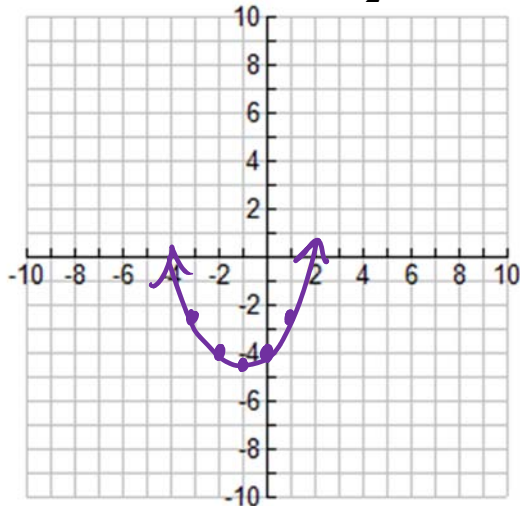


Algebra 2 Trig H
3.4 recap

Name:

****All graphs must have at least five points****

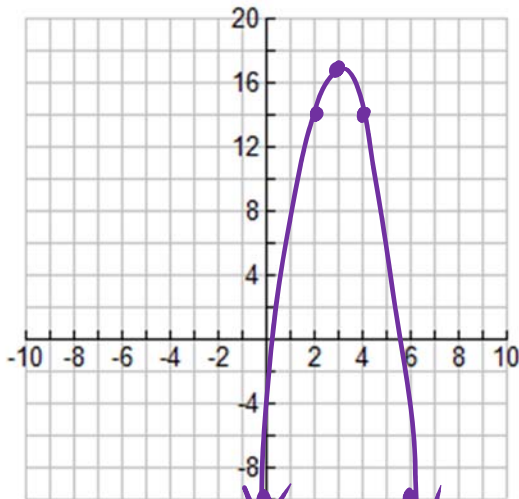
1. Complete the square of $y = \frac{1}{2}x^2 + x - 4$. Then, graph and identify the following:



Axis of symmetry: $x = -1$
 Vertex: $(-1, -\frac{9}{2})$
 y-intercept: $(0, -4)$
 Increasing interval: $[-1, \infty)$
 Decreasing interval: $(-\infty, -1]$
 Range: $[-\frac{9}{2}, \infty)$

$$\begin{aligned} y &= \frac{1}{2}x^2 + x - 4 \\ &= \frac{1}{2}(x^2 + 2x) - 4 \\ &= \frac{1}{2}(x^2 + 2x + 1) - 4 - \frac{1}{2} \\ &= \frac{1}{2}(x+1)^2 - \frac{9}{2} \end{aligned}$$

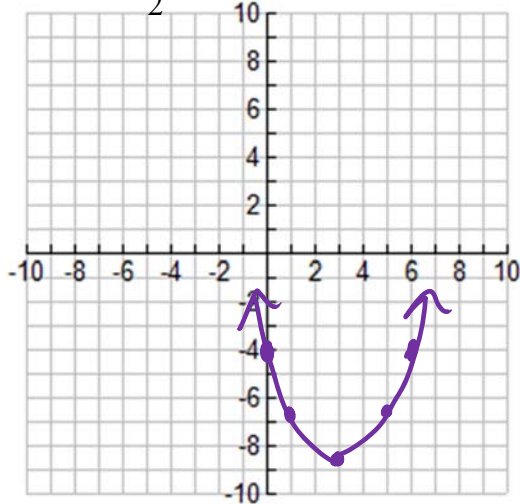
2. Complete the square of $y = -3x^2 + 18x - 10$. Then, graph and identify the following:



Axis of symmetry: $x = 3$
 Vertex: $(3, 17)$
 y-intercept: $(0, -10)$
 Increasing interval: $(-\infty, 3]$
 Decreasing interval: $[3, \infty)$
 Range: $(-\infty, 17]$

$$\begin{aligned} y &= -3(x^2 - 6x) - 10 \\ &= -3(x^2 - 6x + 9) - 10 + 27 \\ &= -3(x-3)^2 + 17 \end{aligned}$$

3. Graph $y = \frac{1}{2}x^2 - 3x - 4$ using standard form methods and identify the information that follows.



Axis of symmetry: $x = 3$

Vertex: $(3, -\frac{17}{2})$

y-intercept: $(0, -4)$

Increasing interval: $[3, \infty)$

Decreasing interval: $(-\infty, 3]$

Range: $[-\frac{17}{2}, \infty)$

$$x = \frac{3}{2 \cdot \frac{1}{2}} = 3$$

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

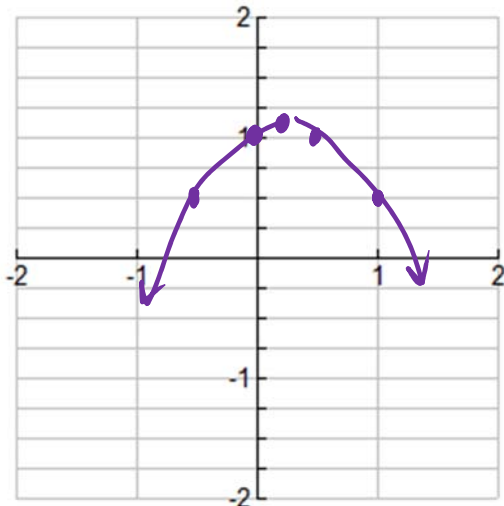
$$= \frac{9}{2} - 9 - 4 = -\frac{17}{2}$$

$$\text{Plug in 1: } \frac{1}{2}(1)^2 - 3(1) - 4$$

$$= \frac{1}{2} - 3 - 4$$

$$= -\frac{13}{2}$$

4. Graph $y = -x^2 + \frac{1}{2}x + 1$ using standard form methods and identify the information that follows.



Axis of symmetry: $x = \frac{1}{4}$

Vertex: $(\frac{1}{4}, \frac{17}{16})$

y-intercept: $(0, 1)$

Increasing interval: $(-\infty, \frac{1}{4}]$

Decreasing interval: $[\frac{1}{4}, \infty)$

Range: $(-\infty, \frac{17}{16}]$

$$x = \frac{-\frac{1}{2}}{2 \cdot -1} = \frac{1}{4}$$

$$y = -\left(\frac{1}{4}\right)^2 + \frac{1}{2} \cdot \frac{1}{4} + 1$$

$$\text{Plug in 1: } -1^2 + \frac{1}{2}(1) + 1$$

$$= -1 + \frac{1}{2} + 1$$

$$= \frac{1}{2}$$

5. Write the equation of the parabola with vertex $(-7,2)$ and through $(1,6)$.

$$y = a(x-h)^2 + k$$
$$6 = a(1+7)^2 + 2$$
$$4 = 64a$$
$$\frac{1}{16} = a$$

$$y = \frac{1}{16}(x+7)^2 + 2$$

6. Write the equation of the parabola with vertex $(3,-5)$ and y-intercept $(0,4)$.

$$y = a(x-h)^2 + k$$
$$4 = a(0-3)^2 - 5$$
$$9 = 9a$$
$$1 = a$$

$$y = (x-3)^2 - 5$$

7. Write the equation of the parabola with x-intercepts $(4,0)$ and $(-8,0)$ and y-intercept $(0,3)$.

$$y = a(x-x_1)(x-x_2)$$
$$3 = a(0-4)(0+8)$$
$$3 = a \cdot -32$$
$$\frac{-3}{32} = a$$

$$y = \frac{-3}{32}(x-4)(x+8)$$

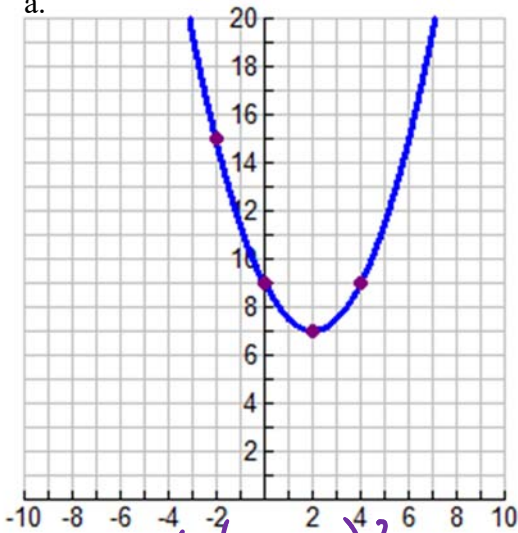
8. Write the equation of the parabola with x-intercepts $(-5,0)$ and $(1,0)$ and through $(2,7)$.

$$y = a(x-x_1)(x-x_2)$$
$$7 = a(2+5)(2-1)$$
$$7 = a \cdot 7$$
$$1 = a$$

$$y = (x+5)(x-1)$$

9. Write the equation of the parabolas below:

a.



$$q = a(0-2)^2 + 7$$

$$q = a \cdot 4 + 7$$

$$\frac{1}{2} = a$$

x	y
-10	0
-8	-12
-6	-20
-4	-24
-2	-24
0	-20
2	-12
4	0

$$-20 = a(0-4)(0+10)$$

$$a = \frac{1}{2}$$

$$y = \frac{1}{2}(x-2)^2 + 7$$

$$y = \frac{1}{2}(x+10)(x-4)$$

10. Write the equation of the parabola through (0,-5), (-4,-1), and (2,5).

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

$$\begin{cases} -1 = a(-4)^2 + b(-4) + -5 \rightarrow 16a - 4b = 4 \\ 5 = a(2)^2 + b(2) + -5 \rightarrow (4a + 2b = 10) \cdot 2 \\ 8a + 4b = 20 \end{cases}$$

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

$$24a = 24$$

$$a = 1 \quad b = 3 \quad c = -5$$

11. Write the equation of the parabola through (-1,7), (2,1), and (1,-1).

$$\begin{cases} 7 = a(-1)^2 + b(-1) + c \rightarrow a - b + c = 7 \\ 1 = a(2)^2 + b(2) + c \rightarrow 4a + 2b + c = 1 \\ -1 = a(1)^2 + b(1) + c \rightarrow a + b + c = -1 \end{cases}$$

$$2a + 2c = 6$$

$$\begin{aligned} 4a + 2b + c &= 1 \\ -2a + 2b - 2c &= 2 \end{aligned}$$

$$2a - c = 3$$

$$2a + 2c = 6$$

$$(2a - c = 3) \cdot 2 >$$

$$\begin{aligned} 2a + 2c &= 6 \\ 4a - 2c &= 6 \end{aligned}$$

$$6a = 12$$

$$a = 2 \quad c = 1 \quad b = -4$$

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