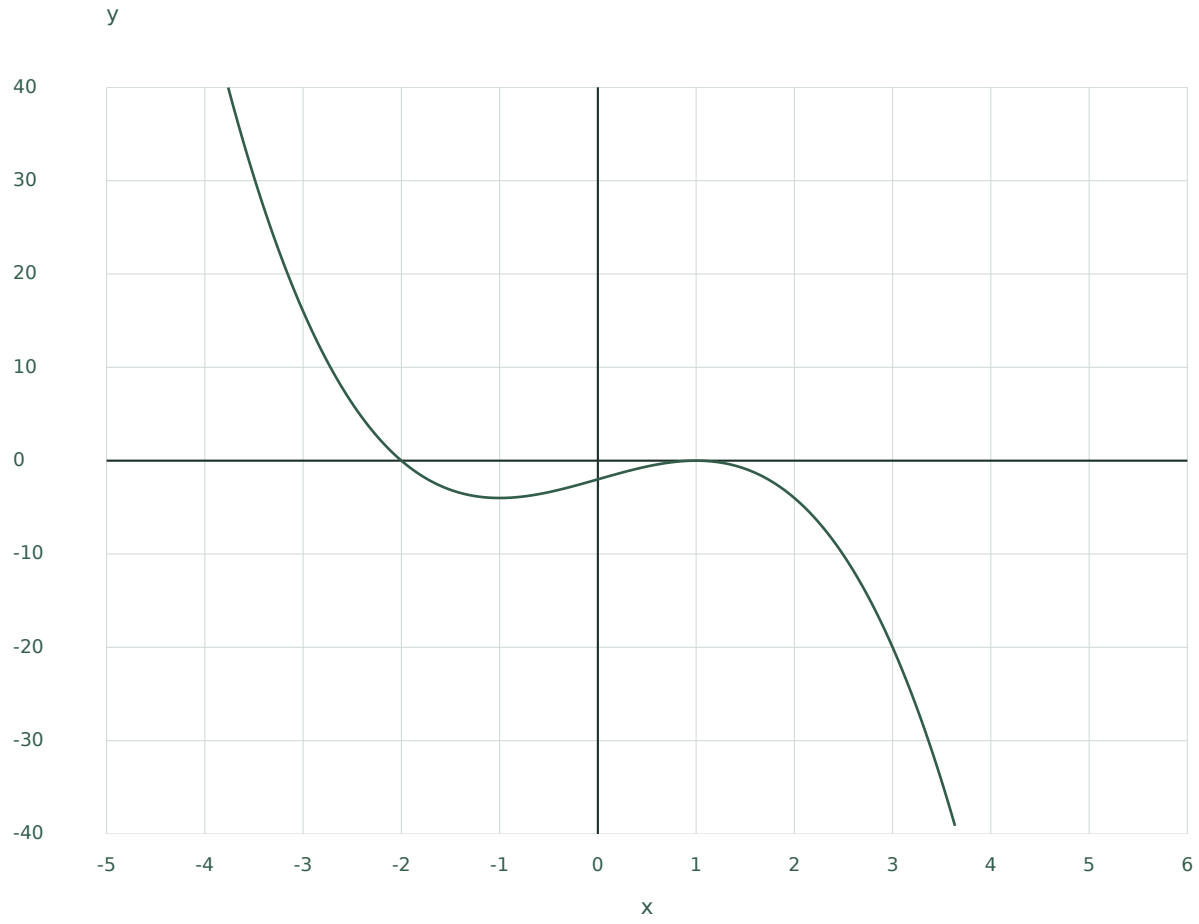
Match Polynomial Functions to Graphs Using Roots and End Behavior

Worked graph



Answer function graph. Candidate descriptions remain literal in the original question; roots, multiplicities and end behavior determine the match.

Match Polynomial Functions to Graphs Using Roots and End Behavior

Original worked example / unchanged complete key

Prompt: Match f(x) = -(x + 2)(x - 1)^2 to one of these described candidate graphs. Graph A: crosses at x = -2, touches at x = 1, rises on both ends. Graph B: crosses at x = -2, touches at x = 1, rises on the left and falls on the right. Graph C: touches at x = -2, crosses at x = 1, falls on both ends.

Answer: Graph B.

Reason: The factors give roots at x = -2 with multiplicity 1 (crossing) and x = 1 with multiplicity 2 (touching). The degree is 1 + 2 = 3, which is odd, so the ends point in opposite directions. The leading coefficient is negative because of the minus sign, so the graph rises on the left and falls on the right. Graph A has even-degree end behavior (rises on both ends), which is wrong for this odd-degree function; Graph C has the multiplicities reversed and the wrong end behavior. Graph B matches all three features: crossing at x = -2, touching at x = 1, and rising left/falling right. As a check, f(0) = -(2)(-1)^2 = -2, which is negative, so the graph should be below the x-axis at x = 0, consistent with Graph B.