

Exponential Study Guide

- Without graphing, determine whether the function $y = (5.2)^x$ represents exponential growth or exponential decay.
- Without graphing, determine whether the function $y = 7(0.28)^x$ represents exponential growth or exponential decay.

3.

Sort the following functions into groups based on whether they demonstrate exponential growth or exponential decay.

Growth	Decay

$$f(x) = \left(\frac{2}{5}\right)^x$$

$$g(x) = 8^x$$

$$h(x) = 2^{-x}$$

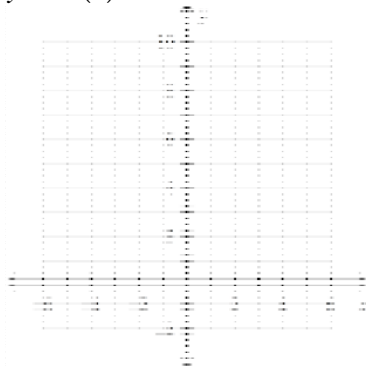
$$j(x) = \left(\frac{9}{4}\right)^x$$

$$k(x) = 0.2 \cdot 3.1^x$$

$$m(x) = e^{|x|}$$

Graph the exponential function. Be sure to LABEL the 3 key points.

4. $y = 4(2)^x$



5. Write an exponential function $y = ab^x$ for a graph that includes (1, 15) and (0, 6).

6. Monica buys a motorcycle for \$5000. Its value depreciates at a rate of 8% per year. How much will the motorcycle be worth in 7 years? (Show the equation and the solution.)

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7. Jerome invests \$1200 in a stock portfolio that gains value at a rate of 4% per *month*. How much will that portfolio be worth in two years?

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- _____ 8. For an annual rate of change of -31% , find the corresponding growth or decay factor.
a. 0.31 b. 0.69 c. 1.31 d. 1.69

Write the equation in logarithmic form.

9. $6^4 = 1,296$

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10. $125^{\frac{4}{3}} = 625$

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11. $e^x = 88$

Write the equation in exponential form.

12. $\log_{32} 8 = \frac{3}{5}$

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13. $\log_5 6k = x + 7$

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14. $\log 1000 = 3$

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- _____ 15. Solve. $5^{2x+3} = 25$
a. $-\frac{1}{2}$ b. 1 c. -1 d. 2

- _____ 16. Solve. $\log_3(2x) = 4$
a. $-\frac{2}{3}$ b. 9 c. $\frac{81}{2}$ d. 79

- _____ 17. The half-life of a certain radioactive material is 85 days. An initial amount of the material has a mass of 801 kg. Write an exponential function that models the decay of this material. Find how much radioactive material remains after 10 days. Round your answer to the nearest thousandth.

a. $y = \frac{1}{2} \left(\frac{1}{801} \right)^{\frac{1}{85}x}$; 0.228 kg

c. $y = 801 \left(\frac{1}{2} \right)^{\frac{1}{85}x}$; 738.273 kg

b. $y = 801 \left(\frac{1}{2} \right)^{85x}$; 0 kg

d. $y = 2 \left(\frac{1}{801} \right)^{\frac{1}{85}x}$; 0.911 kg

The pH of a liquid is a measure of how acidic or basic it is. The concentration of hydrogen ions in a liquid is labeled $[H^+]$. Use the formula $\text{pH} = -\log [H^+]$ to answer questions about pH.

18. Find the pH level, to the nearest tenth, of a liquid with $[H^+]$ about 6.5×10^{-3} .

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19. Solve $3 \log 2x = 4$. Round to the nearest ten-thousandth.

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20. Simplify $\ln e^3$.

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21. Evaluate $\log_2 32$.

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22. Solve $\ln(2x - 1) = 8$. Round to the nearest thousandth.

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Use natural logarithms to solve the equation. Round to the nearest thousandth.

23. $6e^{4x} - 2 = 3$

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24. The amount of money in an account with continuously compounded interest is given by the formula $A = Pe^{rt}$, where P is the principal, r is the annual interest rate, and t is the time in years. Calculate to the nearest hundredth of a year how long it takes for an amount of money to double if interest is compounded continuously at 6.2%. Round to the nearest tenth.

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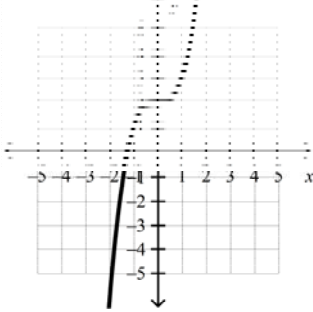
- _____ 25. If $f(x) = 3x + 7$, find $f^{-1}(x)$.

a. $f^{-1}(x) = \frac{1}{3x+7}$ b. $f^{-1}(x) = 7x+3$ c. $f^{-1}(x) = \frac{x-7}{3}$ d. $f^{-1}(x) = 3x-7$

_____ 26. Which of these functions have an inverse that is also a function? Choose all that apply.

- a. $f(x) = x^3 + 7$ c. $f(x) = \sqrt{3x - 2}$ e. $f(x) = 3 \cdot 6^x$
 b. $f(x) = x^2 - 5$ d. $f(x) = (x + 3)(x - 4)$ f. $f(x) = \frac{3}{x + 2}$

_____ 27. The graph of $f(x)$ is given below.



Which of these is the graph of $f^{-1}(x)$?

- a.
- b.
- c.

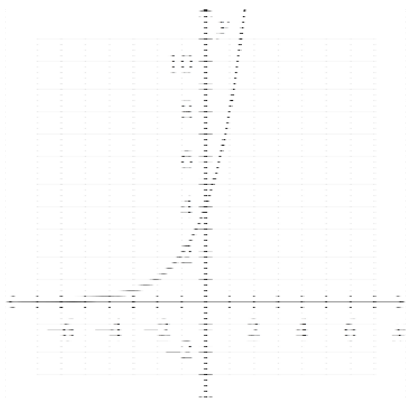
_____ 28. Which of the following is the graph of the INVERSE of $f(x) = 3^x$?

- a.
- b.
- c.
- d.

Exponential Study Guide

Answer Section

1. exponential growth
2. exponential decay
3. Growth: $g(x)$, $j(x)$, $k(x)$ and $m(x)$
Decay: $f(x)$ and $h(x)$
- 4.



5. $y = 6(2.5)^x$
6. $FV = 5000(1 - .08)^7$; \$2789.23
7. \$3075.96
8. B
9. $\log_6 1,296 = 4$
10. $\log_{125} 625 = \frac{4}{3}$
11. $\ln 88 = x$
12. $32^{\frac{3}{5}} = 8$
13. $5^{x+7} = 6k$
14. $10^3 = 1000$
15. A
16. C
17. C
18. 2.2
19. 10.7722
20. 3
21. 5
22. 1,490.979
23. -0.046
24. 11.2 yr
25. C
26. A, C, E, F
27. C
28. B