Completing the Square 2

1: Solve the following:

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

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b) Write $3x^2 + 30x + 65$ in the form $a(x + p)^2 + q$.

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c) Write $4x^2 - 24x + 29$ in the form $a(x + p)^2 + q$.

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2: Solve the following:

a) Write $-x^2 - 4x + 2$ in the form $a(x + p)^2 + q$ and hence find the line of symmetry.

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b) Write $-2x^2 + 16x - 31$ in the form $a(x + p)^2 + q$ and hence find the line of symmetry.

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c) Write $-4x^2 - 24x - 40$ in the form $a(x + p)^2 + q$ and hence find the line of symmetry.

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3: Solve the following:

a) Write $-3x^2 + 6x + 6$ in the form $a(x + p)^2 + q$ and hence find the maximum value.

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b) Write $2x^2 - 20x + 53$ in the form $a(x + p)^2 + q$ and hence find the minimum value.

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c) Write $3x^2 + 24x + 45$ in the form $a(x + p)^2 + q$ and hence find the minimum value.

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4: Solve the following:

a) Write $-2x^2 + 8x + 2$ in the form $a(x + p)^2 + q$ and hence find co-ordinates of the vertex.

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b) Write $-x^2 - 2x - 3$ in the form $a(x + p)^2 + q$ and hence find co-ordinates of the vertex.

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c) Write $-3x^2 + 18x - 33$ in the form $a(x + p)^2 + q$ and hence find co-ordinates of the vertex.

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Answers: Completing the Square 2

1: a) $2x^2 + 4x + 1 = 2(x + 1)^2 - 1$ b) $3x^2 + 30x + 65 = 3(x + 5)^2 - 10$

c) $4x^2 - 24x + 29 = 4(x - 3)^2 - 7$

2: a) $-x^2 - 4x + 2 = -(x + 2)^2 + 6$ $\therefore$ line of symmetry is $x = -2$.

b) $-2x^2 + 16x - 31 = -2(x - 4)^2 + 1$ $\therefore$ line of symmetry is $x = 4$.

c) $-4x^2 - 24x - 40 = -4(x + 3)^2 - 4$ $\therefore$ line of symmetry is $x = -3$.

3: a) $-3x^2 + 6x + 6 = -3(x - 1)^2 + 9$ $\therefore$ maximum value is $x = 9$.

b) $2x^2 - 20x + 53 = 2(x - 5)^2 + 3$ $\therefore$ minimum value is $x = 3$.

c) $3x^2 + 24x + 45 = 3(x + 4)^2 - 3$ $\therefore$ minimum value is $x = -3$.

4: a) $-2x^2 + 8x + 2 = -2(x - 2)^2 + 10$ $\therefore$ vertex is (2, 10).

b) $-x^2 - 2x - 3 = -(x + 1)^2 - 2$ $\therefore$ vertex is (−1, −2).

c) $-3x^2 + 18x - 33 = -3(x - 3)^2 - 6$ $\therefore$ vertex is (3, −6).