Write your name here

Surname		Other names

Edexcel GCSE

Centre Number

Candidate Number

Methods in Mathematics
Unit 1: Methods 1

Higher Tier

Practice paper
Time: 1 hour 45 minutes

Paper Reference
5MM1H/01

You must have:
Ruler graduated in centimetres and millimetres, protractor, 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
  – *you should take particular care on these questions with your spelling, punctuation and grammar, as well as the clarity of expression.*

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 ▶
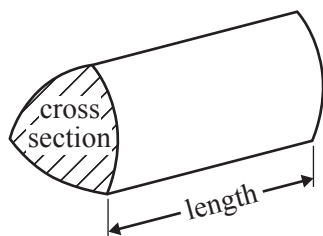
W 4 1 1 1 0 A 0 1 2 0

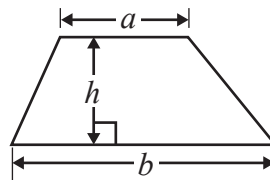**PEARSON**

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.

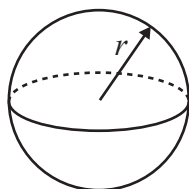**Volume of prism** = area of cross section × length

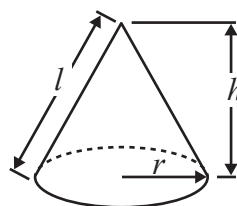**Area of trapezium** $= \frac{1}{2}(a+b)h$

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 $= \pi r l$

In any triangle *ABC*
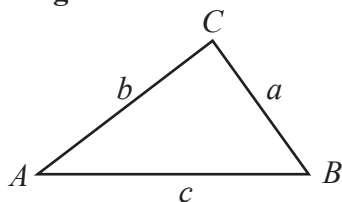
The Quadratic Equation
The solutions of $ax^2 + bx + c = 0$
where $a \neq 0$, are given by
$$x = \frac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}$$

Sine Rule $\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$

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

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

1

A shape **S** has been drawn on a grid of centimetre squares.

(a) Work out the area of shape **S**.

.... cm^2

(2)

(b) Reflect shape **S** in the line $y = x$

(2)

(Total for Question 1 is 4 marks)

2 Here is a Venn diagram.
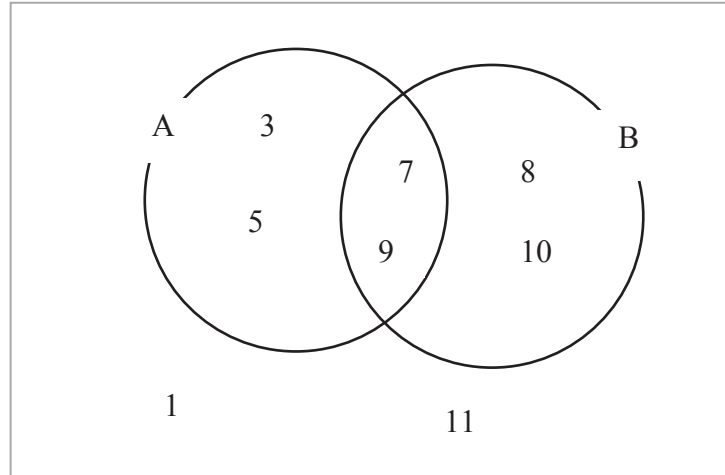
(a) List all the numbers in set A.

....
(1)

(b) List all the numbers which are neither in A nor B.

....
(1)

(c) Write down the numbers in the set A∩B.

....
(1)

A number is selected at random from the Venn diagram.

(d) Find the probability that this number belongs to the set A∪B.

....
(2)

(Total for Question 2 is 5 marks)

*3 Here is a shape made from 3 squares and 2 rectangles.

Diagram **NOT**
accurately drawn
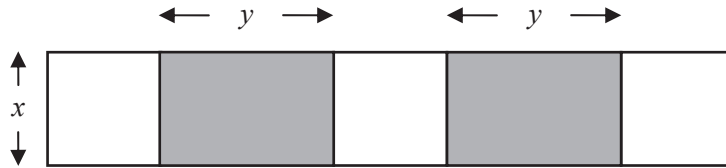
In the diagram all the measurements are in centimetres.

The length of each side of a square is x.

The width of each rectangle is y.

The perimeter is P cm

(a) Show that $P = 8x + 4y$

(3)

Jim claims that $P = 30$ when $x = 4$

Jim is wrong.

(b) Explain why.

(3)

(Total for Question 3 is 6 marks)

W 4 1 1 1 0 A 0 5 2 0

4 Jim has a biased 6-sided dice with the numbers 1 to 6 on it.

The table gives information about the probabilities of getting a 1 or a 2 or a 3 or a 4 when this dice is thrown once.

The probability of getting a 5 is the same as the probability of getting a 6 when the dice is thrown once.

Number	1	2	3	4	5	6
Probability	0.2	0.25	0.3	0.05		

(a) The dice is thrown once.

   (i)   Work out the probability of getting a 1 or a 2

....

   (ii) Work out the probability of getting a 6

....

(4)

The dice is thrown 200 times.

(b) Work out an estimate for the number of times the dice lands on 2

....

(2)

Alanah has another biased dice.

She throws this dice 20 times and gets 3 sixes.

Eri throws the same dice 50 times and gets 7 sixes.

They each use their own results to work out the probability of getting a six.

(c) Who will have the more reliable answer, Alanah or Eri?

You must explain your answer.

(1)

(d) Use all the information to work out an estimate for the probability of getting a six
when this dice is thrown once.

....

(2)

(Total for Question 4 is 9 marks)

5 (a) Write 84 as a product of its prime factors.

....

(2)

(b) Find a number which can be written as the product of 4 different prime numbers.

....

(2)

(c) One factor of 391 is 17

17 has 2 figures.

Find another factor of 391 which has 2 figures.

....

(2)

(Total for Question 5 is 6 marks)

6 Work out an estimate for the value of $\dfrac{9.8 \times 0.091}{\sqrt{80}}$

....

(Total for Question 6 is 3 marks)

7

Diagram **NOT**
accurately drawn
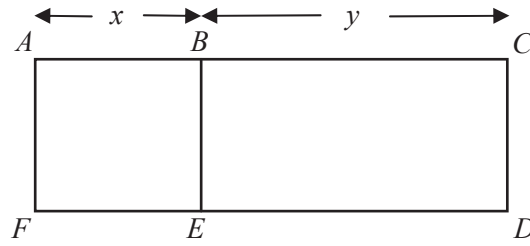
In the diagram all the measurements are in cm.

ABEF is a square.

ACDF is a rectangle.

(a) Find an expression in terms of x and y for the area of the rectangle *ACDF*.

....
(3)

(b) Expand $2(3p - 4q)$

....
(1)

(c) Solve $6(x - 3) = 2x + 10$

....
(3)

(Total for Question 7 is 7 marks)

8 Using the information that $\quad 64 \times 136 = 8704$

(a) write down the value of $\quad 6.4 \times 13.6$

....
(1)

(b) write down the value of $\quad 0.64 \times 0.136$

....
(1)

(c) write down the value of $\quad 0.8704 \div 0.0136$

....
(1)

(Total for Question 8 is 3 marks)

9 (a) On the grid draw the graph of $2x + y = 12$ for values of x from -1 to 5
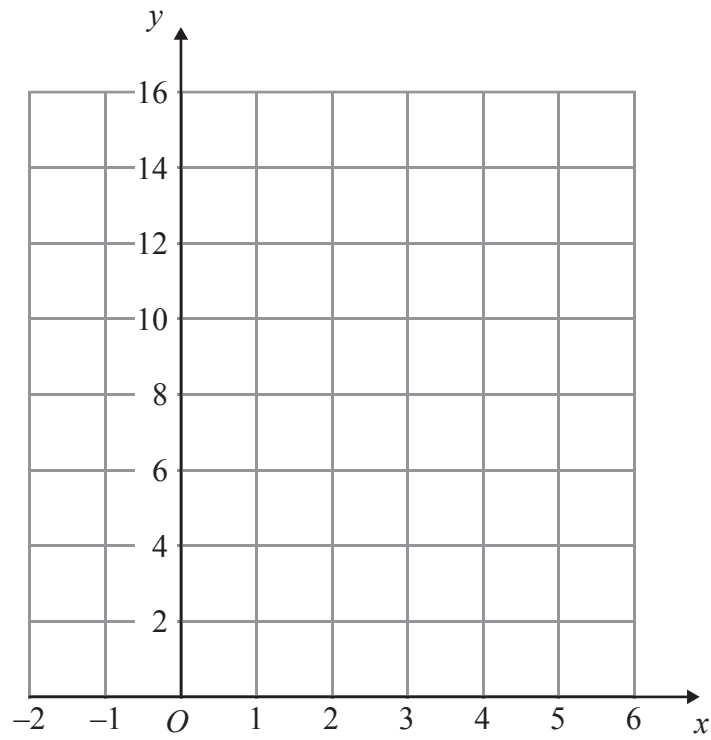
(3)

(b) Find the gradient of the line with equation $2x + y = 12$

....

(2)

(Total for Question 9 is 5 marks)

Turn over ▶

10 (a) Write as a power of 2

   (i) $2^4 \times 2^7$

   ....

   (ii) $2^{10} \div 2^6$

   ....
   (2)

$2^{18} \times 8 = 2^x \div 2$

(b) Work out the value of x.

   ....
   (2)

(Total for Question 10 is 4 marks)

11 (a) Write 20000 in standard form.

   ....
   (1)

(b) Work out $(8 \times 10^5) \times (7 \times 10^4)$

   Give your answer in standard form.

   ....
   (2)

(Total for Question 11 is 3 marks)

12 (a) Expand $x(2x-3)$

....
(1)

(b) Expand $(y+5)(y-3)$

....
(2)

(c) Factorise $t^2 - 25$

....
(1)

(d) Simplify $\dfrac{3}{x} + \dfrac{1}{2x}$

....
(2)

(e) Solve $p^2 - 5p + 6 = 0$

....
(3)

(Total for Question 12 is 9 marks)

Turn over ▶

*13 (i) *O* is the centre of the circle.

P is a point on the circle.

Write down the size of the angle marked *x*.
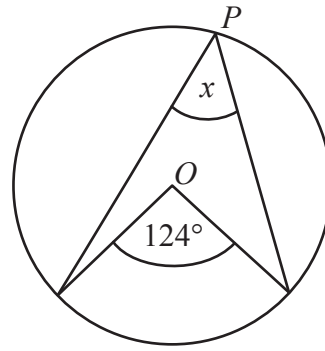
Diagram **NOT** accurately drawn

.... °

(ii) *A*, *B*, *C* and *D* are 4 points on a circle, centre *O*.

Angle *ABD* = 30°

Angle *DOC* = 124°

Calculate the size of angle *ADC*.

You must give reasons for each stage of your calculation.
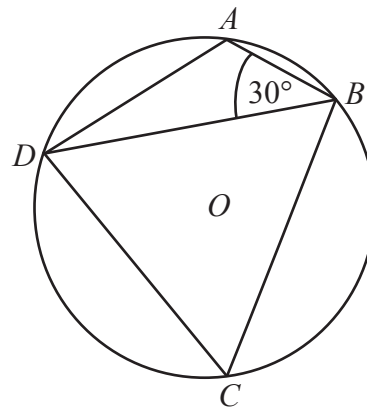

Diagram **NOT** accurately drawn

(4)

(Total for Question 13 is 5 marks)

14 The first 4 terms of a quadratic sequence are

              12   21   32   45

(a) Find the 5th term of this sequence.

....

(1)

(b) Find an expression, in terms of n for the nth term of this sequence.

....

(3)

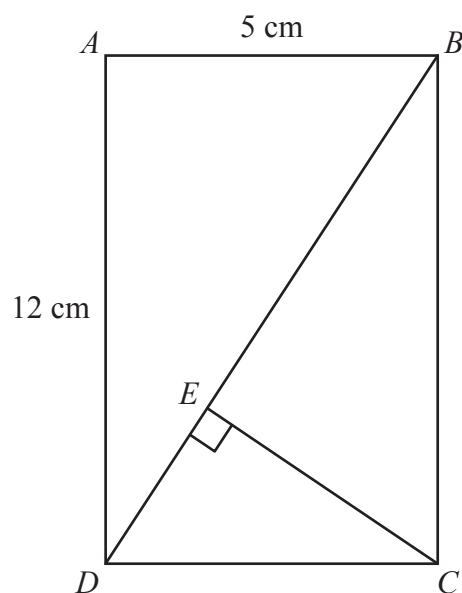**(Total for Question 14 is 4 marks)**

*15 *ABCD* is a rectangle.

AB = 5 cm.

AD = 12 cm.

E is the point on *BD*
such that angle *CED* = 90°.

(a) Prove that triangle *DEC*
    is similar to triangle *BAD*.

A ———— 5 cm ———— B

12 cm

E

D ———— C

(3)

Given that *BD* = 13 cm,

(b) work out the length of *CE*.

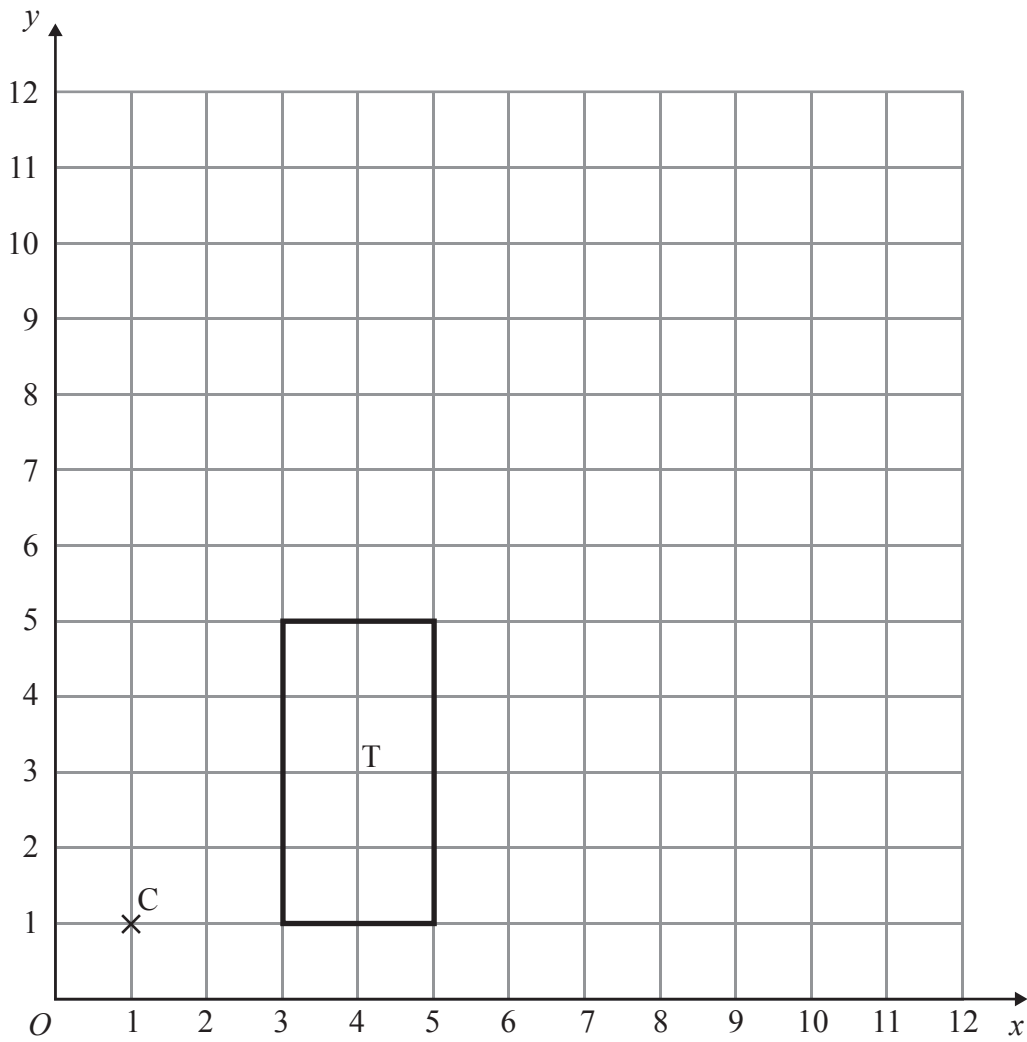.. cm

(2)

(Total for Question 15 is 5 marks)

16

(a) Enlarge shape T by scale factor 2.5 centre C (1, 1). Label the enlarged shape U.

(3)

Shape U is enlarged by scale factor 0.5, centre D (0, 8) to give shape V.

(b) Work out the fraction $\dfrac{\text{area of shape V}}{\text{area of shape T}}$

Give your answer in its simplest form.

....

(3)

(Total for Question 16 is 6 marks)

Turn over ▶

17

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |

The diagram shows 7 tiles.

Each tile has a number.

The tiles are placed in a bag.

Jim takes a tile at random from the bag and notes its number.

He does not replace the tile.

Then, Nelly takes a tile at random from the bag and notes its number.

(a) Find the probability that the number on the tile that Nelly takes is greater than the number on the tile that Jim takes.

(4)

The bag is emptied and the tile with the number 7 on it is replaced by another tile with a number 6 on it (so that there are now two tiles with the number 6)

The tiles are put back in the bag.

Jim takes a tile at random from the bag and notes its number.

He does not replace the tile.

Then Nelly takes a random from the bag and notes its number.

(b) Has the probability that Nelly takes a number greater than Jim takes increased?
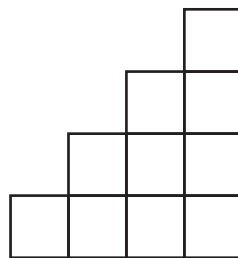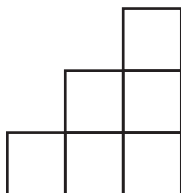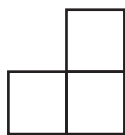
You must explain your answer.

(2)

(Total for Question 17 is 6 marks)

18 Here is a sequence of triangular patterns.

| 1st | 2nd | 3rd | 4th |

The number of centimetre squares in the patterns above represents the first 4 triangular numbers.

$$1 \qquad 3 \qquad 6 \qquad 10$$

(a) Show that the sum of the 4th and 5th triangular numbers is a square number.

....

(1)

An expression for the nth triangular number is $\dfrac{n(n+1)}{2}$

(b) Prove that the sum of any two consecutive triangular numbers is a square number.

....

(4)

(Total for Question 18 is 5 marks)

19 (a) Expand and simplify $\left(1+\sqrt{2}\right)^2$

....
(2)

(b) Show that $x = 1 + \sqrt{2}$ is a solution of the quadratic equation

$$x^2 - 2x = 1$$

....
(2)

(c) Find the other solution of the equation

$$x^2 - 2x = 1$$

....
(1)

(Total for Question 19 is 5 marks)

TOTAL FOR PAPER IS 100 MARKS