Solving Quadratics by Graphing: Find the x-Intercepts

Complete worked example / separate answer key

Solve $x^2 - 2x - 3 = 0$ by graphing $y = x^2 - 2x - 3$.

Answer: The x-intercepts are $x = -1$ and $x = 3$, so the solutions are $x = -1$ and $x = 3$.

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Original tasks 1, 2, 3, 4 / complete keys

Task 1

Solve $x^2 - 4 = 0$ by graphing $y = x^2 - 4$. Use x-values from -3 to 3.

Answer: $x = -2$ and $x = 2$.

Reason: Table: $x = -3$ gives 5; -2 gives 0; -1 gives -3; 0 gives -4; 1 gives -3; 2 gives 0; 3 gives 5. The parabola crosses the x-axis at $(-2, 0)$ and $(2, 0)$.

Check: Substitute each solution: $(-2)^2 - 4 = 0$ and $2^2 - 4 = 0$. Both equal zero.

Task 2

Solve $x^2 + 1 = 0$ by graphing $y = x^2 + 1$. Use x-values from -2 to 2.

Answer: No real solutions.

Reason: Table: $x = -2$ gives 5; -1 gives 2; 0 gives 1; 1 gives 2; 2 gives 5. All y-values are positive, so the parabola never meets the x-axis.

Check: Since $x^2 \geq 0$ for all real x, $x^2 + 1 \geq 1 > 0$, so y is never zero.

Task 3

Solve $x^2 = 0$ by graphing $y = x^2$. Use x-values from -2 to 2.

Answer: $x = 0$ (one repeated real solution).

Reason: Table: $x = -2$ gives 4; -1 gives 1; 0 gives 0; 1 gives 1; 2 gives 4. The parabola touches the x-axis only at (0, 0).

Check: Substitute $x = 0$: $0^2 = 0$. The graph touches the axis at exactly one point.

Task 4

Solve $x^2 - 2x - 3 = 0$ by graphing $y = x^2 - 2x - 3$. Use x-values from -2 to 4.

Answer: $x = -1$ and $x = 3$.

Reason: Table: $x = -2$ gives 5; -1 gives 0; 0 gives -3; 1 gives -4; 2 gives -3; 3 gives 0; 4 gives 5. The parabola crosses the x-axis at $(-1, 0)$ and $(3, 0)$.

Check: Substitute: $(-1)^2 - 2(-1) - 3 = 1 + 2 - 3 = 0$; $3^2 - 2(3) - 3 = 9 - 6 - 3 = 0$.

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Task 1, Task 2, Task 3, Task 4 / Answer Key: Plotted Parabolas, Intercepts, and Number of Real Solutions

Complete answer key with plotted parabolas and intercepts; scale 1 unit per grid square.

Exercise 1: $x = -2$ and $x = 2$. Table: $x = -3$ gives 5; -2 gives 0; -1 gives -3; 0 gives -4; 1 gives -3; 2 gives 0; 3 gives 5. The parabola crosses the x-axis at $(-2, 0)$ and $(2, 0)$. Check: $(-2)^2 - 4 = 0$ and $2^2 - 4 = 0$.

Exercise 2: No real solutions. Table: $x = -2$ gives 5; -1 gives 2; 0 gives 1; 1 gives 2; 2 gives 5. All y-values are positive, so the parabola never meets the x-axis. Check: $x^2 \geq 0$ for all real x, so $x^2 + 1 \geq 1 > 0$.

Exercise 3: $x = 0$ (one repeated real solution). Table: $x = -2$ gives 4; -1 gives 1; 0 gives 0; 1 gives 1; 2 gives 4. The parabola touches the x-axis only at $(0, 0)$. Check: $0^2 = 0$.

Exercise 4: $x = -1$ and $x = 3$. Table: $x = -2$ gives 5; -1 gives 0; 0 gives -3; 1 gives -4; 2 gives -3; 3 gives 0; 4 gives 5. The parabola crosses the x-axis at $(-1, 0)$ and $(3, 0)$. Check: $(-1)^2 - 2(-1) - 3 = 0$; $3^2 - 2(3) - 3 = 0$.

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Worked example / Worked Example: Solve $x^2 - 2x - 3 = 0$ by graphing $y = x^2 - 2x - 3$

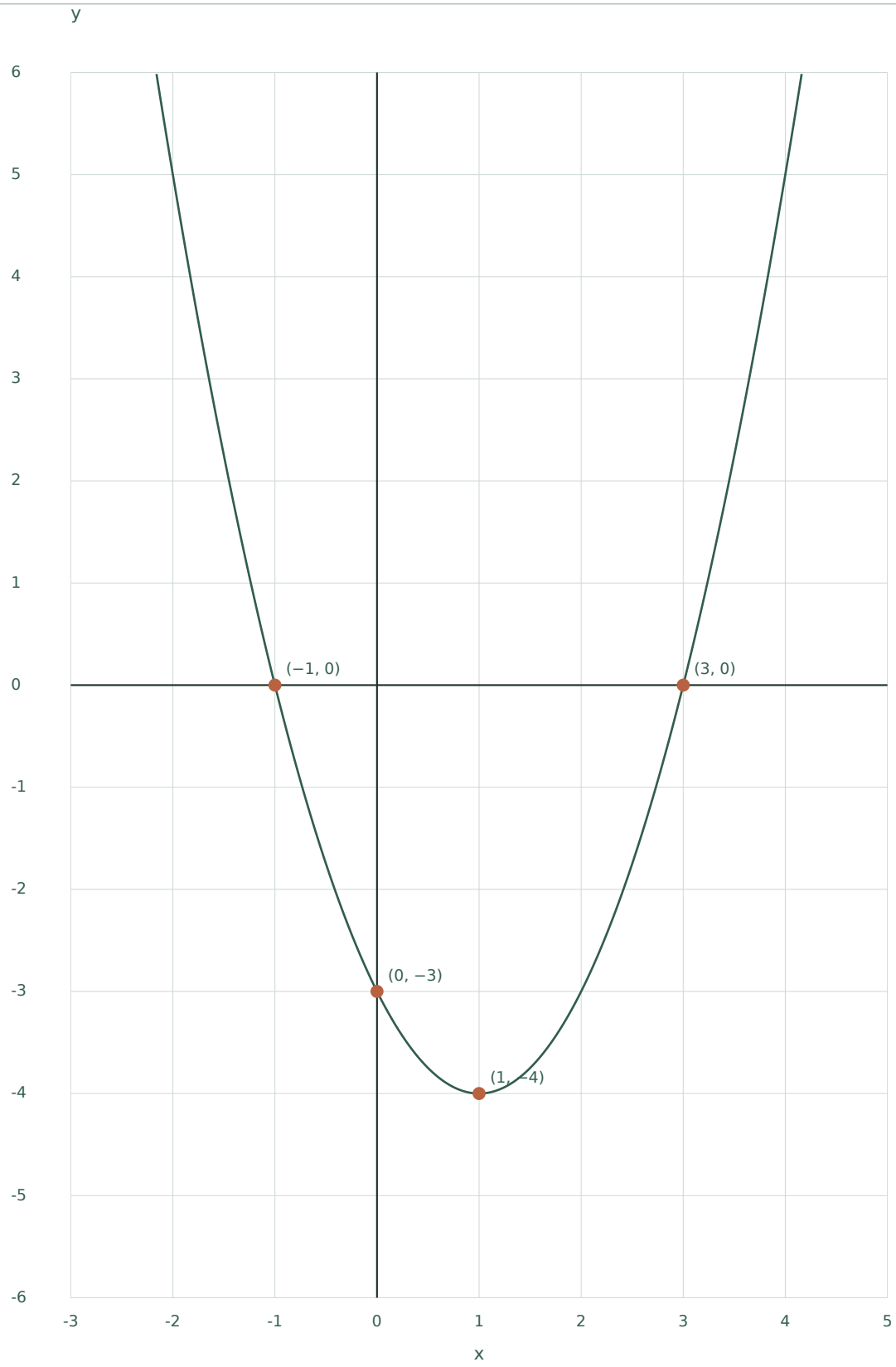


Table: x = −2 gives 5; −1 gives 0; 0 gives −3; 1 gives −4; 2 gives −3; 3 gives 0; 4 gives 5. The parabola crosses the x-axis at (−1, 0) and (3, 0).

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Source rubric / reflection

- [ ] Table includes at least five correct ordered pairs.
- [ ] Parabola is drawn as a smooth curve through the points.
- [ ] Axes are labeled and scale is stated.
- [ ] Each x-intercept is marked and its x-value recorded.
- [ ] Number of real solutions is stated correctly.
- [ ] Valid alternative: a neatly sketched parabola with correct intercepts and labeled scale earns full credit even if the table is abbreviated, provided the intercepts are verifiable.

Reflection: What did you check, what did you change, and what will you try next?