Name:_____Per:_____Date:_____

Exponents and Logs- Summative Assessment

1) Here is a sequence:

a_1	a_2	a_3	a_4	a_5	a_6
8,	16,	32,	64,		

a) Find the values of a_5 and a_6 .

b) Explain the sequence verbally.

_____

c) Write in symbols a rule for your sequence either explicitly or recursively.

_____

d) State whether your rule above is either recursive or explicit.

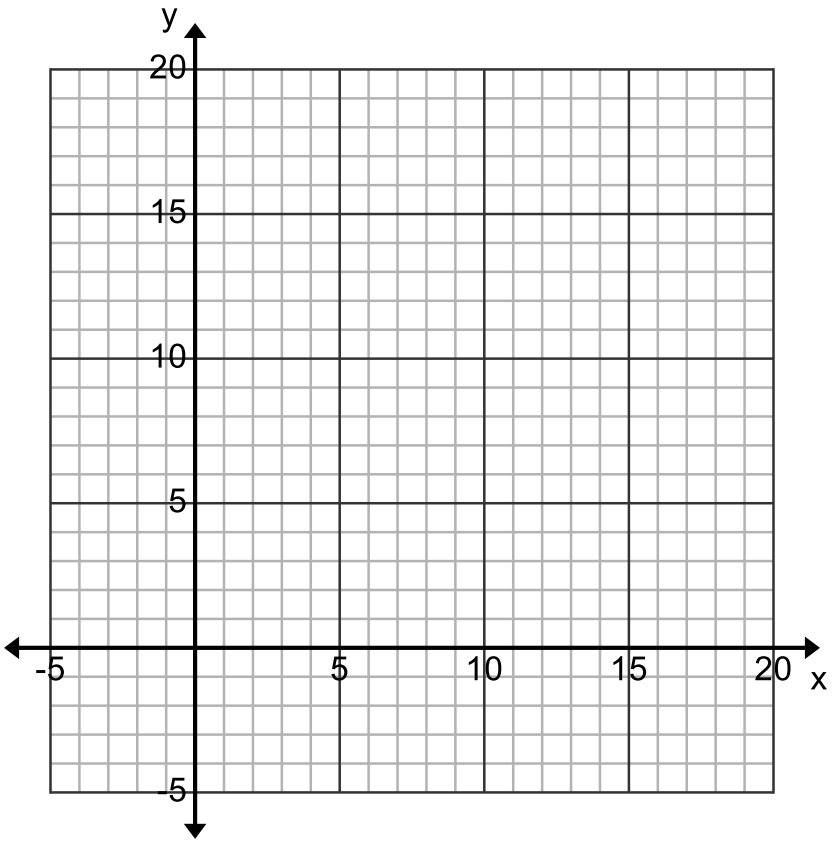
_____

2) a) Make a graph of the function $f(x) = 2^x$, clearly listing at least four important points in a table and graphing those points.

b) Find $f^{-1}(x)$, again make a table and graph with at least four points.

$f(x) = 2^x$

$f^{-1}(x) =$ _____



3. Rewrite each log equation as an exponential equation, and each exponential equation as a log equation.

a. $\log_5 125 = 3$

c. $4^{-3} = \frac{1}{64}$

b. $\mathrm{W} = \log_U L$

d. $21^x = R$

4. Evaluate or simplify each log expression.

a. $\log_8 1$

b. $\log_2 \left(\frac{1}{64}\right)$

c. $\log_3 9$

d. $3\log_7 \left(\frac{1}{49}\right)^2$

e. $\frac{log_5 25^x}{2x}$

f. $\log_2(\log_2 16)$

5) Solve each of the following equations.

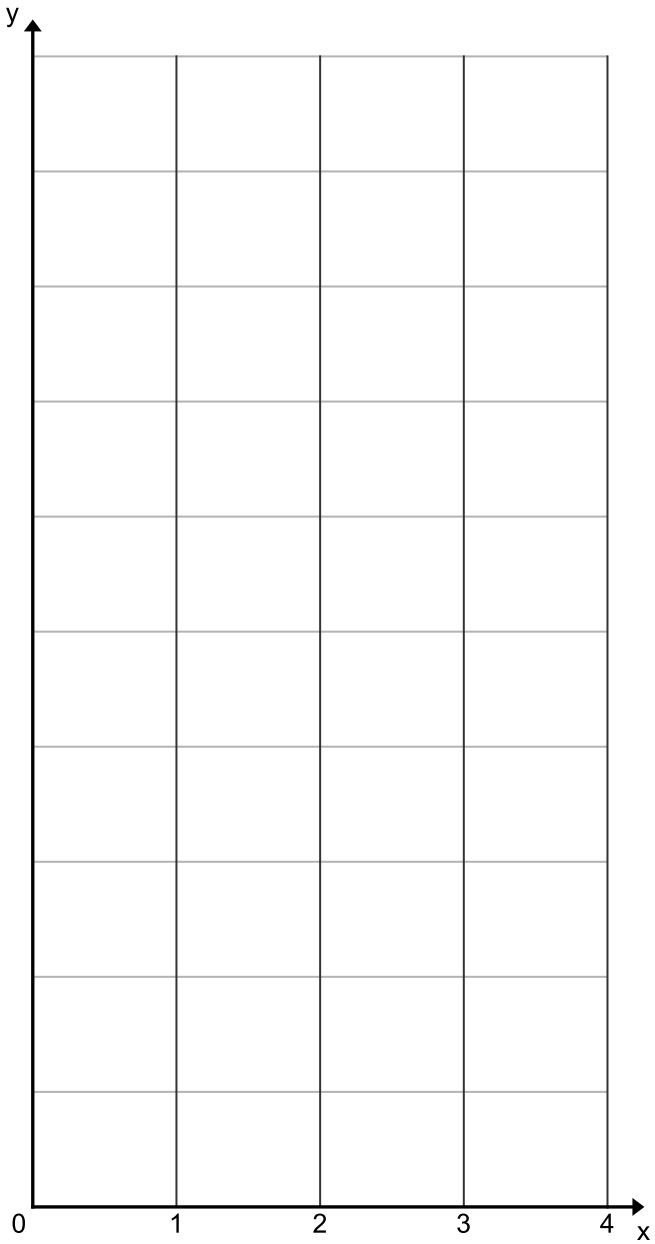
a) $$72 = 4(5)^x + 12$$

b) $$3 - \frac{7}{x} = \frac{1}{2x}$$

c) $$7 = \sqrt{3x + 4}$$

6) For the table below, identify both a linear function f(x) and an exponential function g(x) that fits the two given values. Complete the table and graph for each function.

	0	1	2	3	4	x
Linear f(x)			10	5		
Exponential g(x)						



a) Linear Function

f(x) = _____

Find the average rate of change of f(x) on the interval $0 \le x \le 1$.

Find the average rate of change of f(x) on the interval $2 \le x \le 3$.

b) Exponential Function

g(x) = _____

Find the average rate of change of g(x) on the interval $0 \le x \le 1$.

Find the average rate of change of g(x) on the interval $2 \le x \le 3$.

c) Compare and contrast the average rate of change of f(x) and g(x) on the intervals shown in the graph.

_____

_____

_____

Name:_____Key_____Per:_____Date:_____

Exponents and Logs- Summative Assessment- RUBRIC and KEY

1) Here is a sequence:

a_1	a_2	a_3	a_4	a_5	a_6
8,	16,	32,	64,	128,	256

a) Find the values of a_5 and a_6 .

b) Explain the sequence verbally.

The sequence begins with 8 and doubles each time. Or, each term is 2 to the term number times 4.

c) Write in symbols a rule for your sequence either explicitly or recursively.

$a_1 = 8, a_{n+1} = 2 \cdot a_n$ or $a_n = 4 \cdot 2^n$

d) State whether your rule above is either recursive or explicit.

__The first rule is recursive. The second rule is explicit._____

2) a) Make a graph of the function $f(x) = 2^x$, clearly listing at least four important points in a table and graphing those points.

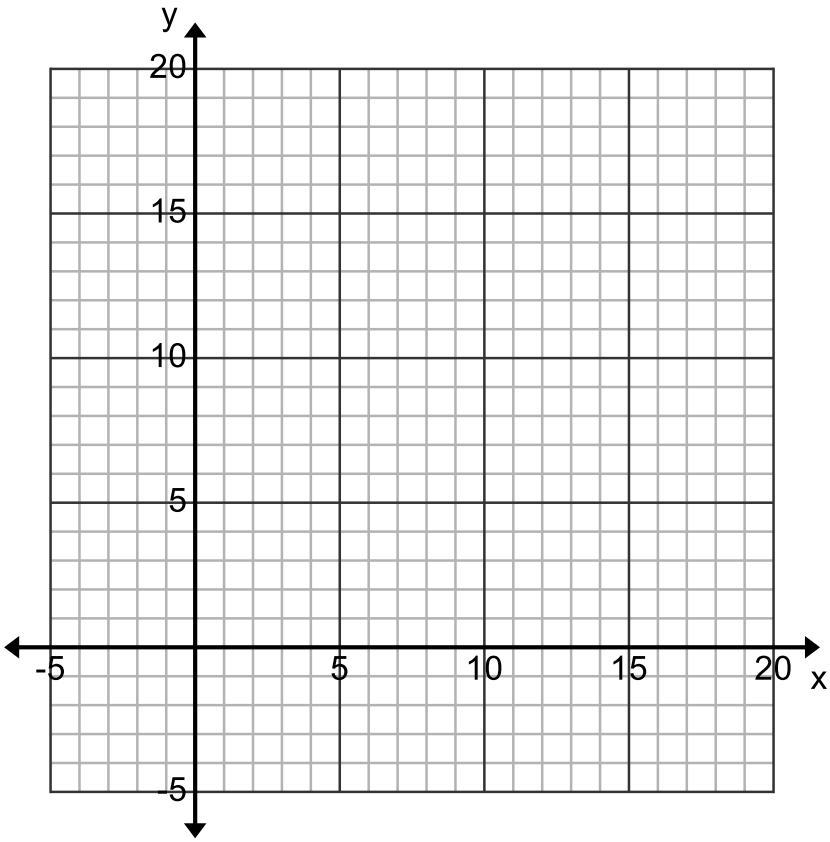
b) Find $f^{-1}(x)$, again make a table and graph with at least four points.

$f(x) = 2^x$

x	y
-1	1/2
0	1
1	2
2	4
3	8
4	16

$f^{-1}(x) =$ __$\log_2 x$__

x	y
1/2	-1
1	0
2	1
4	2
8	3
16	4



3. Rewrite each log equation as an exponential equation, and each exponential equation as a log equation.

a. $\log_5 125 = 3$

ffed

$5^3 = 125$

c. $4^{-3} = \frac{1}{64}$

$\log_4 \frac{1}{64} = -3$

b. $W = \log_U L$

$U^W = L$

d. $21^x = R$

$\log_{21} R = x$

4. Evaluate or simplify each log expression.

a. $\log_8 1$

0

b. $\log_2 \left(\frac{1}{64}\right)$

-6

c. $\log_3 9$

2

d. $3\log_7 \left(\frac{1}{49}\right)^2$

-12

e. $\frac{log_5 25^x}{2x}$

1

f. $\log_2(\log_2 16)$

2

5) Solve each of the following equations.

a)

$$72 = 4(5)^x + 12$$

$$60 = 4(5)^x$$
$$15 = (5)^x$$
$$\log_5 15 = x$$
$$x \approx 1.683$$

b)

$$3 - \frac{7}{x} = \frac{1}{2x}$$

$$6x - 14 = 1$$
$$6x = 15$$
$$x = \frac{15}{6} = 2.5$$

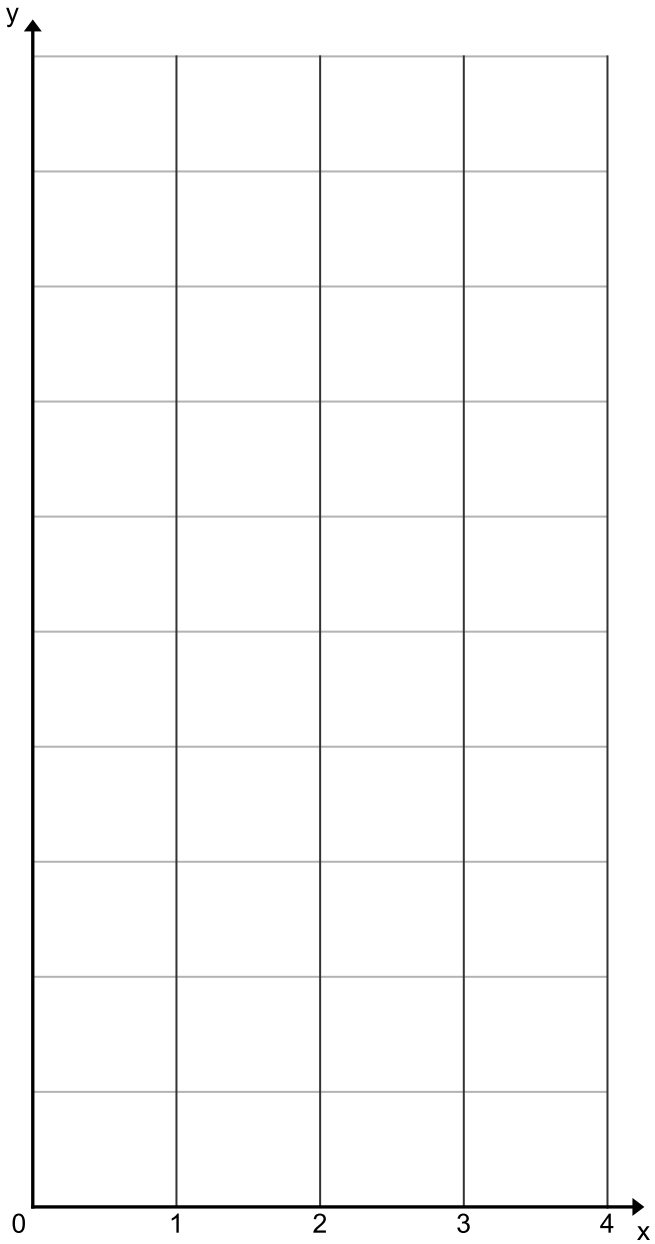
c)

$$7 = \sqrt{3x + 4}$$

$$49 = 3x + 4$$
$$45 = 3x$$
$$15 = x$$

6) For the table below, identify both a linear function f(x) and an exponential function g(x) that fits the two given values. Complete the table and graph for each function.

	0	1	2	3	4	x
Linear f(x)	20	15	10	5	0	-5
Exponential g(x)	40	20			2.5	1.25



a) Linear Function

f(x) = $-5x + 20$

Find the average rate of change of f(x) on the interval $0 \le x \le 1$.

-5

Find the average rate of change of f(x) on the interval $2 \le x \le 3$.

-5

b) Exponential Function

g(x) = _____

Find the average rate of change of g(x) on the interval $0 \le x \le 1$.

-20

Find the average rate of change of g(x) on the interval $2 \le x \le 3$.

-5

c) Compare and contrast the average rate of change of f(x) and g(x) on the intervals shown in the graph.

The linear function is decreasing at a constant rate, -5, but the exponential function starts out decreasing very fast, -20, but later is decreasing slowly. On the interval $2 \le x \le 3$ the two functions have the same average rate of change because they share the same function values at x=2 and x=3.

Scoring Rubric

1) **5 points**
    a. **Two points, one for each of the missing values.**
    b. **One point.**
    c. **One point for a correct rule.**
    d. **One point for correctly identifying their own rule.**
2) **10 points**
    a. **Four points, one each for the four points listed in the table and graphed.**
    b. **Four points, one each for the four points listed in the table and graphed. Two points for the correct equation.**
3) **4 points**
    a. **One point each for the correct answers.**
4) **6 points**
    a. **One point each for the correct answers.**
5) **9 points**
    a. **Three points each for correct solutions to the equations. Give one or two points for one or more correct steps toward a solution with a mistake along the way.**
6) **16 points, Eight points for the missing values in the table**
    a. **Three points, one point for the correct function, one point each for the average rates of change.**
    b. **Three points, one point for the correct function, one point each for the average rates of change.**
    c. **Two points, one for mentioning that they have the same average rate of change on the interval $2 \le x \le 3$, one for some reference to the idea that the average rate of change of g(x) is changing (decreasing) while the average rate of change of f(x) is constant.**