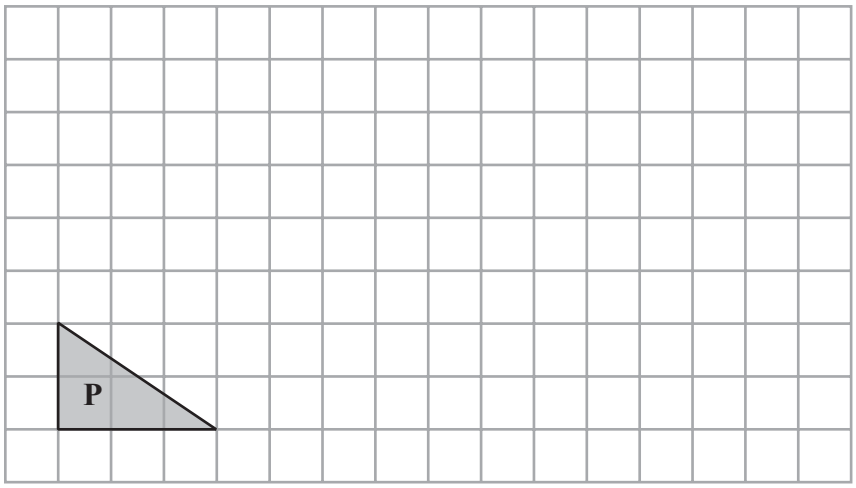
(c) Expand and simplify $(4c + 7)(3c - 1)$

.....

**(2)**

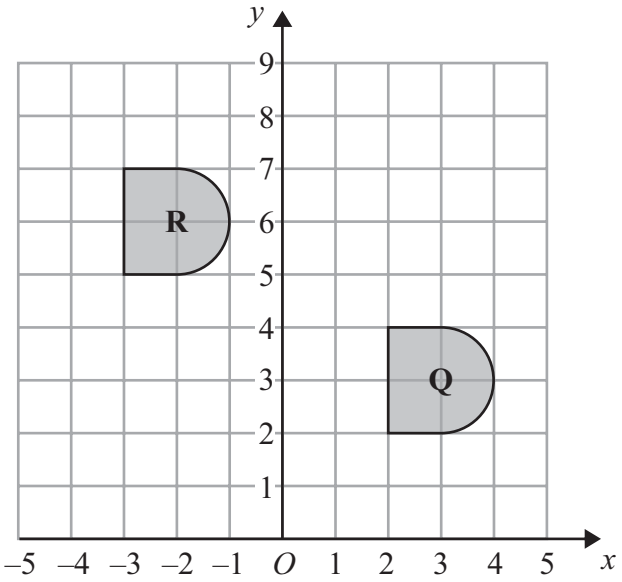
**(Total for Question 3 is 6 marks)**

**4**




(a) On the grid, draw an enlargement of triangle **P** with scale factor 3

**(2)**




(b) Describe fully the single transformation that maps shape **Q** onto shape **R**.

.....

.....

**(2)**

**(Total for Question 4 is 4 marks)**

**5** There are 300 beads in a box.

The beads are red or yellow or black or white or green.

The table shows each of the probabilities that a bead taken at random from the box will be red or yellow or white or green.

| **Colour** | **Red** | **Yellow** | **Black** | **White** | **Green** |
|---|---|---|---|---|---|
| **Probability** | 0.35 | 0.15 | | 0.18 | 0.12 |

A bead is to be taken at random from the box.

(a) Work out the probability that the bead will be black.

.....

**(2)**

There are 300 beads in the box.

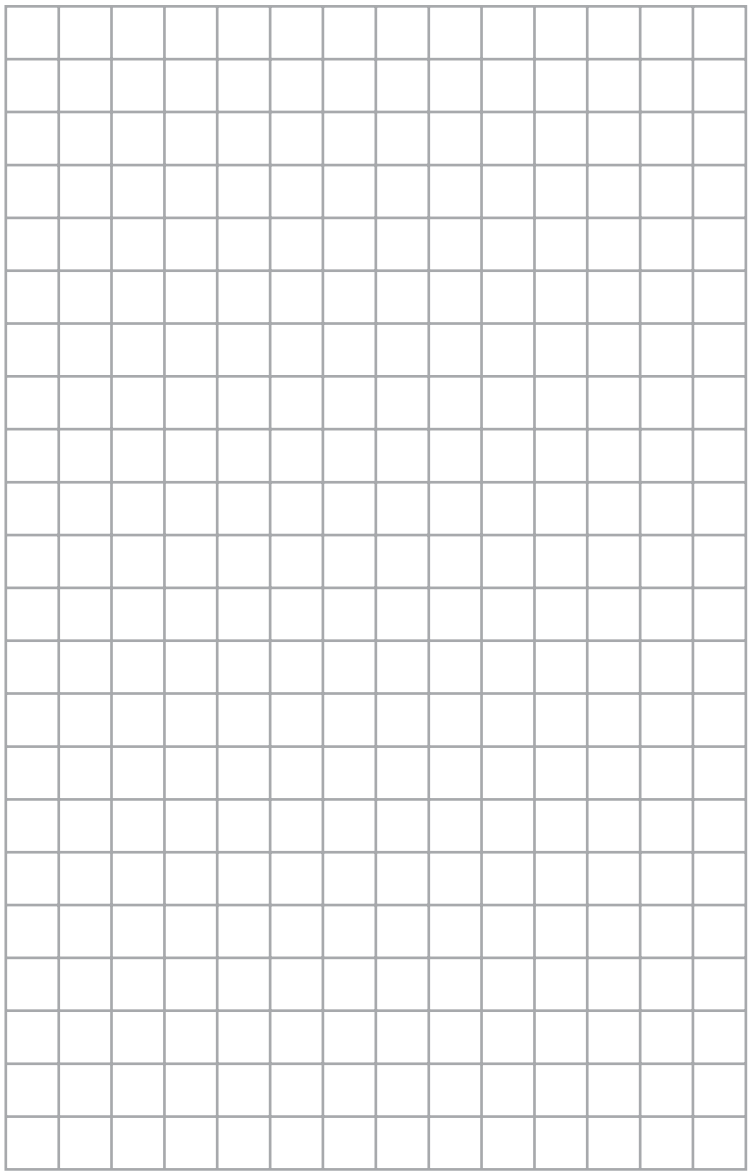
(b) Work out the number of red beads in the box.

.....

**(2)**

**(Total for Question 5 is 4 marks)**

**6** On the grid, draw the graph of $y = 5x + 2$ for values of $x$ from –2 to 2



**(Total for Question 6 is 4 marks)**

**7** Here are the first four terms of a number sequence.

8 14 20 26

(a) Find an expression, in terms of $n$, for the $n$th term of this number sequence.

.....

**(2)**

Dipen says,

'124 is a number in this sequence.'

(b) Dipen is wrong.
Explain why.

**(2)**

**(Total for Question 7 is 4 marks)**

***8**

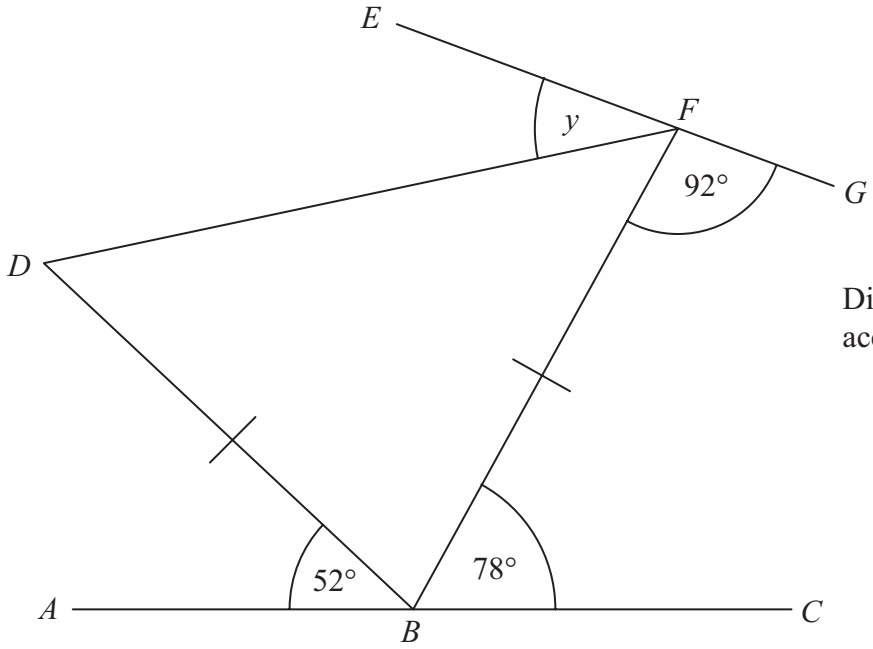



Diagram **NOT** accurately drawn

*ABC* and *EFG* are straight lines.
*BDF* is a triangle.
*BD* = *BF*.

Work out the size of the angle marked *y*.
Give reasons for your answer.

**(Total for Question 8 is 5 marks)**

***9**

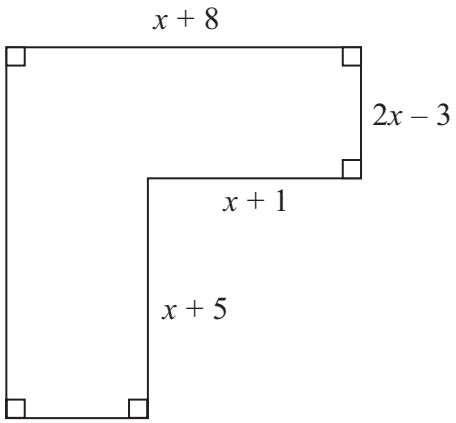



Diagram **NOT** accurately drawn

All the measurements are in centimetres.

The perimeter of this shape is 68 cm.

Use algebra to work out the value of $x$.
You must show all your working.

**(Total for Question 9 is 5 marks)**

**10** The lights and brakes of 50 cars were tested.

10 of the cars failed the lights test.
4 of the cars failed both the lights test and the brakes test.
32 of the cars passed both the lights test and the brakes test.

(a) Draw a Venn diagram to show this information.

**(4)**

One of the 50 cars is chosen at random.

(b) Work out the probability that this car failed the brakes test.

.....

**(2)**

**(Total for Question 10 is 6 marks)**

**11** (a) Simplify $e^{12} \div e^{3}$

.....

**(1)**

(b) Simplify fully $5x^{3}y^{2} \times 2xy^{3}$

.....

**(2)**

**(Total for Question 11 is 3 marks)**

**12** (a) Find the Highest Common Factor (HCF) of 30 and 42

.....

**(2)**

(b) Find the Lowest Common Multiple (LCM) of 30 and 45

.....

**(2)**

**(Total for Question 12 is 4 marks)**

**13** The diagram shows a hexagon *ABCDEF*.

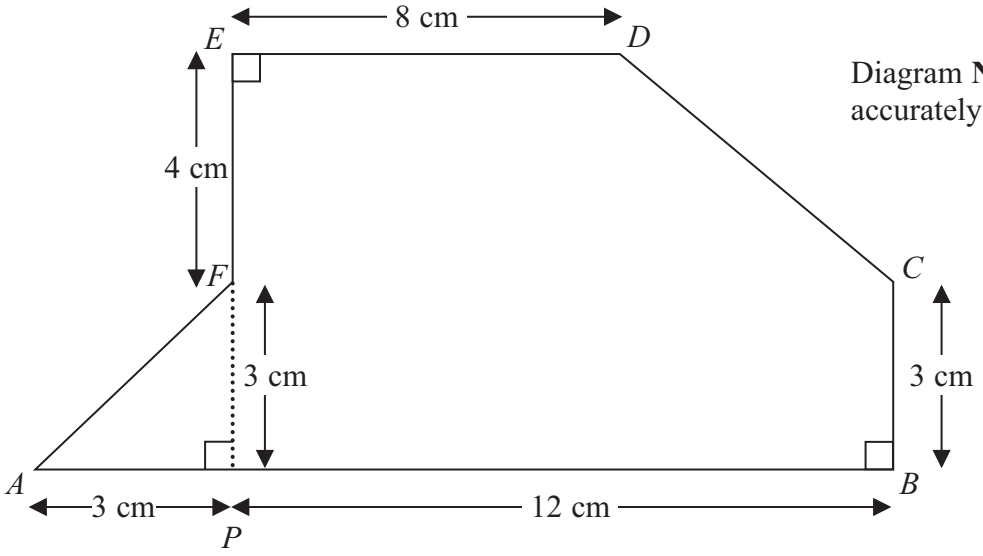



Diagram **NOT** accurately drawn

Work out the area of the hexagon *ABCDEF*.
You must show all stages in your working.

.....

**(Total for Question 13 is 5 marks)**

**14** (a) Write 0.537 in standard form.

.....

**(1)**

(b) Write $9.6 \times 10^4$ as an ordinary number.

.....

**(1)**

**(Total for Question 14 is 2 marks)**

**15** Solve $\frac{5x-1}{3} + \frac{x+4}{2} = 2$

$x =$ .....

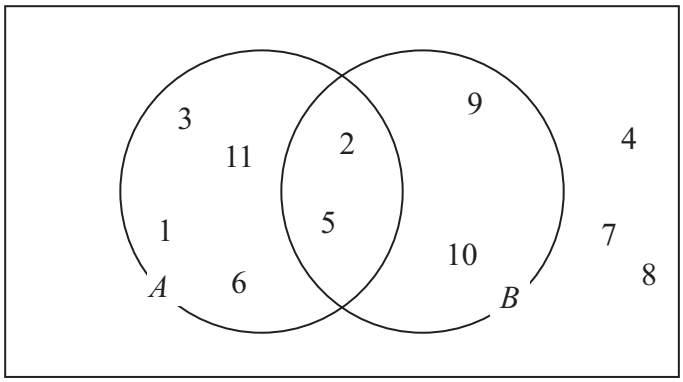
**(Total for Question 15 is 4 marks)**

**16** Work out $3\frac{1}{8} - 1\frac{2}{3}$

.....

**(Total for Question 16 is 3 marks)**

**17** The Venn diagram shows the numbers 1 to 11




(a) Work out P ($A \cup B$)

.....

**(2)**

(b) Work out P ($B'$)

.....

**(2)**

**(Total for Question 17 is 4 marks)**

**18** (a) Write down the value of $100^{\frac{1}{2}}$

.....

**(1)**

(b) Write down the value of $8^0$

.....

**(1)**

(c) Write down the value of $3^{-3}$

.....

**(1)**

(d) $5^x = 125^{-\frac{2}{3}}$

Find the value of $x$.

.....

**(2)**

**(Total for Question 18 is 5 marks)**

**19** Simplify fully $\dfrac{2x^2 - 7x - 4}{x^2 - 16}$

.....

**(Total for Question 19 is 3 marks)**

**20** There are 11 pens in a box.

6 of the pens are black.
3 of the pens are red.
2 of the pens are green.

Henry takes at random two pens from the box.

Work out the probability that he takes one black pen and one green pen.

.....

**(Total for Question 20 is 4 marks)**

***21**

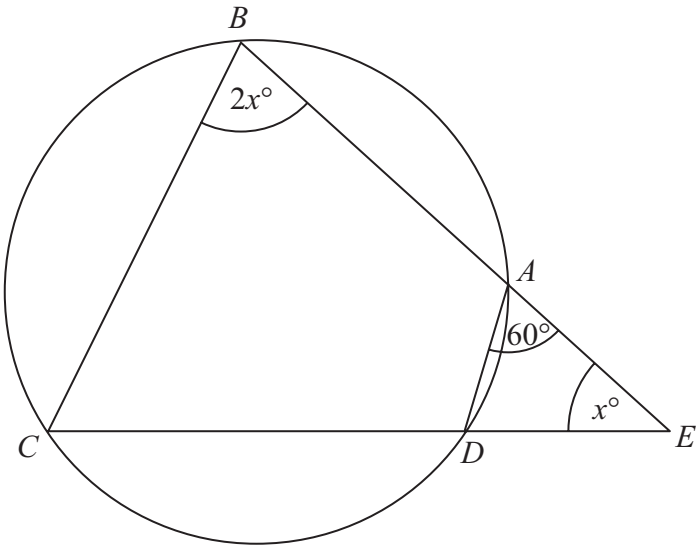



Diagram **NOT** accurately drawn

*ABCD* is a cyclic quadrilateral.
*BAE* and *CDE* are straight lines.
Angle *DAE* = 60°.

Work out the value of *x*.
Give reasons at each stage of your working.

**(Total for Question 21 is 4 marks)**

**22** (a) Given that $x^2 - 8x - 3 = (x - a)^2 - b$ for all values of $x$,

find the value of $a$ and the value of $b$.

$a =$ .....

$b =$ .....

**(2)**

(b) Hence or otherwise, solve $x^2 - 8x - 3 = 0$

Give your answer in the form $p \pm \sqrt{q}$, where $p$ and $q$ are integers.

.....

**(2)**

**(Total for Question 22 is 4 marks)**

**23**

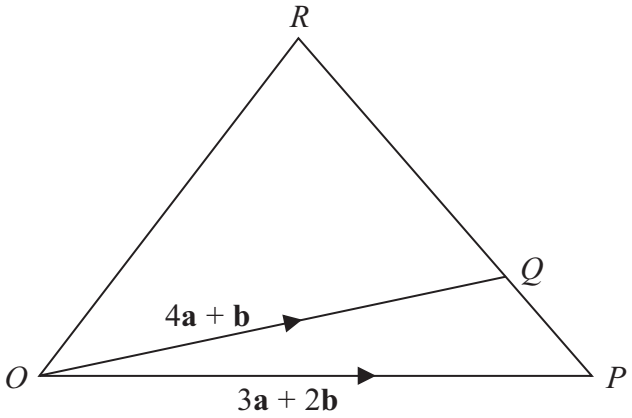



Diagram **NOT** accurately drawn

*OPR* is a triangle.
*PQR* is a straight line.

$\overrightarrow{OP} = 3\mathbf{a} + 2\mathbf{b}$

$\overrightarrow{OQ} = 4\mathbf{a} + \mathbf{b}$

(a) Show that $\overrightarrow{PQ} = \mathbf{a} - \mathbf{b}$

**(1)**

$\overrightarrow{OR} = 8\mathbf{a} - 3\mathbf{b}$

(b) Find the ratio $PQ : QR$ in its simplest form.

**(3)**

**(Total for Question 23 is 4 marks)**

***24** Prove algebraically that the sum of the squares of two consecutive integers is always an odd number.

**(Total for Question 24 is 3 marks)**

**TOTAL FOR PAPER IS 100 MARKS**

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