Name: _____ Date:_____ Period: _____

Unit 2-A Review – Exponential and Logarithmic Functions

Reviews do NOT cover all material from the lessons but will hopefully remind you of key points. To be prepared, you must study all packets for lessons 2.1 – 2.8.

Find an equation that gives the nth term of each sequence. Instead of the initial value use the kth term of the sequence in your equation. k is given for each problem.

1. $\{116, 136, 156, 176, ...\}$ $k = 2$

2. $\left\{2, \frac{2}{3}, \frac{2}{9}, \frac{2}{27}, ...\right\}$ $k = 1$

3. For the sequence $\{8, 5, 2, -1, ...\}$, what is the 315th term?

A function has the following coordinate points. Could the function represent a linear function, exponential function, or neither?

4. $(3, 6), (4, 11), (5, 16)$

5. $(-10, 3), (-9, 6), (-8, 12)$

6. The following function is either linear or exponential. Which is it? Justify your answer.

x	6	11	16
$f(x)$	10	13	16

Is each function linear or exponential. Identify the constant (slope or ratio) that causes the output values to change?

7. $y = -\left(\frac{3}{5}\right)^x$

8. $y - 7 = 6(x - 4)$

9. It is known that y is an exponential function and that it passes through the points $(3, 6)$ and $(9, 42)$. Write an equation for this function.

10. The value $4 \cdot 4 \cdot 4 \cdot 6$ is an output value of an exponential function of the form $f(x) = a \cdot b^x$, where a and b are constants. Write the function along with the input value that represents the output value.

$f(x) =$

where $x =$

11. Identify if the exponential function is growth or decay and justify your response. $f(x) = 1.4(0.07)^x$

12. Is the exponential function $f(x) = 8(1.7)^x$ increasing or decreasing?

13. Is the exponential function $f(x) = -(6)^x$ concave up or concave down?

14. Find $\lim\limits_{x \to -\infty} f(x)$ for the function $f(x) = 4(0.3)^x$

Let $f(x)$ be a function on which a transformation occurs. Let $g(x)$ be a transformation of f. For each problem, name the transformation(s) of f.

15. $f(x) = 9^x$ and $g(x) = f(x) \cdot 9$

16. $f(x) = 2^x$ and $g(x) = \frac{f(x)}{16}$.

17. $f(x) = 7^x$ and $g(x) = \left(f(x)\right)^{-3}$

18. $f(x) = 7^x$ and $g(x) = -\frac{f(x)}{49}$

Evaluate the function at the given input values.

19. Let $h(x) = 6 \cdot 4^{x/3}$. Find $h(2)$

20. Let $h(x) = 9 \cdot 2^{x/5}$. Find $h(-1)$

21. Below is a table of values for an exponential function in the form $f(x) = a(b)^x + k$. Write the equation for this exponential function.

x	0	1	2	3	4
$f(x)$	3	6	18	66	258

22. The table gives the weight of a catfish at selected weeks t during its first eight weeks of life.

| Week	1	3	6	8	9
Weight (pounds)	0.08	0.2	0.467	0.501	0.7

   a. Use an exponential regression $f(t) = ab^t$ to model these data. Round to three decimals but store the original equation in your calculator.

   b. According to the model in your calculator, how much will the catfish weigh after 5 weeks?

   c. According to the model in your calculator, how much will the catfish weigh after 7 weeks?

   d. If the model continues past 9 weeks, when will the catfish weigh 1 pound?

   e. Use your model from part a to find the error at $t = 8$.

   f. Is the value predicted an overestimate or underestimate of the actual value?

23. A student creates a model for a data set. The residual plot for their exponential regression is shown. Is the model appropriate? Why or why not?
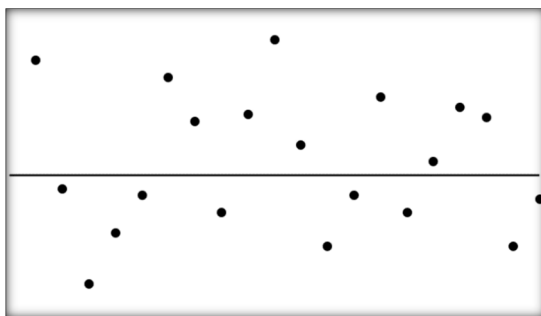
24. Several students' SAT scores are collected and compared to their GPA from their first year at college. A regression model was calculated with the SAT scores as input values and GPA from the first year at college as the output values. The residual plot for the regression model and data points is below.
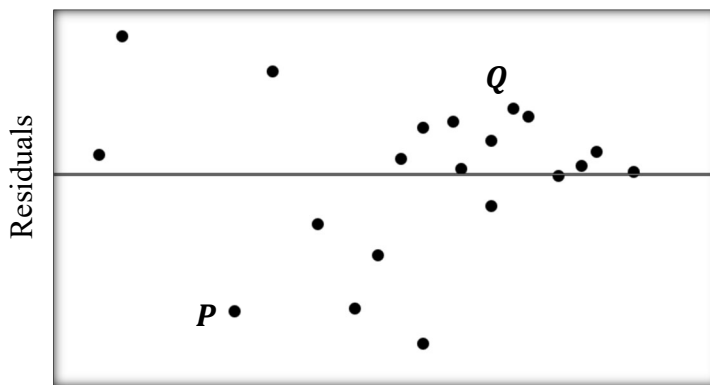
a. The given residual plot has a point labeled P at the coordinate $(1050, -0.633)$. What does point P indicate in the context?

b. The point labeled Q is at the coordinate $(1420, 0.3)$. What does point Q indicate in the context?

25. Use the tables to find the given values.

a. $g(f(4)) =$

b. $(f \circ g)(0) =$

x	$g(x)$
-5	4
-2	10
0	-2
4	8

x	$f(x)$
-5	5
-2	9
0	0
4	-2

Let $f(x) = 3x^2 - 4x$ and $g(x) = 5 - 3x$.

26. Find $f\big(g(-1)\big)$.

27. Find $(g \circ f)(1)$.

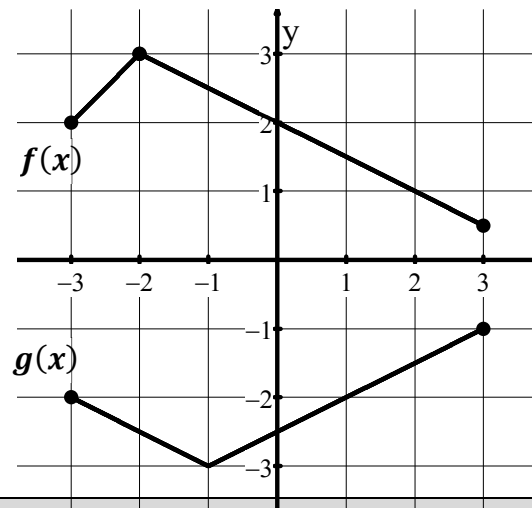28. Let $f(x) = 7x - 5$ and $h(x) = f\big(g(x)\big)$. Fill in the table.

x	$g(x)$	$h(x)$
-5	2	
0	-1	
5	3	

Use the graph to find the following values.

29. Find $f\big(g(1)\big)$.

30. Find $f\big(g(-3)\big)$.

31. Find $g\big(f(2)\big)$.

Let $f(x) = \dfrac{1}{x-6}$ and $g(x) = 1 - x$.

32. Find $f \circ g$

34. Find $g \circ f$

33. State the domain of $f \circ g$

35. State the domain of $g \circ f$

36. Express h as a composition of two simpler functions f and g where $h(x) = f(g(x))$.

$$h(x) = \sqrt{7 - x^2}$$

$f(x) =$

$g(x) =$

37. Find the inverse of $f(x) = (x - 2)^2 + 1$ for $x \leq 2$. List the domain and range of $f^{-1}(x)$.