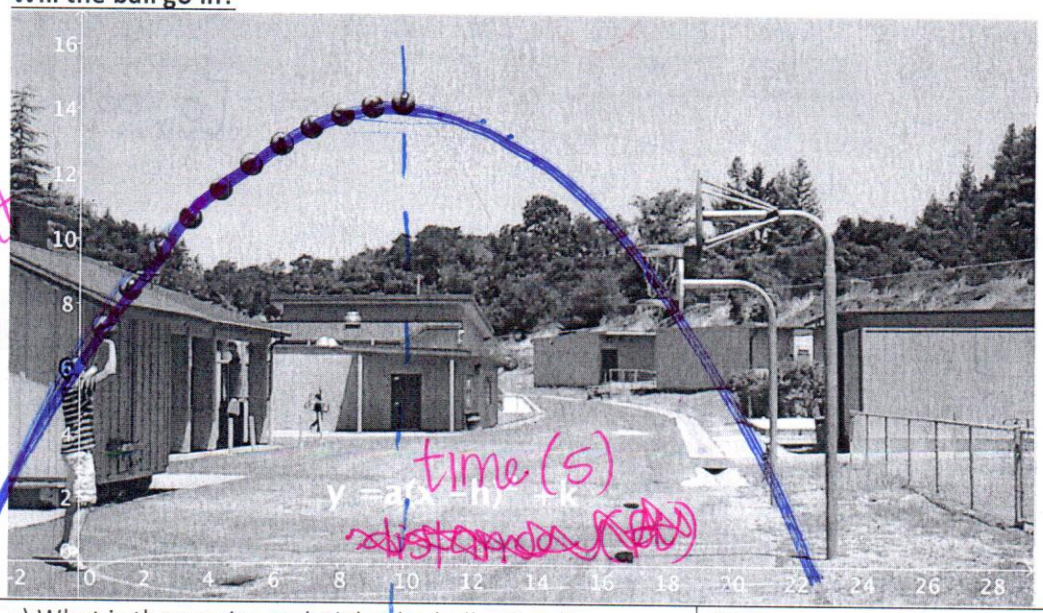
Objectives:

- By the end of class students will be able to graph a quadratic function by making a table of values and be able to analyze key features of a quadratic function (key features: domain, range, vertex, axis of symmetry, x and y intercepts).

Vocabulary:

1. **Vertex**: The highest or lowest point. Written as (h, k)
2. **Maximum or minimum**: The highest or lowest point. The Vertex.
3. **Axis of symmetry**: The line down the middle of the parabola. Written as $x = h$.
4. **Y-intercept**: Set $x = 0$ and solve for y. (Where graph crosses the y-axis)
5. **X-intercepts**: Set $y = 0$ and solve for x (i.e. factor, square root, quadratic formula) (Crosses the x-axis)
6. **Domain**: All of the possible x-values. A parabola is always "all real numbers" $(-\infty, \infty)$
7. **Range**: Reading the graph from bottom to top, the lowest to highest y-values.

Will the ball go in?



a) What is the maximum height the ball will go?

~14 ft

b) When will the ball reach its maximum height?

~10 sec.

c) What is the range of the ball?

[0, 14]

d) What is the domain of the ball?

[0, 24]

e) When is the ball increasing in height?

[0, 10]

f) When is the ball decreasing in height?

[10, 24]

g) What does the y-intercept represent in this situation?

- the height of the ball right as he shoots.

h) If the ball represented a parabola, what would the x-intercepts be?

$x = -3$ $x = 22$

i) How can we predict if the ball will go in?

- equation
- better camera
- measured

Example 1: Graph the parent function of the quadratic by plotting points. Identify the key features

A "parent function" is the most basic form of a graph. For example if you are graphing a line of the form $y = mx + b$ the parent function would be $y = x$. Last unit we talked about solving quadratic equations. In the unit we will talk about graphing quadratic functions.

Lets Plot Points:

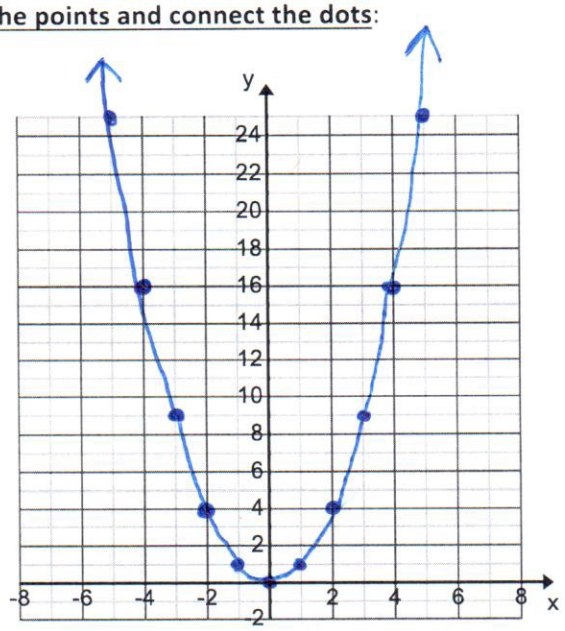
$y = x^2$

input output

x	y
-4	16
-3	9
-2	4
-1	1
0	0
1	1
2	4
3	9
4	16

$y=(-4)^2$ $y=(-3)^2$ (-4,16)

Plot the points and connect the dots:



Identify Critical Information:

Vertex (Max/Min):

Min at (0,0)

Axis of Symmetry:

$x=0$

Y-Intercept:

(0,0)

X-Intercept:

(0,0)

Domain:

$(-\infty, \infty)$

Range:

$[0, \infty)$

Example 2: Graph the quadratic function by plotting points. Identify the key features.

Lets Plot Points:

$f(x) = -2x^2 - 4x + 6$

$y= -2(-3)^2-4(-3)+6$

$-18+12+6$

x	y
-3	0
-2	6
-1	8
0	6
1	0

$y=-2(-2)^2-4(-2)+6$

$-8+8+6$

$y= -2(-1)^2-4(-1)+6$

$-2+4+6$

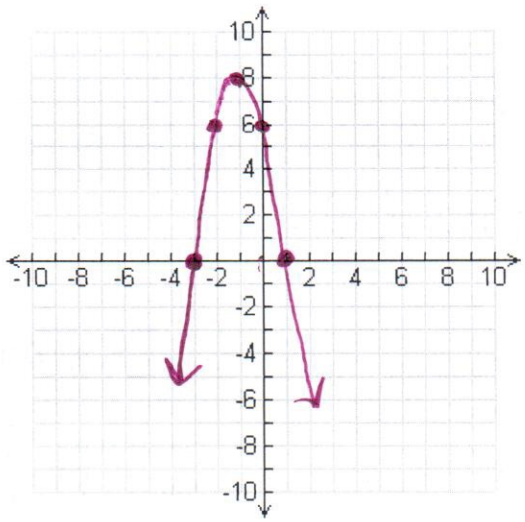
$y=-2(0)-4(0)+6$

$0+0+6$

$y=-2(1)^2-4(1)+6$

$-2-4+6$

Plot the points and connect the dots:



Identify Critical Information:

Vertex (Max/Min):

Max @ (-1,8)

Axis of Symmetry:

$x=-1$

Y-Intercept:

(0,6)

X-Intercept:

(-3,0) (1,0)

Domain:

$(-\infty, \infty)$

Range:

$(-\infty, 8]$