Please check the examination details below before entering your candidate information

Candidate surname | Other names

Centre Number | Candidate Number

Pearson Edexcel International GCSE

Thursday 18 May 2023

Morning (Time: 1 hour 30 minutes) | **Paper reference** **4MB1/01R**

Mathematics B
PAPER 1R

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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Answer all TWENTY SIX questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 Find the Lowest Common Multiple (LCM) of 12, 14 and 15
Show your working clearly.

....

(Total for Question 1 is 2 marks)

2 Without using your calculator and showing each stage of your working, calculate

$$1\frac{1}{5} \times \frac{7}{12}$$

Give your answer as a fraction in its simplest form.

....

(Total for Question 2 is 2 marks)

3 (a) Simplify $5x^2 + 3x^2$
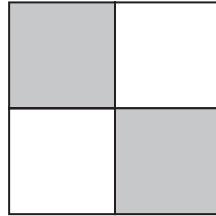
....
(1)

(b) Simplify $2y^2 \times 3y^3$

....
(1)

**(Total for Question 3 is 2 marks)**
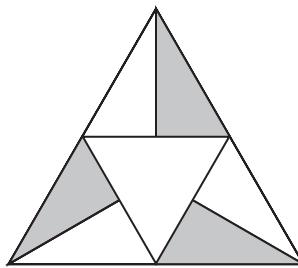
4

The shape above is made from four squares. Two of the squares are shaded.

(a) Draw, on the shape above, all the lines of symmetry of the shape.

(1)

The shape above is made from four identical equilateral triangles. Three of the triangles are half shaded.

(b) Write down the order of rotational symmetry of the shape.

....
(1)

(Total for Question 4 is 2 marks)

5 Here are the first 5 terms of a sequence

$$3 \qquad 10 \qquad 17 \qquad 24 \qquad 31$$

(a) Write down the next 2 terms of the sequence.

.... , ...

(1)

The 15th term of the sequence is 101

(b) Find the 12th term of the sequence.

....

(1)

(Total for Question 5 is 2 marks)

6 Factorise $x^2 - 5x - 14$

....

(Total for Question 6 is 2 marks)

7 Here are ten numbers

$$3 \quad 5 \quad 8 \quad 5 \quad 2 \quad 7 \quad 9 \quad 11 \quad 5 \quad 10$$

(a) Write down the mode.

....
(1)

(b) Find the median.

....
(2)

(Total for Question 7 is 3 marks)

8 A regular polygon has 24 sides.

Calculate the size, in degrees, of each interior angle of the regular polygon.

°
....

(Total for Question 8 is 3 marks)

9   Make g the subject of $T = \sqrt{\dfrac{2r}{g}}$

....

(Total for Question 9 is 2 marks)

10 Given that $y = 5x^4 + x^2(3x + 1)$

find $\dfrac{dy}{dx}$

$\dfrac{dy}{dx} =$ ....

(Total for Question 10 is 3 marks)
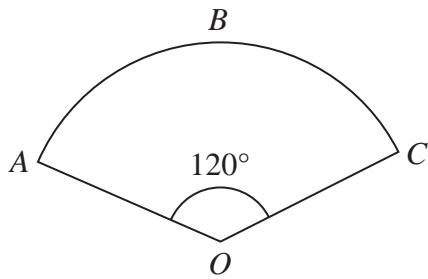
11

Diagram **NOT** accurately drawn

ABC is an arc of a circle centre *O*

Angle *AOC* is 120°
Sector *OABC* has an area of $48\pi \, \text{cm}^2$

Find, in terms of π, the length of the perimeter of *OABC*

.... cm

(Total for Question 11 is 3 marks)

12 Solve $\dfrac{x+2}{6} + \dfrac{x-3}{4} = 5$

Show clear algebraic working.

$x = $ ....

(Total for Question 12 is 3 marks)

13 For the two non-zero, non-parallel vectors **a** and **b**

$$5(3\mathbf{a} - \mathbf{b}) - p(\mathbf{a} + 2\mathbf{b}) = q\mathbf{b}$$

where p and q are scalars.

Find the value of p and the value of q

$p = $ ....

$q = $ ....

(Total for Question 13 is 3 marks)

14 A factory makes bottles.

Of all the bottles the factory made on Monday

7% are made by machine **A**
12% are made by machine **B**

Let y be the total number of bottles that the factory made on Monday.

(a) Write down an expression, in terms of y, for the number of bottles that machine **A** made on Monday.

....
(1)

On Monday machine **B** made 60 more bottles than machine **A**

(b) Find the value of y

$y = $ ....
(3)

(Total for Question 14 is 4 marks)

15 Solve the simultaneous equations

$$20x + 7y = 4$$
$$2x - 2y = -5$$

Show clear algebraic working.

$x =$ ....

$y =$ ....

(Total for Question 15 is 4 marks)

16 208 students travelled to school by bus, which is 10.4% of the students in the school.
510 students walk to school.
The remaining students travel to school by car.

Calculate the percentage of students who travel to school by car.

....%

(Total for Question 16 is 4 marks)

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17 A model of a train is made to a scale of $1:48$

The engine of the train has a length of $16.1\,\text{m}$

(a) Calculate, in cm to 3 significant figures, the length of the engine of the model.

.... cm

(2)

The volume of a carriage on the model is $995\,\text{cm}^3$

(b) Calculate, in m^3 to 3 significant figures, the volume of this carriage on the train.
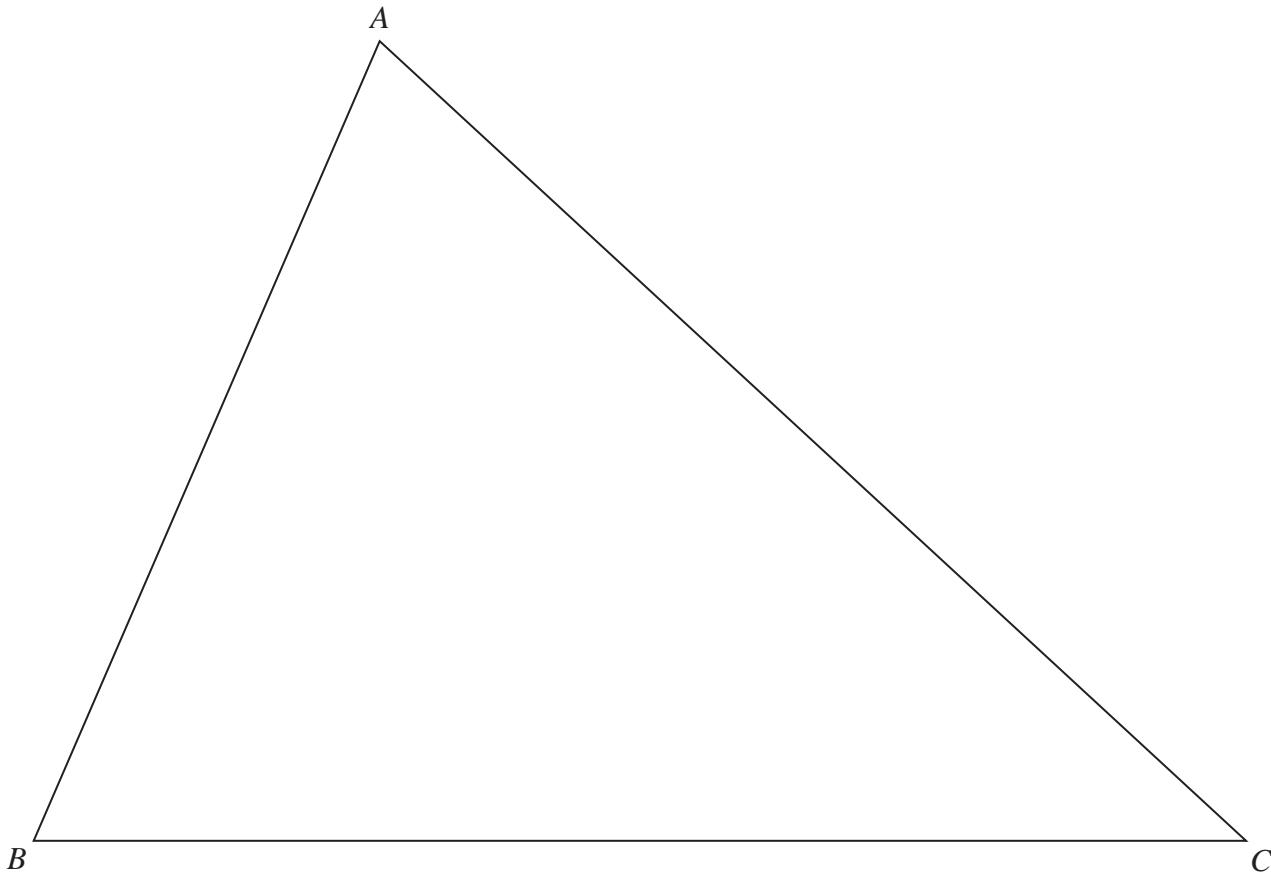
.... m^3

(3)

(Total for Question 17 is 5 marks)

18 The diagram shows triangle *ABC*

A

B   *C*

The point *P* is inside the triangle *ABC* such that

       P is the same distance from *AB* and *BC*
       P is 10 cm from the point *C*

Using ruler and compasses only and **showing all your construction lines**,

find and label the point *P*

**(Total for Question 18 is 4 marks)**

19 In a class of 30 students
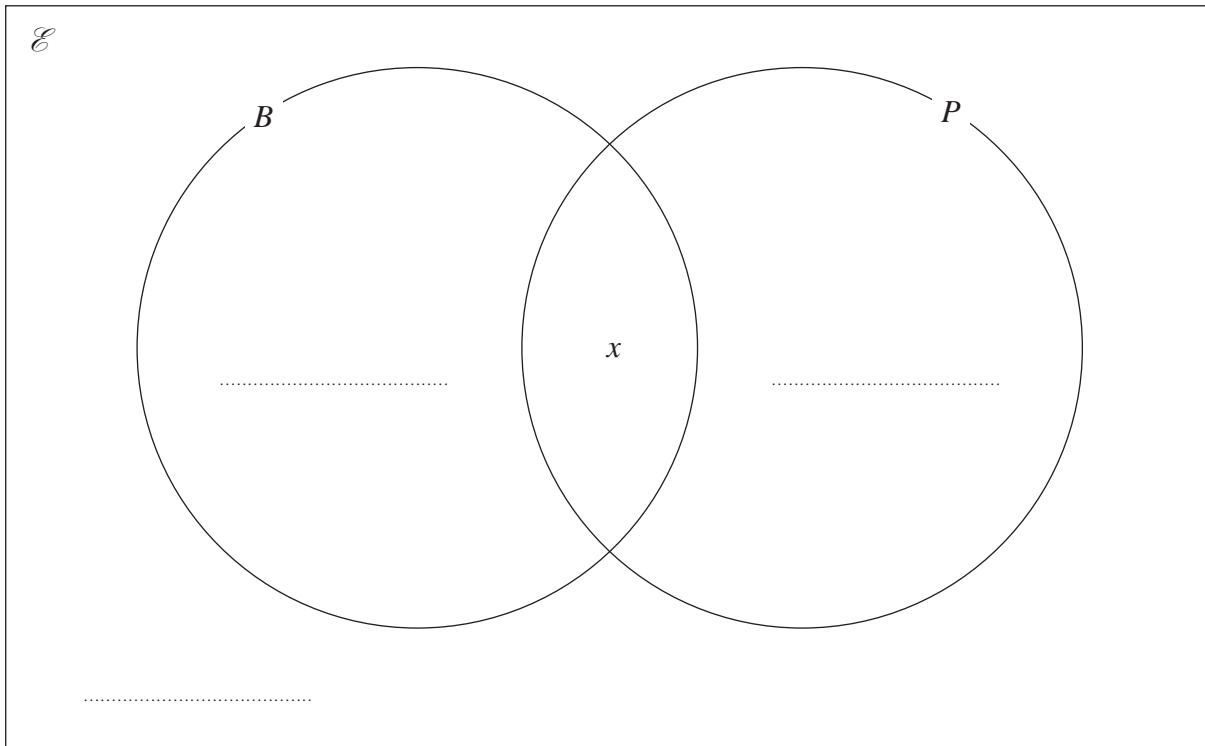
15 have a black pen (*B*)
16 have a pencil (*P*)
 3 have no black pen and no pencil
 x have a black pen and a pencil

(a) Use the information above to complete the Venn diagram, giving answers in terms of *x* where necessary.

ℰ

B   P

x

....

....

(2)

(b) Find the value of *x*

x = ...

(2)

(c) One of these 30 students is chosen at random.

Write down the probability that this student has a black pen but does not have a pencil.

....

(1)

(Total for Question 19 is 5 marks)

20

Diagram **NOT**
accurately drawn

h cm

20 cm

The diagram shows a solid shape made by fixing a solid right circular cone of
diameter 20 cm to the circular face of a solid hemisphere of diameter 20 cm.

The centre of the base of the cone coincides with the centre of the circular face of
the hemisphere.

The overall height of the shape is *h* cm.

Given that for this shape

volume of cone : volume of hemisphere = 3 : 4

find the value of *h*

h = ...

(Total for Question 20 is 5 marks)
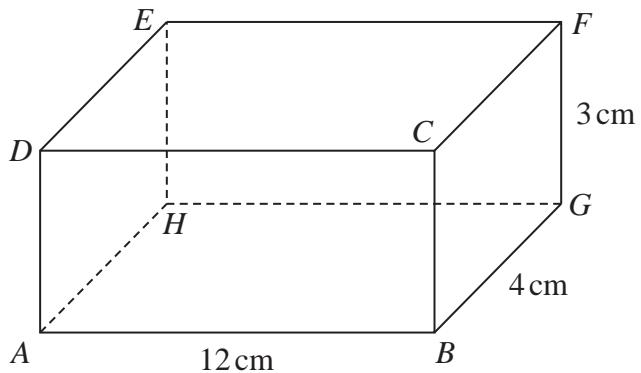
21

Diagram **NOT** accurately drawn

The diagram shows the cuboid *ABCDEFGH*

$$AB = 12 \text{ cm} \qquad BG = 4 \text{ cm} \qquad FG = 3 \text{ cm}$$

(a) Show that $AF = 13$ cm

(3)

(b) Find, in degrees to one decimal place, the size of angle *GAF*

$\angle GAF =$ .... $^\circ$

(2)

(Total for Question 21 is 5 marks)

22 Given that $(x + k)$ is a factor of $x^3 + 4x^2 - 20x + k$ where k is a non-zero constant,

find the possible values of k

$k = $ ....
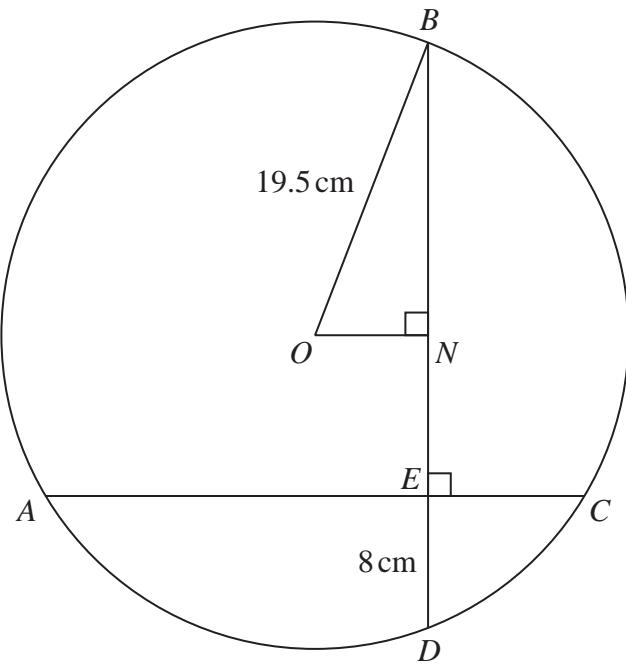
(Total for Question 22 is 5 marks)

P 7 2 9 1 7 A 0 1 7 2 4

23

19.5 cm

8 cm

Diagram **NOT** accurately drawn

A, *B*, *C* and *D* are points on a circle with centre *O* and radius 19.5 cm

AEC and *BNED* are chords of the circle.

$$\angle BEC = \angle BNO = 90° \qquad BD = 36\,\text{cm} \qquad ED = 8\,\text{cm}$$

(a) Show that $ON = 7.5$ cm

(2)

(b) Calculate the length, in cm to 3 significant figures, of *AC*

$AC =$ .... cm

(4)

(Total for Question 23 is 6 marks)

Turn over for Question 24

24 The table shows the number of children in each of the families from a town.

Number of children	Frequency
0	k
1	215
2	362
3	181
4	94
5	15

k is an unknown integer.

The mean number of children in a family = 2.0 to **2 significant figures**.

Find the range of possible values of k

....

(Total for Question 24 is 6 marks)

25

$$\mathbf{A} = \begin{pmatrix} 3 & 1 \\ 5 & 2 \end{pmatrix} \quad \mathbf{B} = \begin{pmatrix} 5 & 1 \\ 5 & 4 \end{pmatrix} \quad \mathbf{C} = \begin{pmatrix} 2 & -1 \\ -5 & 3 \end{pmatrix}$$

(a) Show that **C** is the inverse of **A**

(2)

AB = **D**

(b) (i) Find **D**

$$\mathbf{D} = \begin{pmatrix} & \\ & \end{pmatrix}$$

(2)

(ii) Show that **BA** = **D**

(1)

(c) Using part (a) and part (b), show that **BC** = **CB**

(2)
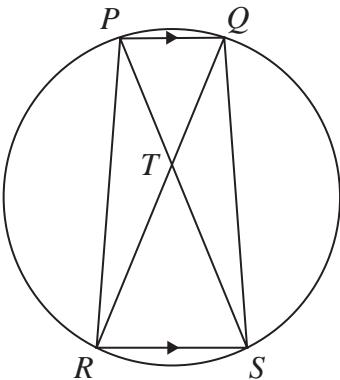
(Total for Question 25 is 7 marks)

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26

Diagram **NOT** accurately drawn

P, *Q*, *S* and *R* are points on a circle.
T is the point where *PS* intersects *QR*
PQ is parallel to *RS*

(a) Prove that *PT* = *QT*
    Give a reason for each stage of your working.

(4)

The area of triangle $PQT = 1 \, \text{cm}^2$ and the area of triangle $RST = 4 \, \text{cm}^2$

(b) Find the area of quadrilateral *PQSR*

.... cm^2

(4)

(Total for Question 26 is 8 marks)

TOTAL FOR PAPER IS 100 MARKS

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