4.10 – Writing Quadratic Functions

We will be writing quadratic functions that will fit one of the three (3) following forms:

Standard Form	$y = ax^2 + bx + c$
Vertex Form	$y = a(x - h)^2 + k$
Intercept Form	$y = a(x - p)(x - q)$

Example 1 Write a quadratic function in vertex form that passes through the point (3, 2), and has a vertex at (1, -2). $y = a(x-h)^2 + k \rightarrow y = a(x-1)^2 - 2$

$2 = a(3-1)^2 - 2$

$2 = a(2^2) - 2$

$2 = 4a - 2$

$4 = 4a$

$a = 1$

$\boxed{y = (x-1)^2 - 2}$

Example 2 Write a quadratic function in intercept form that passes through the points (-1, 0), (3, 2), and (4, 0). $y = a(x-p)(x-q)$ ① x-ints $-1, 4$

pt $(3, 2)$

$y = a(x+1)(x-4)$

$2 = a(3+1)(3-4)$

$2 = a(4)(-1)$

$2 = -4a$

$a = -\frac{1}{2}$

$\boxed{y = -\frac{1}{2}(x+1)(x-4)}$

Example 3 Write a quadratic function in standard form that passes through the points (-1, -3), (0, -4), and (2, 6). $y = ax^2 + bx + c$

$(-1, -3)$

$-3 = a(-1)^2 + b(-1) + c$

$-3 = a - b + c$

$-3 = a - b - 4$

② $a - b = 1$

$(0, -4)$

$-4 = a(0)^2 + b(0) + c$

$\boxed{c = -4}$

$(2, 6)$

$6 = a(2)^2 + b(2) + c$

$6 = 4a + 2b + c$

$6 = 4a + 2b - 4$

① $4a + 2b = 10$

$a - b = 1$

$4a + 2b = 10$

solve system

$a = b + 1$

$4(b+1) + 2b = 10$

$4b + 4 + 2b = 10$

$6b = 6$

$\boxed{b = 1}$

$a = b + 1$

$a = 1 + 1$

$\boxed{a = 2}$

$\boxed{y = 2x^2 + x - 4}$

HW: (6-10), (20-22), (32)

WRITING IN VERTEX FORM **Write a quadratic function in vertex form whose graph has the given vertex and passes through the given point.**

6. vertex: $(-4, 1)$
point: $(-2, 5)$

7. vertex: $(1, 6)$
point: $(-1, 2)$

8. vertex: $(5, -4)$
point: $(1, 20)$

9. vertex: $(-3, 3)$
point: $(1, -1)$

10. vertex: $(5, 0)$
point: $(2, -27)$

11. vertex: $(-4, -2)$
point: $(0, 30)$

12. vertex: $(2, 1)$
point: $(4, -2)$

13. vertex: $(-1, -4)$
point: $(2, -1)$

14. vertex: $(3, 5)$
point: $(7, -3)$

WRITING IN INTERCEPT FORM **Write a quadratic function in intercept form whose graph has the given x-intercepts and passes through the given point.**

20. x-intercepts: 2, 5
point: $(4, -2)$

21. x-intercepts: -3, 0
point: $(2, 10)$

22. x-intercepts: -1, 4
point: $(2, 4)$

23. x-intercepts: 3, 7
point: $(6, -9)$

24. x-intercepts: -5, -1
point: $(-7, -24)$

25. x-intercepts: -6, 3
point: $(0, -9)$

WRITING IN STANDARD FORM **Write a quadratic function in standard form for the parabola that passes through the given points.**

31. $(-4, -3)$, $(0, -2)$, $(1, 7)$

32. $(-2, -4)$, $(0, -10)$, $(3, -7)$

33. $(-2, 4)$, $(0, 5)$, $(1, -11)$

34. $(-1, -1)$, $(1, 11)$, $(3, 7)$

35. $(-1, 9)$, $(1, 1)$, $(3, 17)$

36. $(-6, -1)$, $(-3, -4)$, $(3, 8)$

37. $(-2, -13)$, $(2, 3)$, $(4, 5)$

38. $(-6, 29)$, $(-4, 12)$, $(2, -3)$

39. $(-3, -2)$, $(3, 10)$, $(6, -2)$