

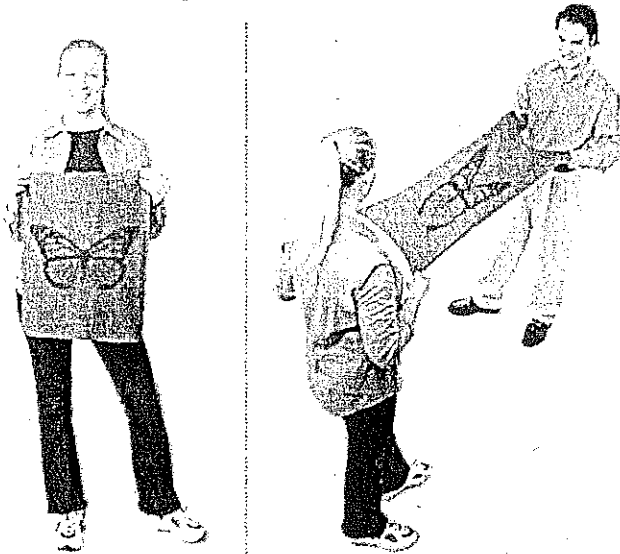
Lesson 10 – Stretches and Shrinks

Objective:

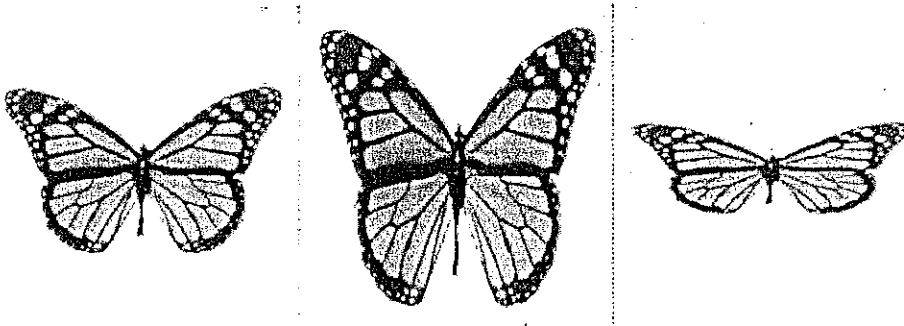
I will observe what happens when a graph stretches or shrinks.

Stretching
and
Shrinking
Graphs

Imagine what happens to a picture that is drawn on a rubber sheet as you **stretch** the sheet vertically.



Another way to change a shape of a picture is by making it **shrink** vertically. The picture will appear to be flattened.



Investigation

Step 1: Graph the following points on your graph $(-3,0)$, $(2,-1)$, $(1,3)$, $(-2,2)$.

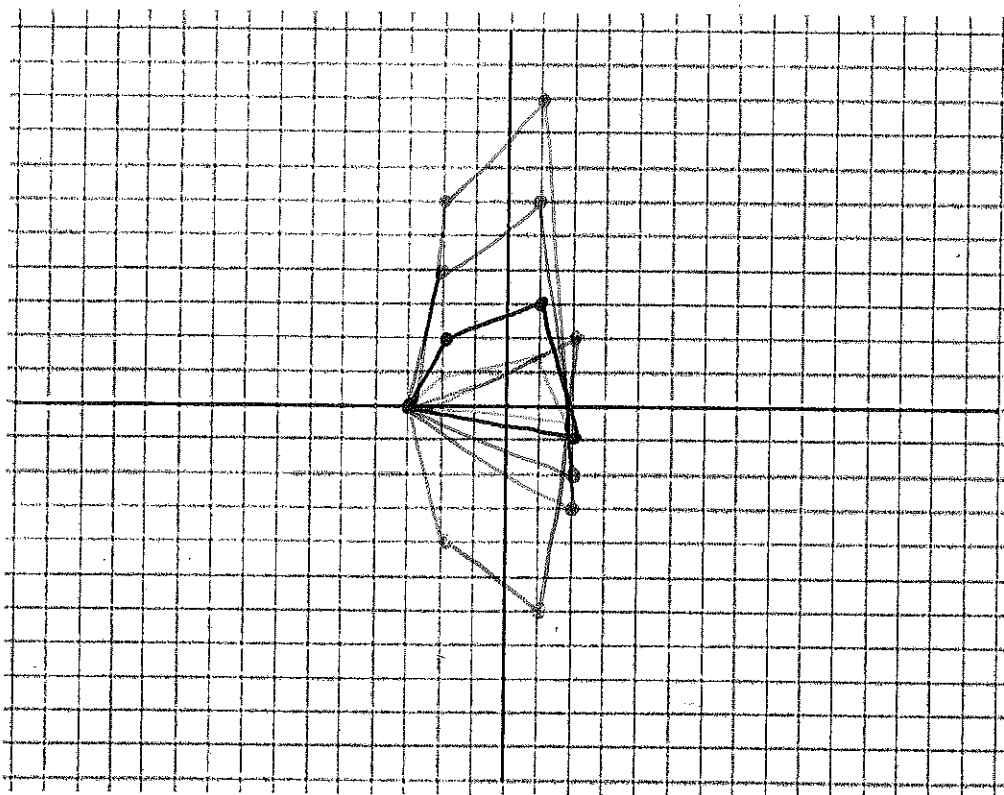
Step 2: Use the following values a : $2, 3, 0.5, -2$ to change the shape of your graph by multiplying the y-values by each a value. Graph each new shape and write your observation for each new shape.

$a = 2$ $(-3,0)(2,-2)(1,6)(-2,4)$ vertically stretched by a factor of 2

$a = 3$ $(-3,0)(2,-3)(1,9)(-2,6)$ vertically stretched by a factor of 3

$a = 0.5$ $(-3,0)(2,-0.5)(1,1.5)(-2,1)$ vertically shrunk by a factor of $\frac{1}{2}$

$a = -2$ $(-3,0)(2,2)(1,-6)(-2,-4)$ vertically stretches by 2 reflects across x-axis



Step 3: Predict the location of each vertex if the value of a is 1.5. Describe how you think the overall appearance of the quadrilateral will change.

$(3,0)$ $(2,-1.5)$ $(1,4.5)$ $(-2,3)$ vertical stretch by 1.5

Step 4: Write a statement about what would happen to your graph when your y -values are multiplied by a number greater than 1.

The graph will vertically stretch.

A number between -1 and 1

The graph will vertically shrink.

And a number less than -1

The graph will vertically stretch and reflect across x -axis

How does that relate to parent functions?

$g(x) = 6|x|$ would vertically stretch by 6

$g(x) = 0.8|x|$ would vertically shrink by 0.8

$k(x) = -2x^2$ would vertically stretches by 2
reflects across x -axis

In words describe the transformations that are happening

1). $j(x) = 5(-x + 4) + 6$

left 4
up 6
reflects across y -axis
vertically stretches by 5

2). $-r(x) = 0.5|x| - 2 = r(x) = -0.5|x| - 2$

down 2
vertically shrinks by 0.5
reflection across x -axis