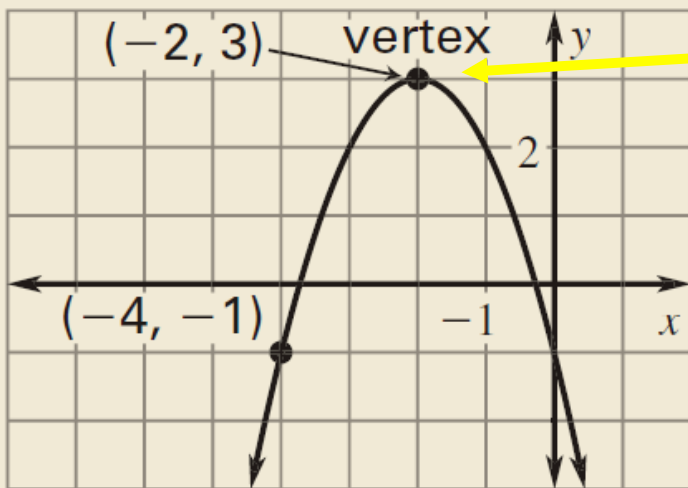


60-61 Writing Quadratic Functions

Write a quadratic function for the parabola shown.



Since the vertex is shown, use vertex form.

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

$$y = a(x - -2)^2 + 3$$

$$y = a(x + 2)^2 + 3$$

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

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

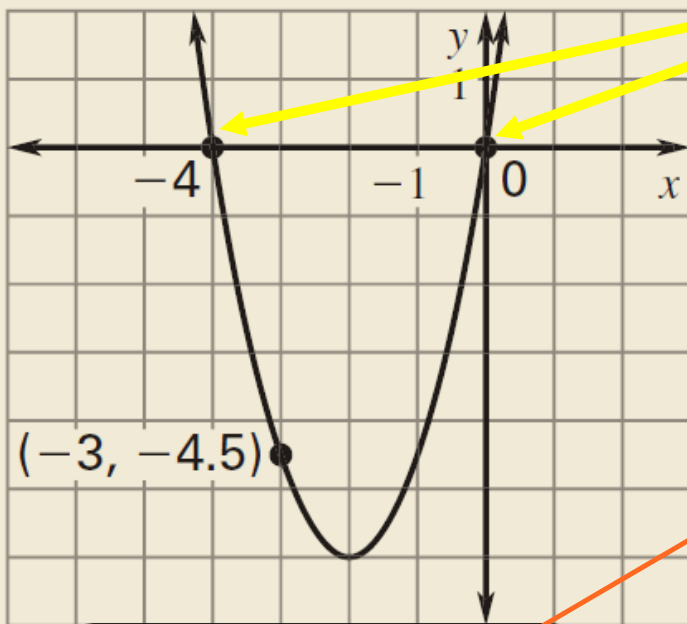
$$-1 = 4a + 3$$

$$-4 = 4a$$

$$-1 = a$$

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

Write a quadratic function for the parabola shown.



Since the intercepts are shown, use intercept form.

$$y = a(x - p)(x - q)$$

$$y = a(x - 0)(x - -4)$$

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

$$-4.5 = a(-3)(-3 + 4)$$

$$-4.5 = a(-3)(1)$$

$$-4.5 = -3a$$

$$1.5 = a$$

$$y = 1.5x(x + 4)$$

Write a quadratic function in standard form for the parabola that passes through the points $(-2, 30)$, $(1, 6)$ and $(4, 36)$.

$$\begin{aligned} y &= ax^2 + bx + c \\ 30 &= a(-2)^2 + b(-2) + c \\ 30 &= 4a - 2b + c \end{aligned}$$
$$\begin{aligned} y &= ax^2 + bx + c \\ 6 &= a(1)^2 + b(1) + c \\ 6 &= a + b + c \end{aligned}$$
$$\begin{aligned} y &= ax^2 + bx + c \\ 36 &= a(4)^2 + b(4) + c \\ 36 &= 16a + 4b + c \end{aligned}$$

The diagram shows three sets of equations. The first set (blue) starts with the general form $y = ax^2 + bx + c$ and substitutes the point $(-2, 30)$ to get $30 = a(-2)^2 + b(-2) + c$, which simplifies to $30 = 4a - 2b + c$. The second set (red) starts with the general form and substitutes the point $(1, 6)$ to get $6 = a(1)^2 + b(1) + c$, which simplifies to $6 = a + b + c$. The third set (green) starts with the general form and substitutes the point $(4, 36)$ to get $36 = a(4)^2 + b(4) + c$, which simplifies to $36 = 16a + 4b + c$. Arrows point from the simplified equations on the left to the corresponding equations on the right.

$$30 = 4a - 2b + c$$

$$6 = a + b + c$$

$$36 = 16a + 4b + c$$

$$4a - 2b + c = 30$$

$$a + b + c = 6$$

$$16a + 4b + c = 36$$

$$\begin{bmatrix} 4 & -2 & 1 \\ 1 & 1 & 1 \\ 16 & 4 & 1 \end{bmatrix} \cdot \begin{bmatrix} a \\ b \\ c \end{bmatrix} = \begin{bmatrix} 30 \\ 6 \\ 36 \end{bmatrix}$$

$$A \cdot X = B$$

$$\cancel{A^{-1} \cdot A} \cdot X = A^{-1} \cdot B$$

$$X = A^{-1} \cdot B = \begin{bmatrix} 3 \\ -5 \\ 8 \end{bmatrix}$$

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

$$y = 3x^2 - 5x + 8$$

"Quadratic Applications" worksheet due Tuesday, Dec 11

CHAPTER 4 TEST ON THURSDAY, DECEMBER 13