

Vertex Form using: $h = \frac{-b}{2a}$, $k = f(h)$

Name: Key Hr: _____

Axis of symmetry: $x = h = \frac{-b}{2a}$, $k = f(h)$ Vertex: (h, k) Vertex form: $y = a(x - h)^2 + k$

1-6. Use the formula $\left(\frac{-b}{2a}, f\left(\frac{-b}{2a}\right) \right)$ to find the vertex and then write the equation in vertex form.

1. $y = x^2 - 6x + 1$

$\frac{6}{2(1)} = 3$ $(3, -8)$
 $y = (x - 3)^2 - 8$

2. $y = -4x^2 + 16x - 11$

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

3. $y = x^2 - 8x + 18$

$\frac{8}{2(1)} = \frac{8}{2} = 4$ $(4, 2)$
 $y = (x - 4)^2 + 2$

4. $f(x) = -x^2 + 2x + 5$

$\frac{-2}{2(-1)} = \frac{-2}{-2} = 1$ $(1, 6)$
 $y = -(x - 1)^2 + 6$

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

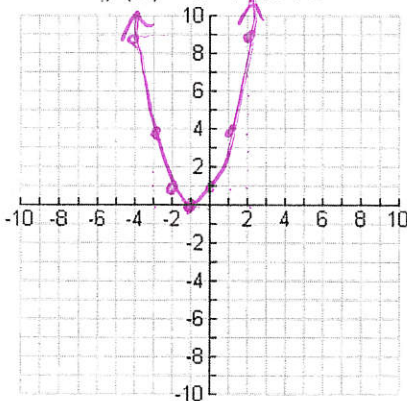
$\frac{-(-1)}{2(2)} = \frac{1}{4}$ $\left(\frac{1}{4}, \frac{7}{8}\right)$
 $y = 2\left(x - \frac{1}{4}\right)^2 + \frac{7}{8}$

6. $f(x) = x^2 - 8x + 16$

$\frac{-(-8)}{2(1)} = \frac{8}{2} = 4$ $(4, 0)$
 $y = (x - 4)^2$

7-8. Find the following: (a) write the equation in vertex form, (b) identify vertex, (c) identify axis of symmetry, (d) state if vertex is a max or a min, (e) sketch graph, (f) x-intercepts, (g) y-intercept, (h) domain and range.

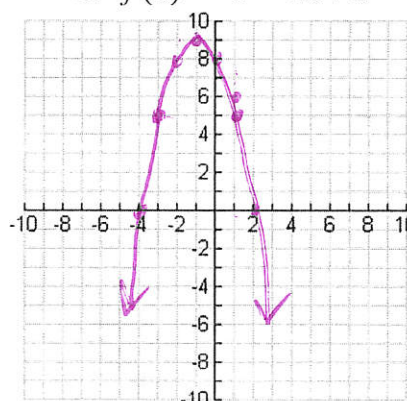
7. $f(x) = x^2 + 2x + 1$



$\frac{-2}{2(1)} = \frac{-2}{2} = -1$
 $(-1, 0)$

$f(0) = 0^2 + 2(0) + 1$
 $= 0 + 1$
 $= 1$

8. $f(x) = -x^2 - 2x + 8$



$\frac{-(-2)}{2(-1)} = \frac{2}{-2} = -1$
 $(-1, 9)$

$f(-3) = -(-3)^2 - 2(-3) + 8$
 $= -9 + 6 + 8$
 $= -3 + 8$
 $= 5$

- a) $y = (x + 1)^2$
- b) $(-1, 0)$
- c) $x = -1$
- d) min at 0
- e) See graph
- f) $(-1, 0)$
- g) $(0, 1)$
- h) $D: (-\infty, \infty)$ $R: [0, \infty)$
- i) Find $f(0) = 1$

- a) $y = -(x + 1)^2 + 9$
- b) $(-1, 9)$
- c) $x = -1$
- d) max at 9
- e) See graph
- f) $(-4, 0), (2, 0)$
- g) $(0, 8)$
- h) $D: (-\infty, \infty)$ $R: (-\infty, 9]$
- i) Find $f(-3) = 5$

9-14. State if the equation is in vertex form or standard form or both. Then find the vertex for each equation.

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

Vertex form
 $(6, 3)$

10. $y = x^2 - 25$

Both
 $(0, -25)$

$(y = (x-0)^2 - 25)$

11. $y = -2x^2 + 20x - 35$

Standard

$\frac{-20}{2(-2)} = \frac{-20}{-4} = 5$ $(5, 15)$
 $-2(5)^2 + 20(5) - 35$

12. $y = 5x^2 - 6$

Both
 $(0, -6)$

$(y = 5(x-0)^2 - 6)$

13. $y = 4x^2 + 24x$

Standard
 $(-3, -36)$

$\frac{-24}{2(4)} = \frac{-24}{8} = -3$

$4(-3)^2 + 24(-3)$

$4 \cdot 9 - 72$

$36 - 72$

$= -36$

14. $f(x) = -3(x+2)^2 - 17$

Vertex form
 $(-2, -17)$