Name: _____ Date: _____

Graphing Quadratic Equations in Standard Form

1. $f(x) = x^2 - 4x + 5$

$a=1$ $b=-4$ $c=5$

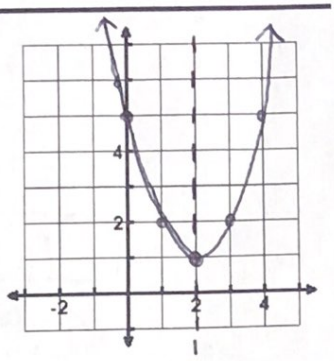
$\boxed{a=1}$

$h = \frac{4}{2(1)} = \boxed{2=h}$

$k = (2)^2 - 4(2) + 5$

$\boxed{k=1}$

Characteristics	
A.O.S.	$x=2$
Vertex:	$(2,1)$
Solution(s):	no real solutions

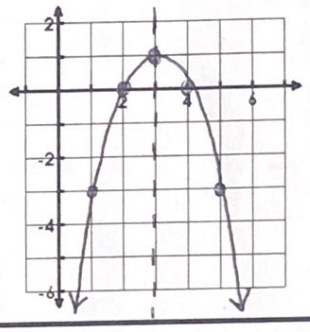


2. $f(x) = -x^2 + 6x - 8$

$a=-1$ $b=6$ $c=-8$

$\boxed{a=-1}$ $h=3$ $k=1$

Characteristics	
A.O.S.	$x=3$
Vertex:	$(3,1)$
Zero(s):	$x=2$ $x=4$

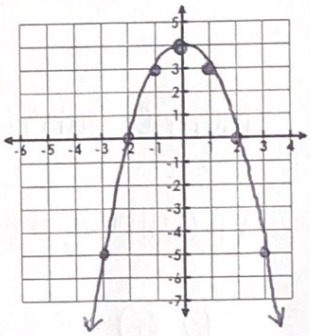


3. $f(x) = -x^2 + 4$

$a=-1$ $b=0$ $c=4$

$a=-1$ $h=0$ $k=4$

Characteristics	
A.O.S.	$x=0$
Vertex:	$(0,4)$
Solution(s):	$x=-2$ $x=2$



4. The path of a soccer ball is modeled by the function $h(x) = -0.5t^2 + 3t + 1.5$, where h is the height in meters and t is the time that the ball travels in seconds. What is the **maximum height** that the ball reaches? *Hint: start by finding the vertex.*

opens down, since a is negative

(time, height) Maximum = vertex (3, 6)

$a=-0.5$ $b=3$ $c=1.5$

$a=-0.5$ $h=3$ $k=6$

The max height is 6 feet.

5. The function $A(x) = x(10 - x)$ describes the area A of a rectangular flower garden, where x is its width in yards. What is the maximum area of the garden? *Hint: get your equation in standard form 1st and then start finding the vertex.*

$A(x) = x(10-x)$

$A(x) = 10x - x^2$

$A(x) = -x^2 + 10x$

(width, area) Maximum = vertex (5, 25)

$a=-1$ $b=10$ $c=0$

$a=-1$ $h=5$ $k=25$

The max area is 25 ft

6. A baker has modeled the monthly operating costs for making wedding cakes by the function $y = 0.5x^2 - 12x + 150$ where y is the total cost in dollars and x is the number of cakes prepared.

A. Find the **vertex** and **axis of symmetry**. *The vertex would represent (Cakes Prepared, $Cost).*

x y
h k

$a=0.5$ $h=-12$ $k=150$ vertex $(12, 78)$

$a=0.5$ $h=12$, $k=78$ AOS $x=12$

B. What is the **minimum** monthly operating **cost**?

$78

C. How many **cakes** should be prepared each month to yield the minimum operating cost?

12 cakes

↳ $x=0$

D. What are the baker's costs if he/she makes **no cakes** (**zero**)?

$h(0)=0.5(0)^2-12(0)+150 =$ $150

A frog is about to hop from the bank of a creek. The path of the jump can be modeled by the equation $\boldsymbol{h(x) = -x^2 + 4x + 1}$, where *h(x)* is the frog's height above the water and x is the number of seconds since the frog jumped. A fly is cruising at a height of **5 feet** above the water.

1. Can the frog catch the fly without jumping? How do you know?

No, he starts at a height of 1 ft. $h(0)=-(0)^2+4(0)+1$, $h(0)=1$ feet

2. Is the extreme value a maximum or minimum? Why?

A maximum, the quadratic opens down (a is negative)

3. What is the vertex of the equation?

(2,5) At 2 seconds, he reaches a maximum height of 5 feet.

4. If the frog jumps to catch the fly with his **mouth** in one **GULP** (<u>not</u> by using his tongue), is it possible for the frog to catch the fly?

Yes, at the maximum he will reach the fly.

5. Graph the paths of the frog and fly.