Graphing Quadratic Functions

Algebra 1 •Section 9.1

Name: _____	Date: _____	Score: _____ / 12

Quick Review and Helpful Hints

Quadratic functions can be read through their zeros, vertex, axis of symmetry, and opening direction. Choose factoring, square roots, completing the square, or the quadratic formula based on the form you see.

▷ **Example:** Solve $x^2 - 5x + 6 = 0$.
Work: Factor the quadratic: $x^2 - 5x + 6 = (x - 2)(x - 3)$. Set each factor equal to zero.
★ **Answer:** $x = 2$ or $x = 3$

Practice Problems

Solve each problem. Show enough work that another student could follow your thinking.

1. Find the vertex of $y = (x - 2)^2 + 5$. _____

2. Find the axis of $y = x^2 + 6x + 8$. _____

3. Find the y-intercept of $y = 2x^2 - 3x + 7$. _____

4. Does $y = -x^2 + 4$ open up or down? _____

5. Find zeros of $y = x^2 - 9$. _____

6. Find the vertex of $y = x^2 - 4x + 1$. _____

7. Find the minimum of $y = (x + 1)^2 - 6$. _____

8. Find the maximum of $y = -2(x - 4)^2 + 10$. _____

9. Find the zeros of $y = x^2 - 5x + 6$. _____

10. Convert $y = (x - 3)^2 + 2$ to standard form. _____

Word Problems

11. A diver height is $h = -t^2 + 4t + 5$. Find the maximum time. _____

12. A profit model $P = -x^2 + 14x - 45$ has zeros? _____

Answer Keys

1. $\boxed{(2, 5)}$
2. $\boxed{x = -3}$
3. $\boxed{7}$
4. $\boxed{\text{Down}}$
5. $\boxed{x = \pm 3}$
6. $\boxed{(2, -3)}$
7. $\boxed{-6}$
8. $\boxed{10}$
9. $\boxed{x = 2, 3}$
10. $\boxed{y = x^2 - 6x + 11}$
11. $\boxed{t = 2}$
12. $\boxed{x = 5, 9}$

Step-by-Step Explanations

1. Vertex form $y = a(x - h)^2 + k$ basically labels the vertex for you — it's right there as (h, k).
2. The axis of symmetry lives at $x = -b/(2a)$, which here works out to $-6/2 = -3$.
3. A y-intercept is just where $x = 0$. Plug that in and every x term vanishes, leaving the 7.
4. The sign in front of x^2 tells the whole story — negative means the parabola opens downward.
5. Set it equal to zero to get $x^2 = 9$, then take the square root — both signs count.
6. First find the axis $x = 2$, then plug it back in: $4 - 8 + 1 = -3$ gives the vertex's height.
7. A squared term can never go below zero, so the smallest y can ever be is the -6 tacked on the end.
8. This parabola opens down, so the vertex is its ceiling — and that $+10$ is the highest it reaches.
9. Two numbers multiplying to 6 and adding to -5 are -2 and -3, so it factors as $(x - 2)(x - 3)$.
10. Expand the square to $x^2 - 6x + 9$, then combine the leftover $+2$ to finish at $+11$.
11. The diver's peak happens at the vertex, $t = -b/(2a) = -4/(-2) = 2$ seconds.
12. Set $P = 0$, flip signs, and $x^2 - 14x + 45 = (x - 5)(x - 9)$ reveals where profit hits zero.

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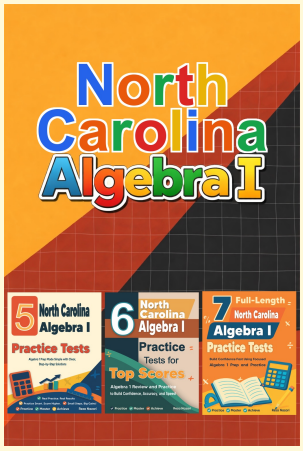

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