

Unit 2: Logarithms

Topic: Logarithms Review

Objective: *SWBAT solve various problems using logarithms.*

CALCULATOR ALLOWED ON BOLDED QUESTIONS ONLY

Directions: Read each problem carefully and show all work!!

1) Find the exact value for each of the following:

a) $3e^{5+\ln 4}$

b) $2\log_3 \sqrt[5]{81}$

c) $\log_6 \frac{1}{216}$

d) $-12\ln \sqrt[3]{e}$

2) Simplify each of the following:

a) $2e^{3\ln(x+1)}$

b) $7 + 2\ln e^{5x}$

c) $-2 + \ln e^{3x+3}$

d) $e^{\ln 2x-1}$

e) $e^{\ln x^3 + 4}$

f) $3\log \frac{1}{1000}$

3) Solve each of the following equations:

a) $\left(\frac{1}{81}\right)^{4x+3} + 13 = 94$

b) $\frac{1}{16} = 64^{2x+5}$

c) $12^{x-5} + 1 = 26$

d) $-2e^{7x-1} + 3 = -48$

e) $16\ln e^{x^3+2} = 34$

f) $\log_3(2x - 1) + 5 = 9$

4) The function f is given by $f(x) = \log_4(2x^2 - 8)$. Find each of the following:

a) $f(6) =$

b) $f(x) = 3$

5) Use the properties of logarithms to expand the following expression: $\ln\left(\frac{\sqrt[3]{a}}{b^4c^2}\right)$

6) Solve for x : $\log_2(2x - 1) + \log_2(x + 7) = 3$

7) Solve for x : $\log(7 - 3x) - \log(x + 5) = 1$

8) Write the following expression as a single logarithm:

$$\frac{1}{4} \log(x + 2) - (3 \log y + 5 \log z)$$

9) Solve for x : $2 \log_4(3x + 8) - 1 = 5$

10) **A bacterium grows exponentially with a constant relative growth rate. After 3 hours there are 800 bacteria and after 12 hours the count is 96,000. What is the relative growth rate?**

11) A bacteria culture starts with 6,000 bacteria. After 7 hours there are 84,000 bacteria present. How long did it take the original amount to triple?

12) A colony of insects doubles every 12 days. If the colony has 1100 insects today, how many are/were present

- a) in 20 days?
- b) 10 days ago?

- 13) During a certain epidemic, the number of people that are infected at any time increases at rate proportional to the number of people that are infected at that time. If 1,000 people are infected when the epidemic is first discovered, and 1,200 are infected 7 days later, how many people are infected 12 days after the epidemic is first discovered?
- A) 343
 - B) 1,343
 - C) 1,367
 - D) 1,400
 - E) 2,057

