

Surname
Other Names

Centre Number

Candidate Number
0



## WJEC LEVEL 2 CERTIFICATE

9550/01

## ADDITIONAL MATHEMATICS

A.M. MONDAY, 24 June 2013

2  $\frac{1}{2}$  hours

### 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  $\pi$  as 3.14 or use the  $\pi$  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 4(b).

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	7	
3	7	
4	13	
5	5	
6	6	
7	11	
8	8	
9	7	
10	5	
11	5	
12	7	
13	6	
14	5	
15	3	
<b>TOTAL MARK</b>		

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

(a)  $y = 7x^5 - 5x - 2$

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[3]

(b)  $y = x^{-6}$

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

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2. (a) Factorise  $8x^2 - 10x - 3$ .

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**Hence** solve the equation  $8x^2 - 10x - 3 = 0$ .

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- (b) Use the method of completing the square to find the least value of  $x^2 + 12x + 5$ .

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3. Consider two squares of different sizes.  
The perimeter of the larger square is 12 cm greater than the perimeter of the smaller square.  
The area of the larger square is  $30 \text{ cm}^2$  greater than the area of the smaller square.

Calculate the dimensions of each square.

You must use an algebraic method, **not** a trial and improvement method.

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4. The coordinates of the points  $A$  and  $B$  are  $(3, 9)$  and  $(-5, 7)$  respectively.

(a) Calculate the length of the line  $AB$ .  
Express your answer as a surd in its simplified form  $a\sqrt{b}$ .

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(b) *You will be assessed on the quality of your written communication in this part of the question.*

Find the equation of the straight line perpendicular to  $AB$  that passes through the midpoint of  $AB$ . Express your answer in the form  $y = mx + c$ .

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5. Solve  $(3x - 1)(3x + 1) - (1 - x)(1 + x) + 3(1 - 2x)(1 + 2x) = -199$ .

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6. Find the coordinates of the points of intersection of the curve with equation  $y = x^2 + 2x - 3$  and the straight line with equation  $y = x + 1$ .  
Give your answers correct to 2 decimal places.

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7. (a) Find  $\frac{d^2y}{dx^2}$  when  $y = 6x^9$ .

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- (b) Find  $\int 3x^4 + \frac{1}{x^3} + 4 \, dx$ .

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- (c) Showing all your working, evaluate  $\int_2^3 6x^5 + 5 \, dx$ .

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8. (a) Find the remainder when  $7x^3 - 4x^2 + x - 2$  is divided by  $x - 2$ .

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(b) (i) Show that  $x + 3$  is a factor of  $x^3 + 4x^2 - 17x - 60$ .

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(ii) Hence, factorise  $x^3 + 4x^2 - 17x - 60$ .

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9. A pyramid stands on a horizontal surface.  
 The base of the pyramid is in the shape of a kite.  
 The base of the pyramid is shown below.

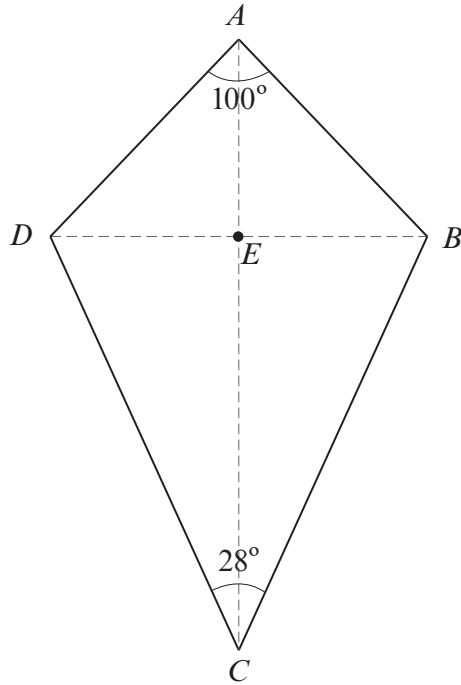


Diagram not drawn to scale

The apex (top vertex) of the pyramid is vertically above  $E$ .  
 The vertical height of the pyramid is 17.3 cm.  
 The length of  $BD$  is 12.6 cm and the angles are as shown on the diagram.  
 Use the line  $EC$  to calculate the angle of elevation of the apex of the pyramid from the point  $C$ .

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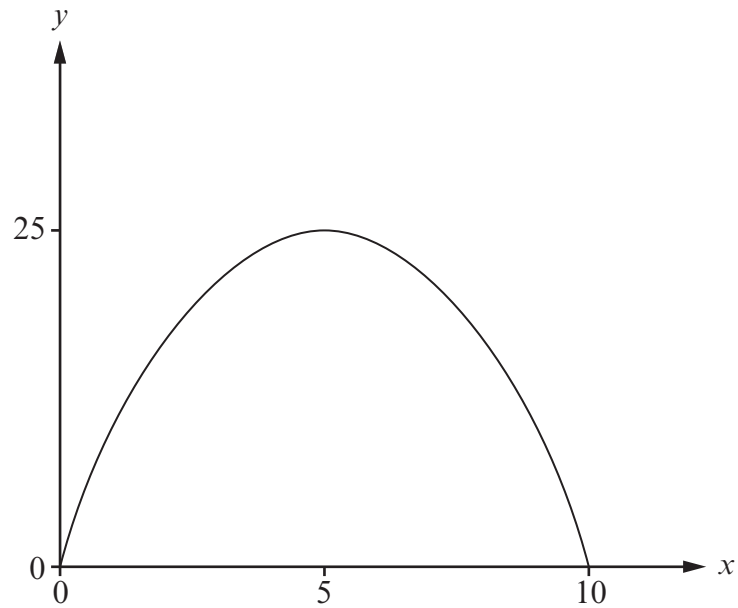
10. Given that  $y = x^2 - 4x$ , find  $\frac{dy}{dx}$  from first principles.

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11. The diagram shows the curve  $y = 10x - x^2$ .



Showing all your working, calculate the area of the region bounded by the curve  $y = 10x - x^2$  and the  $x$ -axis.

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12. Find the coordinates and the nature of each of the stationary points on the curve  $y = 3x^3 - 36x + 11$ . You must show all your working.

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13. Find the equation of the tangent to the curve  $y = 3x^2 + 4x$  at the point where  $x = 2$ .  
Give your answer in the form  $ax + by + c = 0$ .

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14. (a) Showing all your working, find the value of  $(50^{\frac{1}{2}})^4$ .

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

(i) 
$$\frac{3x^{-\frac{5}{4}} \times 4x^{\frac{7}{4}}}{x^{\frac{3}{2}}}$$

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(ii) 
$$\frac{12x^{\frac{1}{6}} + 4x^{\frac{2}{6}}}{4x^{\frac{1}{6}}}$$

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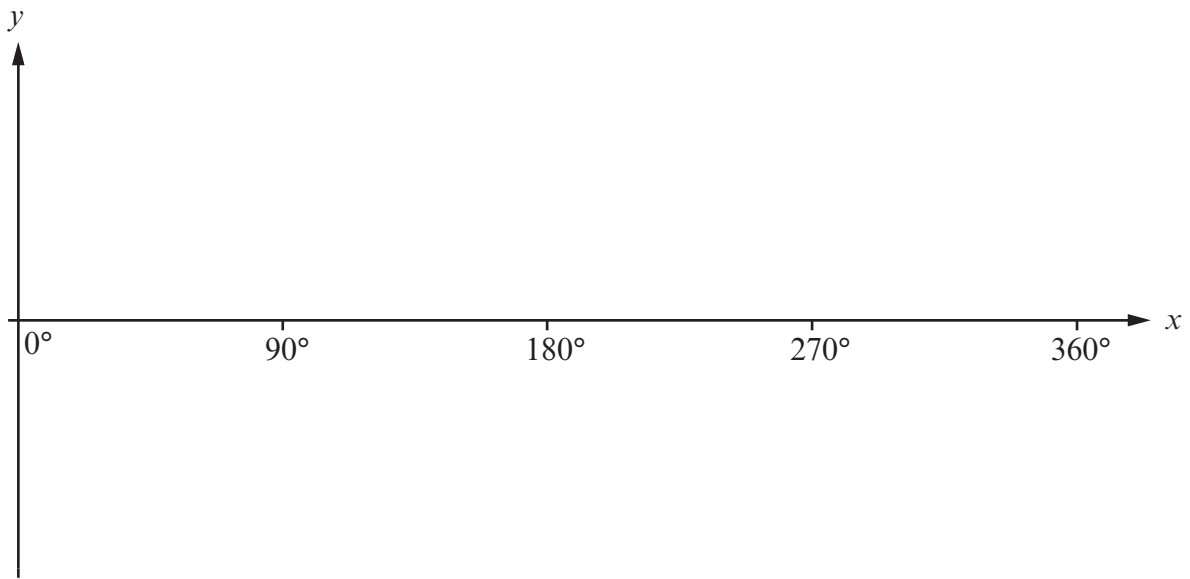
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[2]

15. (a) On the axes below, sketch the graph of  $y = 4 \sin x$  for values of  $x$  from  $0^\circ$  to  $360^\circ$ .



[2]

- (b) Find all the solutions of the equation  $4 \sin x = 0$  for values of  $x$  from  $0^\circ$  to  $360^\circ$ .

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**END OF PAPER**