

1. For all values of x , $x^2 + 6x - 2 = (x + p)^2 + q$

Find the value of p and the value of q .

$$(x + 3)^2 - 3^2 - 2$$

$$(x + 3)^2 - 9 - 2$$

$$(x + 3)^2 - 11$$

$$p = \dots 3 \dots q = \dots -11 \dots$$

(Total 2 marks)

2. Write $x^2 + 10x + 3$ in the form $(x + a)^2 + b$, where a and b are constants.

$$(x + 5)^2 - 25 + 3$$

$$(x + 5)^2 - 22$$

$$(x + 5)^2 - 22$$

.....

(Total 3 marks)

3. (a) Express $x^2 - 4x - 10$ in the form $(x + a)^2 + b$

$$(x - 2)^2 - 4 - 10$$

$$(x - 2)^2 - 14$$

$$\underline{\underline{(x - 2)^2 - 14}}$$

(b) Hence write down the minimum value of $y = x^2 - 4x - 10$

$$(\underline{\underline{2}}), (\underline{\underline{-14}})$$

(Total 3 marks)

4. The expression $x^2 - 8x + 21$ can be written in the form $(x - a)^2 + b$ for all values of x .

(a) Find the value of a and the value of b .

$$(x - 4)^2 - 16 + 21$$

$$(x - 4)^2 + 5$$

$$\dots\dots\dots(x - 4)^2 + 5\dots\dots\dots$$

The equation of a curve is $y = f(x)$ where $f(x) = x^2 - 8x + 21$.

(b) Write down the coordinates of the minimum point of this curve.

$$(\dots\dots\dots 4 \dots\dots\dots), (\dots\dots\dots 5 \dots\dots\dots)$$

(Total 3 marks)

5. (a) Express $x^2 - 6x + 10$ in the form $(x + a)^2 + b$

$$(x - 3)^2 - 9 + 10$$

$$(x - 3)^2 + 1$$

$$\underline{\underline{(x - 3)^2 + 1}}$$

(b) Hence write down the minimum value of $y = x^2 - 6x + 10$

$$(\underline{\underline{3}}), (\underline{\underline{1}})$$

(Total 3 marks)

6. (a) Express $x^2 + 4x - 12$ in the form $(x + a)^2 + b$

$$(x+2)^2 - 4 - 12$$
$$(x+2)^2 - 16$$

$$\underline{\underline{(x+2)^2 - 16}}$$

- (b) Hence, or otherwise, solve $x^2 + 4x - 12 = 0$

$$(x+2)^2 - 16 = 0$$

$$(x+2)^2 = 16$$

$$x+2 = \pm\sqrt{16}$$

$$x = -2 \pm 4$$

$$x = -6 \text{ or } 2$$

.....
(Total 4 marks)

7. By completing the square solve $x^2 + 8x + 13 = 0$

Give your answers in surd form.

$$(x+4)^2 - 16 + 13 = 0$$

$$(x+4)^2 - 3 = 0$$

$$(x+4)^2 = 3$$

$$x+4 = \pm\sqrt{3}$$

$$x = -4 \pm \sqrt{3}$$

$$x = -4 + \sqrt{3} \text{ or } x = -4 - \sqrt{3}$$

(Total 5 marks)

8. By completing the square find the minimum point of the curve $y = x^2 + 10x + 3$

$$y = (x + 5)^2 - 25 + 3$$

$$y = (x + 5)^2 - 22$$

$$\underline{\underline{(-5, -22)}}$$

(Total 4 marks)