HIGHER

8.4 Completing the Square: 10-minute Pack

EDEXCEL 1MA1 · Calculator allowed · about 10 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

Completing the Square: Method Reminder

Revision Library original resource, written for Edexcel 1MA1 topic 8.4.

To complete the square for x^2 + bx + c, halve the coefficient of x to get b/2, then write (x + b/2)^2 - (b/2)^2 + c. For ax^2 + bx + c with a not equal to 1, first factorise a out of the x^2 and x terms before completing the square inside the bracket, then multiply back through. Once in the form a(x+p)^2 + q, you can read off the turning point of the graph directly: minimum (or maximum) at (-p, q). To solve ax^2 + bx + c = 0, isolate the squared bracket and take a square root of both sides, remembering the +/- sign.

1 Write $x^2 + 18x + 4$ in the form $(x + p)^2 + q$.

(Total for Question 1 is 2 marks)

2 The graph of $y = (x - 7)^2 + 2$ is a translation of the graph of $y = x^2$. State the coordinates of its minimum point.

(Total for Question 2 is 2 marks)

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3 Given that $x^2 + px + q = (x + 6)^2 - 11$ for all values of x, find the values of p and q.

(Total for Question 3 is 2 marks)

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4 Solve $x^2 + 6x + 2 = 0$ by completing the square. Give your answers as exact surds, simplified where possible.

(Total for Question 4 is 3 marks)

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Mark scheme · 8.4 Completing the Square: 10-minute Pack

A correct answer earns full marks unless the question asks for working, a method, proof or explanation.

Question 1

$(x + 9)^2$ seen	**M1**
$(x + 9)^2 - 77$ cao	**A1**

Answer: $(x + 9)^2 - 77$

Question 2

x-coordinate = 7	**B1**
y-coordinate = 2 (accept coordinate pair (7, 2) for both marks if fully correct)	**B1**

Answer: (7, 2)

Question 3

p = 12 cao	**B1**
q = 25 cao	**B1**

Answer: p = 12, q = 25

Question 4

$(x + 3)^2 - 9 + 2 = 0$ oe, correct completed square set to zero	**M1**
$(x + 3)^2 = 7$ leading to $x + 3 = +-\sqrt{7}$	**M1**
$x = -3 + \sqrt{7}$ and $x = -3 - \sqrt{7}$ oe, both exact	**A1**

Answer: $x = -3 + \sqrt{7}$ or $x = -3 - \sqrt{7}$

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