Algebra 2 Review: Exponential & Logarithmic Functions

Station 1 of 4: Exponential Functions: Evaluating, Graphing, and Transformations

Name: _____ Date: _____

Answer each question. Give exact answers unless told to round.

1. Evaluate $f(x) = 4\left(\frac{1}{2}\right)^x$ at $x = 3$.

2. Evaluate $f(x) = 2 \cdot 3^{x-1} + 4$ at $x = 3$.

3. Is $y = 120(0.85)^x$ growth or decay? Give the percent rate of change per period.

4. Is $y = 0.5(1.2)^x$ growth or decay? Give the percent rate of change per period.

5. The table shows $x = 0, 1, 2, 3$ and $y = 6,\ 9,\ 13.5,\ 20.25$. Show that it is exponential and write the equation.

6. Write $y = ab^x$ (with $b > 0$) through the points $(0, 5)$ and $(2, 45)$.

7. Write $y = ab^x$ (with $b > 0$) through the points $(1, 6)$ and $(3, 54)$.

8. State the domain, range, and horizontal asymptote of $f(x) = 2^{x-3} + 5$.

9. Describe how $g(x) = -3^{x+2} + 1$ is transformed from $y = 3^x$, and state its horizontal asymptote.

10. Find the y-intercept and horizontal asymptote of $f(x) = 4\left(\frac{1}{3}\right)^x - 2$.

Algebra 2 Review: Exponential & Logarithmic Functions

Station 2 of 4: Compound Interest, the Number e, and Continuous Growth

Name: _____ Date: _____

Round money to the nearest cent and other answers as directed. Use $A = P\left(1 + \frac{r}{n}\right)^{nt}$ *and* $A = Pe^{rt}$.

1. Find the balance after 8 years if \$3,000 is invested at 4.5% interest compounded annually.

2. Find the balance after 10 years if \$5,000 is invested at 6% interest compounded monthly.

3. Find the balance after 15 years if \$1,200 is invested at 3.5% interest compounded quarterly.

4. Find the balance after 7 years if \$2,500 is invested at 5.2% interest compounded continuously.

5. Evaluate $\left(1 + \frac{1}{n}\right)^{n}$ for $n = 1000$ to four decimal places. How close is it to $e \approx 2.7183$?

6. Which earns more on \$4,000 over 5 years: 6% compounded quarterly or 5.9% compounded continuously? By how much (nearest cent)?

7. How many years until \$6,000 grows to \$10,000 at 4% interest compounded annually? Round to the nearest tenth.

8. At 7% interest compounded continuously, how many years does it take money to double? Round to the nearest tenth.

9. A bacteria culture grows continuously, $A = 500e^{kt}$, from 500 to 2,000 in 6 hours. Find k to the nearest thousandth, then the population after 10 hours (use the unrounded k; nearest whole number).

10. Carbon-14 has a half-life of 5,730 years. What percent of a sample remains after 2,000 years? Round to the nearest tenth of a percent.

Algebra 2 Review: Exponential & Logarithmic Functions

Station 3 of 4: Logarithms: Definition, Evaluating, Properties, and Change of Base

Name: _____ Date: _____

Do not use a calculator unless the problem asks you to round. Assume all variables are positive.

1. Write $2^5 = 32$ in logarithmic form.

2. Write $\log_9 81 = 2$ in exponential form.

3. Evaluate $\log_2 \dfrac{1}{32}$.

4. Evaluate $\log_8 4$.

5. Evaluate $\ln e^4 + \log 0.01$.

6. Expand $\log_3 \left(\dfrac{9x^2}{y}\right)$.

7. Expand $\log \left(100a^3\sqrt{b}\right)$.

8. Write as a single logarithm: $2\log_5 3 + \log_5 8 - \log_5 6$.

9. Use the change-of-base formula to evaluate $\log_7 90$ to the nearest thousandth.

10. A student writes $\log(a+b) = \log a + \log b$. Test the claim with $a = b = 10$, then explain the error.

Algebra 2 Review: Exponential & Logarithmic Functions

Station 4 of 4: Solving Exponential and Logarithmic Equations

Name: _____ Date: _____

Always check for extraneous solutions. Round only at the end, as directed.

1. Solve $4^{x+1} = 64$.

2. Solve $8^x = 2^{x+6}$.

3. Solve $5^{2x-1} = 125^{x-2}$.

4. Solve $e^{2x-1} = 15$. Give the exact answer, then round to the nearest hundredth.

5. Solve $7^x = 50$. Round to the nearest thousandth.

6. Solve $\log_3(2x - 1) = 2$.

7. Solve $\ln(x + 4) = \ln(3x - 2)$ and check your answer.

8. Solve $\log_2 x + \log_2(x - 2) = 3$. Reject any extraneous solution.

9. Solve $\log x + \log(x + 9) = 1$. Reject any extraneous solution.

10. An account follows $A = 1500e^{0.045t}$. After how many years does the balance reach \$4,000? Round to the nearest tenth.