Quadratic graphs and completing the square Worksheet

Algebra

Name _____ Date _____

Warm-up

1. Which way does $y = -8x^2 + 8$ open?
   (A) Down (B) Right (C) Up (D) Left

2. Solve $(x - 4)^2 = 25$, smaller answer first.
   Smaller _____ Larger _____

3. What's the vertex of $y = (x + 7)^2 - 1$?
   (A) $(-7, 1)$ (B) $(-7, -1)$ (C) $(7, 1)$ (D) $(7, -1)$

4. $x^2 - 8x + 16 = (x + k)^2$. Find k.

5. What's the vertex of $y = (x - 9)^2 + 5$?
   (A) $(-9, 5)$ (B) $(5, 9)$ (C) $(9, 5)$ (D) $(9, -5)$

Practice

6. Find the y-coordinate of the vertex of $y = x^2 - 6x + 10$.

7. Rewrite $x^2 + 10x + 26$ as $(x + 5)^2 + k$. Find k.

8. Evaluate $y = 3(x - 2)^2 + 7$ at $x = 5$.

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9. Solve $x^2 + 6x = 72$ by completing the square, smaller answer first.
   Smaller _____ Larger _____

10. Find the x-coordinate of the vertex of $y = x^2 + 10x + 4$.

Challenge

11. A ball's height is $h = -2(t - 4)^2 + 137$. What's the greatest height?

12. Find the minimum value of $y = x^2 + 2x + 2$.

13. A parabola has zeros at $x = -1$ and $x = 9$. What's the x-coordinate of its vertex?

14. Solve $x^2 - 12x - 28 = 0$, smaller answer first.
   Smaller _____ Larger _____

15. Find c so that $y = x^2 - 10x + c$ has its vertex on the x-axis.

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Quadratic graphs and completing the square Worksheet: Answer Key

Algebra

1. (A) Down

   The number in front of x^2 is negative.

2. Smaller -1, Larger 9

   Take roots: $x - 4 = \pm 5$.

3. (B) $(-7, -1)$

   $x + 7$ is 0 when $x = -7$.

4. -4

   k is half of -8.

5. (C) $(9, 5)$

   $x - 9$ is 0 when $x = 9$.

6. 1

   $x = 3$, then substitute.

7. 1

   Add and subtract 25 inside.

8. 34

   Parentheses first, then square, then multiply.

9. Smaller -12, Larger 6

   Add 9 to both sides: $(x + 3)^2 = 81$.

10. -5

    $x = -\dfrac{10}{2}$.

11. 137

    The vertex is at the top, and its y is 137.

12. 1

    Complete the square: $(x + 1)^2 + 1$. A square is at least 0.

13. 4

    It sits halfway between the zeros.

14. Smaller -2, Larger 14

    Move -28 across, then complete the square.

15. 25

    The vertex is on the axis when it's a perfect square: $(x - 5)^2$.

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