

Surname	Centre Number	Candidate Number
First name(s)		4



LEVEL 2 CERTIFICATE

9550/01



S24-9550-01

WEDNESDAY, 19 JUNE 2024 – 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.

Write your answers in the spaces provided in this booklet. If you run out of space, use the additional page(s) at the back of the booklet, taking care to number the question(s) correctly.

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 **11**.

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.	2	
5.	8	
6.	5	
7.	5	
8.	6	
9.	5	
10.	5	
11.	7	
12.	2	
13.	6	
14.	3	
15.	7	
16.	3	
17.	6	
18.	6	
19.	4	
20.	5	
Total	100	

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

(a) $y = 5x^6 - 2 + x^{-5}$

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

[1]

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(c) $y = \frac{3}{13x^4}$

[1]

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2. Simplify **each** of the following.

(a) $\left(x^{\frac{1}{8}} \times 2x^{\frac{3}{8}}\right)^{10}$

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(b) $x^{-\frac{1}{5}} \left(7x^{\frac{3}{5}} - 6x^{-\frac{4}{5}}\right)$

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

The area of a trapezium is $(20 + 4\sqrt{5})\text{cm}^2$.

The lengths of the parallel sides are $(1 + \sqrt{5})\text{cm}$ and $(6 + 2\sqrt{5})\text{cm}$.

Calculate the perpendicular height of the trapezium.

Give your answer in the form $a + b\sqrt{5}$, where a and b are integers.

You must show all your working.

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4. The diagram below shows a sector of a circle with radius 4.1 cm.

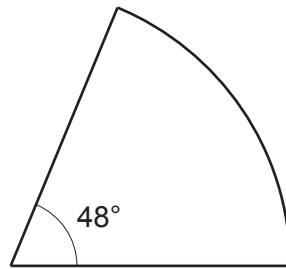


Diagram not drawn to scale

Calculate the area of this sector of a circle.

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

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- (b) (i) Show that $x - 3$ is a factor of $x^3 + 4x^2 - 9x - 36$.

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- (ii) **Hence** factorise $x^3 + 4x^2 - 9x - 36$.
Do not use a calculator to answer this part of the question.
You must show all your working.

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6. Given that $y = 11x^2 + 2x$, find $\frac{dy}{dx}$ from first principles.

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7. Find $\int \left(55x^{10} - 6 - \frac{10}{x^6} \right) dx$.

Simplify your answer.

You must show all your working.

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- $$y = \frac{x^2}{2} - 2x + 3 \text{ and } 6y = 4x + 1.$$

You must show all your working.

[6]



9. Matilda buys $(2w + 3)$ apples for £7.

Jac buys $(5w - 2)$ oranges for £11.

Rowena buys 2 apples and 1 orange from the same shop.

Write an expression for the total cost, in pounds, of the 2 apples and 1 orange that Rowena buys.

You must simplify your expression to give your answer as a single fraction in terms of w . [5]

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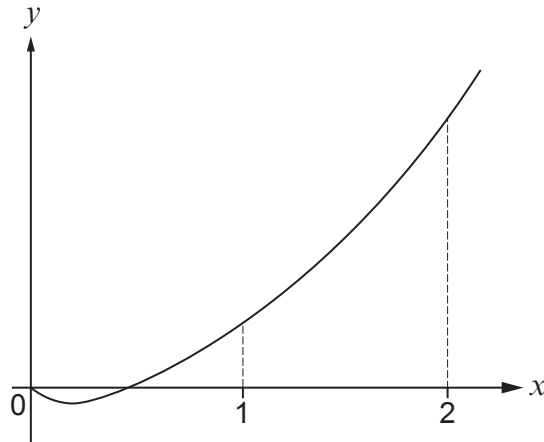
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10. The diagram below shows a sketch of the curve $y = 18x^2 - 3x$.



Calculate the area of the region bounded by:

- the curve $y = 18x^2 - 3x$,
- the line $x = 1$,
- the line $x = 2$,
- the x -axis.

You must show all your working.

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12. Find $\frac{d^2y}{dx^2}$ when $y = 5x^{14}$.

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13. Find the equation of the straight line that:

- passes through the midpoint of the straight line joining the points with coordinates $(2, 7)$ and $(-4, -5)$, and
- is perpendicular to the line $y = 8 - \frac{x}{4}$.

Express your answer in the form $ax + by + c = 0$, where a , b and c are integers.

Give your answer in its simplest form.

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14. Do **not** use a calculator to answer this question.

$$\text{Solve } \sqrt{2} \sin 60^\circ + \sqrt{3} \sin 45^\circ = \sqrt{x}.$$

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You must show all your working.

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16. The expression $x^2 + 28x + 100$ 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 $x^2 + 28x + 100$ occurs when $x =$

The minimum value of $x^2 + 28x + 100$ is



17. (a) Show that $\frac{x^2 - 9}{x^2 + 8x + 15} \equiv \frac{x - 3}{x + 5}$.

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(b) Hence solve $\frac{x^2 - 9}{x^2 + 8x + 15} = x - 3$.

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18. Find the equation of the tangent to the curve $y = 2x^2 - 10x + 5$ at the point where $x = 1$.

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

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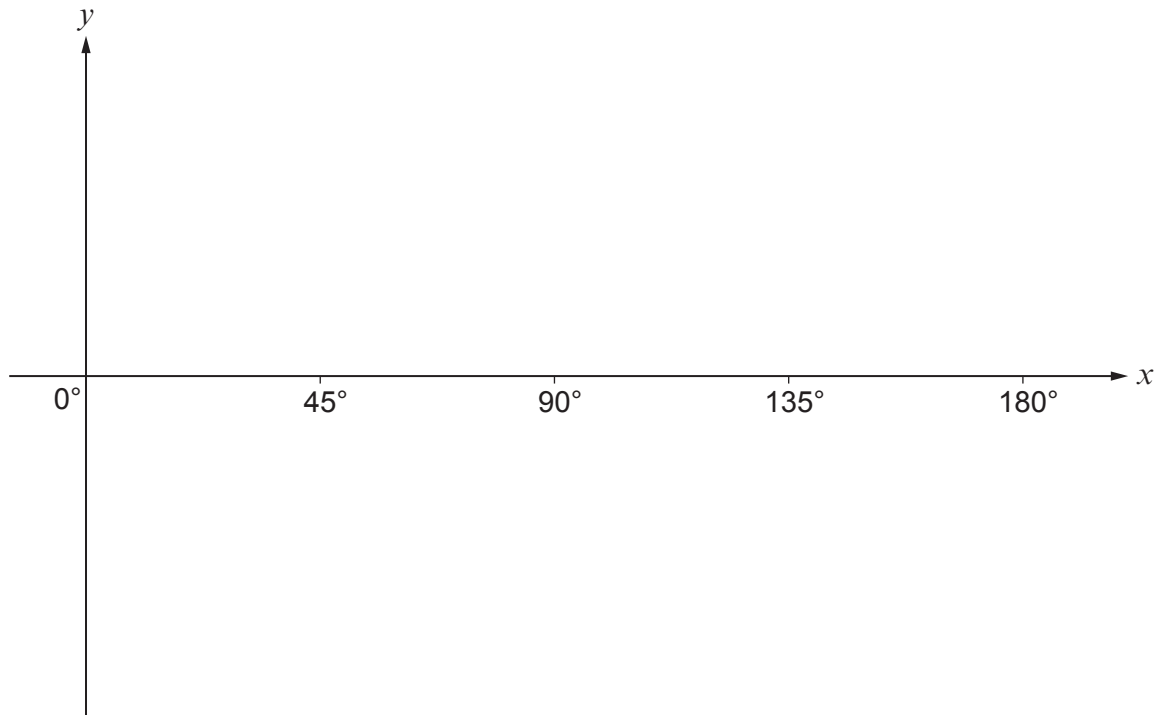
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19. (a) On the axes below, sketch the graph of $y = \tan 2x$ for values of x from 0° to 180° . [2]



- (b) Find all the solutions of the equation $\tan 2x = 10$ for values of x from 0° to 180° . [2]

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- 20.** The diagram below shows a slanted cone with a circular base, diameter 10.8 cm.

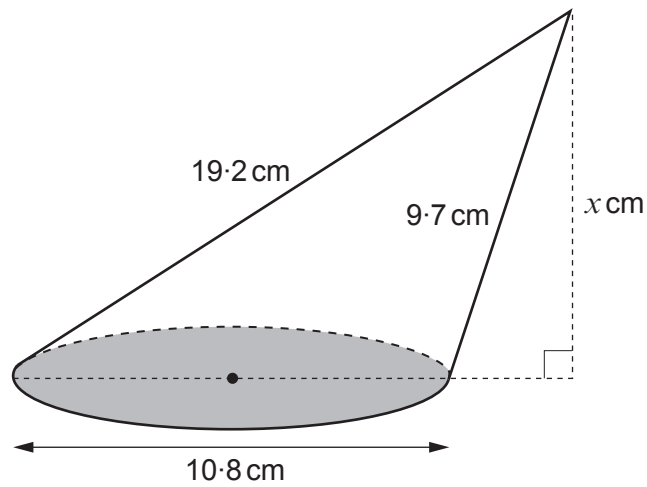


Diagram not drawn to scale

Calculate the value of x .

[5]

END OF PAPER



[illegible]

[illegible]