

Candidate Name	Centre Number	Candidate Number
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WJEC LEVEL 2 CERTIFICATE

9550/01

ADDITIONAL MATHEMATICS

P.M. TUESDAY, 21 June 2011

2½ 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 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	7	
2	5	
3	9	
4	4	
5	8	
6	5	
7	9	
8	7	
9	11	
10	7	
11	7	
12	5	
13	7	
14	5	
15	4	
TOTAL MARK		

1. (a) (i) Factorise $6x^2 - 13x - 5$.

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- (ii) Hence solve the equation $6x^2 - 13x - 5 = 0$.

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- (b) Use the method of completing the square to find the least value of $x^2 + 6x + 5$.

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[3]

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

(a) $y = 8x^4 + 3x - 6$

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(b) $y = x^{-4}$

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

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3. The coordinates of the points A and B are $(2, 8)$ and $(4, -6)$ respectively.

(a) Calculate the length of the line AB .

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(b) Find the equation of the straight line perpendicular to AB that passes through the mid-point of AB .

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4. Prove that $\frac{2x}{7} - \frac{x-3}{2} + \frac{3x+2}{21} \equiv \frac{67-3x}{42}$.

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5. (a) Find the remainder when $6x^3 - 13x^2 + x + 2$ is divided by $x + 3$.

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- (b) (i) Show that $x - 2$ is a factor of $6x^3 - 13x^2 + x + 2$.

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- (ii) Hence factorise $6x^3 - 13x^2 + x + 2$.

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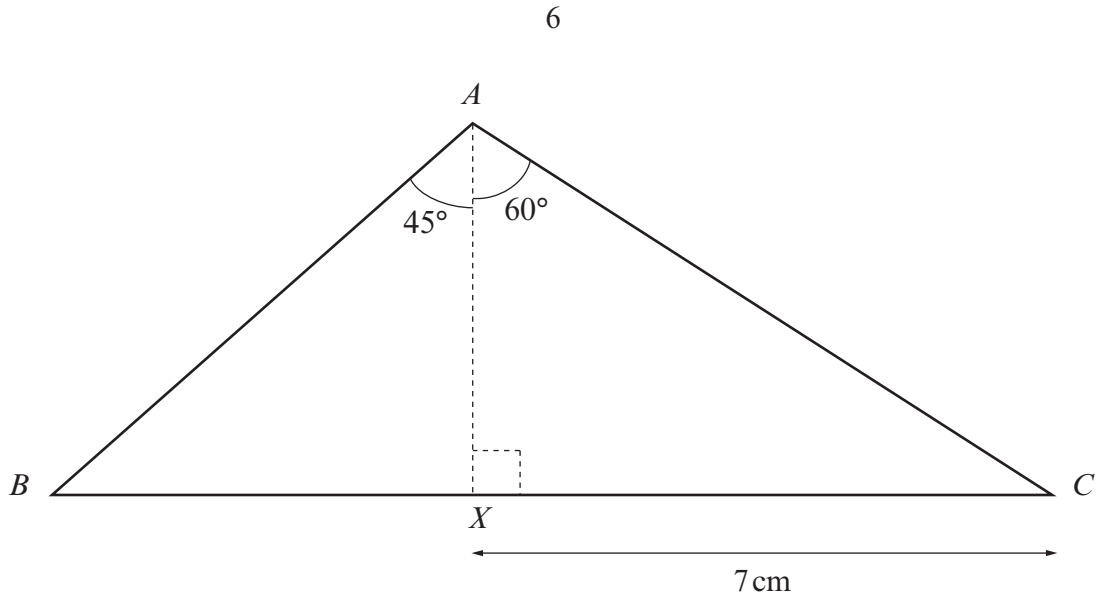


Diagram not drawn to scale

Find the length of AB in surd form.

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8. (a) Given that $y = x^2 + 2x$, find $\frac{dy}{dx}$ from first principles.

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(b) Find the x -coordinate of the point on the curve $y = x^2 + 2x$ where the gradient of the tangent to the curve is 12.

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9. (a) Find $\frac{d^2y}{dx^2}$ when $y = 5x^8$.

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- (b) Find $\int \left(4x^6 + \frac{1}{x^2} + 9\right) dx$.

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- (c) Evaluate $\int_1^2 (3x^2 + 1) dx$.

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10. Find the coordinates and nature of each of the stationary points on the curve $y = 2x^3 - 6x + 5$. You must show all your working.

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11. (a) Showing all your working, find the value of **each** of the following.

(i) $36^{-\frac{1}{2}} \times 125^{\frac{1}{3}}$

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(ii) $\left(49^{\frac{1}{2}}\right)^{-2}$

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(b) Simplify **each** of the following.

(i) $\frac{6x^{\frac{3}{2}} \times 5x^{\frac{1}{4}}}{(x^5)^{\frac{1}{4}}}$

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(ii) $\frac{3y^{\frac{1}{5}} + 2y^{\frac{6}{5}}}{5y^{\frac{1}{5}}}$

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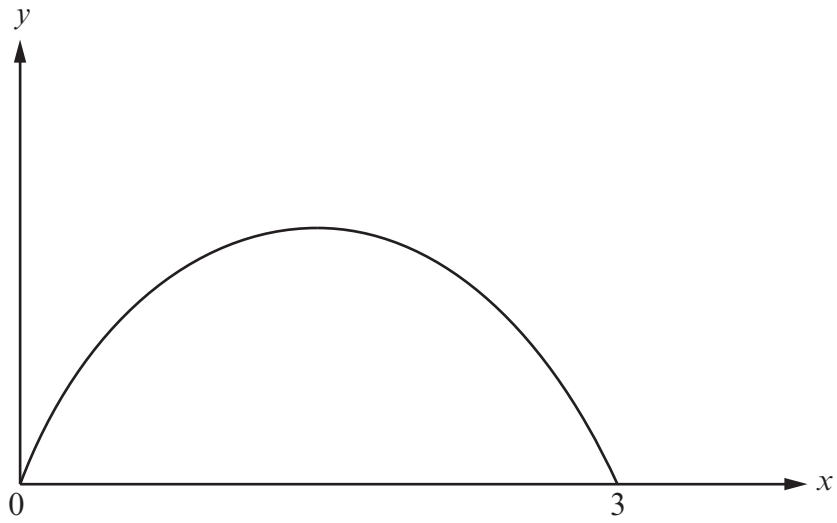
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12. The diagram shows a sketch of the curve $y = 3x - x^2$.



Calculate the area of the region bounded by the curve $y = 3x - x^2$ and the x -axis.

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13. Solve the equation $3 + \frac{x-6}{3x} = \frac{3x+1}{2(x-3)}$.

Give your solutions correct to two decimal places.

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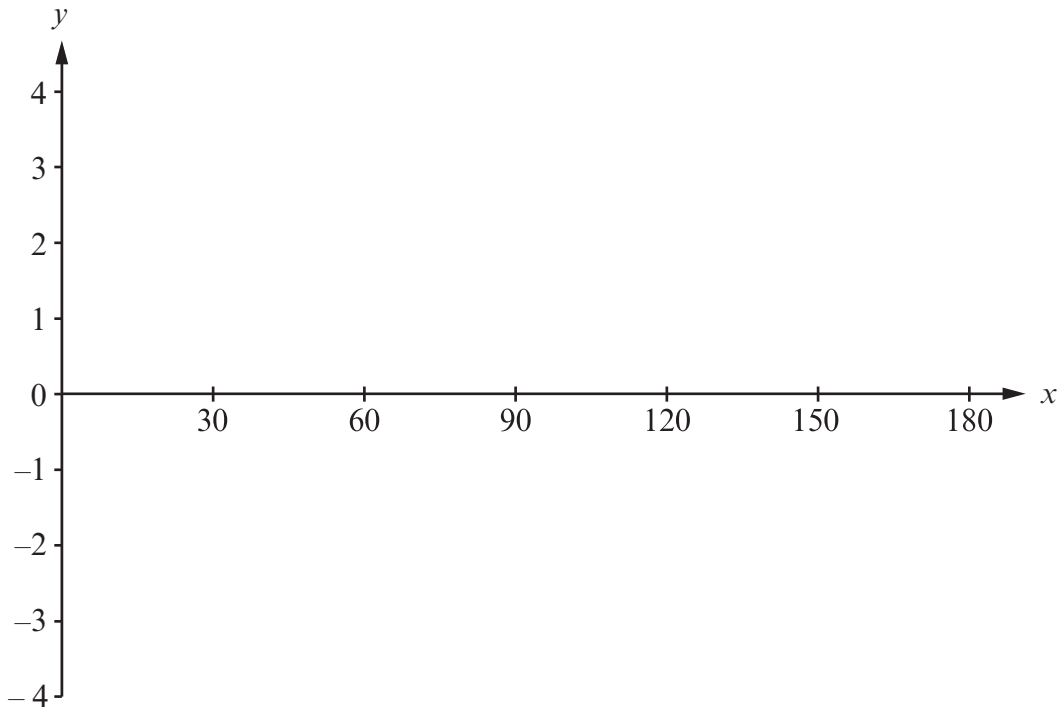
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14. (a) On the axes below, sketch the graph of $y = 3\sin 2x$ for values of x from 0° to 180° .



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- (b) Find all the solutions of the equation $3\sin 2x = 1$ for values of x from 0° to 180° , giving your answers correct to one decimal place.

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15. The diagram shows a flexible piece of card in the form of a sector of a circle with centre A and radius 18 cm.

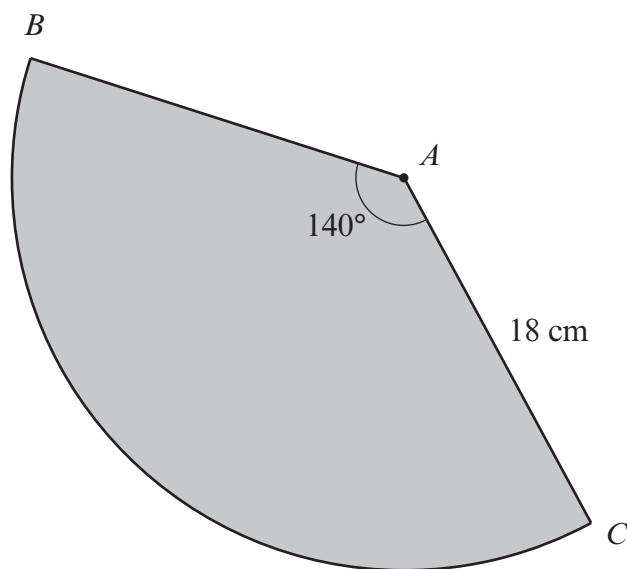


Diagram not drawn to scale

The card is bent and the edges AB and AC are taped together so that the card forms the curved surface of a cone with a circular base.
Calculate the radius of the circular base.

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