Completing the square

6 questions | 14 marks

Equivalent correct methods earn the corresponding marks.

1. Write $x^2 + 4x + 1$ in completed-square form. [2 marks]

Add/subtract 4.

Group the perfect square.

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

2. Write $x^2 - 6x + 2$ in completed-square form. [2 marks]

Add/subtract 9.

Combine constants.

Answer: $(x - 3)^2 - 7$

3. Rewrite $3x^2 - 12x + 8$ in square form. [3 marks]

Use $3(x^2 - 4x) + 8$.

Replace the inside with $(x - 2)^2 - 4$.

Answer: $3(x - 2)^2 - 4$

4. Solve $(x-2)^2=7$ exactly. [2 marks]

Take both roots.

Add 2.

Answer: $x=2\pm\sqrt{7}$

5. Find the maximum of $-2(x+1)^2+9$. [2 marks]

The square is at least zero.

Its negative multiple is at most zero.

Answer: 9 at $x=-1$.

6. Solve $x^2-4x-1=0$ by completing the square. [3 marks]

Rewrite $(x-2)^2-5=0$.

Isolate the square and take both roots.

Answer: $x=2\pm\sqrt{5}$