A-Level Starter Activity

Jotnwa Maths

# Topic: Completing the Square

Chapter Reference: Pure 1, Chapter 2

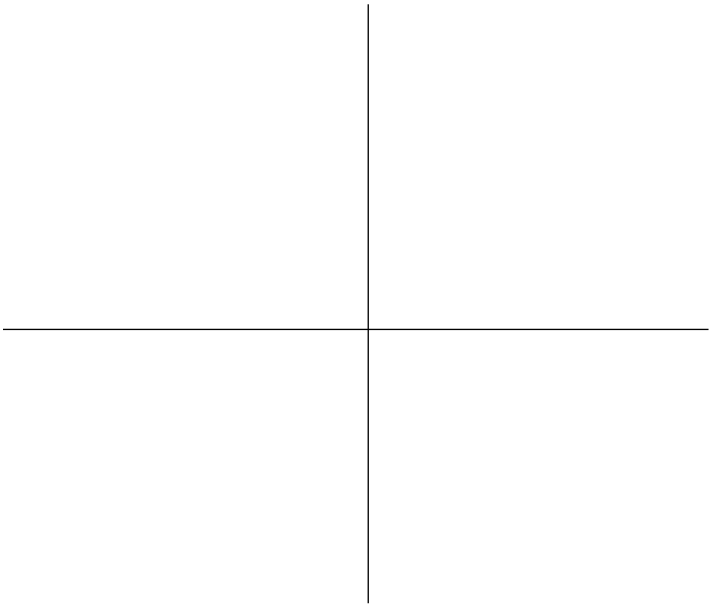
8 minutes

1. Express $x^2 - 11x + 37$ in the form $(x + a)^2 + b$ **(2)**

2. Express $4x^2 + 6x - 7$ in the form $a(x + b)^2 + c$ **(3)**

3. Solve the equation $2x^2 - 4x + 1 = 0$ by completing the square. **(3)**

4. Sketch the curve $y = 30 + 8x + x^2$ showing the exact coordinates of its turning point and the point where it crosses the $y$-axis. **(6)**



# Solutions

1.

| | |
|---|---|
| $x^2 - 11x + 37 = (x - \frac{11}{2})^2 - \frac{121}{4} + 37$ | **M1** |
| $= (x - \frac{11}{2})^2 - \frac{27}{4}$ | **M1** |

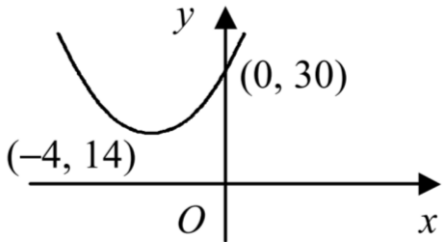
2.

| | |
|---|---|
| $4x^2 + 6x - 7 = 4[x^2 + \frac{3}{2}x] - 7$ | **M1** |
| $= 4[(x + \frac{3}{4})^2 - \frac{9}{16}] - 7$ | **M1** |
| $= 4(x + \frac{3}{4})^2 - \frac{37}{4}$ | **M1** |

3.

| | |
|---|---|
| $2x^2 + 8x + 5 = 0$<br>$y = 2[x^2 + 4x] + 5$ | **M1** |
| $y = 2[(x + 2)^2 - 4] + 5$<br>$y = 2(x + 2)^2 - 3$ | **M1** |
| Therefore, turning point is (-2, -3) and is a minimum (as coefficient of $x^2$ is positive) | **M1** |

4.

| | |
|---|---|
| $y = 30 + 8x + x^2 = x^2 + 8x + 30$ | **M1** |
| $y = (x + 4)^2 - 16 + 30$ | **M1** |
| $y = (x + 4)^2 + 14$ | **M1** |
| Minimum at (-4, 14)<br>When $x = 0$, $y = 30$ | **M1** |
|  | **M1**<br>**(shape)**<br><br>**M1**<br>**(y-intercept)** |