

Journal Entry:

Compare and Contrast:

Explain the similarities/ differences of finding the vertex of a function written in vertex form and finding the vertex of a function in standard form.

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Section 4-3 Modeling with Quadratic Functions

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When you know the vertex and one point on a parabola, you can write the function in vertex form.

If you do not know the vertex, you can use standard form and any three points on the parabola to find the equation for the function.

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A parabola contains (0, 0), (1, -2), and (-1, -4). What is the equation for the function in standard form?

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

$(0, 0)$ $(1, -2)$ $(-1, -4)$
 $0 = c$ $-2 = a + b + c$ $-4 = a - b + c$
 $-2 = a + b + 0$ $-4 = a - b + 0$
 $\begin{cases} a + b = -2 \\ a - b = -4 \end{cases}$ $a + b = -2$
 $2a = -6$ $-3 + b = -2$
 $a = -3$ $b = 1$

$$y = -3x^2 + x + 0$$

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

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#12. (-2, 9), (-4, 5), (1, 0)

$$\begin{matrix} (-2, 9) & (-4, 5) & (1, 0) \\ 9 = 4a - 2b + c & 5 = 16a - 4b + c & 0 = a + b + c \end{matrix}$$

$$\begin{matrix} -(4a - 2b + c = 9) & 16a - 4b + c = 5 \\ 16a - 4b + c = 5 & -(a + b + c = 0) \\ + -4a + 2b - c = -9 & -a - b - c = 0 \end{matrix}$$

$$\begin{matrix} 12a - 2b = -4 & 15a - 5b = 5 \end{matrix}$$

$$\begin{matrix} -5(2a - 2b = -4) & 15a - 5b = 5 \\ 2(5a - 5b = 5) & \end{matrix}$$

$$\begin{matrix} -60a + 10b = 20 & \\ 30a - 10b = 10 & \end{matrix}$$

$$\begin{matrix} -30a = 30 \\ a = -1 \end{matrix}$$

$$b = -4$$

$$c = 5$$

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

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Determine whether a quadratic model exists for each set of values. If so, write the model.

#19. $f(0) = 5, f(2) = 3, f(-1) = 0$

$$(0, 5) \quad (2, 3) \quad (-1, 0)$$

$$5 = c \quad 3 = 4a + 2b + c \quad 0 = a - b + c$$

$$\begin{matrix} 4a + 2b = -2 \\ 2(a - b) = -5 \\ 2a - 2b = -10 \end{matrix}$$

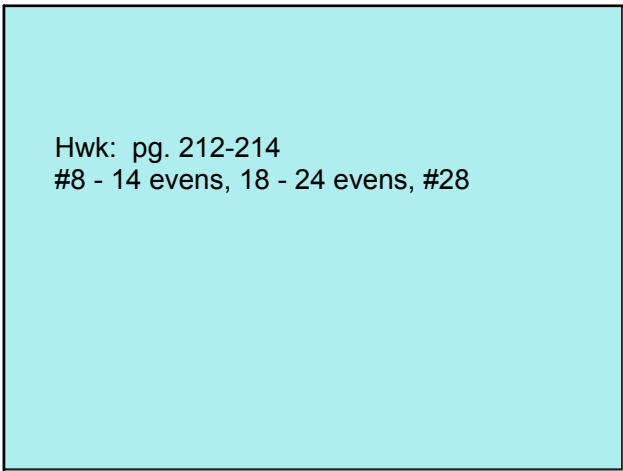
$$\begin{matrix} 6a = -12 \\ a = -2 \end{matrix}$$

$$0 = -2 - b + 5$$

$$b = 3$$

$$y = -2x^2 + 3x + 5$$

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