

Please write clearly in block capitals.

Centre number

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Candidate number

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Surname

Forename(s)

Candidate signature

I declare this is my own work.

Level 2 Certificate FURTHER MATHEMATICS

Paper 1 Non-Calculator

Tuesday 11 June 2024

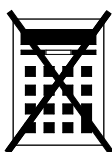
Afternoon

Time allowed: 1 hour 45 minutes

Materials

For this paper you must have:

- mathematical instruments
 - the Formulae Sheet (enclosed).
- You must **not** use a calculator.



Instructions

- Use black ink or black ball-point pen. Draw diagrams in pencil.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- If you need extra space for your answer(s), use the lined pages at the end of this book. Write the question number against your answer(s).
- Do all rough work in this book. Cross through any work you do not want to be marked.
- In all calculations, show clearly how you work out your answer.

Information

- The marks for questions are shown in brackets.
- The maximum mark for this paper is 80.
- You may ask for more graph paper and tracing paper. These must be tagged securely to this answer book.

For Examiner's Use

Pages	Mark
2–3	
4–5	
6–7	
8–9	
10–11	
12–13	
14–15	
16–17	
18–19	
20–21	
22	
TOTAL	



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Answer **all** questions in the spaces provided.**1**Work out the value of $\sqrt{\frac{t}{20}}$ where $t = 2.42 \times 10^3$ **[2 marks]**

Answer _____

2Factorise $x^2 - y^2$ **[1 mark]**

Answer _____



3 The n th term of a sequence is $\frac{3n+4}{n}$

Circle the limiting value of $\frac{3n+4}{n}$ as $n \rightarrow \infty$

[1 mark]

1

3

4

7

4 The equations of two straight lines are

$$y - 3x = 4 \quad \text{and} \quad 6y = 18x - 5$$

Show that the lines are parallel.

[2 marks]

Turn over for the next question

Turn over ►



5

$$y = \frac{4x^3 + x^7}{x^4}$$

Work out $\frac{dy}{dx}$

[3 marks]

$$\frac{dy}{dx} = \underline{\hspace{10cm}}$$

6

Points $A(-12, 1)$ and $B(12, -1)$ lie on a circle.

AB is a diameter of the circle.

Work out the equation of the circle.

[3 marks]

Answer $\underline{\hspace{10cm}}$



7

A point $P(x, y)$ is transformed using the transformation represented by $\begin{pmatrix} 4 & 0 \\ -2 & 3 \end{pmatrix}$

The image of P is $(-8, 7)$

Work out the values of x and y .

[3 marks]

$x =$ _____ $y =$ _____



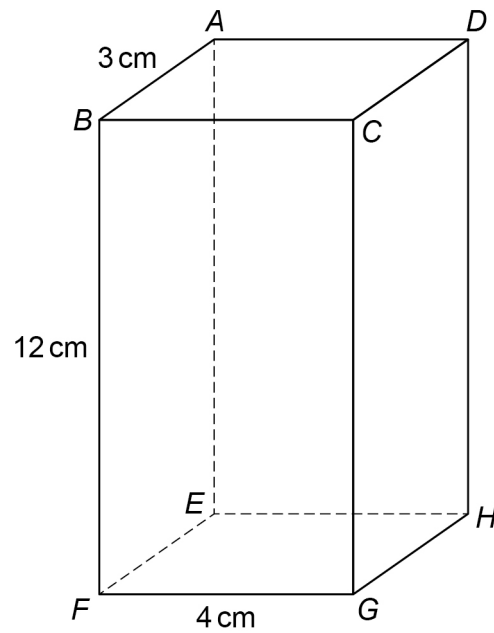
8 Solve by factorising $2x^3 - 9x^2 - 5x = 0$

[3 marks]

Answer _____



9

 $ABCDEFGH$ is a cuboid.Work out the length AG .**[3 marks]**

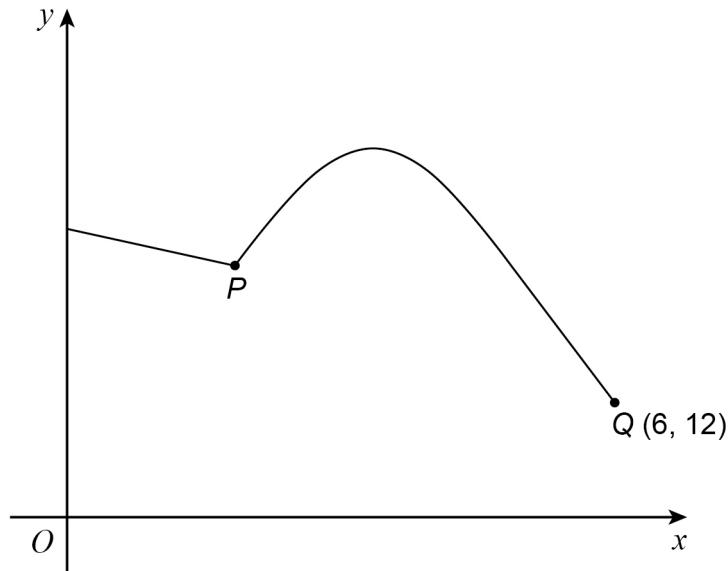
 $AG =$ _____ cm 

10

A function f is given by

$$f(x) = -\frac{1}{2}x + 21 \quad 0 \leq x \leq 2$$

$$= ax^2 + bx \quad 2 < x \leq 6$$

A sketch of $y = f(x)$ is shown.Work out the values of a and b .**[5 marks]**

 $a = \underline{\hspace{2cm}} \quad b = \underline{\hspace{2cm}}$


Work out the other two linear factors.

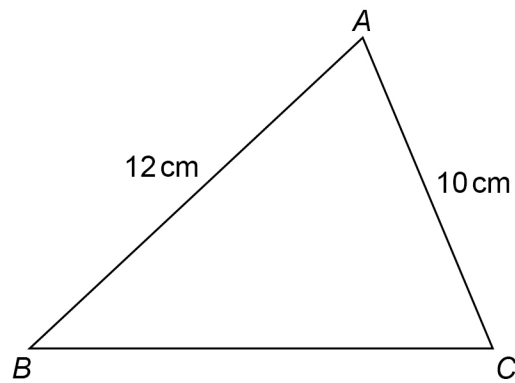
11 (b) $(x - 2)$ is a factor of $ax^4 - 3ax^3 + 5x - 22$

Work out the value of a .

11

12

In triangle ABC , $\cos A = \frac{3}{4}$



Not drawn
accurately

Work out the length BC .

[3 marks]

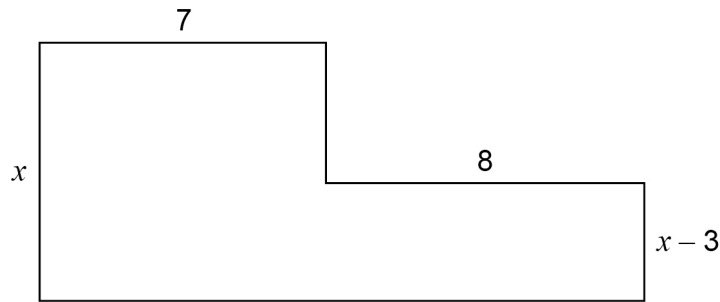
Answer _____ cm



13

A garden patio is made from two rectangles.

All lengths are in metres.



Not drawn
accurately

The area of the patio is **less than** 51 m^2

Work out the range of possible values of x .

Give your answer in the form $a < x < b$ where a and b are both integers.

You **must** show your working.

[4 marks]

Answer _____ $< x <$ _____



14 (a) Write $2x^2 - 16x + 7$ in the form $k(x + m)^2 + n$ where k , m and n are integers.

[3 marks]

Answer _____

14 (b) Solve $(x - 1)^2 - 5 = 0$

[1 mark]

Answer _____



15 (a) Matrix **M** represents a reflection in the line $y = -x$

Write down matrix **M**

[1 mark]

$$\mathbf{M} = \begin{pmatrix} \underline{\hspace{2cm}} & \underline{\hspace{2cm}} \\ \underline{\hspace{2cm}} & \underline{\hspace{2cm}} \end{pmatrix}$$

15 (b) $\mathbf{N} = \begin{pmatrix} 0 & 1 \\ -1 & 0 \end{pmatrix}$

Describe geometrically the single transformation represented by $\mathbf{N}^2$

[2 marks]

Turn over for the next question

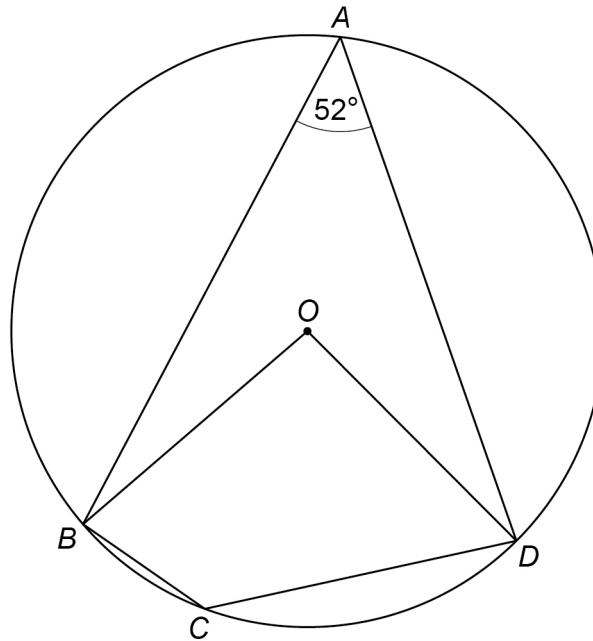
Turn over ►



16

A, B, C and D are points on a circle, centre O .

angle OBC : angle $ODC = 5 : 3$



Not drawn
accurately

Work out the size of angle OBC .

You **must** show your working.

[4 marks]

Answer _____ °



7

[4 marks]

$$\frac{3\sqrt{5} + \sqrt{3}}{\sqrt{5} - \sqrt{3}}$$

Answer _____

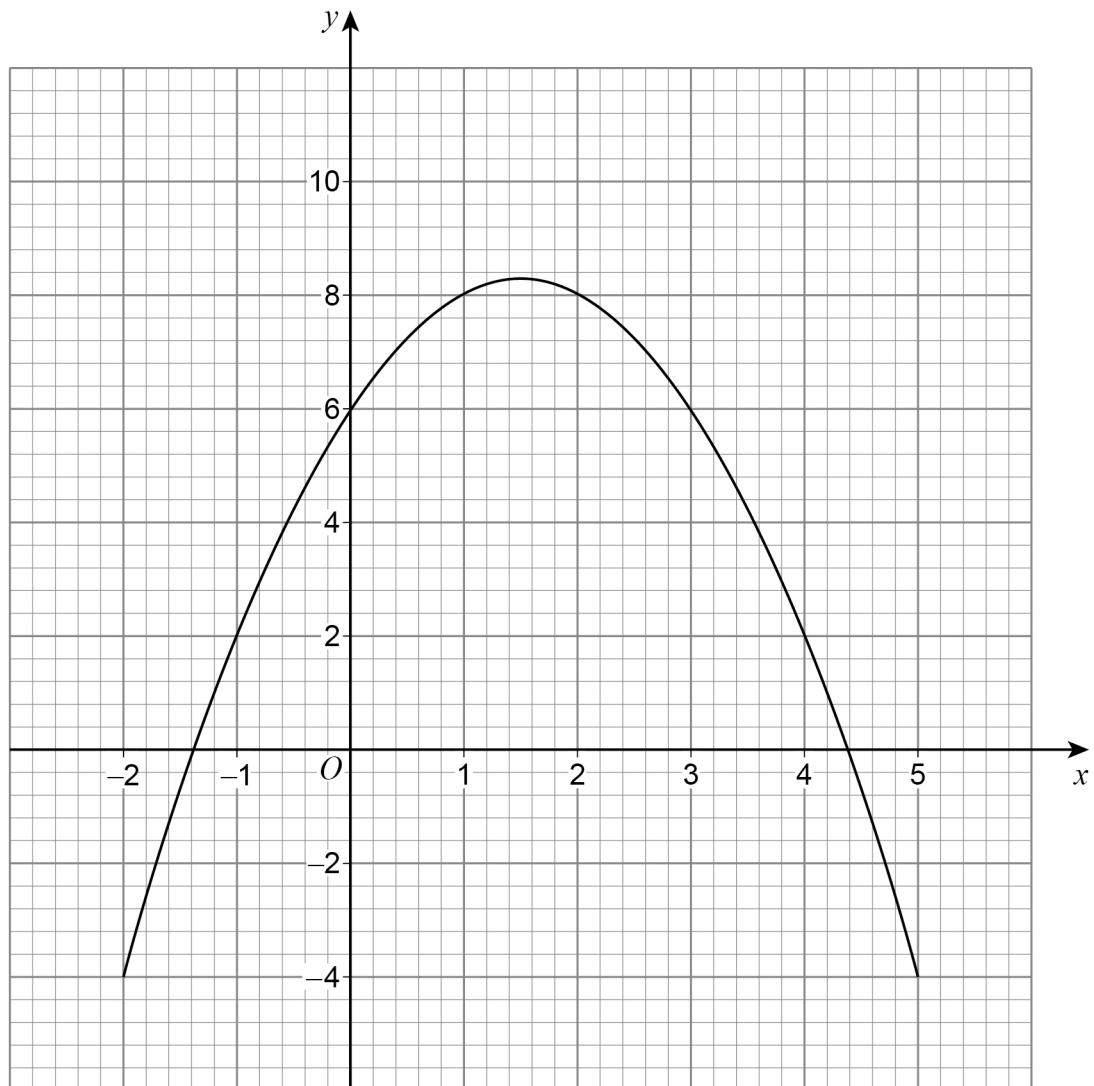


[5 marks]

Stationary point (_____ , _____) Nature _____

20

Here is the graph of $y = -x^2 + 3x + 6$ for $-2 \leq x \leq 5$



[4 marks]

$$x^2 - \frac{7}{2}x - 3 = 0$$

Answer _____

Turn over ►



$$(2^{x+3})^{4x+1} = 8^{x-1}$$

[5 marks]

Answer _____



$$f(x) = \frac{3 \sin x \cos x + \sin^2 x}{12 \cos^2 x + 4 \sin x \cos x}$$

You **must** show your working.

[4 marks]

$$x =$$

Turn over for the next question



The n th term of a quadratic sequence is $an^2 - 5n + c$ where a and c are integers.
The first four terms of the sequence are

Work out the values of x and y .

[5 marks]

$x =$ _____ $y =$ _____

END OF QUESTIONS



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2 8



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