Please check the examination details below before entering your candidate information

Candidate surname	Other names

Pearson Edexcel International GCSE

Centre Number | | | | | |

Candidate Number | | | | |

Thursday 7 January 2021

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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P 6 6 2 9 3 A 0 1 2 8

Pearson

Answer ALL TWENTY EIGHT questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 The nth term of a sequence is given by $9 - 4n$

Find the first 3 terms of this sequence.

..... , ... , ...

(Total for Question 1 is 2 marks)

2 Find the highest common factor (HCF) of 60, 126 and 648
Show your working clearly.

.....

(Total for Question 2 is 2 marks)

3 Express 325 millilitres as a fraction of 3.7 litres.
Give your answer in its simplest form.

.....

(Total for Question 3 is 2 marks)

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

$$3\frac{1}{4} \times 2\frac{2}{3}$$

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

.....

(Total for Question 4 is 2 marks)

5 $N = \dfrac{1025 \times 623}{254 \times 58^3}$

Evaluate N, giving your answer

(a) to 3 significant figures,

.....

(1)

(b) to 6 decimal places.

.....

(1)

(Total for Question 5 is 2 marks)

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6 Find the size of each interior angle of a regular 18-sided polygon.

.....°

(Total for Question 6 is 2 marks)

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7 A straight line passes through the points with coordinates $(12, -4)$ and $(-2, 3)$

Calculate the gradient of the line.

.....

(Total for Question 7 is 2 marks)

8

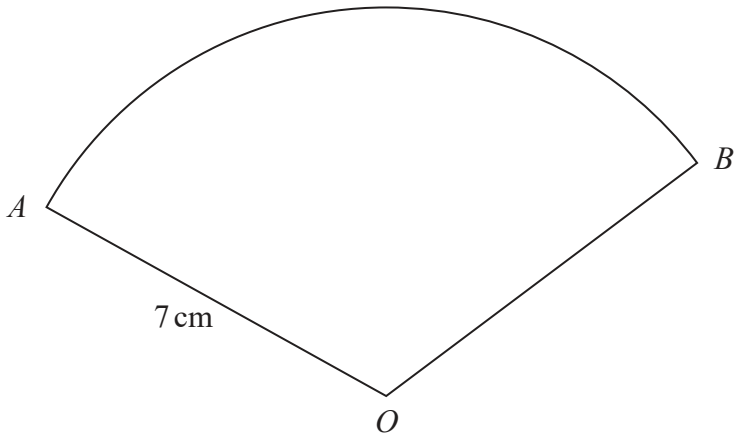

Diagram **NOT** accurately drawn

The diagram shows a sector OAB of a circle centre O and radius 7 cm.

Given that the area of the sector OAB is 52 cm^2

calculate the size, to the nearest degree, of $\angle AOB$.

.....°

(Total for Question 8 is 2 marks)

9 (a) Factorise completely $6xy - 3x$

.....

(1)

(b) Factorise completely $6ab - 2bc + 3ad - cd$

.....

(2)

(Total for Question 9 is 3 marks)

10 Solve $\frac{9 - 5x}{3} = \frac{5x + 1}{2}$

Show clear algebraic working.

$x =$ .....

(Total for Question 10 is 3 marks)

11 A company makes two sizes of containers, small and large.

Each small container is similar to each large container.

The volume of each small container is 225 cm^3
The volume of each large container is 650 cm^3

Given that the height of each large container is 18 cm,

calculate the height, in cm to 3 significant figures, of each small container.

..... cm

(Total for Question 11 is 3 marks)

12 x is an integer such that $2(1 - 3x) > 25 - 2x$

Find the greatest possible value of x.

.....

(Total for Question 12 is 3 marks)

13 **A** and **B** are two matrices such that the determinant of **A** is equal to the determinant of **B**.

Given that $\mathbf{A} = \begin{pmatrix} 3 & 2 \\ -1 & \sqrt{a} \end{pmatrix}$ and $\mathbf{B} = \begin{pmatrix} 5 & 3 \\ 1 & 4 \end{pmatrix}$ where a is a positive integer,

find the value of a.

$a =$ .....

(Total for Question 13 is 3 marks)

14 The equation of the curve C is $y = x^3 - \frac{3}{x^2}$

The point A lies on C such that the x coordinate of A is -1

Use differentiation to find the gradient of C at the point A.

.....

(Total for Question 14 is 3 marks)

15

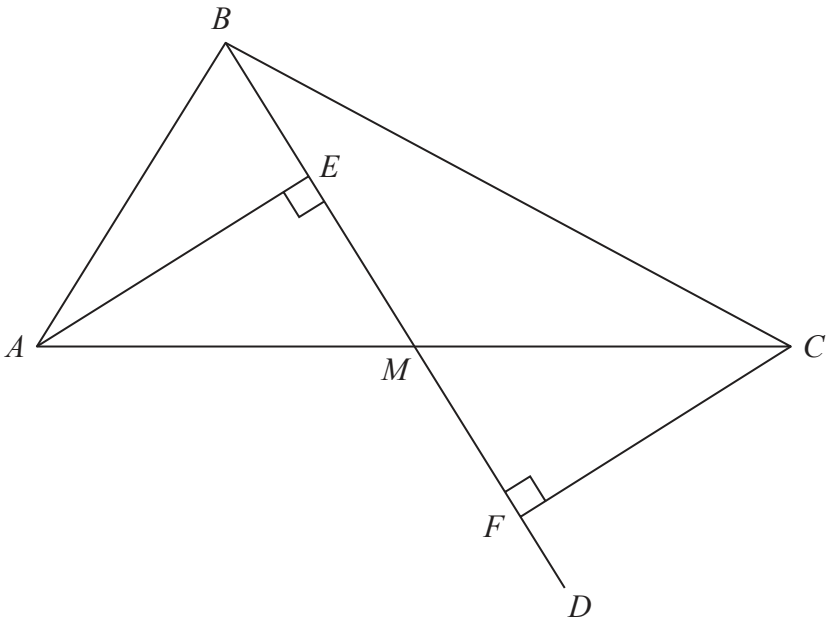

Diagram **NOT** accurately drawn

The diagram shows $\triangle ABC$ and the straight line BMD such that M is the midpoint of AC.

The points E and F lie on BMD such that AE and CF are each perpendicular to BMD.

Prove that $\triangle AEM$ is congruent to $\triangle CFM$.

(Total for Question 15 is 3 marks)

16 $\mathbf{A} = \begin{pmatrix} 3 & -2 \\ 4 & 1 \end{pmatrix}$ $\mathbf{B} = \begin{pmatrix} -2 & 5 \\ 4 & 3 \end{pmatrix}$

Find

(a) $\mathbf{A} - \mathbf{B}$

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

(2)

(b) $3\mathbf{A} + 2\mathbf{B}$

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

(2)

(Total for Question 16 is 4 marks)

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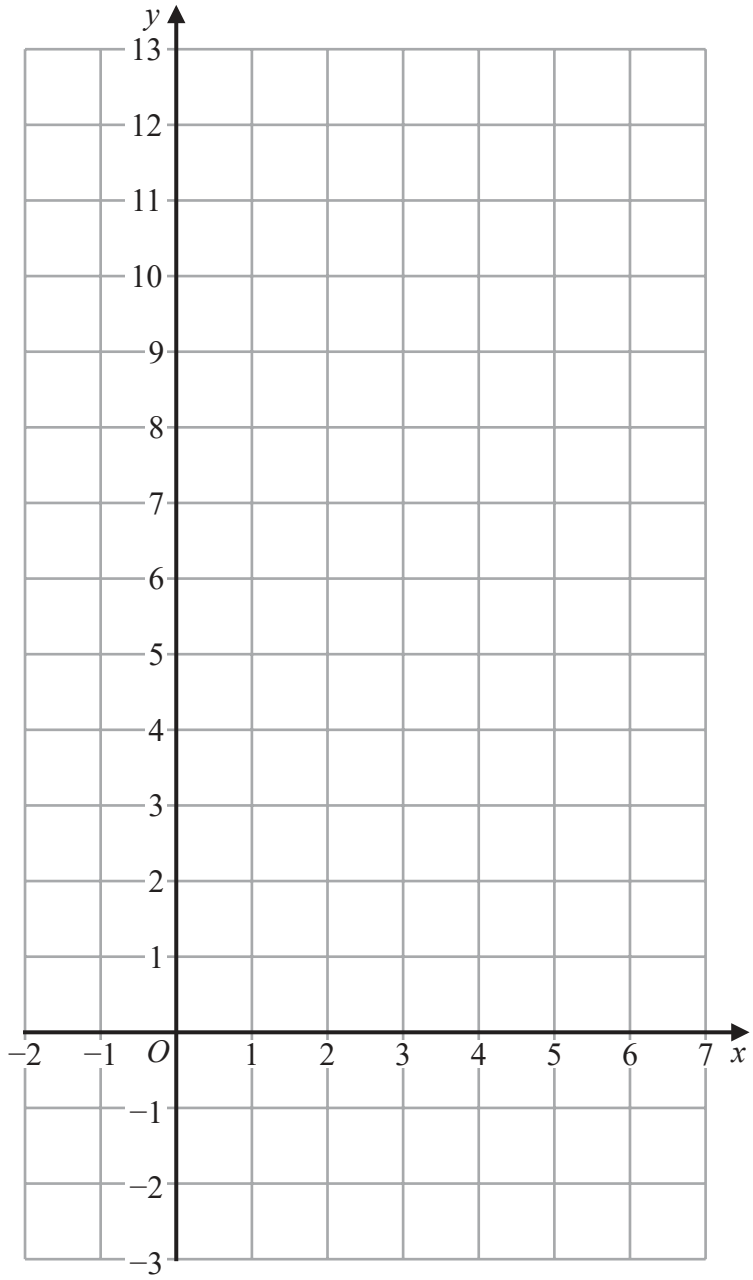
17 Show that $\dfrac{5x-15}{x^2+x-12} \div \dfrac{x-4}{3x^2-48}$ is equal to an integer.

Show clear algebraic working.

(Total for Question 17 is 4 marks)

18



(a) On the grid, draw and label the straight line with equation

(i) $x = 4$

(ii) $2x + y = 8$

(iii) $y = 3x - 1$

(3)

(b) On the grid, show by shading, the region **R** defined by the inequalities

$$x \leqslant 4 \quad \text{and} \quad 2x + y \geqslant 8 \quad \text{and} \quad y \leqslant 3x - 1$$

Label the region **R**.

(1)

(Total for Question 18 is 4 marks)

19

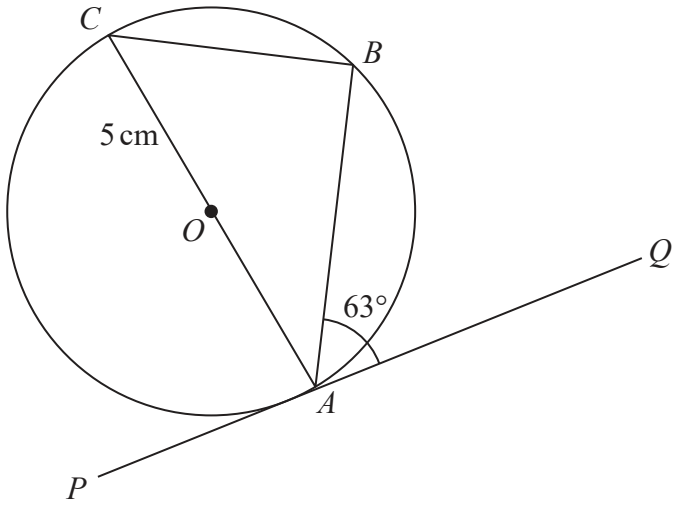


Diagram **NOT** accurately drawn

In the diagram, A, B and C are points on a circle with centre O and radius 5 cm.

AOC is a diameter of the circle and PAQ is the tangent to the circle at A.

$\angle BAQ = 63°$

Calculate the length, in cm to 3 significant figures, of AB.

$AB =$ ..... cm

(Total for Question 19 is 4 marks)

20 $\dfrac{2-\sqrt{2}}{\left(1+\sqrt{2}\right)^2}$ can be written in the form $a + b\sqrt{2}$ where a and b are integers.

Find the value of a and the value of b.
Show your working clearly.

$a =$ .....

$b =$ .....

(Total for Question 20 is 4 marks)

21 y varies inversely as the cube of x and $y = 3a$ when $x = 2a$

Find an expression for y in terms of a when $x = 4a^2$
Give your answer in its simplest form.

$y =$ .....

(Total for Question 21 is 4 marks)

22

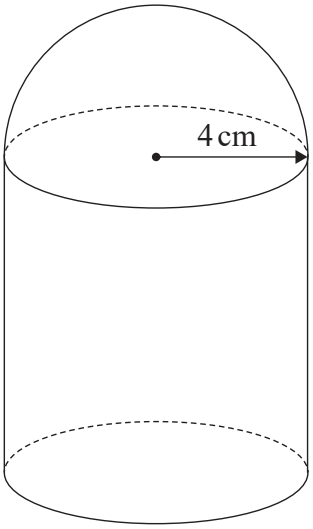


Diagram **NOT** accurately drawn

The diagram shows a solid made by fixing a solid hemisphere of radius 4 cm on the flat circular top face of a solid cylinder of radius 4 cm.

The centre of the hemisphere coincides with the centre of the flat circular top face of the cylinder.

The total volume of the solid is $\frac{920}{3}\pi$ cm^3

Find the total height, in cm, of the solid.

..... cm

(Total for Question 22 is 4 marks)

23

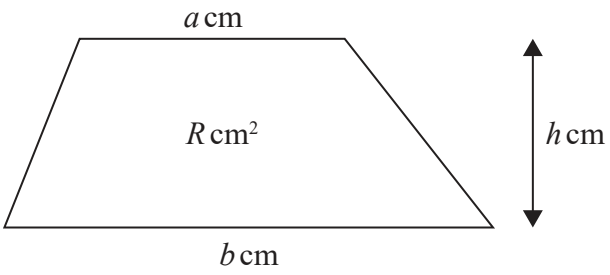


Diagram **NOT** accurately drawn

The diagram shows a trapezium in which the parallel sides are of length a cm and b cm

The height of the trapezium is h cm
The area of the trapezium is R cm^2

Given that

$b = 14.5$ to the nearest 0.5
$h = 4.0$ to the nearest 0.1
$R = 50$ to the nearest whole number

calculate the lower bound, to 3 significant figures, of a

.....

(Total for Question 23 is 4 marks)

24 $\mathbf{p} = \begin{pmatrix} 2 \\ 3 - 2x \end{pmatrix}$ $\mathbf{q} = \begin{pmatrix} -3 \\ 1 \end{pmatrix}$

The vectors **p** and **q** are such that $|\mathbf{p}| = |\mathbf{p} - 2\mathbf{q}|$

Find the value of x.
Show clear algebraic working.

$x =$ .....

(Total for Question 24 is 4 marks)

25 There are 12 marbles in bag *A* and 15 marbles in bag *B*.

In bag *A*, there are 7 yellow marbles and 5 red marbles.
In bag *B*, there are 10 yellow marbles and 5 red marbles.

Eugene takes at random **one** marble from bag *A* and without looking at the marble puts the marble into bag *B*.

Eugene then takes at random **one** marble from bag *A* and takes at random **two** marbles from bag *B*. He places the **three** marbles on a table.

Calculate the probability that the **three** marbles on the table all have the same colour.

(Question 25 continued)

.....

(Total for Question 25 is 5 marks)

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26

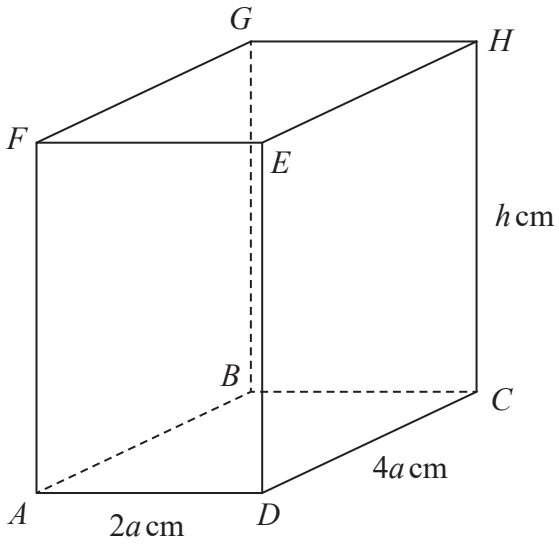


Diagram **NOT** accurately drawn

The diagram shows a cuboid $ABCDEFGH$ in which

$AD = 2a$ cm $\qquad DC = 4a$ cm $\qquad CH = h$ cm

Given that $AC = \left(2\sqrt{a}\right)BH$ and that $\angle HAC = 45°$

find the value of a.

(Question 26 continued)

$a =$ .....

(Total for Question 26 is 6 marks)

27 Amrit recorded the time, in minutes, that he took to complete each of his homework tasks last term.

The table shows information about these times.

Time (t minutes)	Frequency
$15 \leqslant t < 20$	12
$20 \leqslant t < 25$	10
$25 \leqslant t < 30$	8
$30 \leqslant t < 40$	28
$40 \leqslant t < 50$	14

(a) Find the class interval that contains the median of these times.

.....

(1)

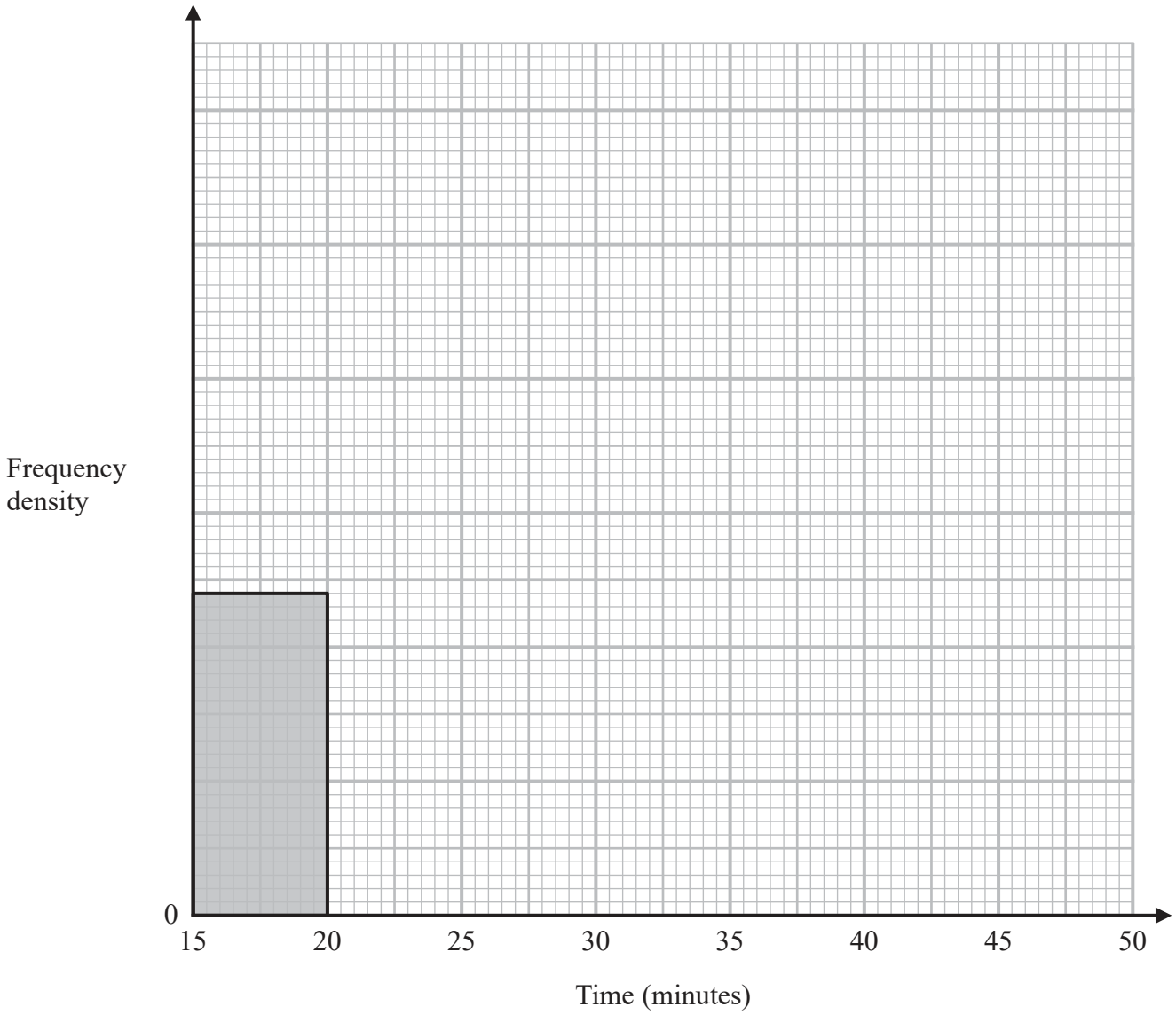
(b) Calculate an estimate, to 3 significant figures, of the mean time it took Amrit to complete his homework tasks last term.

.....minutes

(4)

(Question 27 continued)

The diagram below is an incomplete histogram for the information in the table.



(c) Use the information in the table to complete the histogram.

(3)

(Total for Question 27 is 8 marks)

28

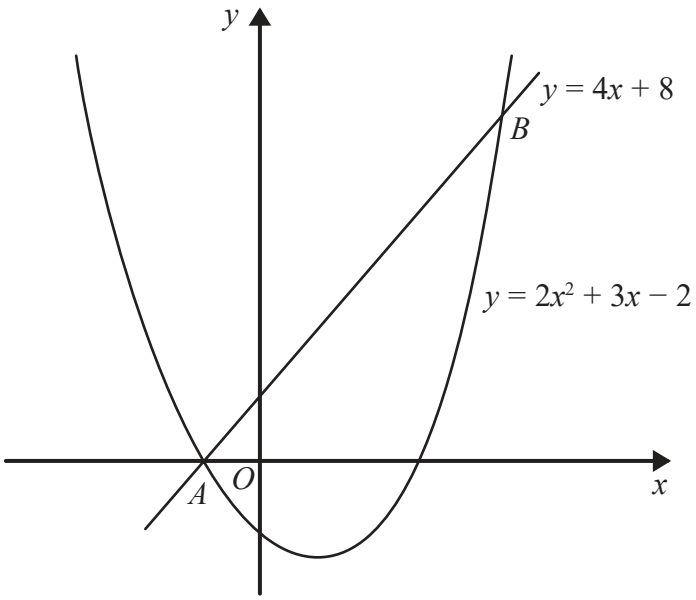


Diagram **NOT** accurately drawn

The diagram shows a sketch of part of the curve with equation $y = 2x^2 + 3x - 2$ and part of the straight line with equation $y = 4x + 8$

The points of intersection of the line with the curve are A and B.

(a) Find the length of AB, giving your answer in the form $k\sqrt{17}$, where k is a rational number to be determined.
Show your working clearly.

(Question 28 continued)

.....

(6)

The point C has coordinates $(-5, 0)$

(b) Calculate the size, to the nearest degree, of $\angle CAB$.

.....°

(2)

(Total for Question 28 is 8 marks)

TOTAL FOR PAPER IS 100 MARKS

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