

Surname
Other Names

Centre Number

Candidate Number
4



LEVEL 2 CERTIFICATE

9550/01



ADDITIONAL MATHEMATICS

TUESDAY, 18 JUNE 2019 – MORNING

2 hours 30 minutes

ADDITIONAL MATERIALS

A calculator will be required for this paper.

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen.

Write your name, centre number and candidate number in the spaces at the top of this page.

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

Take π as 3.14 or use the π button on your calculator.

INFORMATION FOR CANDIDATES

You should give details of your method of solution when appropriate.

Unless stated, diagrams are not drawn to scale.

Scale drawing solutions will not be acceptable where you are asked to calculate.

The number of marks is given in brackets at the end of each question or part-question.

You are reminded that assessment will take into account the quality of written communication (including mathematical communication) used in your answer to question **5**.

When you are asked to show your working you must include enough intermediate steps to show that a calculator has not been used.

For Examiner's use only		
Question	Maximum Mark	Mark Awarded
1.	12	
2.	5	
3.	4	
4.	5	
5.	9	
6.	7	
7.	8	
8.	7	
9.	1	
10.	10	
11.	4	
12.	11	
13.	6	
14.	4	
15.	2	
16.	5	
Total	100	

1. (a) (i) Factorise $27x^2 + 6x - 5$.

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(ii) Hence solve the equation $27x^2 + 6x - 5 = 0$.

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(b) (i) Express $x^2 + 10x + 35$ in the form $(x + a)^2 + b$, where a and b are integers to be found.

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(ii) Hence, find the least value of $x^2 + 10x + 35$.

[1]

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Least value of $x^2 + 10x + 35$ is

(iii) What is the value of x when $x^2 + 10x + 35$ has its least value?

[1]

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(c) **Do not use a calculator** to answer this question.

Solve, by completing the square, $x^2 = 22x - 5$.

You must show all your working and leave your answer in surd form.

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2. Find $\frac{dy}{dx}$ for **each** of the following.

(a) $y = 10x^4 + 3x^2 - 5.$

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(b) $y = \frac{2}{x^{11}}.$

[1]

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(c) $y = x^{\frac{7}{8}}.$

[1]

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3. Prove that $\frac{x}{2} - \frac{x+3}{5} + \frac{x+5}{11} \equiv \frac{43x-16}{110}.$

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4. Given that $y = x^2 + 7x + 2$, find $\frac{dy}{dx}$ from first principles.

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5. You will be assessed on the quality of your written communication in this question.

The 3D shape below is such that:

- Trapezium $ABCG$ is congruent to trapezium $FHDE$,
- all the other faces are rectangles.

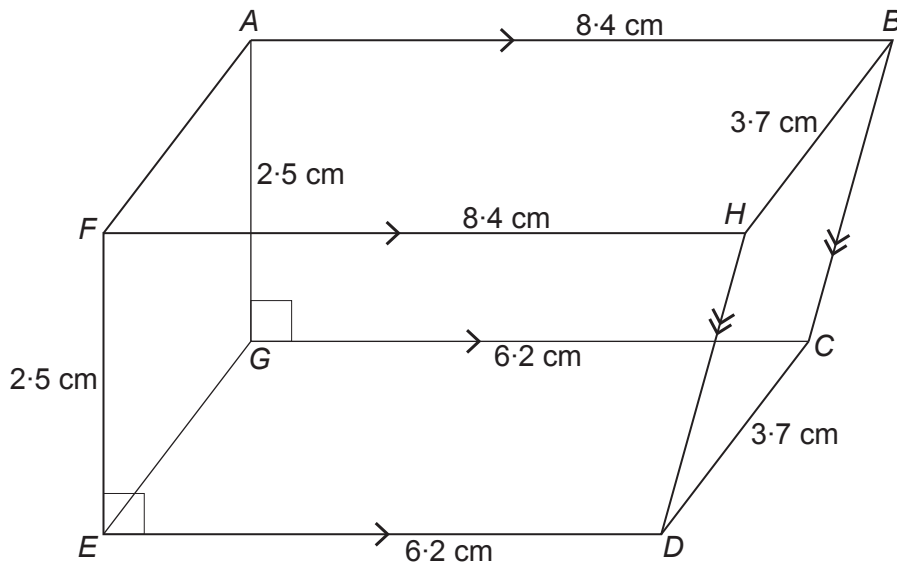


Diagram not drawn to scale.

Calculate \hat{ECB} .

You must show all your working.

[7 + 2 QWC]

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6. (a) **Do not use a calculator** to answer this question.

Simplify $\frac{2}{6 + \sqrt{3}}$.

Give your answer in the form $\frac{a + b\sqrt{c}}{d}$ where a , b , c and d are integers.

You **must** show all your working.

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- (b) Showing all your working, simplify each of the following.

(i) $\frac{y^{-\frac{3}{5}} \times y^{\frac{4}{5}}}{y^{\frac{3}{4}}}$.

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(ii) $\frac{x^{\frac{2}{7}} + 6x^{\frac{3}{7}}}{2x^{\frac{2}{7}}}$.

[2]

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7. (a) Find the remainder when $x^3 + 8x^2 - 2x + 6$ is divided by $x - 3$.

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- (b) (i) Show that $x + 3$ is a factor of $x^3 + x^2 - 41x - 105$.

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- (ii) Hence factorise $x^3 + x^2 - 41x - 105$.

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9. **Do not use a calculator** to answer this question.
You **must** show all your working.

Simplify $\sin 60^\circ \times \cos 60^\circ$.

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10. The coordinates of the points F and G are $(-4, 10)$ and $(8, 28)$ respectively.

(a) Calculate the length of the line FG .
Give your answer in the form $m\sqrt{n}$.

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(b) Find the gradient of the straight line that passes through points F and G .

[2]

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- (c) Find the equation of the straight line that;
- passes through the mid-point of the line FG , and
 - is perpendicular to the line FG .

Express your answer in the form $ax + by + c = 0$, where a , b and c are integers to be found. [6]

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11. (a) Use the axes below to sketch the graph of $y = -5\sin x + 7$ for values of x from 0° to 360° . You must label any important values on the axes. [3]

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- (b) State the maximum value and the minimum value of $y = -5\sin x + 7$. [1]

Maximum value

Minimum value

12. (a) Find $\frac{d^2y}{dx^2}$ when $y = 2x^8 + 4x^2 + 6$.

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(b) Find $\int \left(5x^4 + 3x^{-2} - \frac{2}{x^3} \right) dx$.

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(c) Showing all your working, evaluate $\int_2^3 (6x + 10) dx$.

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14. Find, using an algebraic method, the coordinates of the points of intersection of the curve $y = x^2 - 5x + 13$ and the line $y = 2x + 1$.

You must show all your working.

[4]

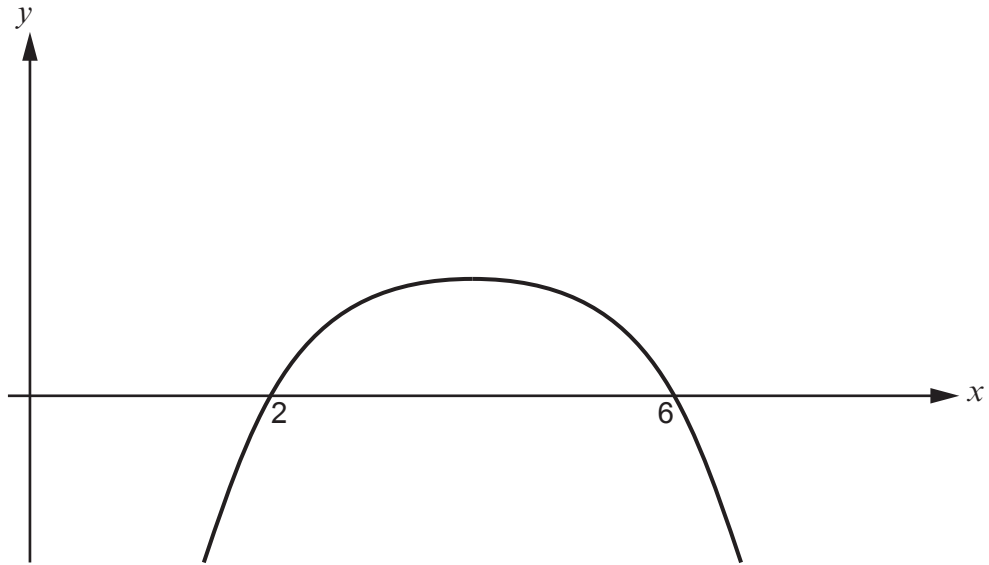
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15. Do the points (7, 10) and (2, -5) lie on the curve $3y^2 - 5x^2 = 55$?
You must support your answer by showing all your working.

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16. A sketch of the curve $y = -x^2 + 8x - 12$ is shown below.



Calculate the area of the region bounded by the curve $y = -x^2 + 8x - 12$ and the x -axis.

You must show all your working.

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END OF PAPER