AQA

Please write clearly in block capitals.

Centre number | | | | | | Candidate number | | | | |

Surname _____

Forename(s) _____

Candidate signature _____

I declare this is my own work.

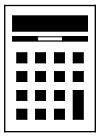
Level 2 Certificate
FURTHER MATHEMATICS

Paper 2 Calculator

Wednesday 18 June 2025 Afternoon Time allowed: 1 hour 45 minutes

Materials

For this paper you must have:



- a calculator
- mathematical instruments
- the Formulae Sheet (enclosed).

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.
- The use of a calculator is expected but calculators with a facility for symbolic algebra must **not** be used.

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	
22–23	
TOTAL	

Answer **all** questions in the spaces provided.

Do not write outside the box

1

Sequence	*n*th term
A	$\frac{6n}{7n+25}$
B	$\frac{20}{n+4}$

The 5th term in sequence A is also a term in sequence B.

Work out the **position** of the term in sequence B.

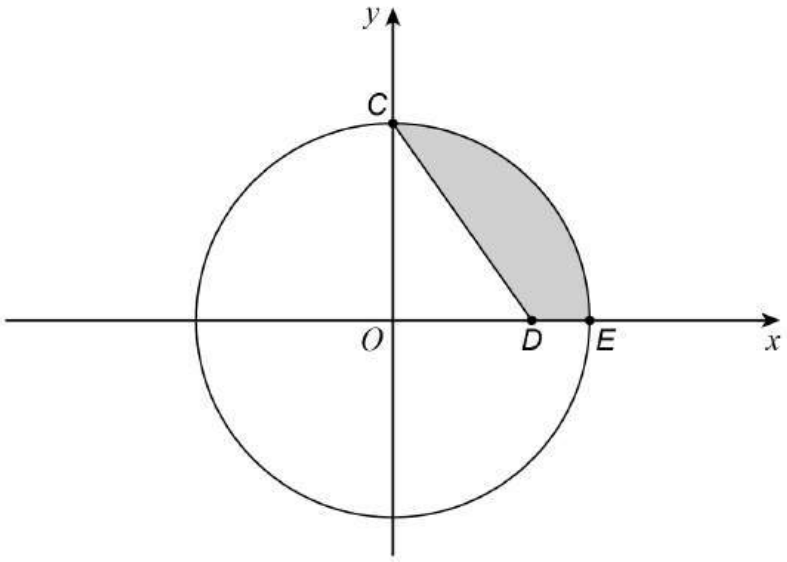
[3 marks]

Answer _____

2 *C* and *E* are points on the circle with equation $x^2 + y^2 = 144$

CD is a straight line.

$OD : DE = 5 : 1$



Not drawn accurately

Work out the shaded area.

Give your answer as a decimal.

[4 marks]

Answer _____ units^2

7

Do not write outside the box

3 The equation of a straight line is $2ax + y = 25$ where a is a constant.

The line passes through the point (3, 1)

Work out the value of the gradient of the line.

[3 marks]

Answer _____

4 $-5 \leqslant n \leqslant 5$

Work out the range of possible values of n^2

[2 marks]

Answer _____

Do not write outside the box

5 The equation of a curve is $y = x^5 + px^4$ where p is a constant.

When $x = -1$ the gradient of the curve is -3

Work out the value of p.

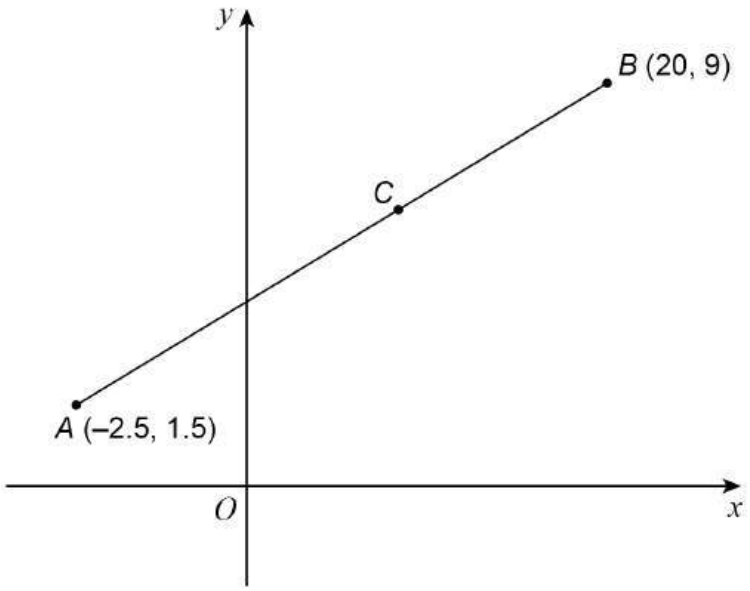
[3 marks]

$p =$ _____

Turn over for the next question

8

6 *C* is a point on the straight line *AB*.



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AC : *CB* = 3 : 2

Work out the equation of the straight line passing through O and *C*.

[3 marks]

Answer _____

Do not write outside the box

7 (a) $2^{5a+1} = 2^a$

Work out the value of a.

[2 marks]

$a =$ _____

7 (b) $3^{-7} \div 3^c = \left(3^{-3}\right)^{2c}$

Work out the value of c.

[3 marks]

$c =$ _____

8

Do not write outside the box

8 k is a positive integer.

Prove that $4k(k+8)-(4k+9)(k-1)$ is a multiple of 9

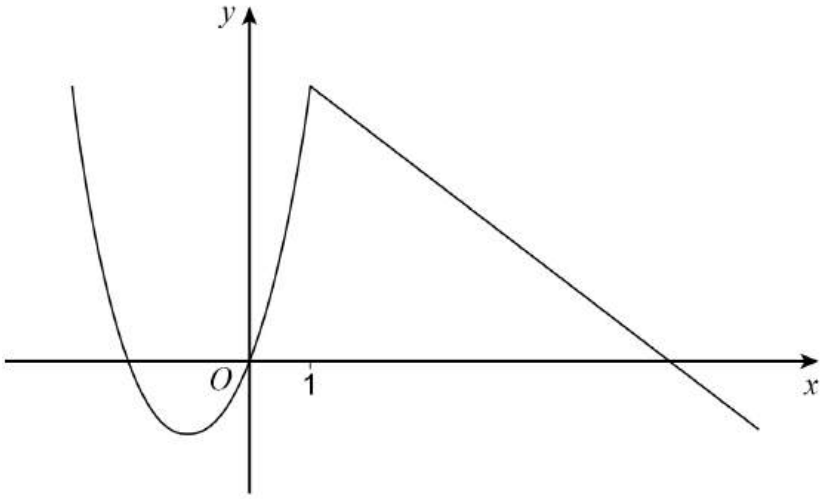
[3 marks]

Do not write outside the box

9 $f(x) = x^2 + px \qquad x \leqslant 1$

$= 2p - \frac{1}{2}x \qquad x > 1$

A sketch of $y = f(x)$ is shown.



Work out the value of p.

[2 marks]

$p =$ _____

Turn over for the next question

5

Do not write outside the box

10 The first four terms of a quadratic sequence are

–1 11 31 59

Work out an expression for the nth term.

Give your answer in the form $an^2 + b$ where a and b are constants.

[2 marks]

Answer _____

Do not write outside the box

11 (a) Simplify fully $\frac{3}{4w} + \frac{1}{6w}$

[2 marks]

Answer _____

11 (b) Factorise fully $(x-1)^9 + (x-1)^8(x+4)$

[2 marks]

Answer _____

11 (c) Factorise fully $8y^2 - 50$

[2 marks]

Answer _____

8

Do not write outside the box

12 (a) Circle the matrix that represents an enlargement, scale factor 3, centre O.

[1 mark]

$\begin{pmatrix} 3 & 0 \\ 0 & 3 \end{pmatrix}$ $\begin{pmatrix} 3 & 3 \\ 0 & 0 \end{pmatrix}$ $\begin{pmatrix} 0 & 3 \\ 3 & 0 \end{pmatrix}$ $\begin{pmatrix} 3 & 0 \\ 3 & 0 \end{pmatrix}$

12 (b) $OABC$ is the unit square.

O (0, 0) A (1, 0) B (1, 1) C (0, 1)

K is the transformation represented by $\begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix}$

L is the transformation represented by $\begin{pmatrix} 0 & 1 \\ -1 & 0 \end{pmatrix}$

$OABC$ is mapped to $OA'B'C'$ under a **combined** transformation of **K** followed by **L**.

Work out the coordinates of A', B' and C'.

[3 marks]

A' (_____ , _____) B' (_____ , _____) C' (_____ , _____)

Do not write outside the box

13 Rearrange $x = \dfrac{3k^2}{5k^2 - 2}$ to make k the subject.

[4 marks]

Answer _____

Turn over for the next question

8

Do not write outside the box

14 All lengths shown are in centimetres.

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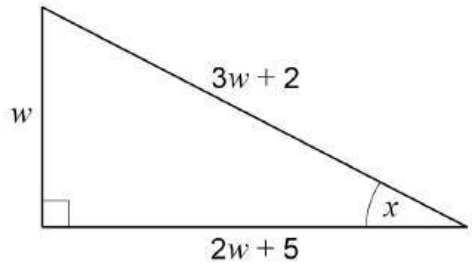


14 (a) Use Pythagoras' theorem to show that $4w^2 - 8w - 21 = 0$

[2 marks]

Do not write outside the box

14 (b) Work out the size of angle x.

[3 marks]

$x =$ _____ °

Turn over for the next question

5

Do not write outside the box

15 For a curve $y = f(x)$

$$\frac{dy}{dx} = 1 - \frac{9}{x^2}$$

15 (a) Show that the curve has a turning point where $x = 3$

[1 mark]

15 (b) Use $\frac{d^2y}{dx^2}$ to work out the nature of the turning point.

You **must** show your working.

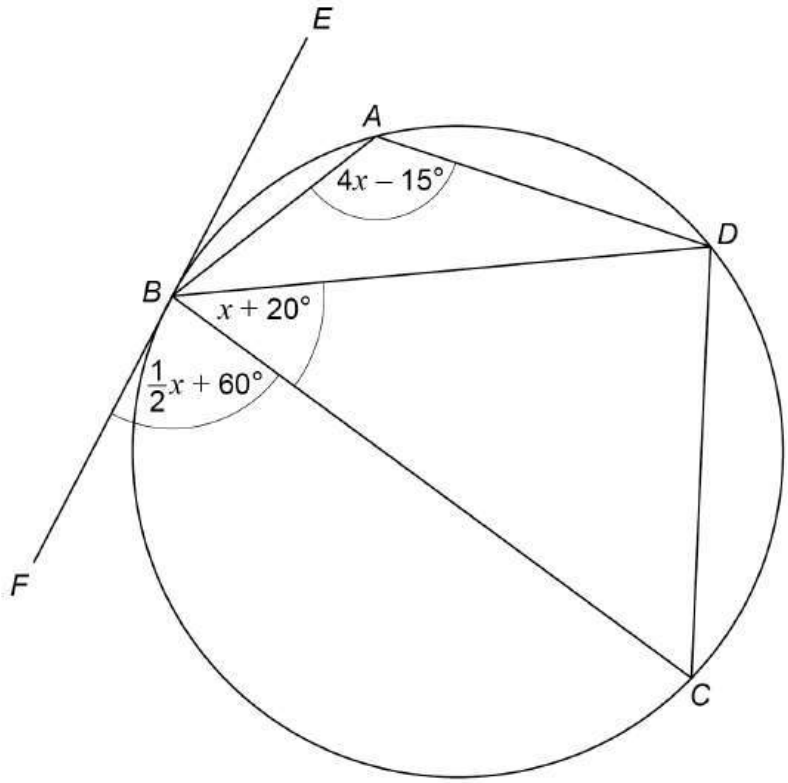
[2 marks]

Answer _____

Do not write outside the box

16 *A*, *B*, *C* and *D* are points on a circle.

EBF is a tangent.



Not drawn accurately

Work out the value of x.

[4 marks]

$x =$ _____ °

7

Turn over ►

Do not write outside the box

17 Solve

$$2a + 4b + c = 12$$
$$3a - b + 2c = -2$$
$$a - 5b - 3c = 6$$

Do **not** use trial and improvement.

You **must** show your working.

[5 marks]

$a =$ _____ $b =$ _____ $c =$ _____

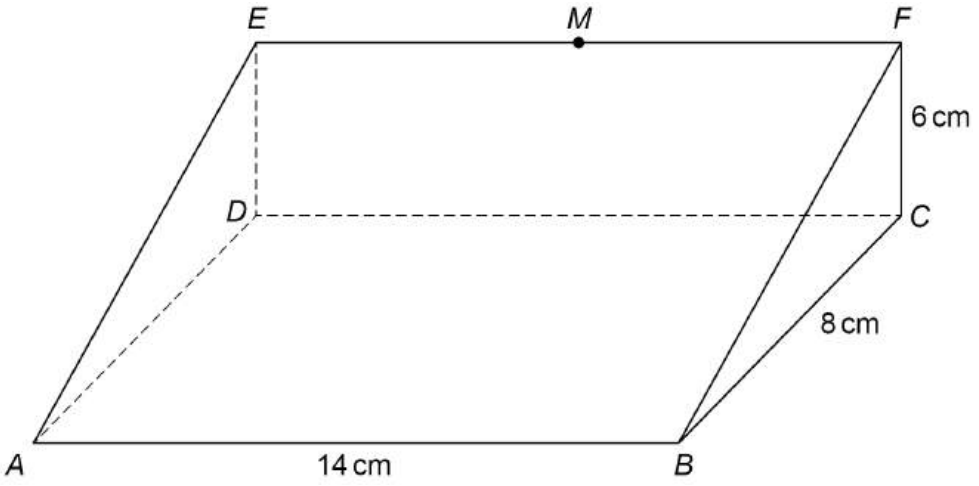
Do not write outside the box

18 *ABCDEF* is a triangular prism.

ABCD is a rectangle and angle *BCF* is 90°

AB = 14 cm *BC* = 8 cm *CF* = 6 cm

M is the midpoint of *EF*.



Work out the size of angle *BMD*.

[5 marks]

Answer _____ °

10

Turn over ►

Do not write outside the box

19 $f(x) = 4x^3 - 7$ $g(x) = 6x + 8$

Work out the value of x for which $f(2x) = gf(x)$

[4 marks]

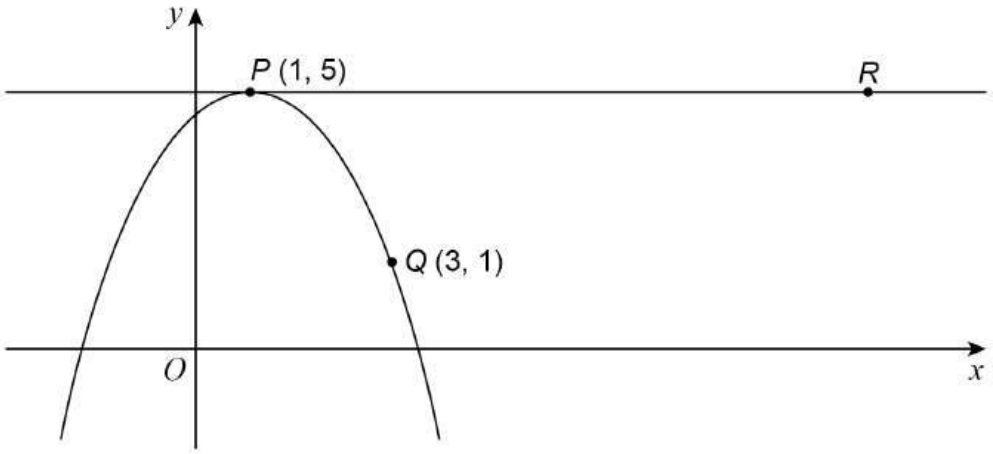
$x =$ _____

Do not write outside the box

20 Here is a sketch of the curve with equation $y = 4 + 2x - x^2$

The tangent to the curve at the turning point *P* is shown.

The normal to the curve at *Q* meets this tangent at *R*.



Work out the x-coordinate of *R*.

[5 marks]

Answer _____

9

Turn over ►

Do not write outside the box

21 (a) θ is an angle between 270° and 360°

$$\cos\theta = \frac{1}{5k} \quad \text{and} \quad \tan\theta = -3k$$ where k is a positive constant.

Work out the value of θ.

[2 marks]

Answer _____ °

Do not write outside the box

21 (b) Work out the values of x between 0° and 360° for which

$$8\cos^2 x - \cos x = 0$$

[3 marks]

Answer _____

END OF QUESTIONS

5