Name: _____ANSWER KEY_____   Date: _____

QUARTERLY REVIEW DAY 1 – EXPONENTS!

1. The expression $\dfrac{5x^9}{10x^3}$ can be simplified to

$\dfrac{1}{2} \times^6$

(1) $2x^6$ (3) $2x^3$

②$\dfrac{1}{2}x^6$ (4) $\dfrac{1}{2}x^3$

_____2_____

2. Which of the following is equivalent to 2^{-3}?

(1) -6 (3) -8 $\downarrow$ $\dfrac{1}{2^3} = \dfrac{1}{8}$

negative exponent

(2) $\dfrac{1}{6}$ ④$\dfrac{1}{8}$

_____4_____

3. If $f(x)=10(2)^x$ then which of the following represents the value of $f(0)$?

(1) 1   ③10 $f(0) = 10(2)^0$

$= 10(1)$

(2) 0   (4) 20 $= 10$

_____3_____

4. Which of the following is the equation of an increasing exponential function?

(1) $y=4(0.75)^x$ (3) $y=5x-2$

②$y=7\left(\dfrac{3}{2}\right)^x$ (4) $y=4x^2$

bigger than 2

_____2_____

5. If Jordan had his hourly salary increase from \$9.25 per hour to \$10.75 per hour, which of the following is closest to the percent increase in Jordan's salary?

(1) 8%   ③16%

(2) 14%   (4) 19% $\dfrac{change}{original} \times 100$

_____3_____

$\dfrac{1.5}{9.25} = .16 \times 100$
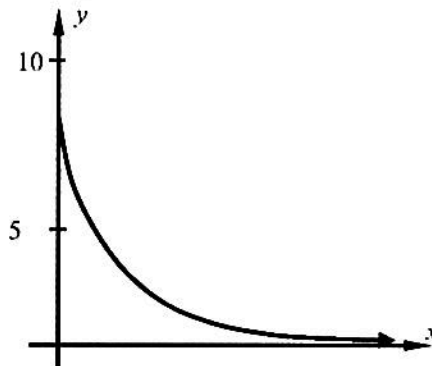
16%

$$m\left(\quad \frac{f(b)-f(a)}{b-a} \right.$$

6. Which of the following could be the equation of the exponential function shown below?

(1) $y = 3(0.9)^x$

(2) $y = 7(1.2)^x$

(3) $y = 8(0.5)^x$

(4) $y = 4(2.5)^x$

_____3_____

7. The population of Ketcham High School has been <u>decreasing</u> by 5% per year. If its population is currently 2,600 students, which of the following is closest to its population two years from now?

(1) 2,340

(3) 2,470

(2) 2,347

(4) 2,590

$2600(1-.05)^2$
$2600(.95)^2$

2346.5

_____2_____

8. A population of bacteria is increasing at a rate of 7.5% per hour. If there were originally 275 bacteria, which of the following equations models the population of bactera h-hours after the original 275 bacteria were measured?

(1) $P = \underline{275}(7.5)^h$

(3) $P = 1.075h + 275$

(2) $P = 7.5(275)^h$

(4) $P = \underline{275}(1.075)^h$

_____4_____

9. If the first two terms of a geometric sequence are 4 and 12, which of the following would be the 10th term?

(1) 76

(3) 78,732

(2) 84

(4) 236,196

$a_1 = 4$ $a_n = a_1 \cdot r^{n-1}$
$r = 12 \div 4 = 3$ $a_{10} = 4 \cdot (3)^9$
$a_{10} = 78,732$

_____3_____

10. A radioactive material has a mass given by $m(t) = 126(0.84)^t$, where the mass is in grams and the time, t, is in years. Which of the following gives the average rate of change of the mass over the interval $2 \leq t \leq 5$ years?

(1) −12.1 grams per year
(2) −36.2 grams per year
(3) 18.3 grams per year
(4) 28.9 grams per year

$\frac{\Delta y}{\Delta x} = \frac{126(.84)^5 - 126(.84)^2}{5-2}$

$\frac{f(b)-f(a)}{b-a}$

$= -12.07$

$\Downarrow$

-12.1

$\frac{y_2 - y_1}{x_2 - x_1}$

_____1_____

Free Response Questions

1. Simplify the following expression. Write it in two ways, one with the use of negative exponents and one with the use of a fraction (that doesn't have negative exponents).

$$\frac{x^5}{x^9}$$

$$x^{-4} \longrightarrow \boxed{\frac{1}{x^4}}$$

12. Simplify the following expression.

$$\frac{\left(3x^3\right)^2}{(6x)(2x)} = \frac{(3x^3)(3x^3)}{12x^2} = \frac{9x^6}{12x^2}$$

$$= \boxed{\frac{3}{4}x^4}$$

13. An object's speed can be modeled with the equation $S = 24(1.06)^t$, where S represents its speed in miles per hour and t represents the amount of time that has passed, in seconds. Give an interpretation of the parameters 24 and 1.06 from the equation.

$$24 \longrightarrow \text{original value}$$

$$1.06 \longrightarrow \text{growth factor}$$

14. An exponential function, f, is shown in the table below. Determine an equation for it in $f(x) = a(b)^x$ form.

x	0	1	2	3
$f(x)$	13	39	117	351

$$f(x) = 13(3)^x$$

↑ growth factor

common ratio

$$39 \div 13 = 3$$

15. Max deposits money into a savings account that earns 3.5% interest applied annually. If Max initially deposits $450 into the account, how much money does the account hold after 5-years if Max does not deposit or withdraw any additional money? Show how you arrived at your answer.

increasing

$$450(1.035)^5$$

$$\$534.46$$

16. A function passes through the points $(0, 8)$ and $(1, 24)$.

(a) Write the equation of a linear function that passes through these two points and write the equation of an exponential function that passes through these two points.

Linear, $y = mx + b$ Exponential, $y = a(b)^x$

(b) How much greater is the exponential function's value at $x = 5$ than the linear function's value? Show how you arrived at your answer.