Please check the examination details below before entering your candidate information

Candidate surname   Other names

Centre Number   Candidate Number

Pearson Edexcel International GCSE

Monday 13 November 2023

Morning (Time: 1 hour 30 minutes)

Paper reference **4MB1/01**

Mathematics B
PAPER 1

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.**

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.
- Without sufficient working, correct answers may be awarded no marks.

Turn over

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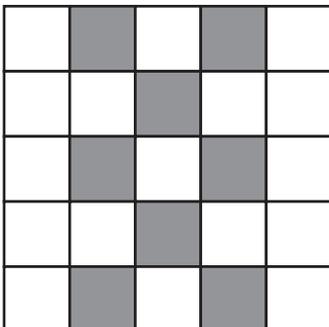
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Pearson

Answer all TWENTY EIGHT questions.

Write your answers in the spaces provided.

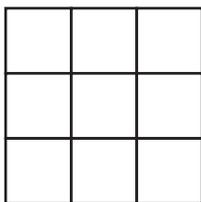**You must write down all the stages in your working.**

1   A pattern is made with grey and white squares.

(a) Write down the order of rotational symmetry for this pattern.

....

(1)

(b) Shade, on the grid below, exactly 5 squares to make a pattern with 4 lines of symmetry.

(1)

(Total for Question 1 is 2 marks)

2

$$-3 \qquad 4 \qquad \frac{3}{2} \qquad \sqrt{3}$$

Write down a number from the above list that is

(a) both a rational number and a natural number,

....

(1)

(b) an irrational number.

....

(1)

(Total for Question 2 is 2 marks)

3 The nth term of a sequence is given by $3n^2 - 20$

Find the difference between the 4th term and the 5th term of this sequence.

....

(Total for Question 3 is 2 marks)

4 Using ruler and compasses only and **showing all your construction lines**, construct the bisector of angle *FGH*

F

H

G
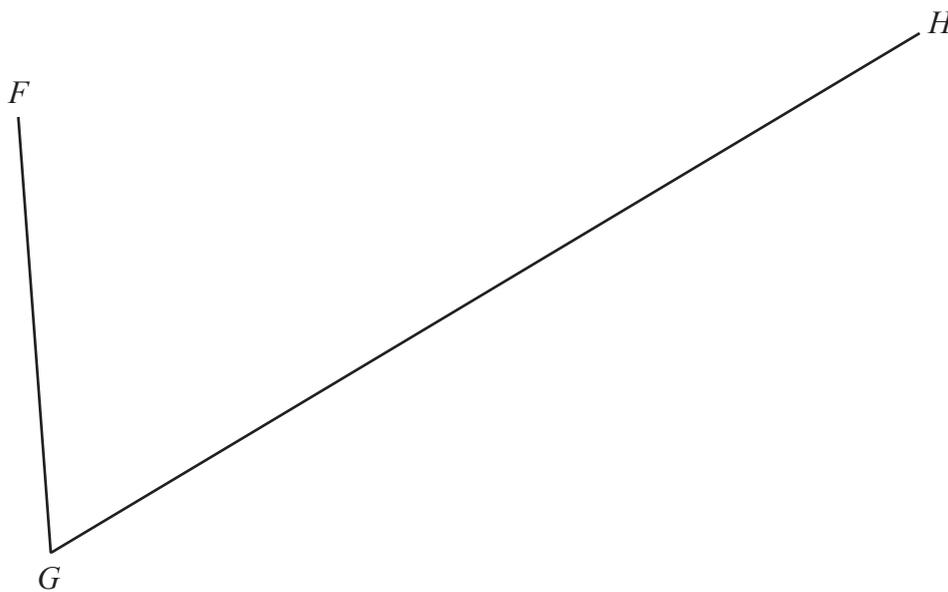
(Total for Question 4 is 2 marks)

Turn over ▶

5 Without using a calculator and showing all your working, work out

$$2\frac{1}{3} \div 1\frac{1}{5}$$

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

....

(Total for Question 5 is 2 marks)

6 Factorise fully $5mp^2 - 10p$

....

(Total for Question 6 is 2 marks)

7 Harpreet has been given

$2^2 \times 3 \times 5^5 \times 7$ red bricks

$2^2 \times 5^4 \times 7^2$ green bricks

$2^4 \times 3^2 \times 5^3 \times 7$ blue bricks

Harpreet is asked to arrange the bricks in rows according to the following rules.

Each row must contain just one colour of brick.
Each row must contain the same number of bricks.

Calculate the maximum number of bricks there can be in a row.

....

(Total for Question 7 is 2 marks)

8 Given that $\mathbf{a} = \begin{pmatrix} 7 \\ -3 \end{pmatrix}$ find the exact value of $|\mathbf{a}|$

....

(Total for Question 8 is 2 marks)

Turn over ▶

9 A car travels at an average speed of $80\,km/h$ for 2.5 hours and then travels a further distance of 25 km in 0.5 hours.

Calculate the average speed, in km/h, of the car for the whole journey.

.... km/h

(Total for Question 9 is 3 marks)

10 In a survey, 32 students were asked whether they study either History (H) or Geography (G).

Given that, of these students, $2x - 5$ study Geography and $5x - 1$ study History

(a) complete the Venn diagram for this information, giving the missing value in terms of x

(1)
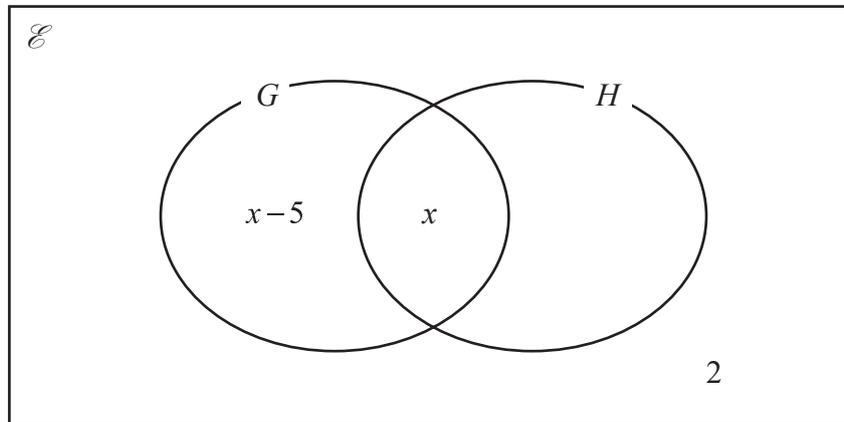
(b) Calculate the value of x

$x =$ ....

(2)

(Total for Question 10 is 3 marks)

11 Calculate the mean of the two numbers 4×10^{100} and 3.6×10^{101}
Give your answer in standard form.

....

(Total for Question 11 is 3 marks)

12
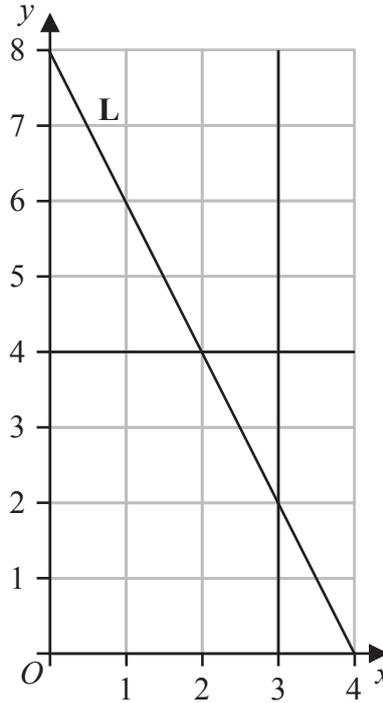
The diagram above shows the line **L** with equation $y = mx + c$, the line with equation $y = 4$ and the line with equation $x = 3$

(a) Find the value of m and the value of c

$m = $ ....

$c = $ ....

(2)

(b) On the grid, shade and label the region **R** defined by

$$0 \leqslant y \leqslant 4 \quad \text{and} \quad 0 \leqslant x \leqslant 3 \quad \text{and} \quad y \leqslant mx + c$$

(1)

(Total for Question 12 is 3 marks)

Turn over ▶

13 Simplify $\dfrac{x^3 + x^2}{x^2 + 3x + 2}$

....

(Total for Question 13 is 3 marks)

14 A bag contains red pens, blue pens, black pens, green pens and purple pens.

A pen is selected at random from the bag.
The table gives information about the probability of the colour of the pen that is selected.

Colour	red	blue	black	green	purple
Probability	0.25	0.10	$3y + 0.15$	x	y

Tisam draws a pie chart to show the information about the number of pens of each colour in the bag. The size of the angle of the sector representing green pens is 50.4°

(a) Show that $x = 0.14$

(1)

(b) Calculate the value of y

$y = $ ....

(3)

(Total for Question 14 is 4 marks)

15 A bag contains red counters, blue counters and yellow counters such that

number of red counters : number of blue counters = 5 : 2
number of blue counters : number of yellow counters = 3 : 4

The number of yellow counters in the bag is 56
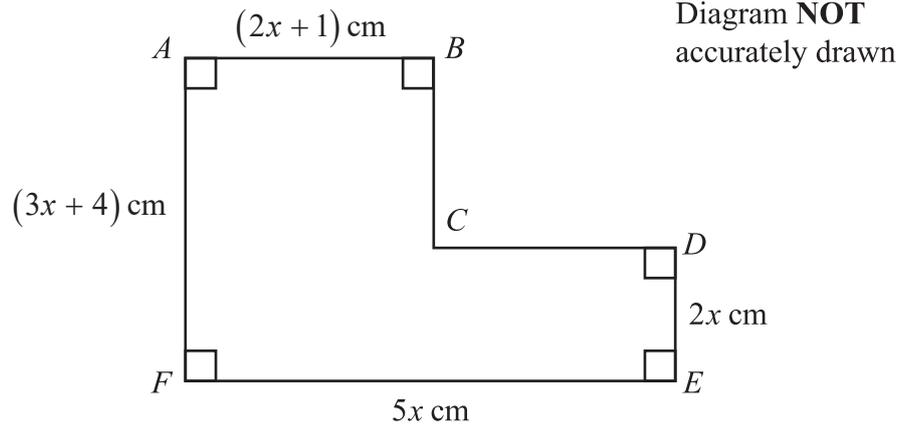
Calculate the total number of counters in the bag.

....

(Total for Question 15 is 4 marks)

16 Here is hexagon *ABCDEF*

Diagram **NOT** accurately drawn

$AB = (2x + 1)\,\text{cm}$ $DE = 2x\,\text{cm}$ $FE = 5x\,\text{cm}$ $AF = (3x + 4)$

The perimeter of the hexagon is 40 cm.

Find the area, in cm^2, of the hexagon.

.... cm^2

(Total for Question 16 is 4 marks)

17

$$\mathbf{A} = \begin{pmatrix} 2 & -1 \\ 4 & 3 \end{pmatrix} \qquad \mathbf{B} = \begin{pmatrix} -3 & -1 \\ 2 & 7 \end{pmatrix}$$

(a) Calculate $3\mathbf{A} - 2\mathbf{B}$

$$\begin{pmatrix} & \\ & \end{pmatrix}$$

(2)

$$\mathbf{B} = \begin{pmatrix} -3 & -1 \\ 2 & 7 \end{pmatrix} \qquad \mathbf{C} = \begin{pmatrix} p & -3 \\ 4 & 1 \end{pmatrix} \qquad \mathbf{BC} = \begin{pmatrix} -10 & 8 \\ 32 & 1 \end{pmatrix}$$

(b) Calculate the value of p

$p = $ ....

(2)

(Total for Question 17 is 4 marks)

18
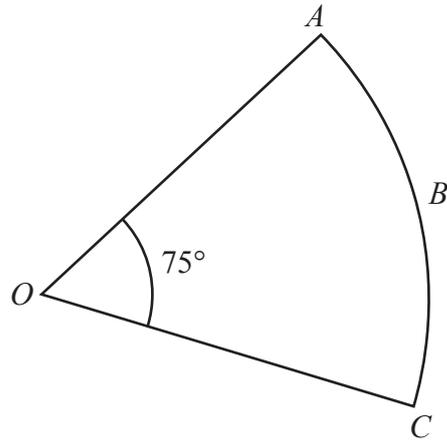
Diagram **NOT** accurately drawn

OABC is a sector of a circle, centre *O*, with ∠*AOC* = 75°
The arc length *ABC* = 54 cm.

Calculate the area, in cm^2 to 2 significant figures, of the sector.

.... cm^2

(Total for Question 18 is 4 marks)

19 The diagram shows two mathematically similar solids, **A** and **B**

Diagram **NOT** accurately drawn
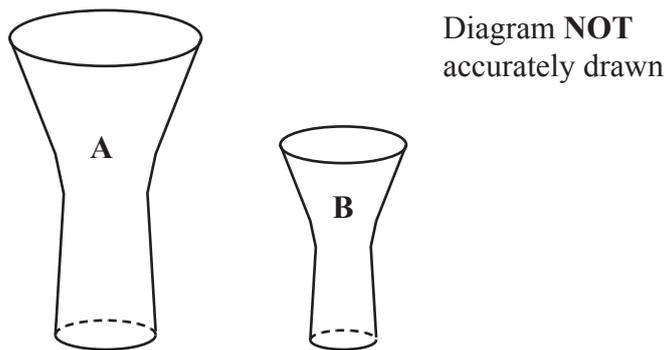
The volume of solid **B** is 43% less than the volume of solid **A**

The total surface area of solid **A** is 700 cm^2

Work out the total surface area, in cm^2 to 3 significant figures, of solid **B**

.... cm^2

(Total for Question 19 is 4 marks)

20
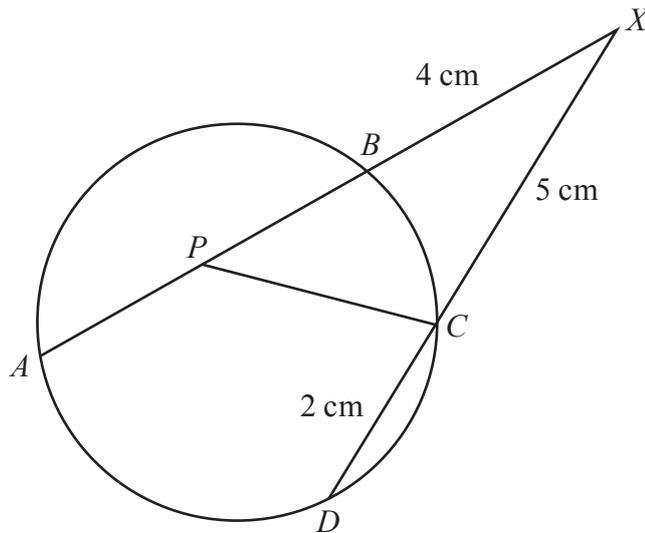
4 cm

Diagram **NOT**
accurately drawn

5 cm

2 cm

A, *B*, *C* and *D* are four points on a circle.
P is the midpoint of *AB*

APBX is a straight line.
DCX is a straight line.

$BX = 4$ cm $CX = 5$ cm $DC = 2$ cm $\angle PCX = 115°$

Calculate, in degrees to one decimal place, $\angle BPC$

$\angle BPC =$ .... °

(Total for Question 20 is 5 marks)

21 (a) Express $3x^2 + 6x - 9$ in the form $p(x + q)^2 + r$ where p, q and r are integers to be found.

....

(3)

(b) Hence, or otherwise, solve the equation $3x^2 + 6x - 9 = 0$ without using a calculator. Show your working clearly.

....

(2)

(Total for Question 21 is 5 marks)

Turn over ▶

22 A particle is moving along a straight line. At time t seconds, the displacement, x metres, of the particle from a fixed point O on the line is given by

$$x = 2t^3 - 8t^2 + 15t$$

At time t seconds, the velocity of the particle is v m/s

(a) Find an expression for v in terms of t

$v = $ ....

(2)

(b) Find the least speed, in m/s, of the particle.

.... m/s

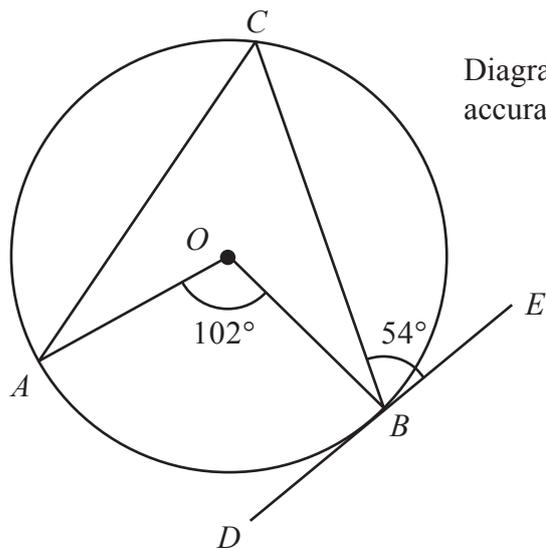(3)

(Total for Question 22 is 5 marks)

23

Diagram **NOT** accurately drawn

In the diagram, *A*, *B*, and *C* are points on a circle, centre *O*
DBE is the tangent to the circle at the point *B*

$$\angle EBC = 54° \qquad \angle AOB = 102°$$

Find, in degrees, the size of $\angle OCA$
Give reasons for each stage of your working.

$\angle OCA = $ .... °

(Total for Question 23 is 6 marks)

24 A box contains n buttons.

The buttons are either red or blue such that

number of red buttons : number of blue buttons $= 3 : 5$

A sample of 2 buttons is taken at random from the bag.

Given that the probability of the 2 buttons being the same colour is $\dfrac{10}{19}$

find the value of n

(6)

$n =$ ....

(Total for Question 24 is 6 marks)

25 Make h the subject of $p = \dfrac{2h + 5}{h}$

....

(Total for Question 25 is 3 marks)

26

Diagram **NOT**
accurately drawn
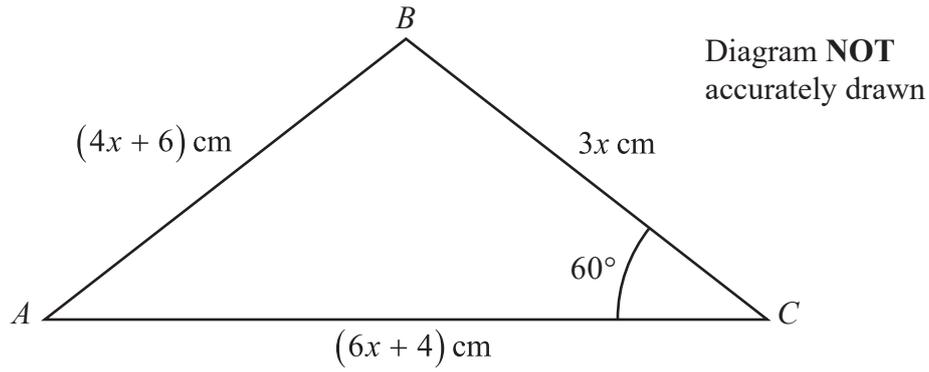
The diagram shows triangle ABC

$$AB = (4x + 6) \text{ cm}$$
$$BC = 3x \text{ cm}$$
$$AC = (6x + 4) \text{ cm}$$
$$\angle ACB = 60°$$

Find the area, in cm² to 3 significant figures, of triangle ABC

(6)

.... cm^2

(Total for Question 26 is 6 marks)

27 (a) Write $\sqrt{8}$ in the form $a\sqrt{b}$ where a and b are prime numbers.

....

(1)

(b) Without using your calculator and showing all your working

express $\dfrac{6 + 2\sqrt{3}}{3\sqrt{2} - \sqrt{8}}$ in the form $\sqrt{p} + \sqrt{q}$ where p and q are integers.

....

(2)

(Total for Question 27 is 3 marks)

Turn over ▶

28

$$f(x) = 12x^3 - 4x^2 - 25x + 14$$

(a) Use the factor theorem to show that $(3x - 4)$ is **not** a factor of $f(x)$

(2)

$$g(x) = f(x) - 2$$

(b) Factorise fully $g(x)$
Show clear algebraic working.

(4)

(Total for Question 28 is 6 marks)

TOTAL FOR PAPER IS 100 MARKS