Name:_____

11U6 W24 - Exponential Functions Practice Test

Multiple Choice

*Circle (CLEARLY) the choice that best answers the question, **AND** write the letter of your choice beside the question.*

1. Which of the following is equivalent to 1?
   a. $1^3 + 1^2$
   b. $5^{-4} \times 5^4$
   c. $(-1)^3$
   d. $\frac{13^4}{13^{-4}}$

2. Which of the following is equivalent to the expression $12^{-4} \times \frac{12^2}{\left(12^3\right)^{-1}}$?
   a. $\frac{1}{12^4}$
   b. $\frac{1}{12^9}$
   c. 12^9
   d. 12

3. What is $\sqrt[3]{-125^4}$ in exponent form?
   a. $(-5)^{\frac{4}{3}}$
   b. $125^{-\frac{3}{4}}$
   c. $(-125)^{\frac{3}{4}}$
   d. $(-125)^{\frac{4}{3}}$

4. Which function describes exponential growth?
   a. $f(x) = 180(0.95)^x$
   b. $f(x) = 13.7\left(\frac{1}{5}\right)^x$
   c. $f(x) = 18.9(10)^{\frac{x}{4}}$
   d. $f(x) = -24(-6)^x$

Written Solutions: Provide clear solutions to the following problems. You can recieve up to **3 Communication points** for how well you present your mathematics.

5. Evaluate. No decimals are allowed.

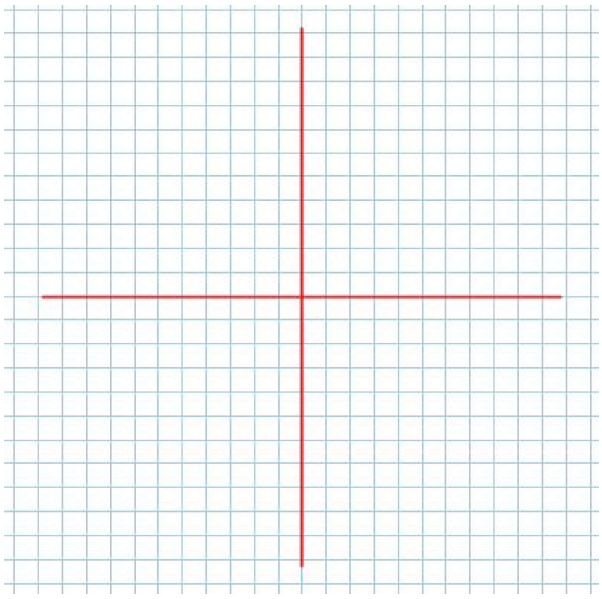
a) $\left(\frac{2^3 \times 3^2}{2^5}\right)^{-2}$

b) $\sqrt[7]{128^5}$

6. Simplify the expression. Express your answer with positive exponents.

$$\frac{\left(81a^{16}b^{-4}\right)^{\frac{1}{4}}}{\left(4ab^3\right)^3}$$

7. Sketch the function $g(x) = 2^x - 1$. Determine the y-intercept, the horizontal asymptote and whether the function describes growth or decay.



8. A delicious apple pie was left to cool in a room whose temperature was 21°C. The temperature changes according to the function $T(t) = 168\left(\frac{1}{2}\right)^{\frac{t}{30}} + 21$, where t is in minutes and $T(t)$ is temperature in Celcius. Determine the temperature of the pie after:
   i) 30 minutes, ii) 2 hours and 20 minutes

   Explain the ***meaning*** of the y-intercept and the horizontal asymptote in the context of this problem.

9. The value of a piece of art appreciates after it is purchased according to the formula

$$V(t) = 75500(1.013)^t$$

where $V(t)$ is the piece of art's value after t years. Determine:

a) The purchase price of the artwork

b) The rate of appreciation *(the rate of growth in value)*

c) The piece of art's value after 5 years.

10. A small town, with a population of 8500 in 2000 experiences a poulation growth rate of 3.5% per year every year after 2000.

a) Develop an equation which models the poulation of the town t years after 2000 (thatis, we take the year 2000 to be $t = 0$).

b) Determine the population of the town in 2016.

c) In what year will the population double?