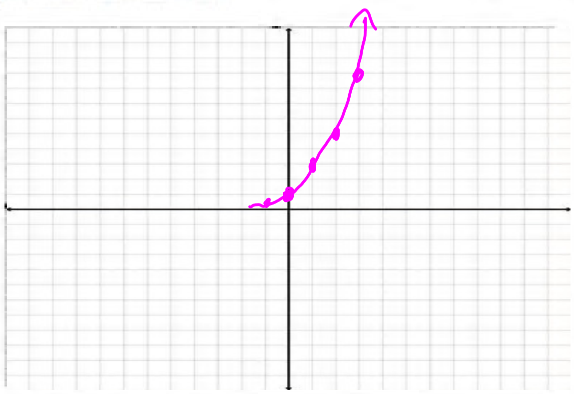
Integrated Math 3 Name KEY

12.1 (Day 3) Exponential Functions Date ______________ Period ______

Review Worksheet

Using a graphing calculator, graph the function $f(x) = 2^x$ and sketch the graph on the grid provided below.



1. Is the graph an increasing or decreasing function? Explain your answer.

Increasing from left to right. I know this by looking at the table of values. The y-values increase exponentially

2. Trace or use the table feature on your calculator to fill out the tables below.

As the value of x gets very large, what happens to the value of 2^x?

x	2^x
0	1
1	2
5	32
10	1024
20	1,050,000

The values will quickly approach infinity

As the value of x gets very small, what happens to the value of 2^x?

x	2^x
−1	$\frac{1}{2}$
−3	$\frac{1}{8}$
−5	$\frac{1}{32}$
−10	$\frac{1}{1024}$
−20	$\frac{1}{1,050,000}$

The values will quickly approach 0 but never equal it.

3. Will the value of 2^x ever equal 0? Explain your answer.

No. As x approaches negative infinity, the y-values become very small fractions but never become 0.

4. Are there any values of x that would make 2^x undefined? Explain your answer.

No, X can be any negative or positive real number with no limitations. This can be seen by the domain

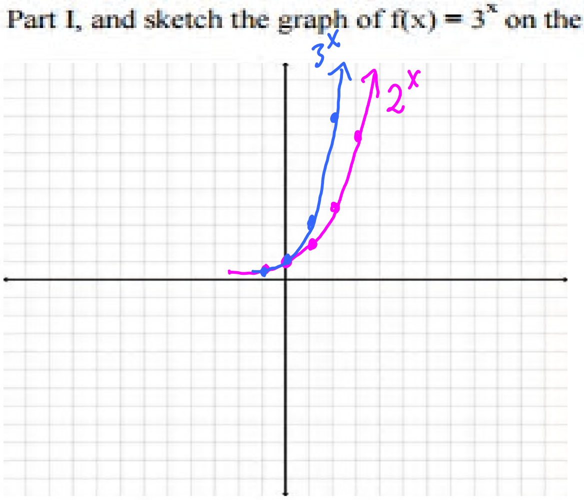
5. State the domain and range for $f(x) = 2^x$

Domain: $(-\infty, \infty)$

Range: $(0, \infty)$

Part II:

Using a graphing calculator, graph the function $f(x) = 3^x$ along with the graph of $f(x) = 2^x$ from Part I, and sketch the graph of $f(x) = 3^x$ on the grid provided below.



1. Is the graph an increasing or decreasing function? Explain your answer.

Increasing from left to right. I know this by looking at the table of values. The y-values increase exponentially

2. As the value of x gets very large, what happens to the value of 3^x?

The values will quickly approach infinity

3. As the value of x gets very small, what happens to the value of 3^x?

The values will quickly approach 0 but never equal it.

4. How does the graph of $y = 3^x$ compare to the graph of $y = 2^x$?

The graph of 3^x has the same general shape but grows more rapidly than 2^x.

5. a. Given the general form $f(x) = a^x$ (where $a > 1$), what effect does increasing the value of "a" have upon the graph?

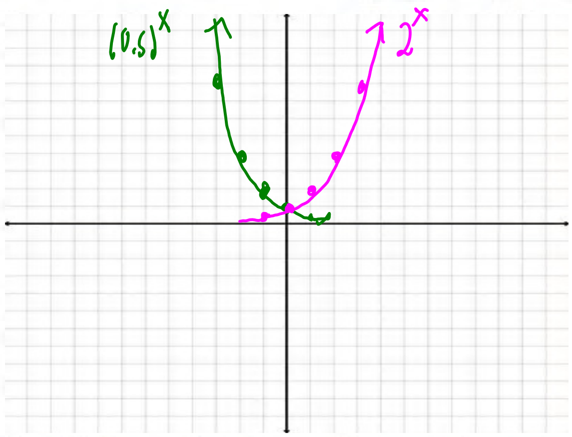
Increasing the "a" value will cause the graph to grow more rapidly.

b. What effect does decreasing the value of "a" have upon the graph?

Decreasing the "a" value will cause the graph to grow more slowly.

Part III:

Use a graphing calculator to graph the function $f(x) = (0.5)^x$ along with the graph of $f(x) = 2^x$ from Part I, and sketch the graph of $f(x) = (0.5)^x$ on the grid provided below.



1. Is the graph an increasing or decreasing function? Explain your answer.

The graph is a decreasing function from left to right. This can be observed by looking at a table of values.

2. Trace or use the table feature on your calculator to fill out the tables below.

As the value of x gets very large, what happens to the value of $(0.5)^x$?

x	$(0.5)^x$
0	1
1	$\frac{1}{2}$
5	$\frac{1}{32}$
10	$\frac{1}{1024}$
20	$\frac{1}{1,050,000}$

The values will quickly approach 0 but never equal it.

As the value of x gets very small, what happens to the value of $(0.5)^x$?

x	$(0.5)^x$
−1	2
−3	8
−5	32
−10	1024
−20	1,050,000

The values will quickly approach infinity

3. Will the value of $(0.5)^x$ ever equal 0? Explain your answer.

No. As x approaches positive infinity, the y-values become very small fractions but never become 0.

4. Are there any values of x that would make $(0.5)^x$ undefined? Explain your answer.

No, X can be any negative or positive real number with no limitations. This can be seen by the domain

5. State the domain and range for $f(x) = (0.5)^x$

Domain: $(-\infty, \infty)$

Range: $(0, \infty)$

6. How does the graph of $f(x) = (0.5)^x$ compare to the graph of $f(x) = 2^x$?

The graph is a reflection over the y-axis.

Review

1. Construct an exponential function from each geometric sequence.

a. $a_n = 0.3 \cdot 2^{(n-1)}$

$= 0.3 \cdot 2^n \cdot 2^{-1}$

$0.3 \cdot 2^n \cdot \frac{1}{2}$

$= .15 \cdot 2^n$

b. $a_n = 1.2 \cdot 3^{(n-1)}$

$= 1.2 \cdot 3^n \cdot 3^{-1}$

$= 1.2 \cdot 3^n \cdot \frac{1}{3}$

$= .4 \cdot 3^n$

c. $a_n = 6.4 \cdot 4^{(n-1)}$

$= 6.4 \cdot 4^n \cdot 4^{-1}$

$= 6.4 \cdot 4^n \cdot \frac{1}{4}$

$= 1.6 \cdot 4^n$

d. $a_n = 7 \cdot (0.4)^{(n-1)}$

$= 7 \cdot 0.4^n \cdot 0.4^{-1}$

$= 7 \cdot 0.4^n \cdot 2.5$

$= 17.5 \cdot 0.4^n$

a. Iodine-131 is used to destroy thyroid tissue in the treatment of an overactive thyroid. The half-life of iodine-131 is 8 days. If a hospital receives a shipment of 200 g of iodine-131, how much I-131 would remain after 32 days?

$200 \cdot \left(\frac{1}{2}\right)^{\frac{t}{8}}$

$200 \cdot \left(\frac{1}{2}\right)^{\frac{32}{8}}$

$200 \cdot \left(\frac{1}{2}\right)^{4}$

4 Half Lifes pass →

12.5 grams would be left

b. Technetium-99 is used for brain scans. If a laboratory receives a shipment of 200 g of this isotope, how much will remain after 24 hours. The half life of Technetium-99 is 6 hours.

$200 \cdot \left(\frac{1}{2}\right)^{\frac{t}{6}}$

$200 \cdot \left(\frac{1}{2}\right)^{\frac{24}{6}}$

$200 \cdot \left(\frac{1}{2}\right)^{4}$

4 Half Lifes pass →

12.5 grams would be left

c. Mercury -197 is used for kidney scans and has a half-life of 3 days. If the 32 grams of mercury-197 is ordered, but takes 15 days to arrive, how much would arrive in the shipment?

$32 \cdot \left(\frac{1}{2}\right)^{\frac{t}{3}}$

$32 \cdot \left(\frac{1}{2}\right)^{\frac{15}{3}}$

5 Half Lifes Would Pass

$32 \cdot \left(\frac{1}{2}\right)^{5}$

1 Gram would remain

1

↳ What a ripoff!!