Please check the examination details below before entering your candidate information

Candidate surname | Other names

Centre Number | Candidate Number

Pearson Edexcel International GCSE

Time 2 hours 30 minutes

Paper reference **4MB1/02R**

Mathematics B
PAPER 2R

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.

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Pearson

Answer ALL TWELVE questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1   Rory buys and sells jewellery.

Rory buys a necklace for $180
He sells the necklace for $230

(a) Calculate, to 3 significant figures, Rory's percentage profit.

(2)

Rory sells a bracelet for $203
This price represents a 16% profit on his cost price.

(b) Calculate the cost price of the bracelet.

(2)

Rory travelled by plane from New York to Dubai to buy some jewellery.

The total flight time for the journey was 12 hours 48 minutes.
The average speed for the journey was 860 km/h

(c) Calculate the total distance, in kilometres, travelled by the plane.

(3)

Rory bought some earrings for a total cost of 91 750 dirhams.

Using the exchange rate,

1 dollar = 3.67 dirhams

(d) calculate the total cost of the earrings in dollars.

(2)

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Question 1 continued

(Total for Question 1 is 9 marks)

Turn over ▶

2 (a) Write $76\,000\,000$ in standard form.

(1)

(b) Write 8.3×10^{-4} as an ordinary number.

(1)

(c) Calculate $(3 \times 10^{147}) \div (6 \times 10^{122})$
Give your answer in standard form.

(2)

(d) Write 1.6×10^{41} as a product of its prime factors.
Show your working clearly.

(3)

Question 2 continued

(Total for Question 2 is 7 marks)

3

Diagram **NOT**
accurately drawn

8 cm

Figure 1

Figure 1 shows a solid right circular cone.

The radius of the base of the cone is 8 cm.
The volume of the cone is $320\pi\,\text{cm}^3$

The **total** surface area of the cone is $k\pi\,\text{cm}^2$

Calculate the value of k

(5)

$$\left[\begin{array}{l} \text{Volume of a cone} = \dfrac{1}{3}\,\pi r^2 h \\[2mm] \text{Curved surface area of cone} = \pi r l \end{array}\right]$$

Question 3 continued

(Total for Question 3 is 5 marks)

4 Trapeziums P and Q are drawn on the grid opposite.

(a) Describe fully the single transformation that maps trapezium P onto trapezium Q

(3)

Trapezium P is transformed to trapezium A under the translation $\begin{pmatrix} 2 \\ -3 \end{pmatrix}$

(b) On the grid, draw and label trapezium A

(2)

Trapezium P is transformed to trapezium B by a rotation of 90° clockwise about the point (5, 2)

(c) On the grid, draw and label trapezium B

(2)

Trapezium C is the image of trapezium Q under the transformation with matrix **M** where

$$\mathbf{M} = \begin{pmatrix} 0 & -\dfrac{1}{2} \\ \dfrac{1}{2} & 0 \end{pmatrix}$$

(d) On the grid, draw and label trapezium C

(3)

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Question 4 continued

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Turn over for a spare grid if you need to redraw your trapeziums.

Question 4 continued

Question 4 continued

Only use this grid if you need to redraw your trapeziums.

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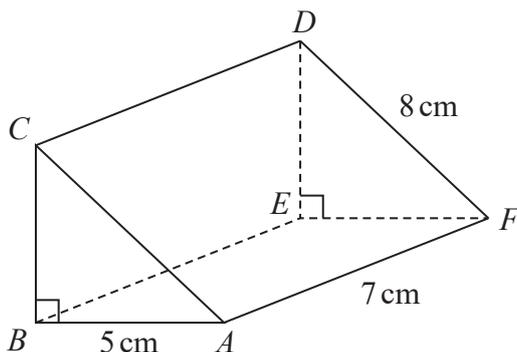
(Total for Question 4 is 10 marks)

5

Diagram **NOT** accurately drawn

Figure 2

Figure 2 shows right triangular prism *ABCDEF*

$AB = 5$ cm $DF = 8$ cm $AF = 7$ cm $\angle CBA = 90°$

(a) Calculate the volume, in cm^3 to the nearest whole number, of the triangular prism.
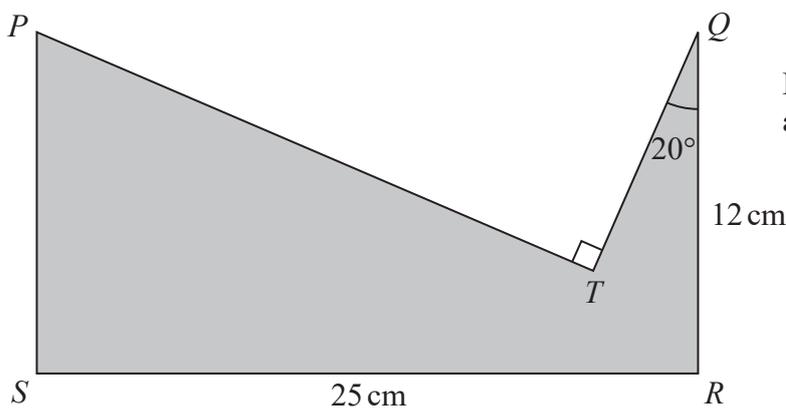
(4)

Diagram **NOT** accurately drawn

Figure 3

Figure 3 shows a shaded shape made by removing triangle *PTQ* from rectangle *PQRS*

$QR = 12$ cm $SR = 25$ cm $\angle PTQ = 90°$ $\angle TQR = 20°$

(b) Calculate the perimeter, in cm to the nearest whole number, of the shaded shape.

(4)

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Question 5 continued

Question 5 continued

Question 5 continued

(Total for Question 5 is 8 marks)

6 Ted has two boxes of buttons, Box **A** and Box **B**

There are 20 buttons in Box **A** and 20 buttons in Box **B**

There are 13 white buttons in Box **A**
There are   9 white buttons in Box **B**

Ted takes at random a button from Box **A** and a button from Box **B**

(a) Complete the probability tree diagram.

Box **A**   Box **B**

                                                    white
                                ....
                white
        ....
                                ....
                                                    not white

                                                    white
                                ....
        ....
                not white
                                ....
                                                    not white
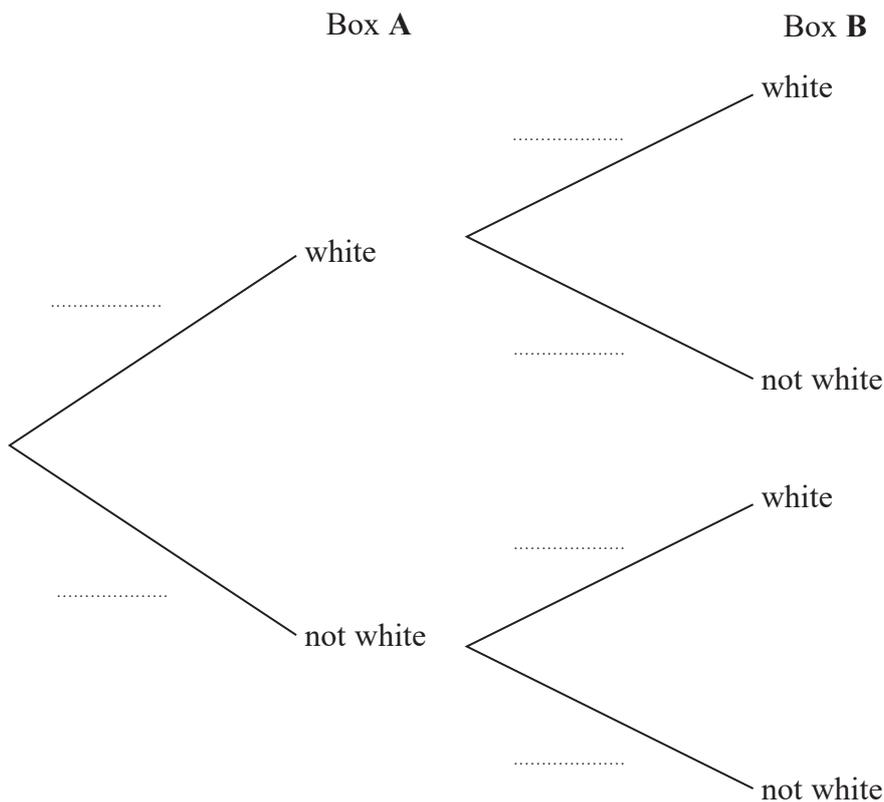
(2)

(b) Calculate the probability that Ted takes at least one white button.

(3)

Ted also has a bag of buttons.
There are 30 buttons in the bag.
There are x white buttons in the bag.

Ted takes at random a button from Box **A**, a button from Box **B** and a button from the bag.

The probability that of the 3 buttons Ted has, 2 of the buttons are white is $\dfrac{337}{1000}$

(c) Work out the value of x
    Show clear algebraic working.

(4)

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Question 6 continued

Question 6 continued

Question 6 continued

(Total for Question 6 is 9 marks)

7 The function g is defined as

$$g : x \mapsto \frac{10}{2x - 3}$$

(a) Find the value of x that must be excluded from the domain of g

(1)

(b) Solve $g(x) = 5$

(3)

The function f is defined as

$$f : x \mapsto 3x^2 + 9x - 7 \quad \text{for} \quad x > -\frac{3}{2}$$

(c) Find $f\left(-\frac{1}{2}\right)$

(2)

(d) Express the inverse function f^{-1} in the form $f^{-1} : x \mapsto \dots$

(4)

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$$\left[\text{Solutions of } ax^2 + bx + c = 0 \text{ are } x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}\right]$$

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Question 7 continued

(Total for Question 7 is 10 marks)
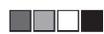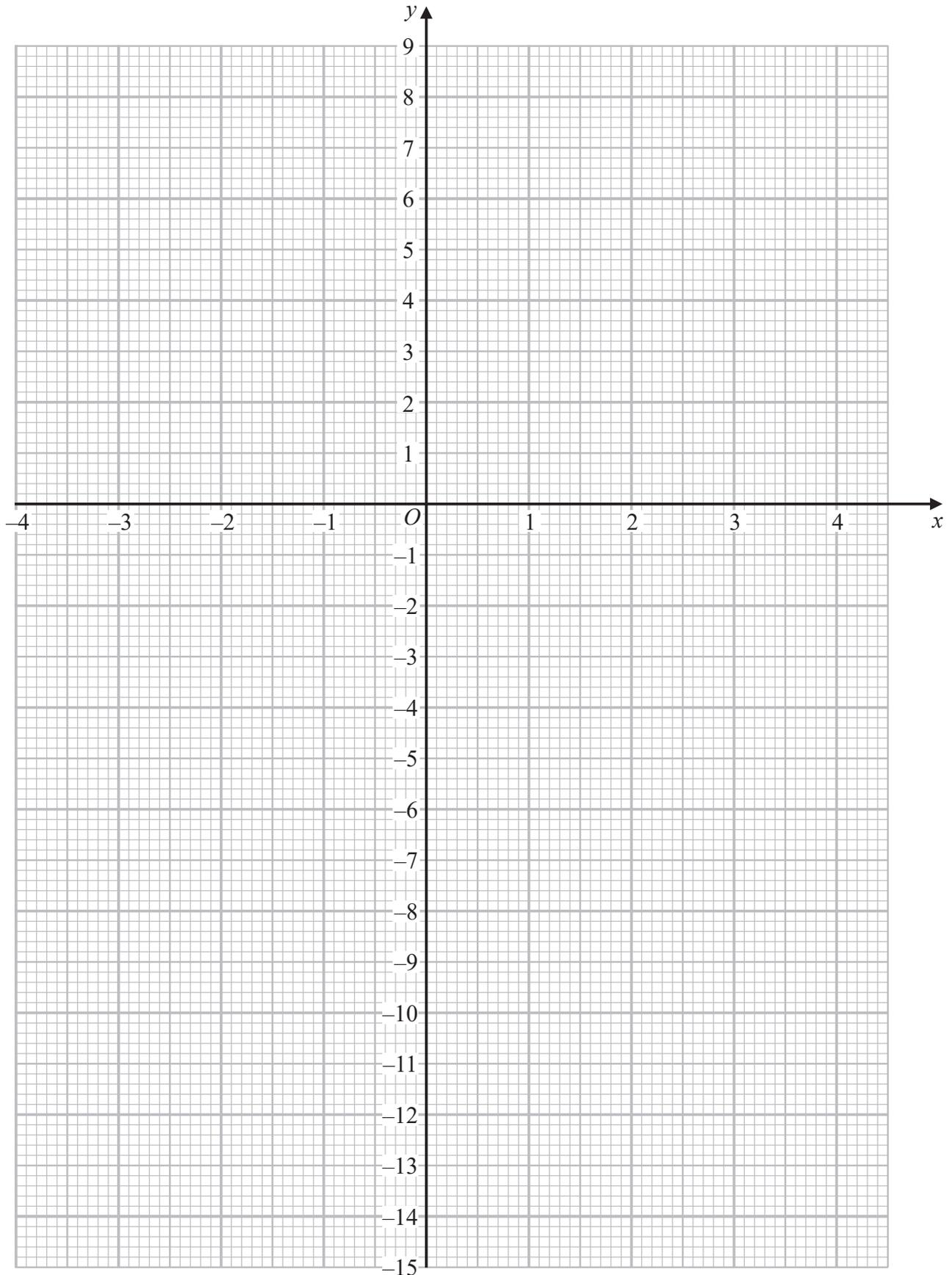
8 The equation of a curve is $y = \dfrac{1}{2}x^3 - 5x - 3$

(a) Complete the table of values for $y = \dfrac{1}{2}x^3 - 5x - 3$

x	-4	-3	-2	-1	0	1	2	3	4
y	-15	-1.5				-7.5			9

(3)

(b) On the grid opposite, plot the points from your completed table and join them to form a smooth curve.

(3)

(c) By drawing a suitable straight line on your grid, find estimates, to one decimal place, of the solutions to the equation

$$\frac{1}{2}x^3 - 5x - 3 = 1 - \frac{1}{2}x \qquad \text{in the interval} \quad -4 \leqslant x \leqslant 4$$

(3)

Question 8 continued

Turn over for a spare grid if you need to redraw your graph.

Turn over ▶

Question 8 continued

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Question 8 continued

Only use this grid if you need to redraw your graph.
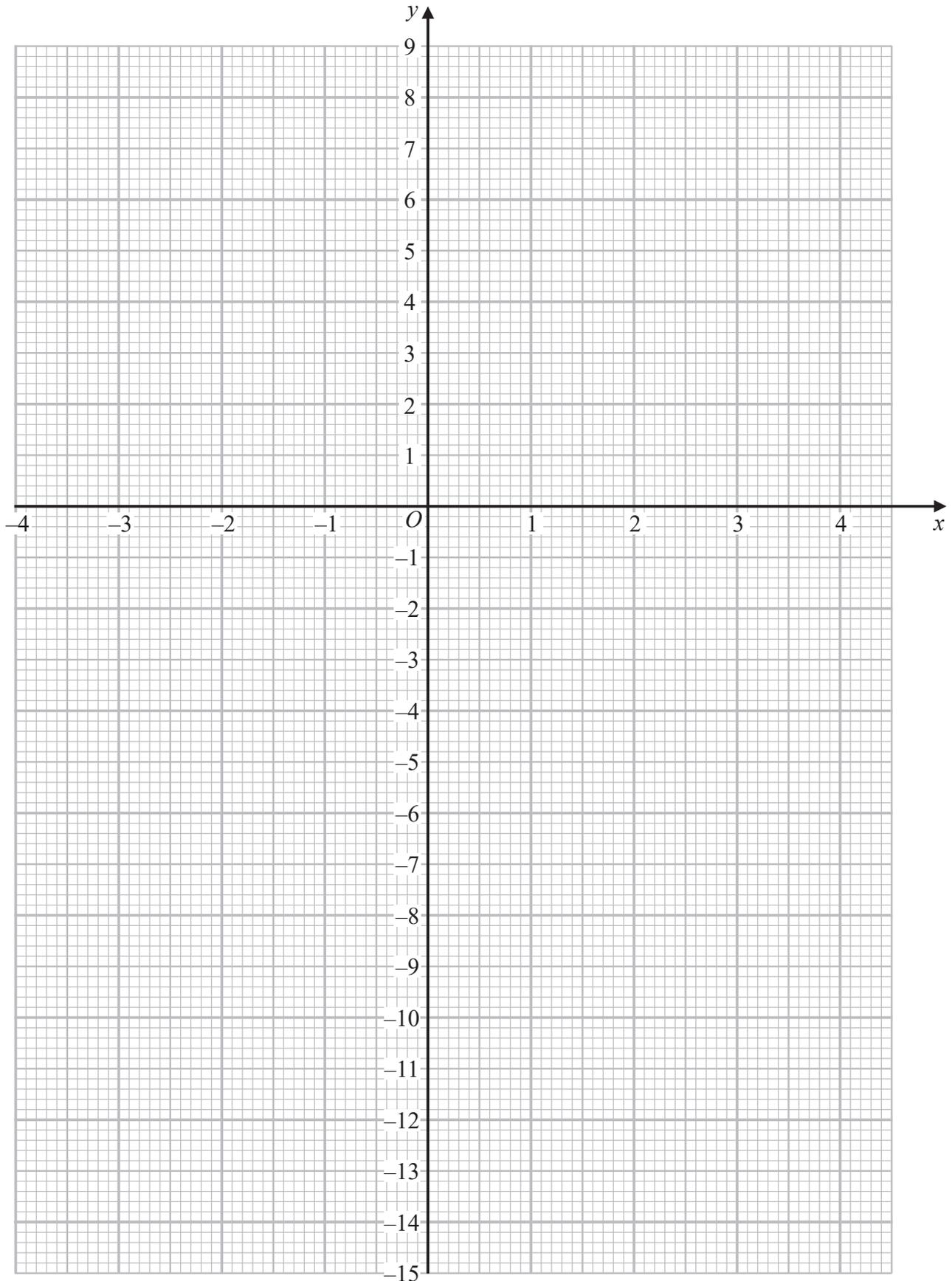
(Total for Question 8 is 9 marks)

9 (a) (i) Solve the inequality $5y - 7 > 2y - 13$

(2)

(ii) Hence, represent on the number line at the top of the next page, the values of y for which $5y - 7 > 2y - 13$

(1)

(b) (i) Solve the inequality $4x^2 + 4x - 35 < 0$

(3)

(ii) Hence find the values of x for which

$$5x - 7 > 2x - 13 \quad \textbf{and} \quad 4x^2 + 4x - 35 < 0$$

(1)

$$\left[\text{Solutions of } ax^2 + bx + c = 0 \text{ are } x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \right]$$

Question 9 continued

$$\overset{\longrightarrow}{\underset{\substack{-5 \quad -4 \quad -3 \quad -2 \quad -1 \quad 0 \quad 1 \quad 2 \quad 3 \quad 4 \quad 5}}{\rule{0pt}{0pt}}}$$
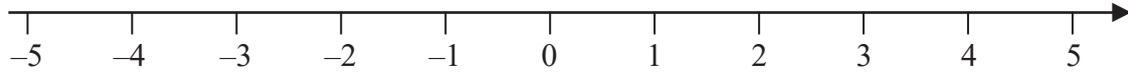
(Total for Question 9 is 7 marks)

10 (a) Express $\dfrac{\sqrt{98} + \sqrt{18}}{\sqrt{5}}$ in the form $\sqrt{a}$ where a is a number to be found.

Show your working clearly.

(3)

(b) Given that $\dfrac{\sqrt{27}}{81^{\frac{4}{3}}} \times \sqrt{3} = 3^{x}$

find the value of x, giving your answer as a fraction in its simplest form.
Show your working clearly.

(3)

Question 10 continued

(Total for Question 10 is 6 marks)

11 A curve **C** and a straight line **L** are drawn on a grid.

C has equation $y = 5x^2 - 16x - 5$

L has equation $y + 5x = 7$

(a) Find the coordinates of the points of intersection of **C** and **L**
Show clear algebraic working.

(5)

P is the point on the curve with equation $y = 5x^2 - 16x - 5$ with *x* coordinate 2

The line **Q** is the tangent to the curve at the point *P*

The line **Q** crosses the *x*-axis at the point *X* and the *y*-axis at the point *Y*
The point *M* lies on **Q** and is such that $XM = MY$

(b) Calculate the coordinates of the point *M*
Give your coordinates as exact values.

(5)

$$\left[\text{Solutions of } ax^2 + bx + c = 0 \text{ are } x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \right]$$

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Question 11 continued

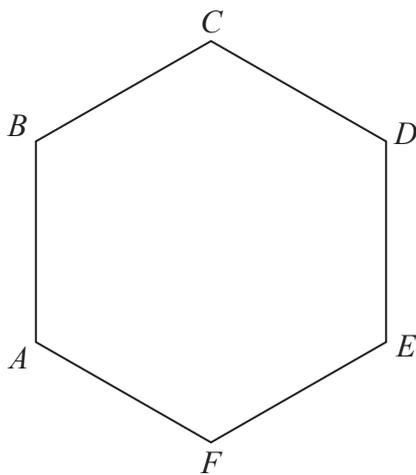**(Total for Question 11 is 10 marks)**

12

Diagram **NOT** accurately drawn

Figure 4

Figure 4 shows a regular hexagon *ABCDEF*

Given that the area of hexagon *ABCDEF* = $150\sqrt{3}$ cm^2

(a) find the perimeter, in cm, of the hexagon.

(4)
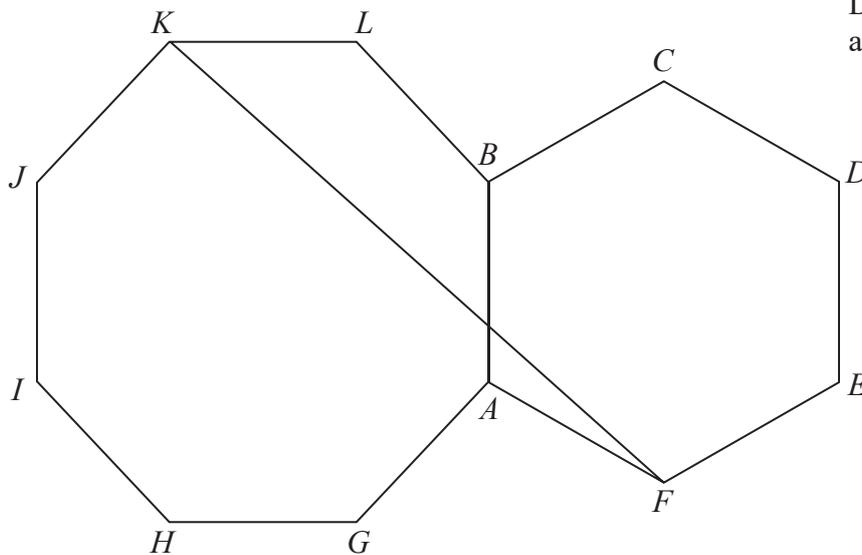
Diagram **NOT** accurately drawn

Figure 5

Figure 5 shows a shape *AGHIJKLBCDEF* made from a regular octagon *GHIJKLBA* and the regular hexagon *ABCDEF* from part (a).

(b) Work out the length, in cm to one decimal place, of the straight line *KF*

(6)

$$\left[\begin{array}{l} \text{Area of triangle} = \dfrac{1}{2}\,ab\sin C \\[2mm] \text{Sum of interior angles of polygon is } (2n-4) \text{ right angles} \end{array} \right]$$

Question 12 continued

Question 12 continued

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(Total for Question 12 is 10 marks)

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