

The Great Quadratic Function Review

Write the following in Vertex Form.

1. $y = x^2 - 4x + 18$

$x = \frac{4}{2} = 2$ (2, 14)
 $y = 4 - 8 + 18 = 14$
 $y = (x-2)^2 + 14$

2. $y = x^2 + 7x - 1$

$x = \frac{-7}{2}$ $(-\frac{7}{2}, -\frac{52}{4})$
 $y = \frac{49}{4} - \frac{49}{2} - 1 = -\frac{52}{4}$
 $y = (x + \frac{7}{2})^2 - \frac{52}{4}$

Write the following in Standard Form.

3. $y = (x - 4)^2 - 8$

$y = x^2 - 8x + 16 - 8$
 $y = x^2 - 8x + 8$

4. $y = (x + 3)^2 + 15$

$y = x^2 + 6x + 9 + 15$
 $y = x^2 + 6x + 24$

Name the vertex and axis of symmetry. Then tell whether the vertex is a minimum or maximum point.

5. $y = x^2 - 16x + 10$

$x = \frac{16}{2} = 8$ $y = 64 - 128 + 10$
 $y = -54$
 (8, -54)
 $x = 8$ minimum

6. $y = -2(x + 14)^2 - 7$

(-14, -7) maximum
 $x = -14$

7. $y = (x - 3)^2 + 12$

(3, 12) minimum
 $x = 3$

8. $y = -2x^2 + 8x - 5$

$x = \frac{-8}{-4} = 2$ $y = -2 \cdot 4 + 16 - 5 = 3$
 (2, 3) maximum
 $x = 2$

State the domain and range of the following.

9. $y = (x - 3)^2 + 12$

vertex (3, 12)
 D: $(-\infty, \infty)$
 R: $[12, \infty)$

10. $y = x^2 - 4x + 18$

vertex (2, 14)
 D: $(-\infty, \infty)$
 R: $[14, \infty)$

Name the intervals of increase and decrease.

11. $y = (x - 4)^2 - 8$ opens up
 vertex (4, -8)

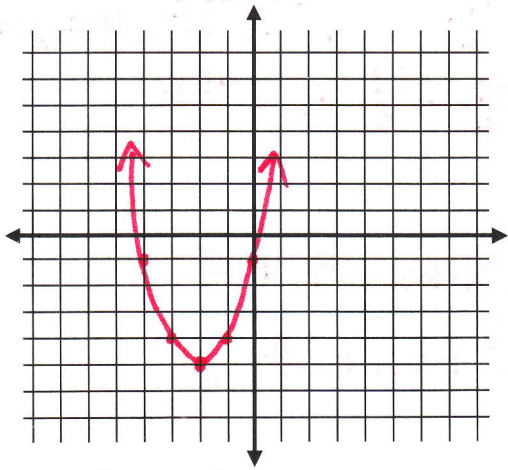
dec $(-\infty, 4)$
 inc $(4, \infty)$

12. $y = -x^2 - 4x + 5$

vertex (-2, 9) opens down
 inc $(-\infty, -2)$
 dec $(-2, \infty)$

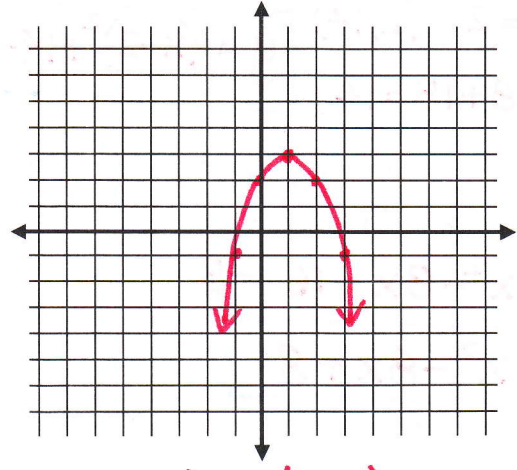
Graph the following.

13. $y = x^2 + 4x - 1$



vertex $(-2, -5)$
opens up

14. $y = -(x - 1)^2 + 3$



vertex $(1, 3)$
opens down

Find the roots/zeros/x-intercepts.

15. $y = x^2 - 9x + 20$

$$(x-4)(x-5) = 0$$

$$x = 4, 5$$

17. $y = x^2 - 4x + 5$

$$x = \frac{4 \pm \sqrt{16 - 20}}{2} = \frac{4 \pm \sqrt{-4}}{2}$$

$$= \frac{4 \pm 2i}{2} = 2 \pm i$$

19. $y = (x + 3)^2 - 6$

$$y = x^2 + 6x + 3$$

$$x = \frac{-6 \pm \sqrt{36 - 12}}{2} = \frac{-6 \pm \sqrt{24}}{2}$$

$$= \frac{-6 \pm 2\sqrt{6}}{2} = -3 \pm \sqrt{6} \approx -3 \pm 2.4 = -0.6 \text{ or } -5.4$$

16. $y = (x - 1)^2 - 5$

$$y = x^2 - 2x - 4$$

$$x = \frac{2 \pm \sqrt{4 + 16}}{2} = \frac{2 \pm \sqrt{20}}{2} = \frac{2 \pm 2\sqrt{5}}{2} = 1 \pm \sqrt{5}$$

$$\approx 1 \pm 2.2 = 3.2 \text{ or } -1.2$$

18. $y = -5x^2 - 5x + 5$

$$x = \frac{5 \pm \sqrt{25 + 100}}{-10} = \frac{5 \pm \sqrt{125}}{-10}$$

$$= \frac{5 \pm 5\sqrt{5}}{-10} = \frac{1 \pm \sqrt{5}}{-2} \approx \frac{1 \pm 2.2}{-2} = -1.6 \text{ or } 0.6$$

20. $y = x^2 + 9x - 10$

$$(x+10)(x-1)$$

$$x = -10, 1$$