11U4 - Exponential Functions: More Practice for the test

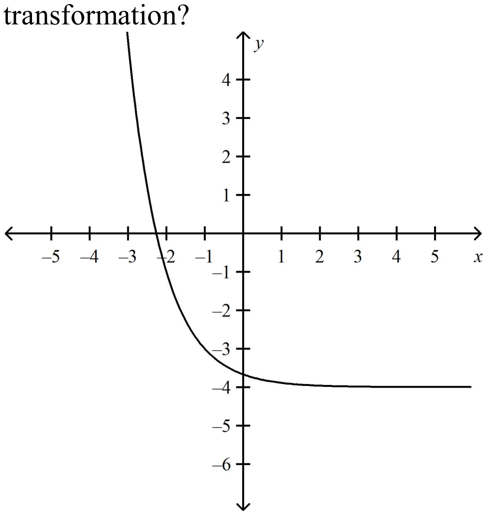
For this assignment, answer all questions as best as you are able. Solutions can be found in Edsby early this evening.

Learning Goal: We are strengthening our learning and understanding of Exponential Functions

Success Criteria:
I can: use the exponent rules, use the general forms of the growth and decay formulas ($A(t) = A_0(1+r)^t$ and $A(t) = A_0(1-r)^t$), solve problems involving half-life and doubling ($A(t) = A_0(2)^{\frac{t}{D}}$ and $A(t) = A_0\left(\frac{1}{2}\right)^{\frac{t}{h}}$).

Multiple Choice
Circle (CLEARLY) the choice that best answers the question.

1. The graph shown represents a transformation of the function $f(x) = 3^x$. What is the equation for the transformation?



a. $g(x) = -\left(3^{x-1}\right) + 4$
b. $g(x) = 3^{-x-1} - 4$
c. $g(x) = 3^x - 4$
d. $g(x) = 3^{-x-4}$

Written Solutions: Provide clear solutions to the following problems.

2. Evaluate. Express your answer in rational form.

$$\frac{4^3}{16^0} \times \left(5^2 \times 5^{-3}\right)^{-2}$$

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

$$\left(\frac{\left(a^5 b^{-2}\right)^{-3}\left(a^6 b^7\right)^{-1}}{\left(a^{-7} b^{-8}\right)^{-4}}\right)^2$$

4. State all transformations applied to "construct" the function $y = -3\left(2^{x+6}\right) - 1$. Also state the parent function and the domain and range.

5. A barista records the internal temperature of a cup of coffee that has been left to cool on a counter. The room temperature is 18°C. An equation that models this situation is $T(t) = 80(0.5)^{\frac{t}{15}} + 18$ where T is the internal temperature in degrees Celsius and t is the time in minutes.
a) Determine the temperature, to the nearest degree, of the coffee after 15 minutes, 30 min and 40 min (rounf to one decimal place).
b) How much time did it take for the coffee to reach an internal temperature of 31°C?
c) What is the lowest possible temperature the coffee can reach?

6. The population of a town has grown at an annual rate of approximately 2.2%.
Write an exponential function which will describe the town's population over time.
a) What is the town's population after 10 years have passed?
b) How long will it take for its population of 38 125 people to double at this growth rate? Explain how you found your answer.

7. In 2001, a sum of \$4000 is invested at a rate of 6.5% per year for 5 years. What is the value of the investment when it matures?

8. Draw (basic) sketches of the following. Indicate the horizontanl asymptote, two points (use $x = -1, 1$ as domain values for those two points) and the y_{int}.

a) $f(x) = 2 \cdot (3)^x - 1$

b) $g(x) = \left(\frac{1}{2}\right)^x + 3$

9. The half time for a certain type of radiation is 4.5 weeks. The amount of radioactive material after t weeks is described by $A(t) = A_0\left(\frac{1}{2}\right)^{\frac{t}{4.5}}$ where A_0 is the initial mass.
Determine the mass of radioactive matrerial after 18 weeks if there was 250g or radioactive material initially.
Q. for thought - will there ever be zero radiactive material? Explain.