ALBERT

Name _____ Date _____

# Logarithms Worksheet

Algebra 2 · Common Core HSF-LE.A.4

> For exponential models, express as a logarithm the solution to $ab^{ct} = d$ where a, c, and d are numbers and the base b is 2, 10, or e; evaluate the logarithm using technology.

## Practice

Builds the skill step by step.

1. What is $\log_2 8$?

2. What is $\log 1000$?

3. Solve $2^x = 32$.

4. What is $\log_3 81$?

5. Which is the solution of $10^x = 50$?

   A. $x = 50 \div 10$

   B. $x = \log 10 \div 50$

   C. $x = \log 50$

   D. $x = 50^{10}$

6. What is $\ln(e^3)$?

7. What is $\log_5 1$?

8. Which logarithm solves $2^x = 7$?

   A. $x = \log_7 2$

   B. $x = 7 \div 2$

   C. $x = \log 7 \cdot 2$

   D. $x = \log_2 7$

9. What is $\log_2(\frac{1}{4})$?

10. Solve $10^x = 100{,}000$.

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## On Level

Grade-level practice.

1. Solve $3 \cdot 2^x = 48$.

2. Solve $5 \cdot 10^x = 2000$. Use $\log 4 \approx 0.602$.

3. Solve $4e^{2x} = 40$ to the nearest hundredth. Use $\ln 10 \approx 2.303$.

4. A colony of 100 bacteria doubles every hour: $N = 100 \cdot 2^t$. After how many hours are there 1600?

5. 1000 dollars grows as $1000(1.05)^t$. Using $\log 2 \approx 0.3010$ and $\log 1.05 \approx 0.0212$, after how many years, to the nearest tenth, does it double?

6. Explain how to solve $6 \cdot 10^x = 42$, and give x to the nearest hundredth using $\log 7 \approx 0.845$.

7. What is $\log_2 64$?

8. Which equation means the same as $\log_b a = c$?

   A. $b^c = a$

   B. $a^c = b$

   C. $c^b = a$

   D. $b^a = c$

9. Solve $10^{2x} = 1000$.

10. Solve $e^{0.5t} = e^4$.

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## Challenge

Multi-step and word problems that stretch it.

1. Solve $2^{x+1} = 5$ to the nearest hundredth. Use $\log 5 \approx 0.699$ and $\log 2 \approx 0.301$.

2. A substance decays as $A = 80(\frac{1}{2})^{t/10}$ grams after t years. After how many years are 10 grams left?

3. A population grows as $P = 2000e^{0.03t}$. Using $\ln 2.5 \approx 0.916$, after how many years, to the nearest tenth, is it 5000?

4. Solve $10^{3x-1} = 100$.

5. Which expression solves $5^x = 20$ using common logarithms?

   A. $x = \log 4$

   B. $x = \log 20 \div \log 5$

   C. $x = \log 20 - \log 5$

   D. $x = 20 \div 5$

6. Solve $5^x = 20$ to the nearest hundredth. Use $\log 20 \approx 1.301$ and $\log 5 \approx 0.699$.

7. Money grows 7% per year: $1.07^t = 2$. Using $\log 2 \approx 0.3010$ and $\log 1.07 \approx 0.0294$, find the doubling time to the nearest tenth of a year.

8. Explain why $2^x = -4$ has no solution.

9. Solve $3e^{2t} + 1 = 13$. Use $\ln 4 \approx 1.386$.

10. Solve $2 \cdot 10^{3t} = 2000$.