Solving Quadratics by Graphing: Find the x-Intercepts

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Reference overview; no practice values.

A quadratic equation in the form $y = ax^2 + bx + c$ can be solved by graphing the parabola and finding where it crosses the x-axis. Those crossing points are the x-intercepts, and their x-values are the solutions (roots) of the equation. This lesson focuses only on graphing and reading intercepts; factoring and the quadratic formula are separate methods. You will build a table of values, plot points, draw a smooth curve, and record each x-intercept as a solution. When the parox

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

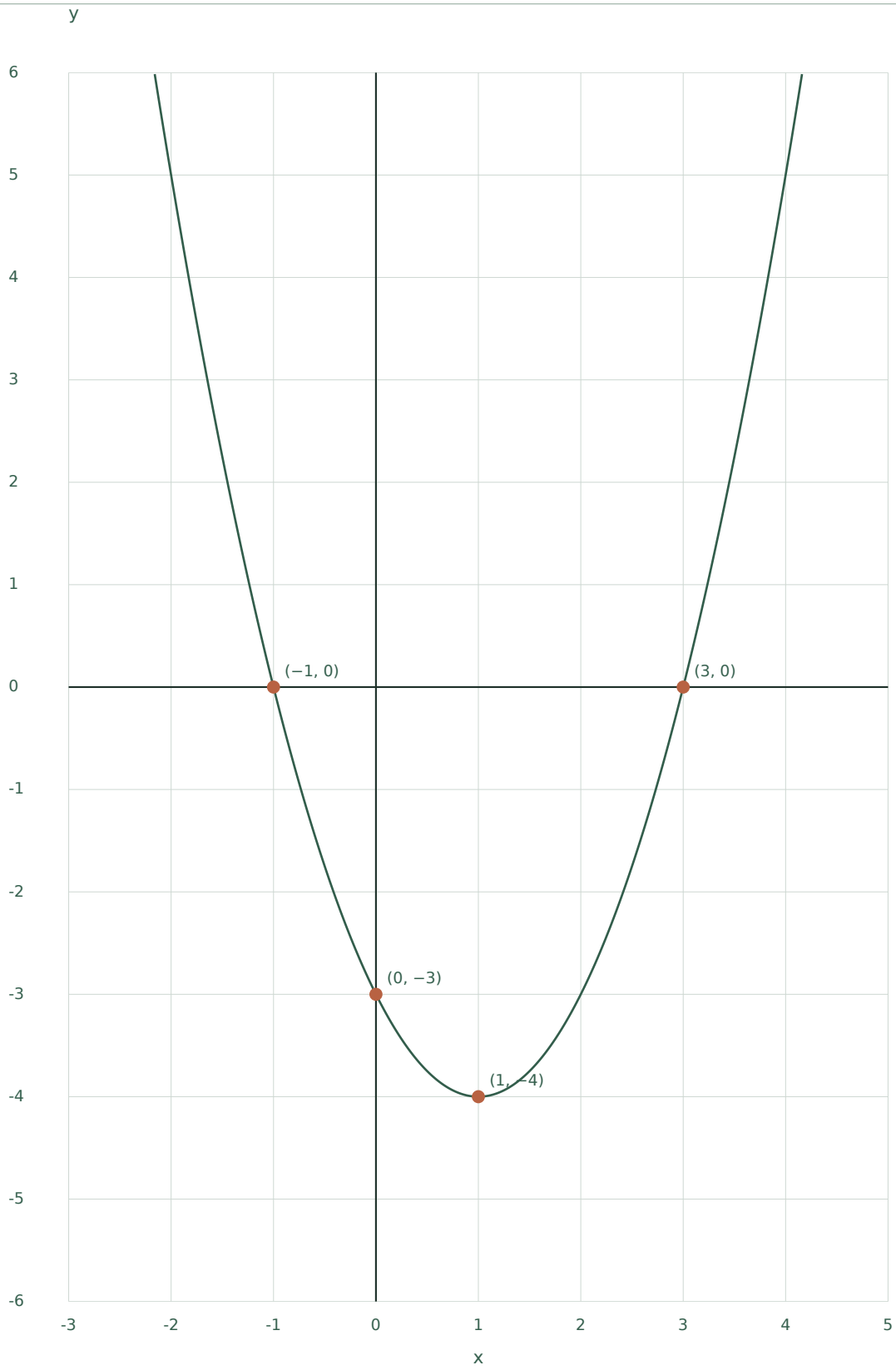


Table: x = −2 gives 5; −1 gives 0; 0 gives −3; 1 gives −4; 2 gives −3; 3 gives 0; 4 gives 5. The parabola crosses the x-axis at (−1, 0) and (3, 0).

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Interpreting Zero, One, or Two Intercepts

Reference text; no practice values.

For $y = x^2 + 1$, every y-value is at least 1, so the parabola never reaches the x-axis; the equation $x^2 + 1 = 0$ has no real solutions. For $y = x^2$, the curve touches the x-axis only at (0, 0), giving one repeated solution $x = 0$.

Always state the number of solutions and their values. If the graph is unclear, add more points near the suspected intercept. A graphing convention: each grid square represents one unit unless labeled otherwise; state your scale before plotting.

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Common Mistakes

Reference text; no practice values.

Mistake: Reading the y-intercept as a solution. Fix: Solutions are x-intercepts where y = 0, not the point (0, c).

Mistake: Connecting plotted points with straight lines. Fix: Draw a smooth curve; a parabola is not made of line segments.

Mistake: Ignoring the scale on the axes. Fix: State the scale first and read intercepts using that scale.

Mistake: Claiming two solutions when the parabola only touches the axis. Fix: A single touching point is one repeated real solution.

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FAQ

Reference text; no practice values.

Q: What if the parabola does not cross the x-axis? A: Then the equation has no real solutions; the graph never reaches y = 0.

Q: How many points should I plot? A: At least five to seven points, including both sides of the vertex, so the curve is clear.

Q: Can I estimate intercepts from the graph? A: Yes, but add points near the intercept to confirm the value; state if it is an estimate.

Q: Does this method also find complex solutions? A: No; graphing shows only real x-intercepts. Complex solutions are outside this method.

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Rubric

Reference text; no practice values.

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.

Solving Quadratics by Graphing: Find the x-Intercepts

Diagram: $y = x^2 - 4$

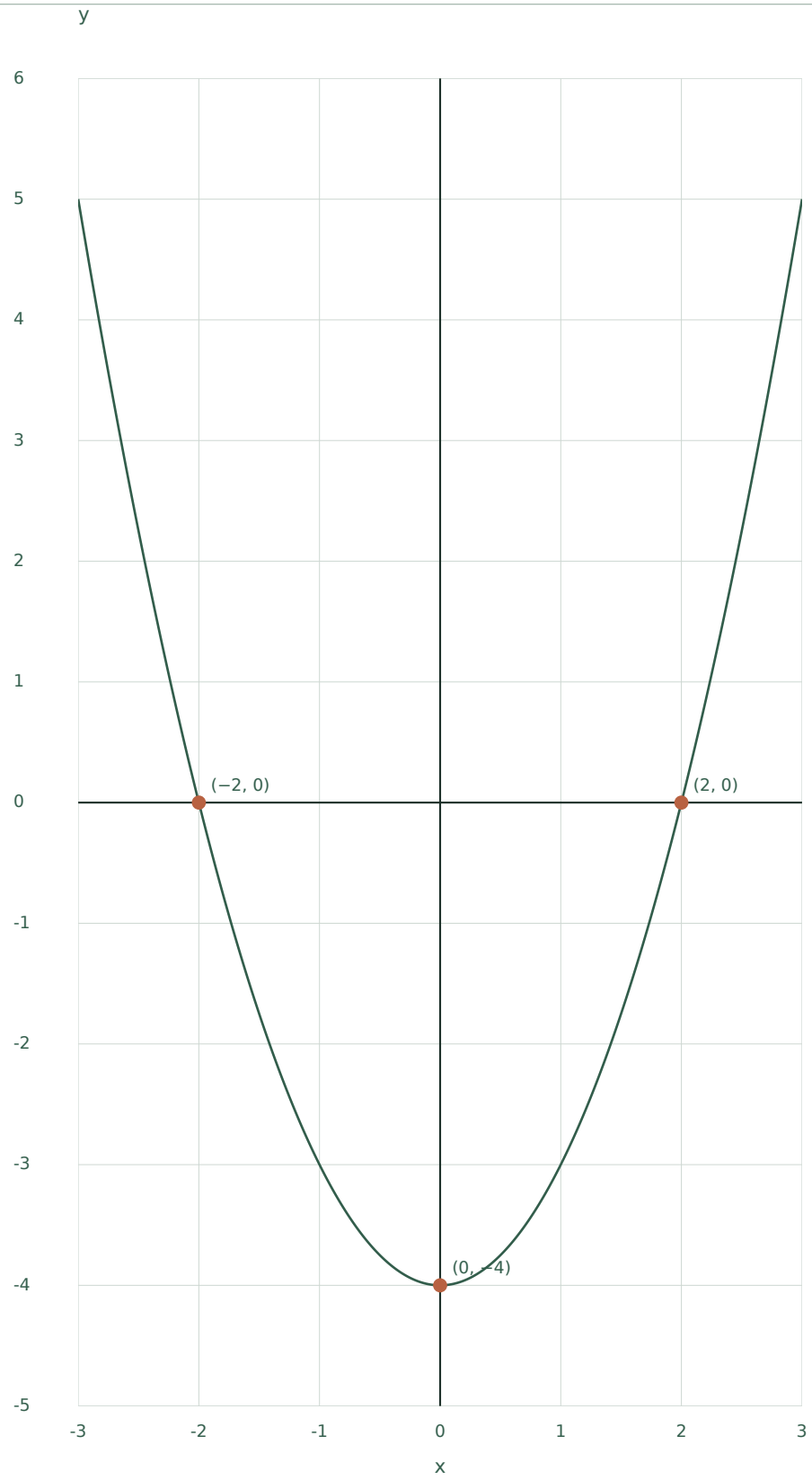


Table: x = −3 gives 5; −2 gives 0; −1 gives −3; 0 gives −4; 1 gives −3; 2 gives 0; 3 gives 5. The parabola crosses the x-axis at (−2, 0) and (2, 0).

Solving Quadratics by Graphing: Find the x-Intercepts

Diagram: $y = x^2 + 1$

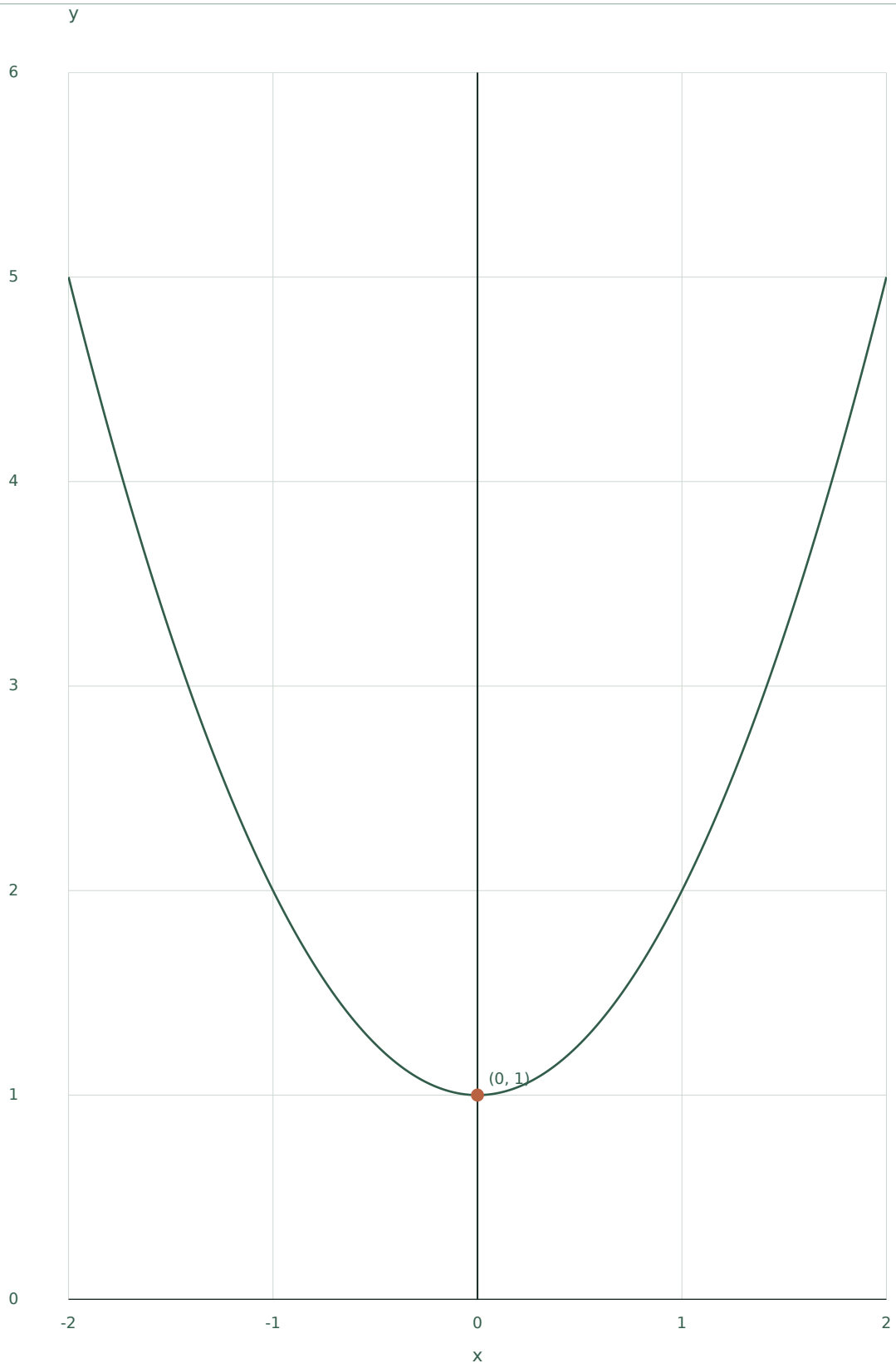


Table: x = −2 gives 5; −1 gives 2; 0 gives 1; 1 gives 2; 2 gives 5. All y-values are positive, so the parabola never meets the x-axis.

Solving Quadratics by Graphing: Find the x-Intercepts

Diagram: $y = x^2$

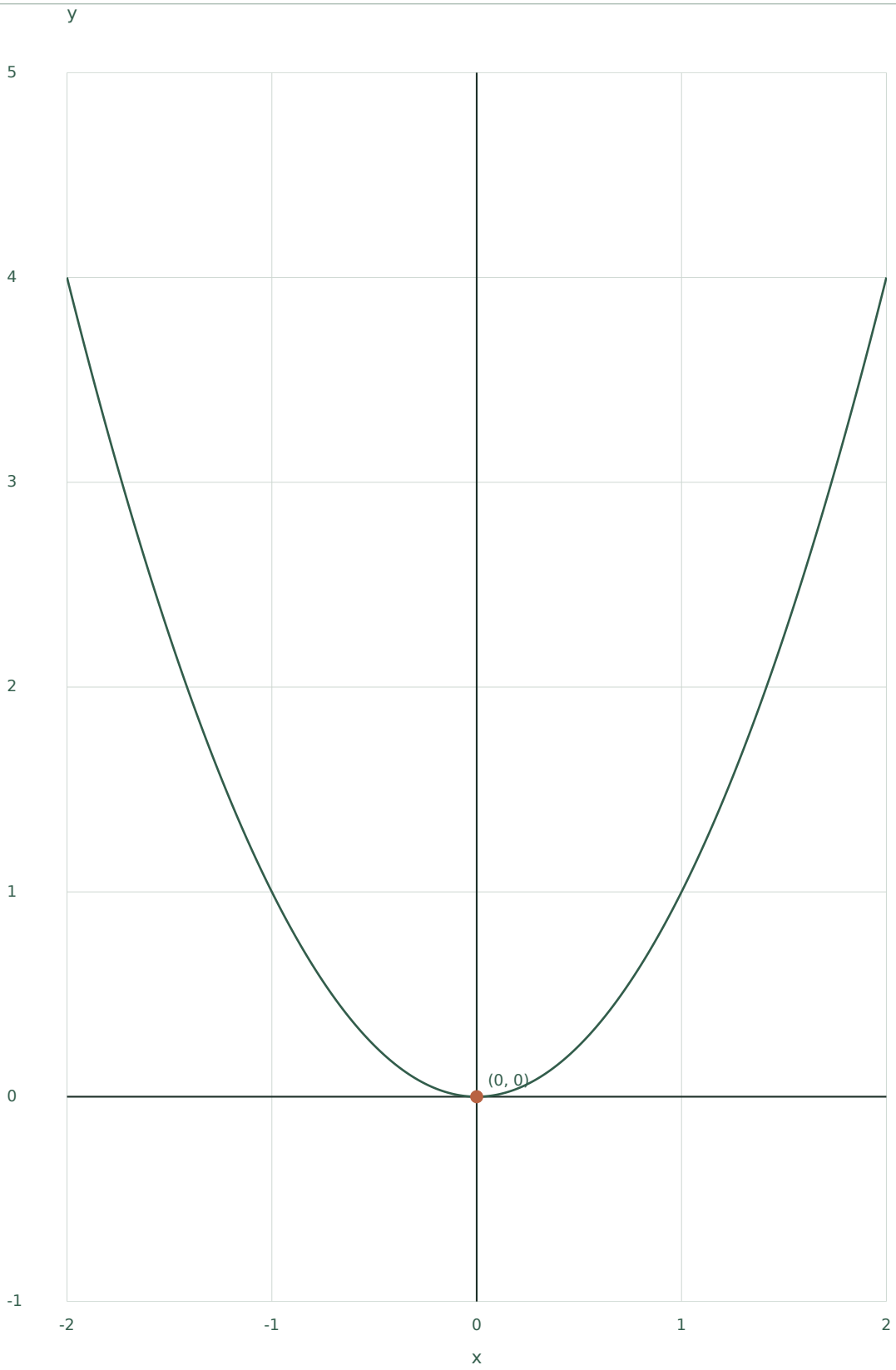


Table: x = −2 gives 4; −1 gives 1; 0 gives 0; 1 gives 1; 2 gives 4. The parabola touches the x-axis only at (0, 0).

Solving Quadratics by Graphing: Find the x-Intercepts

Diagram: $y = x^2 - 2x - 3$

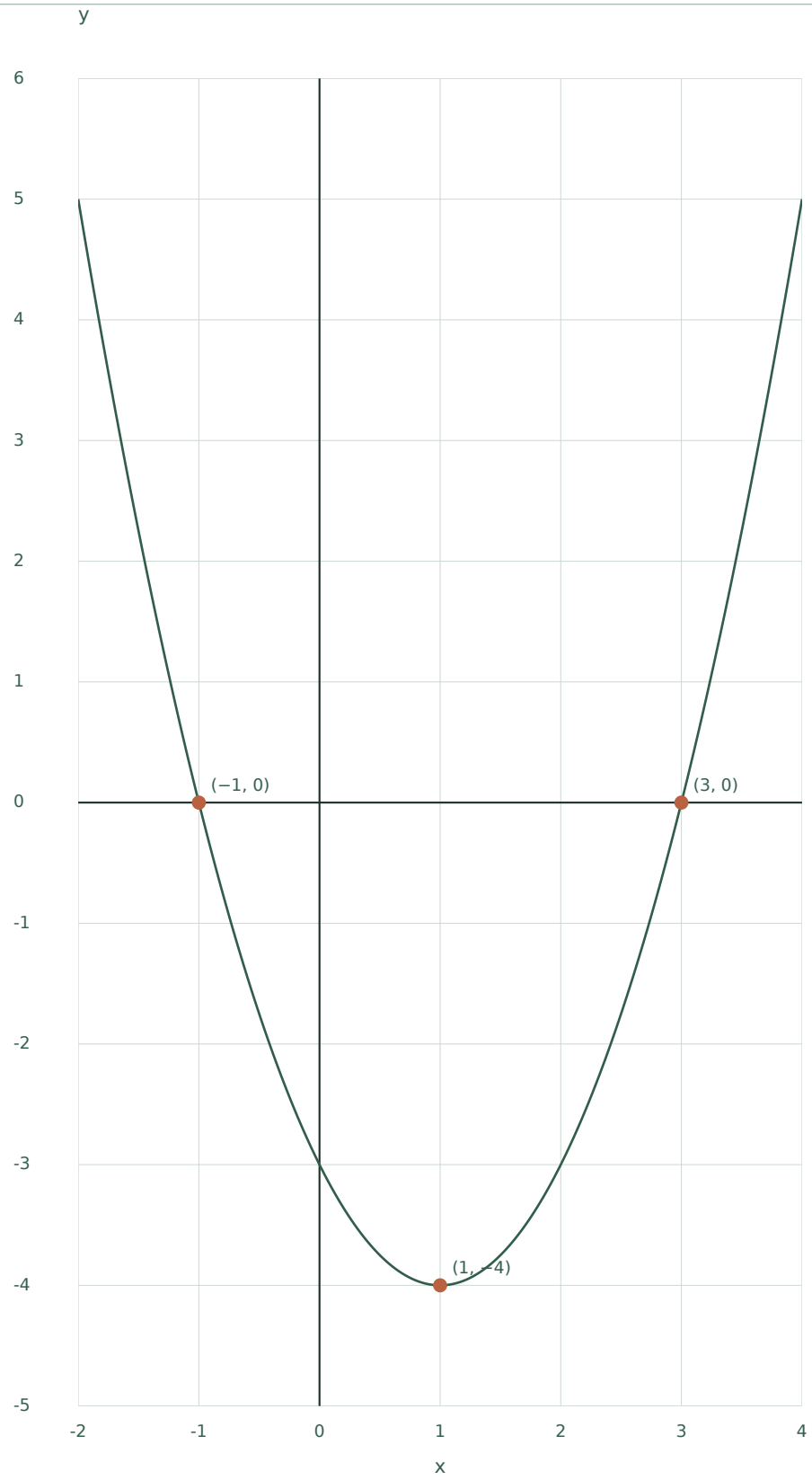


Table: x = −2 gives 5; −1 gives 0; 0 gives −3; 1 gives −4; 2 gives −3; 3 gives 0; 4 gives 5. The parabola crosses the x-axis at (−1, 0) and (3, 0).