Surname	Centre Number	Candidate Number
Other Names		0

WJEC LEVEL 2 CERTIFICATE

9550/01

S15-9550-01

ADDITIONAL MATHEMATICS

A.M. MONDAY, 22 June 2015

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.	**4**	
2.	**3**	
3.	**5**	
4.	**11**	
5.	**10**	
6.	**6**	
7.	**8**	
8.	**5**	
9.	**10**	
10.	**5**	
11.	**7**	
12.	**5**	
13.	**6**	
14.	**7**	
15.	**3**	
16.	**1**	
17.	**4**	
Total	**100**	

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1. Factorise $6x^2 - 11x - 10$ and **hence** solve the equation $6x^2 - 11x - 10 = 0$. [4]

2. The expression $x^2 + 14x + 9$ has a minimum value.

(a) By **completing the square**, find the value of x when $x^2 + 14x + 9$ has its minimum value. You must show your working. [2]

(b) Write down the minimum value of $x^2 + 14x + 9$. [1]

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

(a) $y = 5x^8 - 6x - 9$ [3]

(b) $y = x^{-8}$ [1]

(c) $y = x^{\frac{2}{5}}$ [1]

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Turn over.

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4. The coordinates of the points *D* and *E* are (6, 22) and (–4, 14) respectively.

(a) Calculate the length of the line *DE*.
Express your answer as a surd in its simplified form $n\sqrt{m}$. [3]

(b) Find the equation of the straight line perpendicular to *DE* that passes through the mid-point of *DE*.
Express your answer in the form $ax + by + c = 0$, where a, b and c are integers. [8]

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

The length of a solid rectangular block is x cm.
The width of the block is 4 cm less than its length.
The height is 1 cm more than the length.
The total surface area of the rectangular block is 124 cm^2.

By showing that $x^2 - 2x = 22$, find the length of the rectangular block, giving your answer in its simplest surd form.
You must use an algebraic method and show all your working. [10]

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6. Find the coordinates of the points of intersection of the curve $y = x^2 + 6x - 5$ and the straight line $y = 2x + 1$.
Use an algebraic method and give your answers correct to 2 decimal places. [6]

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

(b) (i) Show that $x - 2$ is a factor of $x^3 + 8x^2 + x - 42$. [2]

(ii) **Hence** factorise $x^3 + 8x^2 + x - 42$. [4]

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8. *(a)* Find $\frac{d^2y}{dx^2}$ when $y = 2x^{10}$. [2]

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

- $y = ax^5 + bx + c$
- $\frac{d^2y}{dx^2} = 20x^3$
- when $x = 0$, $y = 5$
- when $x = 1$, $y = 9$ [3]

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9. *(a)* Find $\int 21x^6 - 3x^2 - \frac{1}{x^2} + 6 \, \mathrm{d}x$. [5]

(b) Showing all your working, evaluate $\int_2^5 6x^2 + 4x \, \mathrm{d}x$. [5]

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10. Do not use a calculator to answer this question.
All working must be shown.

(a) Use fractions and surds to show that $(\sin 30°)^2 + (\cos 30°)^2 = 1$.
You must show all your calculations. [2]

(b) Use fractions and surds to evaluate $5\tan 45° + 2\sin 60° + \tan 60°$.
You must show all your calculations and simplify your answer. [3]

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11. A right square-based pyramid has a perpendicular height of 12 cm.
The area of the square base of the pyramid is 64 cm^2.

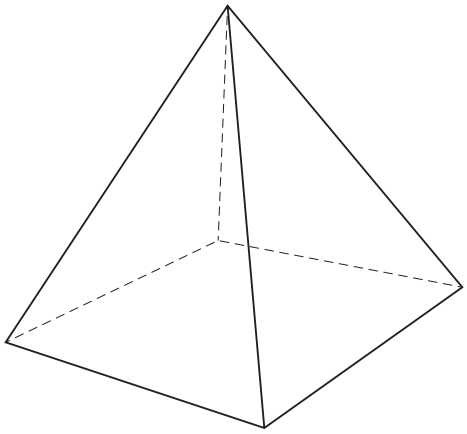

Diagram not drawn to scale

Calculate the angle between the diagonal of the base and one of the sloping edges of the pyramid. [7]

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12. Given that $y = x^2 - 3x$, find $\frac{dy}{dx}$ from first principles. [5]

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13. Find the equation of the tangent to the curve $y = 2x^2 - 8x$ at the point where $x = 3$.
Give your answer in the form $ax + by + c = 0$. [6]

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14. Find the coordinates and the nature of each of the stationary points on the curve $y = 2x^3 - 24x + 13$.
You must show all your working. [7]

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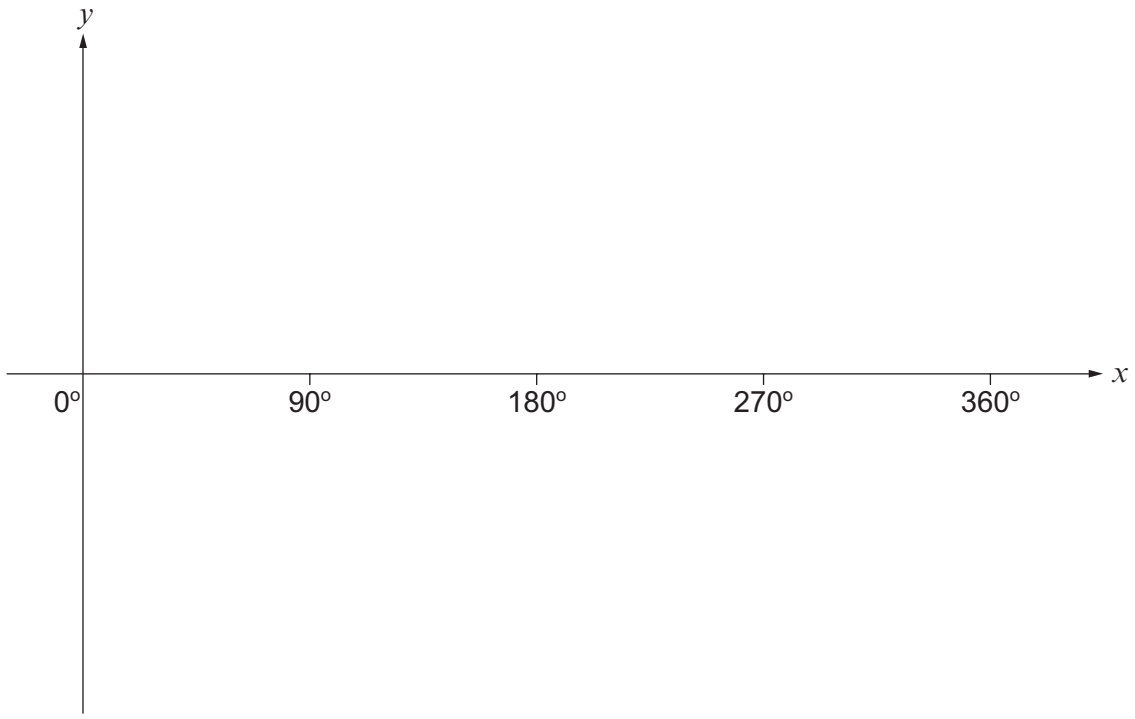
15. *(a)* On the axes below, sketch the graph of $y = 5\cos x$ for values of x from 0° to 360°. [2]



(b) Find all the solutions of the equation $5\cos x = 0$ for values of x from 0° to 360°. [1]

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16. Without using a calculator, find the value of $(12^{\frac{1}{2}})^4$.
Show all your working. [1]

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17. Showing all your working, simplify each of the following.

(a) $\dfrac{5x^{\frac{5}{8}} \times 4x^{\frac{3}{8}}}{x^{\frac{2}{3}}}$ [2]

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(b) $\dfrac{6x^{\frac{1}{4}} + 3x^{\frac{3}{4}}}{3x^{\frac{1}{4}}}$ [2]

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END OF PAPER

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