What you will learn about:
Transformations of Functions

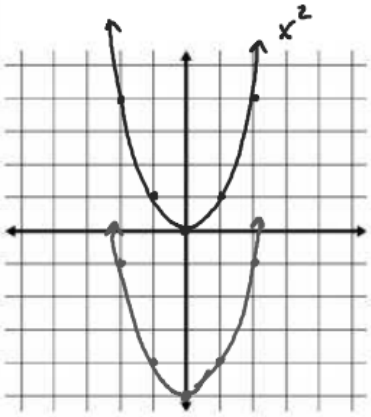
$y = (x-0)^2 + 0$

$y = x^2$

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

Describe how the graph of $y = x^2$ can be transformed to the graph of the given equation.

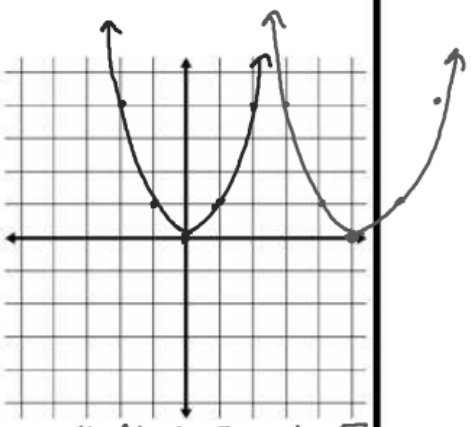
A) $y = x^2 - 5$ $(x-0)^2 - 5$ $(0,-5)$



Shift Down 5

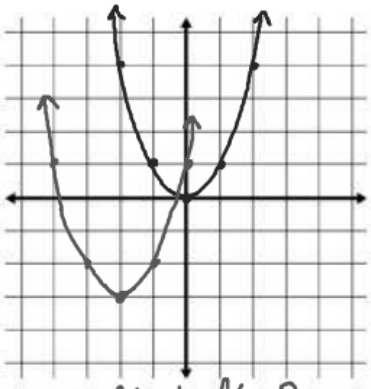
B) $y = (x-5)^2$ $(5,0)$

$y = (x-5)^2 + 0$



Shifted Right 5

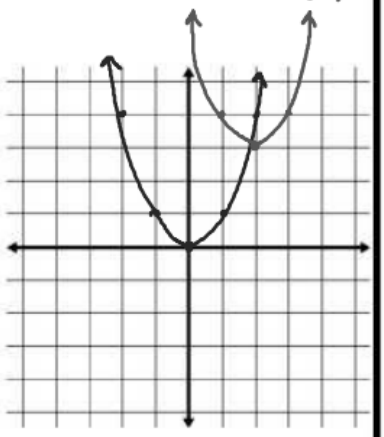
C) $y = (x+2)^2 - 3$ $V(-2,-3)$



Shift Left 2
Shift Down 3

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

$V(2,3)$



Right 2
Up 3

Describe how the graph of $y = x^2$ can be transformed to the graph of the given equation.

$y = x^2$

x	y
0	0
1	1
-1	1

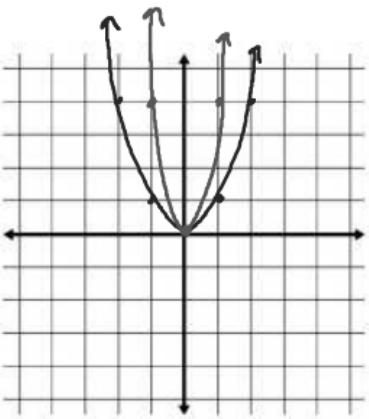
$y = 4x^2$

x	y
0	0
1	4
-1	4

$a > 1$ Vertical stretch

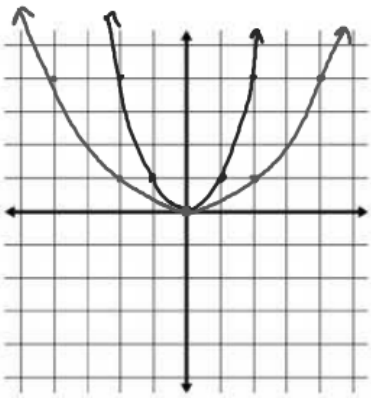
a between 0 and 1 Vertical compression

E) $y = 4x^2$



Vertical Stretch by a factor of 4

F) $y = \frac{1}{4}x^2$



Vertical Compression by factor of $\frac{1}{4}$

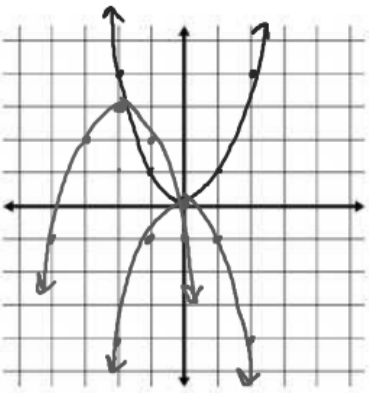
$y = \frac{1}{4}x^2$

x	y
0	0
2	1
-2	1
4	4
-4	4

$y = x^2$ $y = -x^2$

If a is negative Reflection over X-axis.

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



$V(-2, 3)$

Reflect over x-axis
Shift Left 2
Shift up 3

$y = |x|$

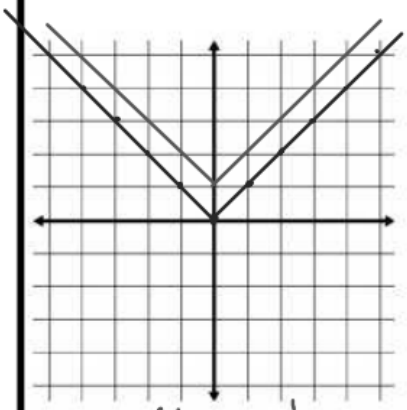
x	y
0	0
1	1
-1	1
2	2
-2	2
-3	3

Describe how the graph of $y = |x|$ can be transformed to the graph of the given equation.

$y = x^2$

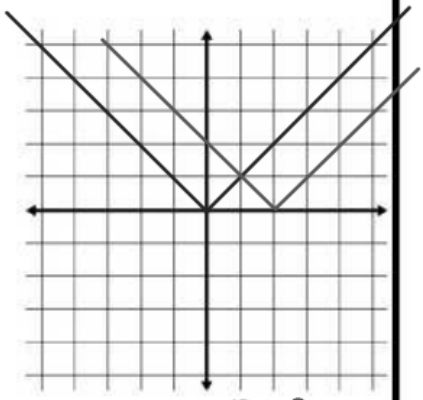
$y = (x-2)^2$

A) $y = |x| + 1$



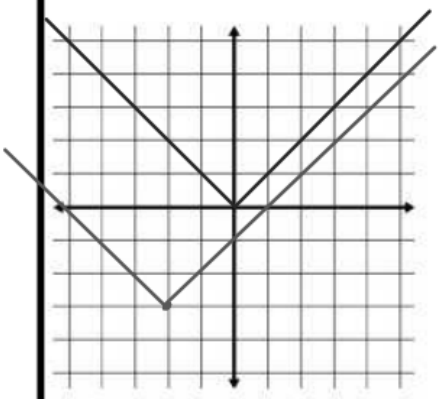
Shift up 1

B) $y = |x-2|$



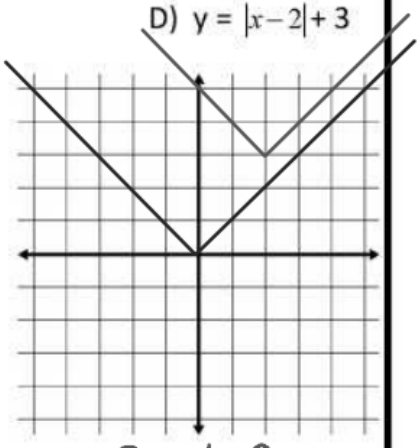
Shift Rt 2

C) $y = |x+2| - 3$



Shift Left 2
Down 3

D) $y = |x-2| + 3$

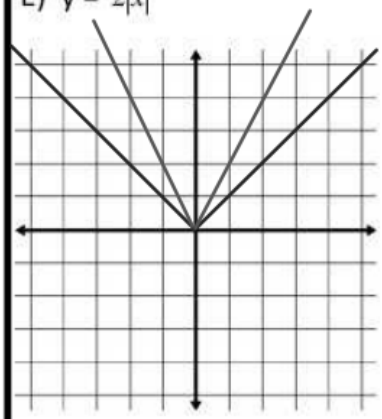


Right 2
up 3

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

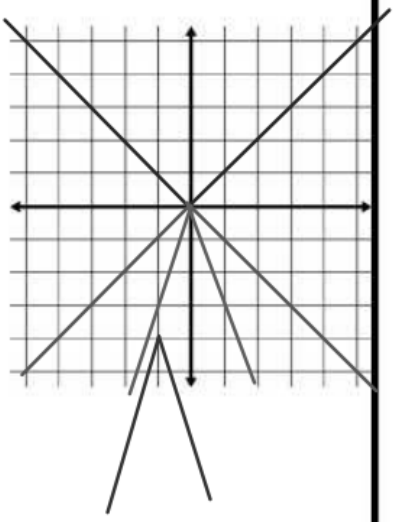
$y = a|x-h| + k$

E) $y = 2|x|$



Vertical Stretch by factor of 2

F) $y = -3|x+1| - 4$



Reflection over x-axis

Vertical Stretch by factor of 3

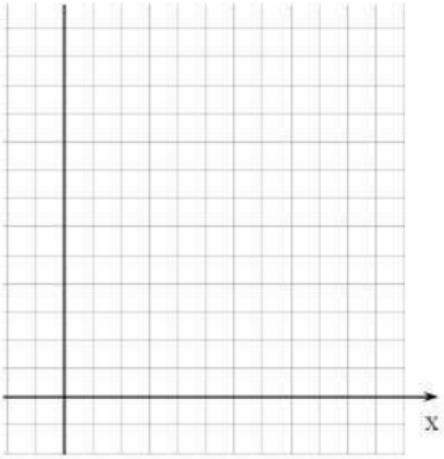
Shift Left 1 Down 4

What you will learn about:
Regression

A pumpkin tossing contest is held each year in Morton, Illinios, where people compete to see whose catipult will send pumpkins the farthest. One catipult launches pumpkins from 25 feet above the ground at a speed of 125 feet per second. The table shows the horizontal distance (in feet) the pumpkins travel when launched at different angles. Use a graphing calculator to find the best-fitting quadratic model for the data.

Angle (Degrees)	20	30	40	50	60	70
Distance (in Feet)	372	462	509	501	437	323

1. Create a scatter plot for the above data. Make sure to accurately lable both your x and y axis.



2. Use your regression capability on your calculator to find the equations that best fits the data. Write that equation.

3. Does the grpah appear to have a maximum or minimum value?

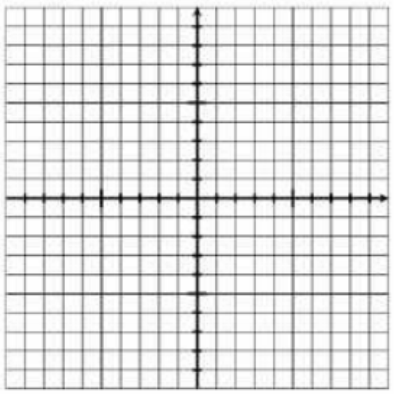
4. What are the x and y coordinates of the max/min point?

5. Using the information from the problem and what you learned from the beginning of the lesson, write an equation for the height of the pumpkin as it relates to the time.

The table shows how wind speed affects a runner's performance in the 200 meter dash. Positive wind speed corresponds to tail winds, and negative wind speeds correspnds to headwinds. The change ***t*** in finishing time is the difference between the runner's time when the speed is ***s*** and the runner's time when there is no wind.

Wind speed (m/sec), ***s***	-6	-4	-2	0	2	4	6
Change in finishing time (sec), ***t***	2.28	1.42	0.67	0	-0.57	-1.05	-1.42

1. Create a scatter plot of the data. Make sure you lable your axis.



2. Use your graphing calculator to find the best-fitting quadratic model.

3. Predict the change in finishing time when the wind speed is 10 m/sec.

For each set of data find a linear model and quadratic model. For the data set which is the better model and expalin why.

The school's student government was planning a moon walk (bump and jump) at the school carnival. They wanted to see how much students would pay to moon walk for five minutes. They collected the following data.

Price in cents	25	50	75	100	125	150
Number of customers	100	80	55	35	20	5

Linear Model: Quadratic Model:

Cedar points is testing the price-profit of their cold soda in vending machines. Here is the price-profit data taking into account the costs of the soda, delverey and all other expences for week 1.

Price ($/Soda)	1.00	2.50	4.00	5.50	7.00
Profit ($)	1000	2000	10,000	2500	0

Linear: Quadratic:

According to the CDC data (www.cdc.gov) here are the U.S. Measles cases per year for a select set of years.

Year	2011	2012	2013	2014
Cases (est.)	205	45	195	625

Linear: Quadratic: