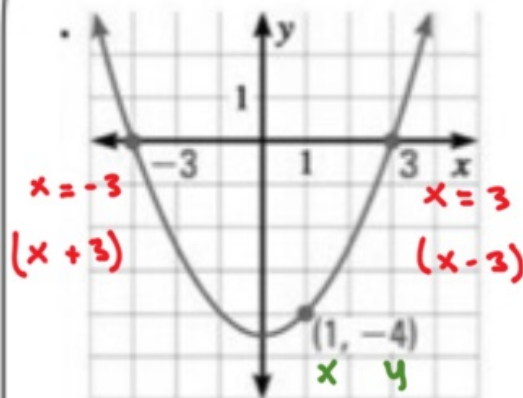Math II   ...ding Quadratic Functions Practice

1. Build a quadratic function in factored form for the parabolas below.

Graph 1:

$x = -3$
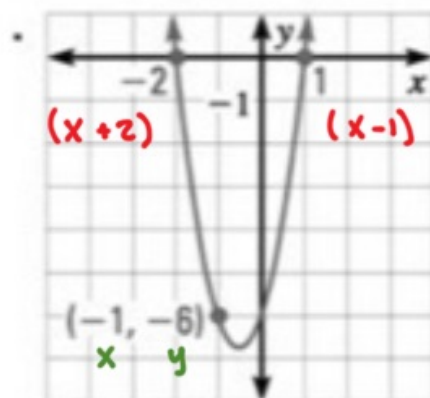$(x + 3)$
$x = 3$
$(x - 3)$
$(1, -4)$

$$y = a(x-p)(x-q)$$
$$y = a(x+3)(x-3)$$
$$-4 = a(1+3)(1-3)$$
$$-4 = a(4)(-2)$$
$$\frac{-4}{-8} = \frac{-8a}{-8} \rightarrow a = \frac{1}{2}$$
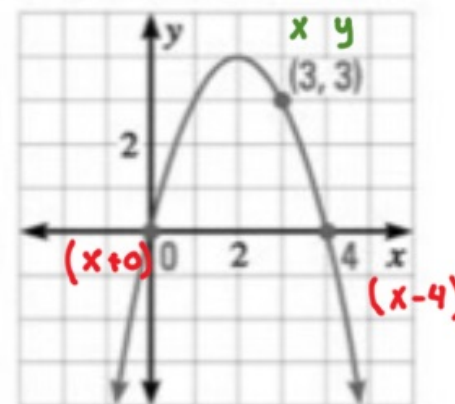
$$\boxed{y = \frac{1}{2}(x+3)(x-3)}$$

Graph 2:

$(x+2)$ $(x-1)$
$(-1, -6)$

$$y = a(x+2)(x-1)$$
$$-6 = a(-1+2)(-1-1)$$
$$-6 = a(1)(-2)$$
$$\frac{-6}{-2} = \frac{-2a}{-2} \rightarrow a = 3$$

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

Graph 3:

$(3, 3)$
$(x+0)$ $(x-4)$

$$3 = a(3+0)(3-4)$$
$$3 = a(3)(-1)$$
$$\frac{3}{-3} = \frac{-3a}{-3} \rightarrow a = -1$$

$$\boxed{y = -(x)(x-4)}$$

2. Build a quadratic function in factored form from whose graph has the given x-intercepts and passes through the given point.

2. Build a quadratic function in factored form from whose graph has the given x-intercepts and passes through the given point.

x-intercepts: 1, 4
point: (3, 2)

$2 = a(3-1)(3-4)$
$2 = a(2)(-1)$
$\dfrac{2}{-2} = \dfrac{-2a}{-2} \rightarrow a = -1$

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

x-intercepts: −2, 2
point: (−4, 8)

$8 = a(-4+2)(-4-2)$
$8 = a(-2)(-6)$
$\dfrac{8}{12} = \dfrac{12a}{12} \rightarrow a = \dfrac{2}{3}$

$\boxed{y = \dfrac{2}{3}(x+2)(x-2)}$

x-intercepts: −1, 6
point: (1, −20)

$-20 = a(1+1)(1-6)$
$-20 = a(2)(-5)$
$\dfrac{-20}{-10} = \dfrac{-10a}{-10} \rightarrow a = 2$

$\boxed{y = 2(x+1)(x-6)}$

x-intercepts: −10, −8
point: (−7, −15)

$-15 = a(-7+10)(-7+8)$
$-15 = a(3)(1)$
$\dfrac{-15}{3} = \dfrac{3a}{3} \rightarrow a = -5$

$\boxed{y = -5(x+10)(x+8)}$

x-intercepts: 3, 9
point: (14, 77)

$77 = a(14-3)(14-9)$
$77 = a(11)(5)$
$\dfrac{77}{55} = \dfrac{55a}{55} \quad a = \dfrac{7}{5}$

$\boxed{y = \dfrac{7}{5}(x-3)(x-9)}$

x-intercepts: −5, 0
point: (−3, 18)

$18 = a(-3+5)(-3+0)$
$18 = a(2)(-3)$
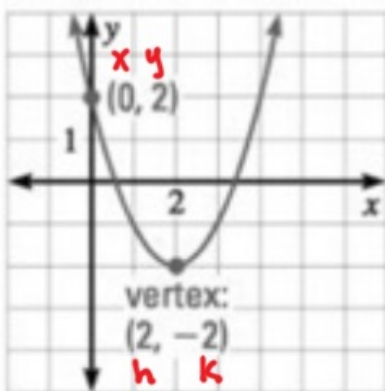$\dfrac{18}{-6} = \dfrac{-6a}{-6} \quad a = -3$

$\boxed{y = -3(x+5)(x)}$

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Math II   ding Quadratic Functions Practice

3. Write a quadratic function in vertex form for the parabolas.
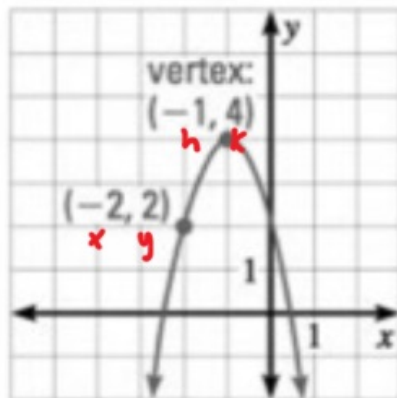
First graph:

x y
(0, 2)

vertex:
(2, −2)
h k

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

$$2 = a(0-2)^2 - 2$$

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

$$\underline{+2 \qquad\qquad +2}$$

$$\frac{4}{4} = \frac{4a}{4} \rightarrow a = 1$$

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

Second graph:

vertex:
(−1, 4)
h k

(−2, 2)
x y

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

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

$$\underline{-4 \qquad\qquad -4}$$

$$-2 = 1a \rightarrow a = -2$$

$$y = -2(x-(-1))^2 + 4$$

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

Third graph:

vertex:
(1, 0)

(−1, −3)
x y

$$-3 = a(-1-1)^2 + 0$$

$$-3 = 4a$$
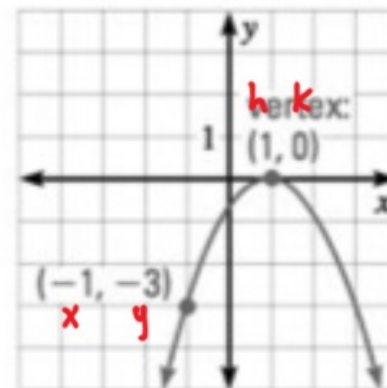
$$\frac{-3}{4} = \frac{4a}{4}$$

$$a = \frac{-3}{4}$$

$$\boxed{y = \frac{-3}{4}(x-1)^2}$$

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4. Write a quadratic function in vertex form whose graph has the given vertex and passes through the given point.

vertex: $(2, -1)$ *h k*
point: $(4, 3)$ *x y*

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

$3 = 4a - 1$

$\underline{+1 \qquad\qquad +1}$

$\dfrac{4}{4} = \dfrac{4a}{4} \rightarrow a = 1$

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

vertex: $(0, 0)$ *h k*
point: $(-2, -12)$ *x y*

$-12 = a(-2-0)^2 + 0$

$\dfrac{-12}{4} = \dfrac{a(4)}{4} \rightarrow a = -3$

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

$\boxed{y = -3(x)^2}$

---

vertex: $(-4, 6)$ *h k*
point: $(-1, 9)$ *x y*

$9 = a(-1 - (-4))^2 + 6$

$9 = a(-1+4)^2 + 6$

$9 = 9a + 6$

$\underline{-6 \qquad\qquad -6}$

$\dfrac{3}{9} = \dfrac{9a}{9} \qquad a = \dfrac{1}{3}$

$\boxed{y = \dfrac{1}{3}(x+4)^2 + 6}$

vertex: $(1, -10)$ *h k*
point: $(-3, 54)$ *x y*

$54 = a(-3-1)^2 - 10$

$54 = 16a - 10$

$\underline{+10 \qquad\qquad +10}$

$\dfrac{64}{16} = \dfrac{16a}{16} \rightarrow a = 4$

$\boxed{y = 4(x-1)^2 - 10}$

---

vertex: $(4, 5)$ *h k*
point: $(8, -3)$ *x y*

$-3 = a(8-4)^2 + 5$

$-3 = 16a + 5$

$\underline{-5 \qquad\qquad -5}$

$\dfrac{-8}{16} = \dfrac{16a}{16} \qquad a = \dfrac{-1}{2}$

$\boxed{y = -\tfrac{1}{2}(x-4)^2 + 5}$

vertex: $(-6, -7)$ *h k*
point: $(0, -61)$ *x y*

$-61 = a(0 - (-6))^2 - 7$

$-61 = 36a - 7$

$\underline{+7 \qquad\qquad +7}$

$\dfrac{-54}{36} = \dfrac{36a}{36} \rightarrow a = \dfrac{-3}{2}$

$\boxed{y = -\tfrac{3}{2}(x+6) - 7}$