QEQFII L5 Determining Equations

Friday, October 7, 2022   4:55 PM
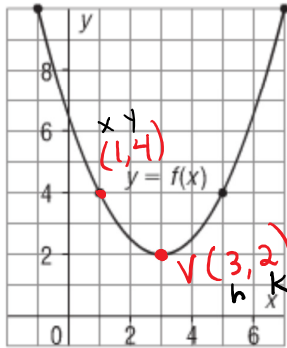
 QEQFII L5 Determining Equations

Lesson 5 Determining Equations of Quadratic Functions

$$\hookrightarrow y = ax^2 + bx + c$$

$$y = a(x-h)^2 + k$$
$$\underbrace{}_{point} \qquad \underbrace{}_{vertex}$$

Example 1

Determine the equation of the quadratic function.

$(1,4)$ with $x\ y$ labels

$V(3,2)$ with $h\ k$ labels

$$y = a(x-h)^2 + k$$
$$4 \overset{-2}{=} a(1-3)^2 + 2^{-2}$$
$$2 = 4a$$
$$\frac{1}{2} = a$$

$$y = \frac{1}{2}(x-3)^2 + 2$$

Sub in h, k, x and y

Solve for "a"

Write the eqn
* sub a, h and k

Example 2

Determine the equation of a quadratic function congruent to $y = 3x^2$, opening downward with vertex at (-1, 5).

$h\ k$ Same Size $\therefore a = 3$

then $a = -3$

$$y = a(x-h)^2 + k$$
$$y = -3(x+1)^2 + 5$$

Example 3

Determine the equation of a quadratic function with x-intercepts -1, 3 and vertex at (1, -4).

$h\ k$

Pts $(-1, 0)$ and $(3, 0)$ $x\ y$

Pick one

$$y = a(x-h)^2 + k$$
$$0 \overset{+4}{=} \boxed{a(3-1)^2} - 4^{+4}$$
$$4 = 4a$$
$$1 = a$$

$$\therefore \text{eqn} \quad y = (x-1)^2 - 4$$

Example 4

The equation of the axis of symmetry of the graph of a quadratic function is $x = 3$. $\overset{h}{}$
The graph passes through the points C(-1, -6) and D(5, 0). Determine an equation
of the function. $\quad x_1 \; y_1 \qquad x_2 \; y_2$

$$y = a(x-h)^2 + k$$

Set up 2 eqns w/two unknowns a, k

$$-6 = a(-1-3)^2 + k$$
$$-6 = 16a + k \quad \text{①}$$

$$0 = a(5-3)^2 + k$$
$$0 = 4a + k \quad \text{②}$$

Substitution
solve for k in ②
$$-4a = k$$

Sub into ①
$$-6 = 16a + k$$
$$-6 = 16a - 4a$$
$$-6 = 12a$$
$$-\tfrac{1}{2} = a$$

Elimination
$$-6 = 16a + k$$
$$- (0 = 4a + k)$$
$$-6 = 12a$$
$$-\tfrac{1}{2} = a$$

$$0 = 4(-\tfrac{1}{2}) + k$$
$$0 = -2 + k$$
$$2 = k$$

$$\therefore y = -\tfrac{1}{2}(x-3)^2 + 2$$

Example 5

The graph of a quadratic function passes through $(6, -60)$ and the zeros of the
function are -4 and 2. Determine the equation of this function in general form.
$\qquad \overset{x}{} \; \overset{y}{}$
x-ints or roots

$$x = -4 \quad x = 2$$
$$(x+4)(x-2)$$

No a, h or k
so use
$$y = ax^2 + bx + c$$
in factored form

$$y = a(x - x_1)(x - x_2)$$
$$y = a(x+4)(x-2)$$

sub in pt $(6, -60)$
$\qquad \overset{x}{} \quad \overset{y}{}$

$$-60 = a(6+4)(6-2)$$
$$-60 = 40a$$
$$-\tfrac{3}{2} = a$$

$$y = -\tfrac{3}{2}(x+4)(x-2)$$
$$y = -\tfrac{3}{2}(x^2 + 2x - 8)$$
$$y = -\tfrac{3}{2}x^2 - 3x + 12$$

$$(-\tfrac{3}{2})(\overset{-4}{-8})$$

Assign
pg 233
1a, c, f, h,
2b, e, g, i
3c, e, h, j