AAT Name _____

3-5 The Graph Scale-Change Thm Date _____ **A#7**

Goal: Apply the Graph Scale-Change Theorem to all relations.

Warm Up:

1. If you multiply a number by 0.8, you can get back to the original number by either multiplying the product by _____ or dividing the product by _____.
2. If you divide a number by 30, you can get back to the original number by either multiplying the quotient by _____ or dividing the quotient by _____.
3. Multiple Choice. When $a \neq 0, \frac{x}{\frac{1}{a}} =$

a. ax b. $\frac{x}{a}$ c. $\frac{\frac{x}{1}}{a}$ d. $\frac{a}{x}$

Activity: Using Desmos, enter the these two functions into the fields:

a. $y = x^3 + 3x^2 - 4x$

b. $y = b\left(x^3 + 3x^2 - 4x\right)$, make a slider for b.

c. $y = \left(\frac{x}{a}\right)^3 + 3\left(\frac{x}{a}\right)^2 - 4\left(\frac{x}{a}\right)$, make a slider for a.

Adjust the sliders to see how a and b affect the original function.

Graph Scale-Change Theorem

In general, a **scale change** centered at the _____ with the **horizontal scale factor** $a \neq 0$ and **vertical scale factor** $b \neq 0$ is a transformation that maps _____ to _____. The rule for this is _____. When $a = b$, then the scale change is called a _____.

Graph Scale-Change Theorem

Given a preimage graph described by a sentence in x and y, the following two processes yield the same image graph:
(1) replacing x by and y by in the sentence;
(2) applying the scale change to the preimage graph.

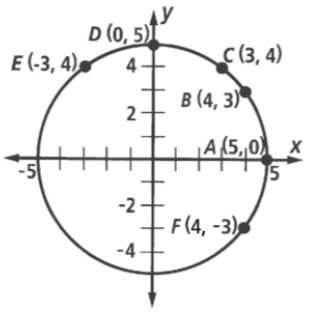
Questions

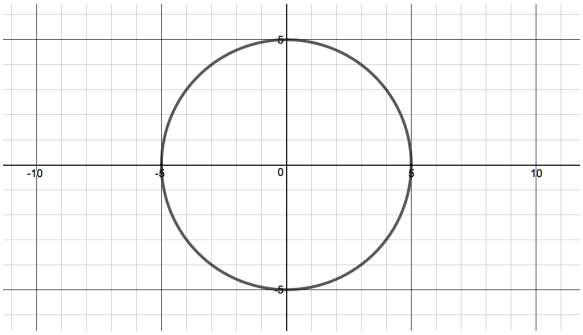
Questions

Review: Compare this to the Graph-Translation Theorem.

Example 1: The relation described by $x^2 + y^2 = 25$ is graphed at the lower left.

a. Find the images of points labeled *A-F* on the graph under $S:(x,y) \to (2x,y)$.
b. Graph the image on the plane lower right.
c. Write an equation for the image relation.



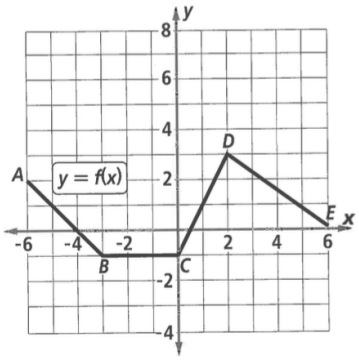


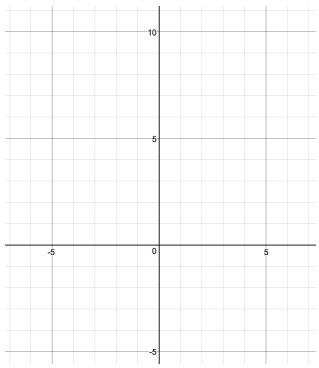
Example 2: Sketch and compare the graphs of $y = |x|$ and $\frac{y}{4} = |6x|$.

Describe the transformation.

Example 3: A graph and table for $y = f(x)$ are given. Draw the graph of $\frac{y}{3} = f(2x)$.

x	f(x)
–6	2
–3	–1
0	–1
2	3
6	0





Example 3a: The line $41x - 29y = 700$ contains the points $(39,31)$ and $(10,-10)$. Use this information to obtain two points on the line with equation $20.5x - 87y = 700$.

Summary: