

Completing the Square

1. Complete the square in each of the following.

(a) $x^2 - 8x - 3 = 0$

(b) $x^2 - 2x - 5 = 0$

(c) $x^2 - 2x + 1 = 0$

2. Write each of the following in the form $(x - p)^2 + q = 0$

(a) $x^2 + 4x - 6 = 0$

(b) $x^2 + 9x + 4 = 0$

(c) $x^2 - 7x - 3 = 0$

3. The graph of $y = a(x - p)^2 + q$ has a minimum point (p,q). By completing the square, find the minimum point of each of the following quadratic equations.

(a) $2x^2 + 4x - 5 = 0$

(b) $3x^2 - 6x - 1 = 0$

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

Express the following questions in the form $(ax + b)^2$ where a,b $\in \mathbb{Z}$.

4. $x^2 + 2x + 1$

5. $x^2 + 6x + 9$

6. $x^2 - 8x + 16$

7. $x^2 - 10x + 25$

8. $x^2 + 4x + 4$

9. $x^2 - 16x + 64$

10. $4x^2 - 4x + 1$

11. $4x^2 - 20x + 25$

12. $9x^2 + 12x + 4$

Express the following questions in the form $(x + b)^2 + c$. Hence or otherwise, find the value of x that gives a minimum value for each expression and find the minimum value.

13. $x^2 - 6x + 11$

$$14. x^2 + 2x + 6$$

$$15. x^2 + 8x + 14$$

$$16. x^2 - 10x + 19$$

$$17. x^2 + 12x + 3$$

$$18. x^2 - 4x + 7$$

Express the following questions in the form $(x + a)^2 - b = 0$. Hence or otherwise, solve for x , writing your answers in the form $p+q\sqrt{r}$ where p, q and $r \in \mathbb{Z}$.

$$19. x^2 - 6x + 7 = 0$$

$$20. x^2 - 10x + 22 = 0$$

$$21. x^2 + 2x - 6 = 0$$

$$22. x^2 + 4x - 1 = 0$$

$$23. 3 - 4x - x^2 = 0$$

$$24. 2 - 2x - x^2 = 0$$

$$25. 4 + 2x - x^2 = 0$$

$$26. x^2 + 12x + 16 = 0$$

$$27. x^2 - 8x + 4 = 0$$