

Please check the examination details below before entering your candidate information

Candidate surname

Other names

Centre Number

Candidate Number

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Pearson Edexcel International GCSE

Time 2 hours 30 minutes

Paper
reference

4MB1/02

Mathematics B

PAPER 2



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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Pearson

Answer ALL TWELVE questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

- 1 A car travels at an average speed of 60 km/h for 2 hours. It then travels at an average speed of x km/h for 3 hours.

The car travels at an average speed of 64.2 km/h for the whole journey.

Calculate the value of x

(4)

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(Total for Question 1 is 4 marks)

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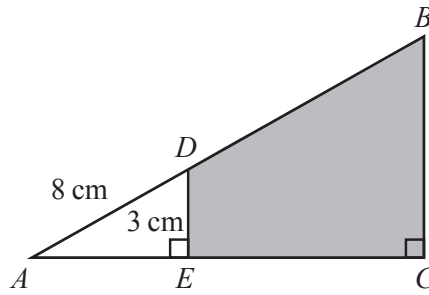


Diagram **NOT**
accurately drawn

Figure 1

Figure 1 shows triangle ABC

The point D lies on AB and the point E lies on AC such that DE and BC are parallel.

$$AD = 8 \text{ cm} \quad DE = 3 \text{ cm} \quad AE : EC = 1 : 2 \quad \angle DEA = \angle BCA = 90^\circ$$

Calculate the area, in cm^2 to 2 significant figures, of the region $BCED$ shown shaded in the diagram.

(5)

$$\left[\text{Area of trapezium} = \frac{1}{2}(a + b)h \right]$$

(Total for Question 2 is 5 marks)



3

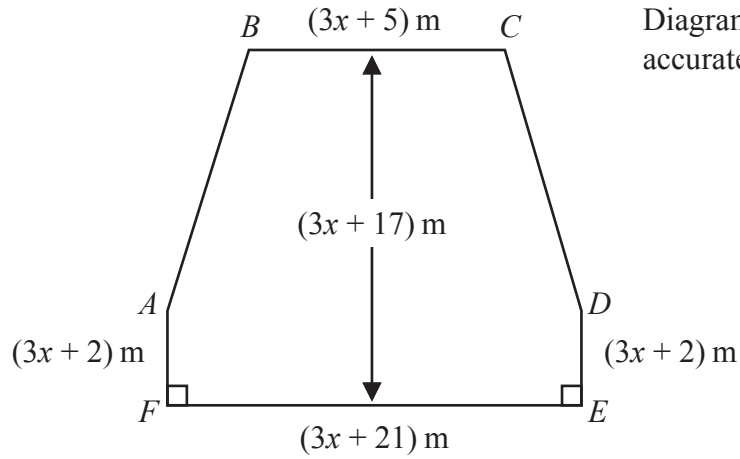


Diagram **NOT** accurately drawn

Figure 2

Figure 2 shows a hexagon $ABCDEF$ in which

$$BC = (3x + 5) \text{ metres} \quad AF = DE = (3x + 2) \text{ metres} \quad FE = (3x + 21) \text{ metres}$$

BC is parallel to FE and $AB = DC$

The perpendicular distance between BC and FE is $(3x + 17)$ metres.

The perimeter of the hexagon $ABCDEF$ is 172 metres.

Calculate the value of x

(5)

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Question 3 continued

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(Total for Question 3 is 5 marks)



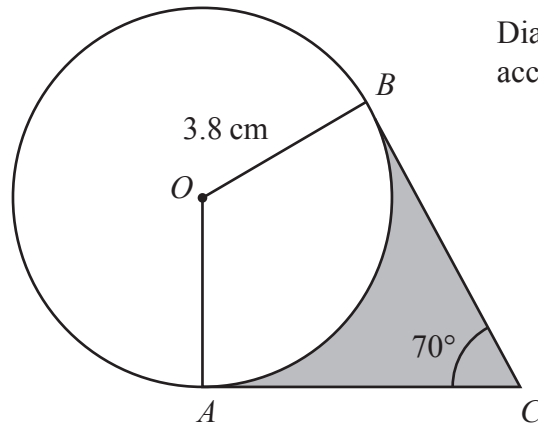


Diagram **NOT**
accurately drawn

Figure 3

Figure 3 shows a circle centre O and radius 3.8 cm

The points A and B lie on the circle.

The point C is such that AC and BC are tangents to the circle and $\angle ACB = 70^\circ$

The region inside the quadrilateral $OACB$ but outside the circle is shown shaded in Figure 3

Calculate the area, in cm^2 to 3 significant figures, of the shaded region.

(6)



Question 4 continued

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Area with horizontal dotted lines for writing.

(Total for Question 4 is 6 marks)



P 7 2 4 7 9 A 0 7 3 2

5 Solve the simultaneous equations

$$\begin{aligned}x + 5y &= 7 \\x^2 + 3xy &= 13\end{aligned}$$

Show clear algebraic working.

(6)

Area with horizontal dotted lines for working.

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



Question 5 continued

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(Total for Question 5 is 6 marks)



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Diagram **NOT**
accurately drawn

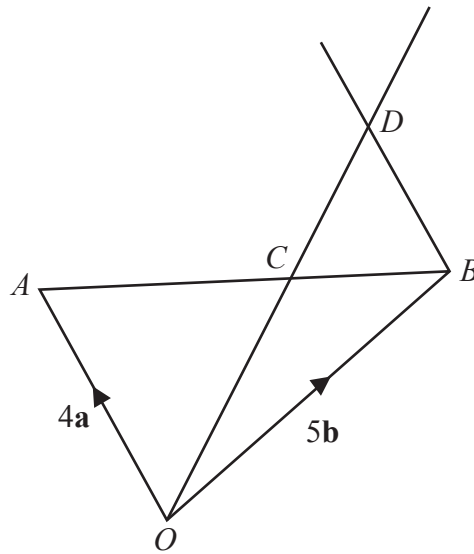


Figure 4

Figure 4 shows triangle OAB

The point C lies on AB such that $AC = \frac{3}{5}AB$

Given that $\vec{OA} = 4\mathbf{a}$ and $\vec{OB} = 5\mathbf{b}$

- (a) find an expression for \vec{OC} in terms of \mathbf{a} and \mathbf{b}
Give your answer in its simplest form.

(3)

The point D is such that OCD is a straight line.

Given that BD is parallel to OA

- (b) use a vector method to find an expression for \vec{OD} in terms of \mathbf{a} and \mathbf{b}
Give your answer in its simplest form.

(4)

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Question 6 continued

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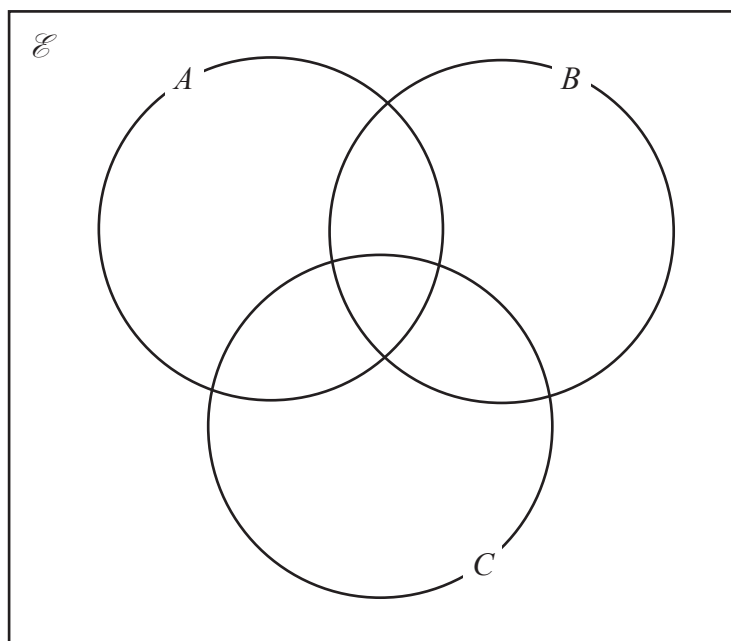
(Total for Question 6 is 7 marks)



P 7 2 4 7 9 A 0 1 1 3 2

- 7 $\mathcal{E} = \{\text{odd numbers between 0 and 30}\}$
 $A = \{\text{multiples of 3}\}$
 $B = \{\text{prime numbers}\}$
 $C = \{\text{factors of 30}\}$

- (a) Complete the Venn diagram for this information showing the position of each of the numbers in the universal set.



(3)

- (b) Find (i) $n([A \cup C] \cap B)$
(ii) $n([B \cap C'] \cup A')$

(2)

A number is chosen at random from the universal set, \mathcal{E}

- (c) Write down the probability that the number is in the set $C \cap A'$

(2)

Given that the number chosen from \mathcal{E} is a multiple of 3

- (d) find the probability that the number is also a factor of 30

(2)

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Question 7 continued

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(Total for Question 7 is 9 marks)



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8 Aanshi makes granola.
She uses nuts, dried raspberries and oats in the ratios 2 : 3 : 7 by weight.
Aanshi uses 80 grams of nuts.

(a) Work out the weight, in grams, of oats she uses to make the granola. (2)

Nuts cost \$26 for 500 grams.

(b) Work out the cost of the nuts used to make 270 grams of the granola. (3)

Aanshi is going to buy 500 grams of dried raspberries from one of the following online supermarkets.

<p><u>US supermarket</u></p> <p>125 g dried raspberries \$30</p> <p>Special offer</p> <p>Buy 375 g get 125 g extra free</p> <p>Postage \$5</p>
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<p><u>UK supermarket</u></p> <p>50 g dried raspberries</p> <p>£3.70 plus Tax at 25%</p> <p>Postage £20</p>

Using an exchange rate of

$$\$1 = \pounds 0.71$$

(c) compare the cost, including postage, of 500 g of dried raspberries bought from the US supermarket with the cost of 500 g of dried raspberries bought from the UK supermarket.
State which supermarket is the cheaper when buying 500 g of dried raspberries.
Show your working clearly.

(5)

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Question 8 continued

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Question 8 continued

Handwriting practice area with 20 horizontal dotted lines.

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Question 8 continued

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(Total for Question 8 is 10 marks)



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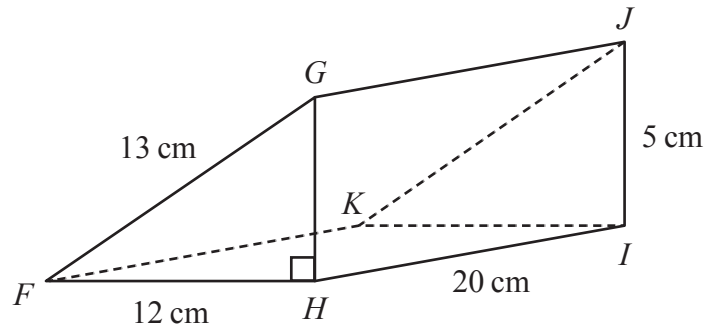


Diagram NOT accurately drawn

Figure 5

Figure 5 shows a solid right-angled triangular prism $FGHIJK$ in which

$$FG = 13 \text{ cm} \quad FH = 12 \text{ cm} \quad IJ = 5 \text{ cm} \quad HI = 20 \text{ cm}$$

The faces $FHIK$ and $GHIJ$ of the prism are rectangles.

- (a) Calculate the total surface area, in cm^2 , of the prism $FGHIJK$ (4)
- (b) Calculate the size, in degrees to one decimal place, of $\angle FJI$ (3)

A company makes door wedges the same size and shape as the triangular prism $FGHIJK$. The company packs the door wedges into boxes that are in the shape of a cube of side 60 cm.

- (c) Calculate the maximum number of door wedges that can fit into the box. (2)

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Question 9 continued

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Question 9 continued

Handwriting practice area with 20 horizontal dotted lines.

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Question 9 continued

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(Total for Question 9 is 9 marks)



P 7 2 4 7 9 A 0 2 1 3 2

10 A box contains 8 green counters and 2 white counters only.

Peter takes at random 2 counters from the box.

- (a) Calculate the probability that Peter will take 1 green counter and 1 white counter. (3)

A bag contains 28 blue beads and n red beads only.

Naasir selects a bead from the bag at random.

- (b) Explain why the probability of the bead being red cannot be $\frac{6}{11}$. (3)

Naasir keeps the first bead and selects a second bead at random from the bag.

The probability of both beads being different colours is $\frac{1}{2}$

Given that there are fewer blue beads than red beads,

- (c) calculate the probability that both beads are blue. Show clear algebraic working. (5)

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



Question 10 continued

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Handwriting practice area with 25 horizontal dotted lines.



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Question 10 continued

Area for writing the answer to Question 10, consisting of multiple horizontal dotted lines.

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Question 10 continued

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(Total for Question 10 is 11 marks)



11 The equation of a curve C is $y = \frac{k}{x} + \frac{9}{x^2} + 1$ where k is a constant.

A minimum point on C occurs when $x = -1.5$

(a) Show that the value of k is 12 (4)

(b) Complete the table of values for $y = \frac{12}{x} + \frac{9}{x^2} + 1$

Give your values of y to 2 decimal places.

x	-6	-5	-4	-3	-2	-1	-0.8
y			-1.44	-2.00	-2.75	-2.00	

(2)

(c) (i) On the grid opposite, plot the minimum point and the points from your completed table.

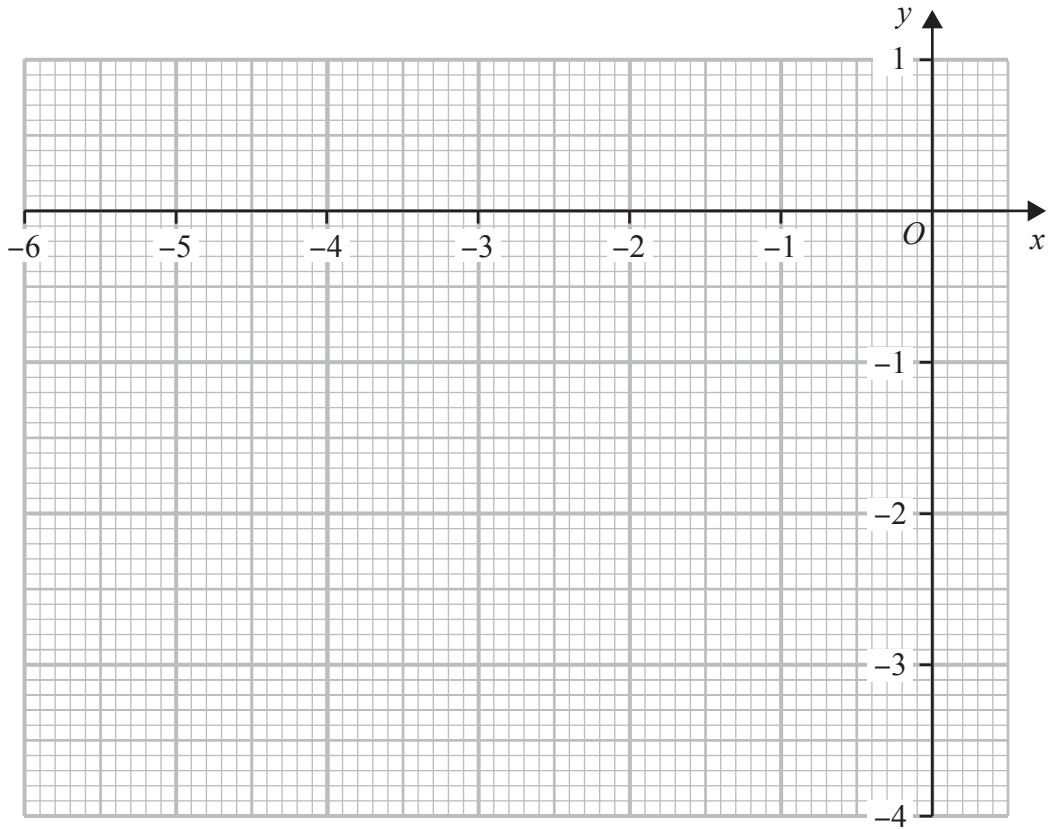
(ii) Join all the points to form a smooth curve. (4)

(d) By drawing a suitable straight line on the grid, find the range of values, to one decimal place, of x in $-6 \leq x \leq -0.8$, for which

$$\frac{12}{x} + \frac{9}{x^2} + 1 \leq \frac{1}{2}x - 2 \quad (3)$$



Question 11 continued



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



Question 11 continued

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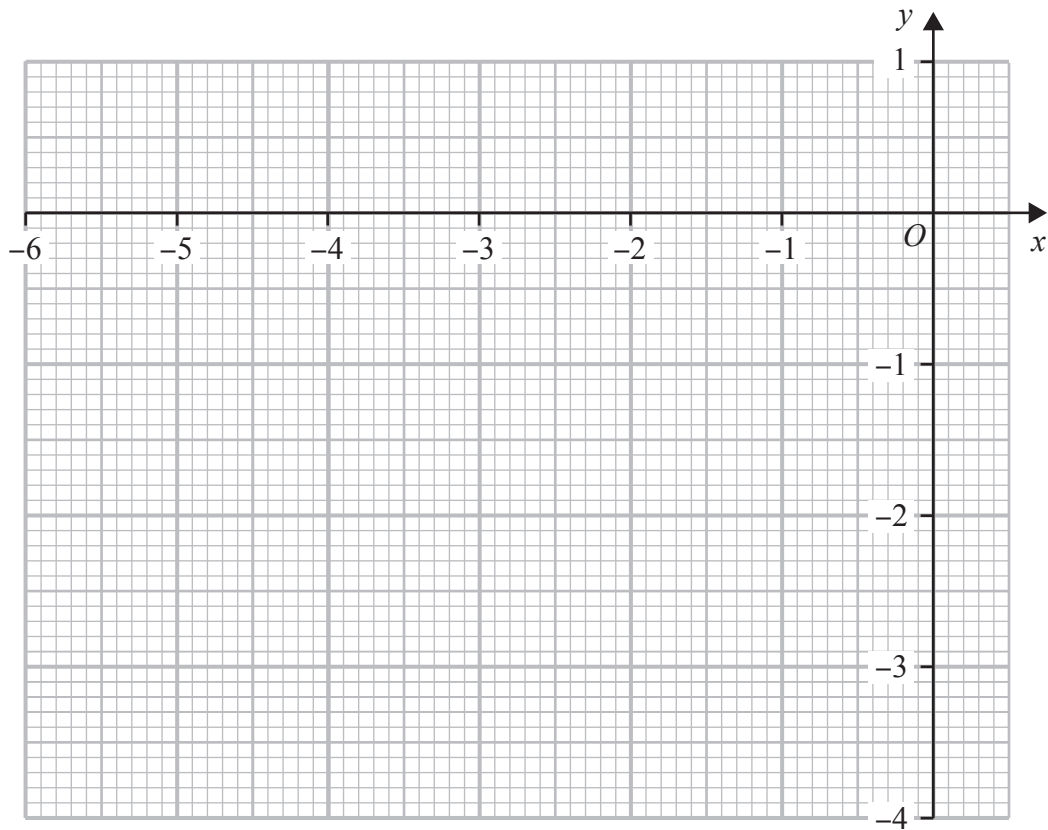
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Question 11 continued

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(Total Question 11 is 13 marks)



12 The functions f and g are such that

$$f : x \mapsto 2x^2 - 4x + 1 \quad \text{where } x > 1$$

$$g : x \mapsto \frac{20}{5 + x}$$

- (a) State the value of x that must be excluded from any domain of g (1)
- (b) Find the value of k such that $g(k) = 8$ (3)
- (c) Find $fg(-3)$ (2)
- (d) Find the inverse of the function f in the form $f^{-1} : x \mapsto \dots$
Simplify your answer. (4)

The function h is defined for all values of x as

$$h : x \mapsto \frac{ax + b}{3}$$

where a and b are constants.

Given that

$$h(2) = 4$$

$$f^{-1}h(1.7) = 2.5$$

- (e) find the value of a and the value of b
Show clear algebraic working. (5)

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



Question 12 continued

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Question 12 continued

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(Total for Question 12 is 15 marks)

TOTAL FOR PAPER IS 100 MARKS

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