

Surname
First name(s)

Centre Number

Candidate Number
4



LEVEL 2 CERTIFICATE

9550/01



TUESDAY, 21 JUNE 2022 – MORNING

ADDITIONAL MATHEMATICS

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. Do not use gel pen or correction fluid.

You may use a pencil for graphs and diagrams only.

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

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

If you run out of space, use the additional page at the back of the booklet. Question numbers must be given for the work written on the additional page.

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 7.

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.	5	
2.	4	
3.	6	
4.	4	
5.	4	
6.	8	
7.	7	
8.	3	
9.	6	
10.	6	
11.	10	
12.	10	
13.	7	
14.	5	
15.	4	
16.	5	
17.	6	
Total	100	

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Answer **all** questions.

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

(a) $y = 4x^8 - 5 + x^{-7}$

[3]

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(b) $y = x^{\frac{1}{6}}$

[1]

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(c) $y = \frac{1}{3x^5}$

[1]

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2. n is a whole number.

Show, **by factorising**, that $n^3 - n$ is the product of 3 consecutive numbers.

Hence, given that $n^3 - n = 120$, find the value of n .

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$n =$



3. Do not use a calculator to answer this question.

(a) Simplify $(4\sqrt{3}+1)^2 - 1$.

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

You must show all your working.

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(b) Rationalise the denominator in the following expression.

$$\frac{1}{6-\sqrt{7}}$$

You must show all your working.

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4. Simplify each of the following.

(a) $2x^{\frac{3}{8}} \times 3x^{\frac{1}{4}}$

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(b) $\left(x^{\frac{4}{5}} \times x^{\frac{1}{5}}\right)^3$

[1]

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(c) $x^{-\frac{1}{8}} \left(5x^{\frac{1}{8}} + 7x^{\frac{5}{8}}\right)$

[2]

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5. Given that $a = v + u$, $b = v - u$ and $c = uv$, show that $a^2 - b^2 = 4c$.

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6. (a) Find the remainder when $3x^3 + 4x^2 + 3x + 1$ is divided by $x - 2$. [2]

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(b) (i) Show that $x + 6$ is a factor of $x^3 + x^2 - 24x + 36$. [2]

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(ii) Hence factorise $x^3 + x^2 - 24x + 36$. [4]

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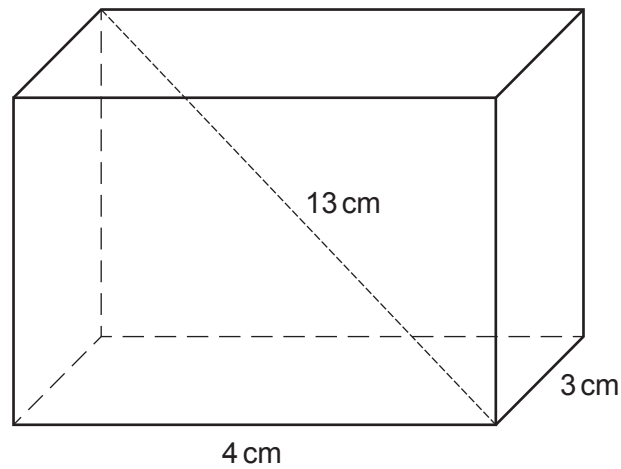
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7. You will be assessed on the quality of your written communication in this question.



The diagram is not drawn to scale.

Calculate the total surface area of the cuboid.

You must show all your working.

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8. The expression $x^2 + 40x + 100$ has a minimum value.

By **completing the square**, complete the statements below.

You must show all your working.

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The minimum value of $x^2 + 40x + 100$ occurs when $x =$

The minimum value of $x^2 + 40x + 100$ is



10. (a) Find $\frac{d^2y}{dx^2}$ when $y = 3x^{10}$.

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(b) Given the following facts, find the values of a , b , c and d .

- $y = ax^3 + bx^2 + cx + d$

- $\frac{dy}{dx} = 27x^2 + 8x + 13$

- The value of d is equal to $\frac{1}{6}$ of the coefficient of x in $\frac{d^2y}{dx^2}$.

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$a =$ $b =$ $c =$ $d =$



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11. (a) The coordinates of the points A and B are $(12, 6)$ and $(-3, 3)$ respectively.

(i) Calculate the length of the line AB .

Express your answer as a surd in its simplest form, $n\sqrt{m}$. [3]

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(ii) Find the gradient of a line perpendicular to the line AB . [3]

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(iii) Find the coordinates of the midpoint of the line AB . [2]

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(b) Find the equation of the straight line with gradient 6 that passes through the point (2, 15).

Give your answer in the form $y = mx + c$.

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12. (a) Find $\int \left(16x^7 + 15x^4 - 4 + \frac{6}{x^4}\right) dx$.

Simplify your answer.

You must show all your working.

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(b) Evaluate $\int_2^3 (3x^2 + 2x) dx$.

You must show all your working.

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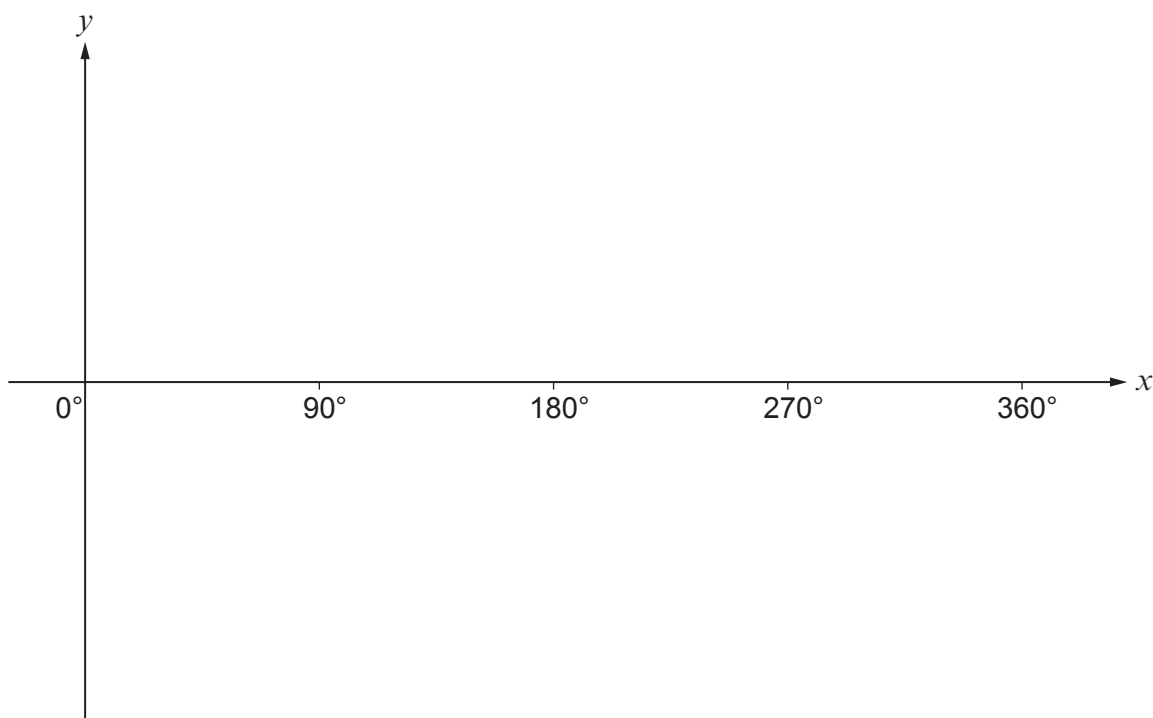
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15. (a) On the axes below, sketch the graph of $y = \sin 2x$ for values of x from 0° to 360° . [2]



- (b) Find all the solutions of the equation $\sin 2x = 0.47$ for values of x from 0° to 360° .

Give your solutions correct to the nearest degree.

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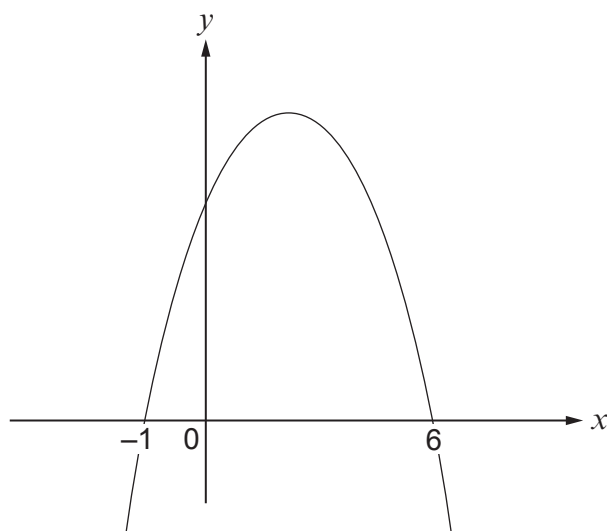
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16. The diagram shows a sketch of $y = -x^2 + 5x + 6$.



Calculate the area of the region defined by $y \leq -x^2 + 5x + 6$, $x \geq 2$ and $y \geq 0$.

You must show all your working.

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