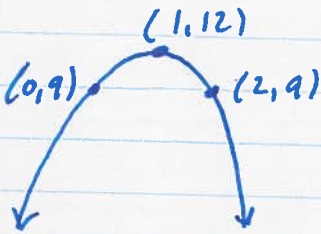


M158

4c) $y = -3(x-1)^2 + 12$

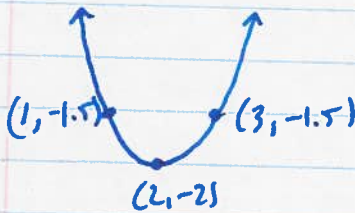
vertex $(1, 12)$ axis $x=1$ concave down
 max at $x=1$ of $y=12$ domain $x \in \mathbb{R}$
 range $y \in \mathbb{R} \mid y \leq 12$



other pt (sub $x=2$)
 $(2, 9)$ symmetry $(0, 9)$

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

vertex $(2, -2)$ axis $x=2$ concave up
 min of $y = -2$ (at $x=2$) domain $x \in \mathbb{R}$
 range $y \in \mathbb{R} \mid y \geq -2$



other pt (sub $x=3$)
 $(1, -1.5)$ (symmetry)

7a) $y = -4x^2 + 14$

vertex $(0, 14)$ concave down symmetry $x=0$
 max $y=14$ domain $x \in \mathbb{R}$ range $y \leq 14$ 2 x-intercepts

b) $y = (x+18)^2 - 8$

vertex $(-18, -8)$ concave up symmetry $x=-18$
~~max~~ ^{min} $y = -8$ domain $x \in \mathbb{R}$ range $y \geq -8$ 2 x-int.

c) $y = 6(x-7)^2$

vertex $(7, 0)$ concave up symmetry $x=7$
 min $y=0$ domain $x \in \mathbb{R}$ range $y \geq 0$ 1 x-int.

d) $y = -\frac{1}{9}(x+4)^2 - 36$

vertex $(-4, -36)$ concave down symmetry $x=-4$
 max $y = -36$ domain $x \in \mathbb{R}$ range $y \leq -36$ 0 x-int.

8 a) $(-3, -4)$

$y = a(x+3)^2 - 4$ $(-2, -3)$

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

$-3 = a(1) - 4$

$1 = a$

$y = (x+3)^2 - 4$

$$b) (1, 12) \quad Y = a(x-1)^2 + 12 \quad (0, 10)$$

$$10 = a(-1)^2 + 12$$

$$-2 = a \quad Y = -2(x-1)^2 + 12$$

$$c) (3, 1) \quad Y = a(x-3)^2 + 1 \quad (1, 3)$$

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

$$2 = 4a$$

$$\frac{1}{2} = a \quad Y = \frac{1}{2}(x-3)^2 + 1$$

$$d) (-3, 4) \quad Y = a(x+3)^2 + 4 \quad (-1, 3)$$

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

$$-1 = a(4)$$

$$a = -\frac{1}{4} \quad Y = -\frac{1}{4}(x+3)^2 + 4$$

$$9. a) Y = a(x)^2 \quad (6, -9)$$

$$-9 = a(36)$$

$$-\frac{1}{4} = a \quad Y = -\frac{1}{4}x^2$$

$$b) Y = a(x)^2 - 6 \quad (3, 21)$$

$$21 = a(3)^2 - 6$$

$$27 = 9a$$

$$a = 3 \quad Y = 3x^2 - 6$$

$$c) Y = a(x-2)^2 + 5 \quad (4, -11)$$

$$-11 = a(4-2)^2 + 5$$

$$-16 = 4a$$

$$a = -4 \quad Y = -4(x-2)^2 + 5$$

$$d) Y = a(x+3)^2 - 10 \quad (2, -5)$$

$$-5 = a(2+3)^2 - 10$$

$$5 = a(25)$$

$$\frac{1}{5} = a \quad Y = \frac{1}{5}(x+3)^2 - 10$$

- 10a) $(4, 16)$ $x \rightarrow 5, y \rightarrow 8 \rightarrow (9, 24)$
 b) $(4, 16)$ $-\frac{1}{4}y \rightarrow (4, -4)$
 c) $(4, 16)$ $x+10, -y \rightarrow (14, -16)$
 d) $(4, 16)$ $3x-8 \rightarrow (4, 40)$



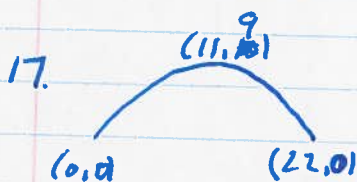
$$y = a(x-p)^2 + q \quad (0,0)$$

$$y = ax^2 \quad (20,12)$$

$$12 = a(20)^2$$

$$\frac{12}{400} = a$$

$$y = \frac{3}{100}x^2 \quad \text{* using vertex shown}$$



* using initial hit spot as origin

$$y = a(x-11)^2 + 9 \quad (0,0)$$

$$0 = a(11)^2 + 9$$

$$-\frac{9}{121} = a$$

$$y = -\frac{9}{121}(x-11)^2 + 9$$

21. a) $(6, 30)$ $y = a(x-6)^2 + 30 \quad (0, -24)$

$$-24 = a(36) + 30$$

$$-54 = 36a$$

$$-\frac{3}{2} = a$$

$$y = -\frac{3}{2}(x-6)^2 + 30$$

b) symmetry axis $x = -13$ (midpt of x intercepts)

$(-13, -24)$ vertex

$$y = a(x+13)^2 - 24 \quad (-5, 0)$$

$$0 = a(8)^2 - 24$$

$$24 = 64a$$

$$\frac{3}{8} = a$$

$$y = \frac{3}{8}(x+13)^2 - 24$$