Write your name here

Surname		Other names

Centre Number

Candidate Number

Mathematics B
Unit 2: Number, Algebra, Geometry 1 (Non-Calculator)

Higher Tier

Friday 6 November 2015 – Morning	Paper Reference
Time: 1 hour 15 minutes	**5MB2H/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 60
- 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.
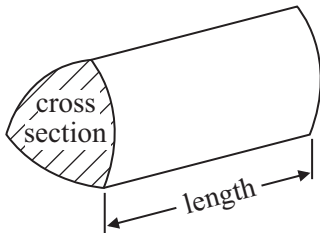
Turn over ▶

PEARSON

P 4 5 9 0 3 A 0 1 2 0
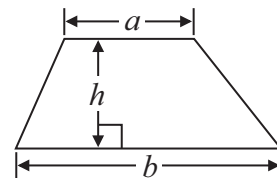
GCSE Mathematics 2MB01

Formulae: Higher Tier

You must not write on this formulae page.
Anything you write on this formulae page will gain NO credit.

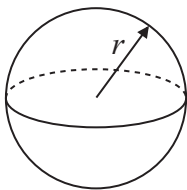**Volume of prism** = area of cross section × length
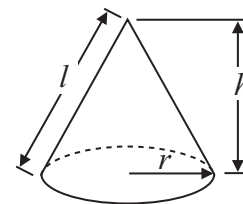

Area of trapezium = $\frac{1}{2}(a + b)h$

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

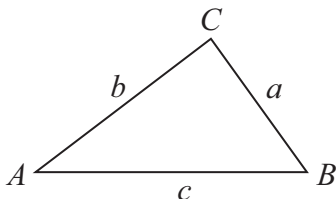**Surface area of sphere** = $4\pi r^2$

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

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   Here are the ingredients needed to make leek and potato soup for 4 people.

> **Leek and potato soup**
>
> **Serves 4**
>
> 4 leeks
>
> 350 g potatoes
>
> 600 m*l* vegetable stock
>
> 300 m*l* milk

Jenny wants to make soup for 6 people.

Work out the amount of each ingredient she needs.

.... leeks

.... g potatoes

.... m*l* vegetable stock

.... m*l* milk

(Total for Question 1 is 3 marks)
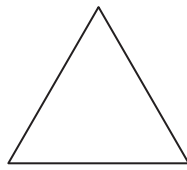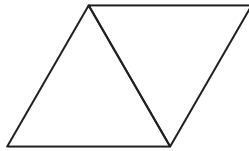
2 Here is an equilateral triangle.

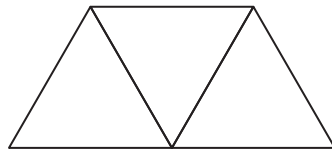Diagram **NOT** accurately drawn

The equilateral triangle has a perimeter of 24 cm.
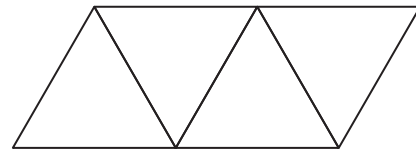
Some of these equilateral triangles are used to make this sequence of quadrilaterals.

quadrilateral 1   quadrilateral 2   quadrilateral 3

Find an expression for the perimeter, in centimetres, of quadrilateral n.

....

(Total for Question 2 is 3 marks)

3 The diagram shows the area of each of three faces of a cuboid.
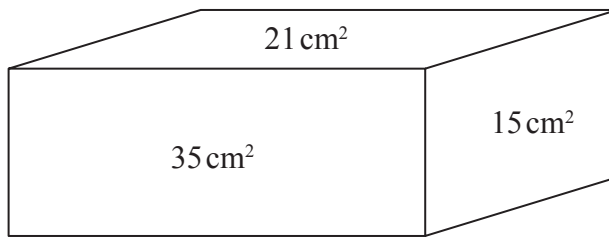

Diagram **NOT** accurately drawn

21 cm²

15 cm²

35 cm²
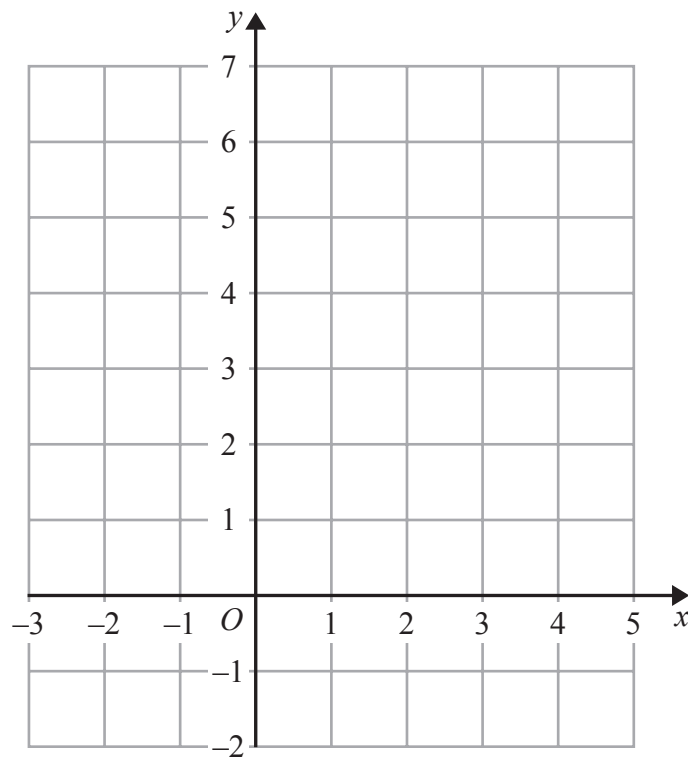
The length of each edge of the cuboid is a whole number of centimetres.

Work out the volume of the cuboid.

....

(Total for Question 3 is 4 marks)

4 On the grid, draw the graph of $y = \dfrac{1}{2}x + 3$ for values of x from -2 to 4

(Total for Question 4 is 3 marks)

5 Andy is going to cover a wall with tiles.

Diagram **NOT** accurately drawn

wall   2.5 m

3 m

tile 25 cm
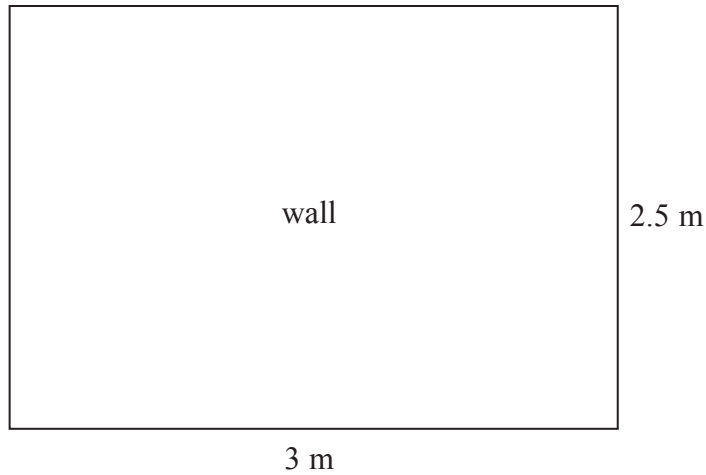
20 cm

The wall is in the shape of a rectangle.
The wall is 3 m wide and 2.5 m high.
The tiles are rectangles 20 cm wide and 25 cm high.

The tiles are sold in boxes.
There are 20 tiles in each box.
Each box of tiles costs £8.50

Work out the total cost of the boxes of tiles Andy needs to buy.
You must show all your working.

£ ....

(Total for Question 5 is 5 marks)

*6 The *n*th term of sequence A is $3n - 2$
The *n*th term of sequence B is $10 - 2n$

Sally says there is only one number that is in both sequence A and sequence B.

Is Sally right?
You must explain your answer.

<div align="right">(Total for Question 6 is 2 marks)</div>

7 Tom and Amy set the alarms on their phones to sound at 6.45 am.

Both alarms sound together at 6.45 am.
Tom's alarm then sounds every 9 minutes.
Amy's alarm then sounds every 12 minutes.

At what time will both alarms next sound together?

....

(Total for Question 7 is 3 marks)

8 (a) Factorise $12e + 4$

....

(1)

(b) Expand $5(3c - 2d)$

....

(1)

(c) Simplify $7a^3b^{-2} \times 4ab^5$

....

(2)

(d) Factorise $x^2 - 49$

....

(1)

(e) Expand and simplify $(2y + 7)(y - 3)$

....

(2)
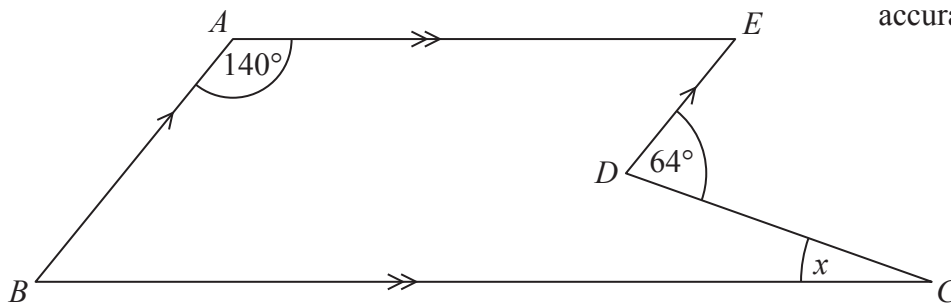
(Total for Question 8 is 7 marks)

*9 The diagram shows a pentagon *ABCDE*.

Diagram **NOT** accurately drawn

AE is parallel to *BC*.
BA is parallel to *DE*.

Angle *EDC* = 64°
Angle *BAE* = 140°

Work out the size of the angle marked *x*.
You must give reasons for your answer.

(Total for Question 9 is 4 marks)

10 Work out $3\dfrac{4}{5} + \dfrac{3}{7}$

Give your answer as a mixed number in its simplest form.

....

(Total for Question 10 is 3 marks)

11 (a) Write 0.0078 in standard form.

....
(1)

(b) Write 6.71×10^6 as an ordinary number.

....
(1)

(c) Write these numbers in order of size.

Start with the smallest number.

$$9^{\frac{1}{2}} \qquad 0.9 \qquad -9 \qquad 9^0$$

....
(2)

(Total for Question 11 is 4 marks)
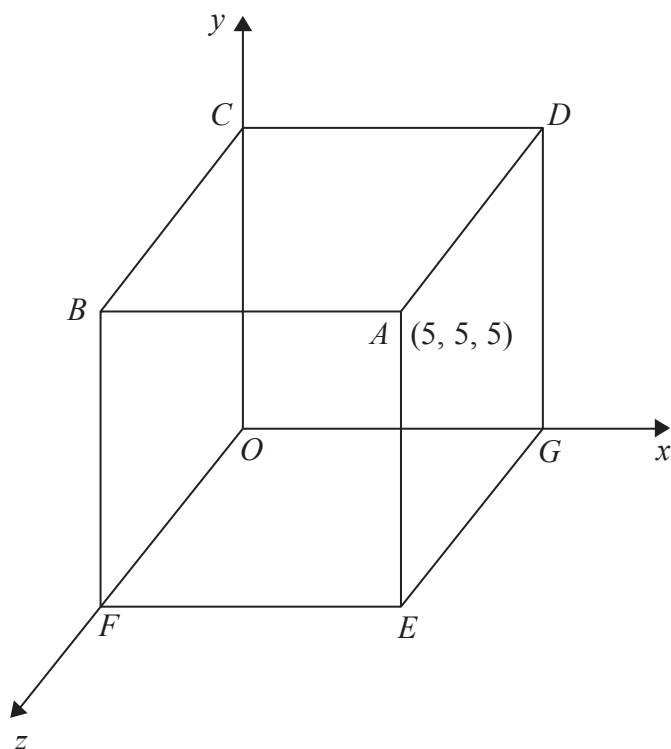
12 The diagram shows a cube drawn on a 3-D grid.

Diagram **NOT** accurately drawn

The coordinates of vertex *A* are (5, 5, 5).

(a) Write down the coordinates of vertex *B*.

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

(1)

(b) Work out the coordinates of the midpoint of *AC*.

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

(1)

(Total for Question 12 is 2 marks)

P 4 5 9 0 3 A 0 1 3 2 0

13 Kristen buys a laptop.

She gets a discount of 20% off the normal price.
Kristen pays £480 for the laptop.

Work out the discount.
Give your answer in pounds.

£ ....

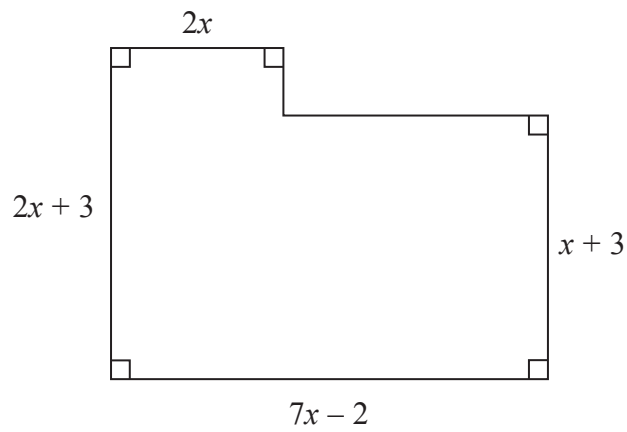**(Total for Question 13 is 3 marks)**

14

2x

Diagram **NOT** accurately drawn

2x + 3

x + 3

7x − 2

All the measurements in the diagram are in centimetres.

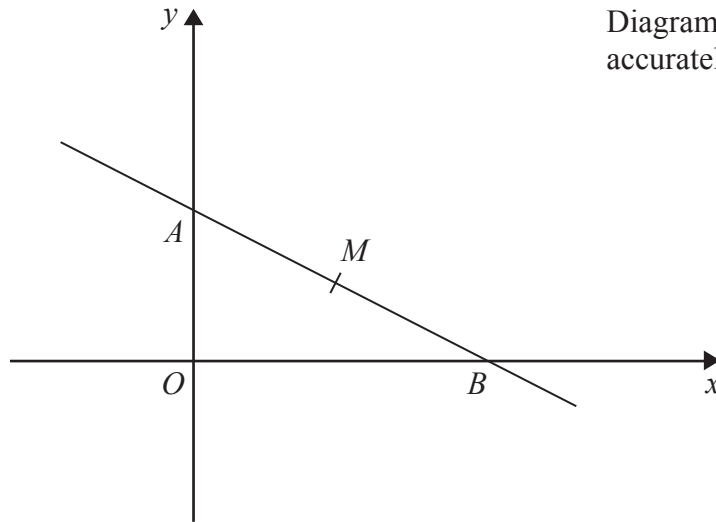The area of the shape is A cm^2.

Find a formula for A in terms of x.
You must write your formula as simply as possible.

....

(Total for Question 14 is 4 marks)

Turn over ▶

15

Diagram **NOT** accurately drawn

In the diagram   *A* is the point (0, 4)
                 B is the point (6, 0)

M is the midpoint of *AB*.

Find an equation of the line that passes through *M* and is perpendicular to *AB*.

....

(Total for Question 15 is 4 marks)

16 Rationalise the denominator of $\dfrac{(4 + \sqrt{2})(4 - \sqrt{2})}{\sqrt{7}}$

Give your answer in its simplest form.

....

(Total for Question 16 is 3 marks)

17 Simplify fully $\dfrac{x^2 - 2x - 15}{2x^2 + 7x + 3}$

....

(Total for Question 17 is 3 marks)

TOTAL FOR PAPER IS 60 MARKS

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