Algebra 2 – Unit 9

Name: _____ Date:_____ Period: _____ **ID: 1**

9 Review – Exponents & Logarithms

Unit 9 Equations Any other equations not listed will be given in the application problem.	**Exponential Growth or Decay** $y = ab^x$	**Compounding Interest** $A = Pe^{rt}$ or $A = P\left(1 + \frac{r}{n}\right)^{nt}$

Part 1 – #1-11 No graphing calculator.

1. Under each function, write "yes" if it is an **exponential** function. If the answer is "no", write an explanation why not.

   a) $y = 3x^5$

   b) $y = -2\left(\frac{3}{4}\right)^x$

2. Tell whether the equation represents an exponential growth or exponential decay function.

   a) $y = -0.5\left(\frac{3}{2}\right)^x$

   b) $y = -3(e)^{-x}$

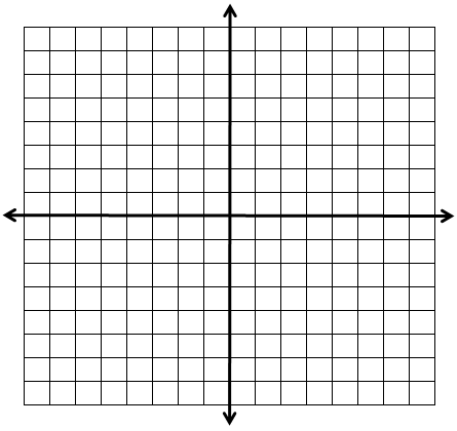
3. Rewrite $\log_{16}\frac{1}{4} = -\frac{1}{2}$ in exponential form.

4. Rewrite $3^{-4} = \frac{1}{81}$ in logarithmic form.

5. Evaluate $\log_{36} 6$

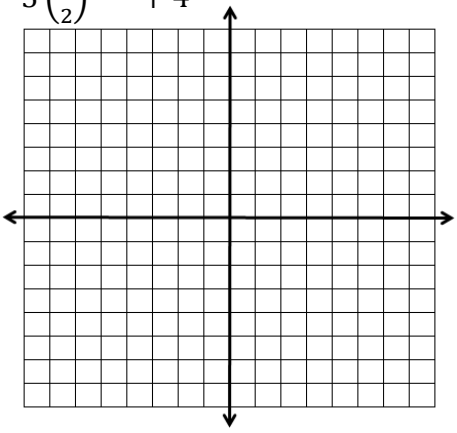
For 6-7, sketch the graph of each exponential function by doing the following: Sketch the asymptote, label at least **two distinct coordinate points** on each graph, and write the domain and range of each function.

6. $y = -4(4)^{x+2} + 8$



Domain: Range:

7. $y = -3\left(\frac{1}{2}\right)^{x+3} + 4$

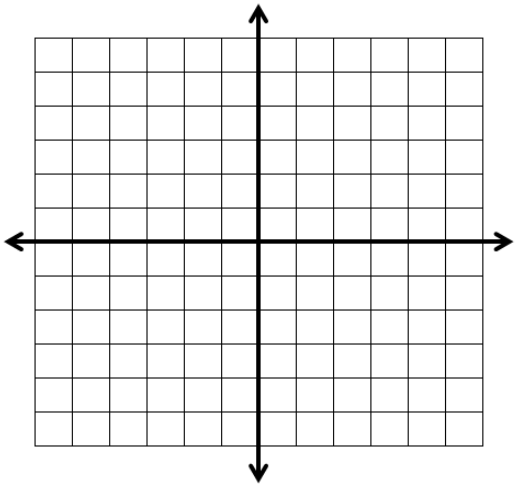


Domain: Range:

8. Sketch the graph of the given function by doing the following: Sketch the asymptote, label at least **two distinct coordinate points**, and write the domain and range.

$$f(x) = \log_3(x + 4)$$

Domain: Range:



9. Simplify $\frac{e^x}{(e^{2x})^{-3}}$. Your answer should contain only positive exponents.	10. Expand $\ln \frac{x}{\sqrt{y}}$	11. Condense to a single logarithm: $2\log a + \frac{1}{3}\log b - \log c$

Part 2 – #12-21 Graphing calculator is allowed.

12. Give the **percent *increase*** or **percent *decrease*** for each equation.

a) $y = 3(1.13)^x$ b) $y = 0.3(0.938)^x$

13. Use a calculator to approximate $\log_2 9$ to three decimal places. *Show your work by using the change-of-base formula.*

For 14-16, solve each equation. If necessary, round answers to three decimal places.

14. $5 + \log_2 a = 3$	15. $-4\log_6(9x) - 7 = -23$	16. $7 \cdot 9^{2p-4} + 3 = 45$

Application– show all work to earn full credit!

17. Dennis just inherited $10,000 from a distant relative who passed away. After spending $2,000 on new tank-tops, he puts the rest into a savings account that earns 4.5% interest compounded monthly. How much money will he have after 5 years?

18. The value of a new car purchased for $20,000 decreases by 10% per year. Write an exponential decay model for the value of the car. Use the model to estimate the value after 4 years.

19. Audrey just won the mega-millions lottery! She decided to take a lump sum payment of $250 million dollars. While thinking about what to do with the money, she wondered how much she could earn from the interest each year if it was all put into a savings account that compounded continuously. She found an account that would pay 2.25% interest. How much **interest** will she gain after one year?

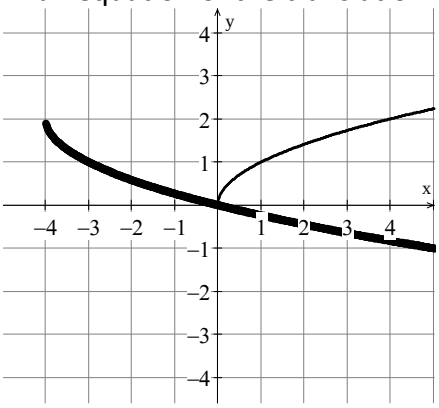
20. The magnitude of an earthquake can be modeled by $\boldsymbol{M = 0.29(\ln E) - 9.9}$ where E is the amount of energy released (in ergs). During Mr. Bean's senior year in high school, he woke up to an earthquake that released 8.18×10^{22} ergs. Mr. Bean's skis actually fell off the wall and he thought there was a monster truck outside his bedroom window…seriously…it was scary! What was the magnitude of this earthquake?

21. The decibel level of a sound is given by $\boldsymbol{D = 10 \log \frac{I}{10^{-12}}}$ where I is the intensity of the sound measured in watts per square meter.
    a) What is the decibel level of a police siren if the sound intensity is 3.162×10^{-2} watts per square meter?

    b) If an NBA arena has a decibel level (dB) of 120. What is the sound intensity? How many times greater is that sound than a police siren (from part *a*)?

Algebra Skillz:

1. Below are graphs of $f(x) = \sqrt{x}$ (thin line) and its translation (bold line). Write an equation of the translation.



Simplify the fraction by rationalizing the denominator.

2. $\frac{3}{\sqrt{2}}$

3. $\frac{21}{5\sqrt{7}}$

Solve by factoring.

4. $x^3 + 2x^2 - 48x = 0$

5. $6x^2 - 23x + 21 = 0$

SAT Prep:

1. Simplify: $(5^{x-1})(5^{2x+1})^x$

(A) $(5)^{4x}$
(B) $(5)^{3x^2}$
(C) $(5)^{2x^3}$
(D) $(5)^{2x^2+2x-1}$

2. If $f(x) = 6(2)^{3x+1} + 4$, find $f(-1)$.