LESSON MAKER PRO

Switch the Form

Connect exponents and logarithms

HIGH SCHOOL · A2.F.2.4

A2.F.2.4 "Apply the inverse relationship between exponential and logarithmic functions to convert from one form to another."

NAME _____ DATE _____

THE INVERSE RULE

For a positive base b other than 1, $b^x = a$ means $\log_b(a) = x$. Keep the base the same. A logarithm tells you the exponent needed to produce a.

WORKED EXAMPLE

Rewrite $7^3 = 343$ in logarithmic form.

1. Identify the base, 7, and the result, 343.
2. The exponent is 3.
3. Place the result inside the logarithm: $\log_7(343) = 3$.

Answer: $\log_7(343) = 3$

PRACTICE 6 problems

1 Rewrite $4^5 = 1024$ in logarithmic form.

ANSWER _____

2 Rewrite $\log_9(81) = 2$ in exponential form.

ANSWER _____

3 Rewrite $(1/2)^4 = 1/16$ in logarithmic form.

ANSWER _____

4 Rewrite $\log_5(1/625) = -4$ in exponential form.

ANSWER _____

5 Rewrite $\log_6(1/36) = x$ in exponential form. Then find x.

ANSWER _____

_____

6 Rewrite $\log_{25}(5) = x$ in exponential form. Then find x.

ANSWER _____

_____

APPLY IT Show your work

1 A video starts with 50 views. Its total views double every hour. After how many hours will it reach 800 views? Write a logarithmic equation and solve.

WORK SPACE

ANSWER _____

2 A 512 MB video file becomes one-fourth its current size each time it is compressed. How many compressions will reduce it to 2 MB? Write a logarithmic equation and solve.

WORK SPACE

ANSWER _____

CHALLENGE One step up

If $\log_4(x) = -2$, find x and $\log_x(4)$. Show each conversion to exponential form.

WORK SPACE AND ANSWER

ANSWER KEY # Switch the Form

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Rewrite $4^5 = 1024$ in logarithmic form.	**$\log_4(1024) = 5$**
2	Rewrite $\log_9(81) = 2$ in exponential form.	**$9^2 = 81$**
3	Rewrite $(1/2)^4 = 1/16$ in logarithmic form.	**$\log_{1/2}(1/16) = 4$**
4	Rewrite $\log_5(1/625) = -4$ in exponential form.	**$5^{-4} = 1/625$**
5	Rewrite $\log_6(1/36) = x$ in exponential form. Then find x.	**$6^x = 1/36$; $x = -2$**
6	Rewrite $\log_{25}(5) = x$ in exponential form. Then find x.	**$25^x = 5$; $x = 1/2$**

PART 2 · APPLY IT

1. **$\log_2(16) = x$; $x = 4$ hours** Divide 800 by 50 to get 16, so $2^x = 16$. Convert to logarithmic form and solve.
2. **$\log_{1/4}(1/256) = x$; $x = 4$ compressions** Divide 2 by 512 to get 1/256, so $(1/4)^x = 1/256$. Convert to logarithmic form and solve.

CHALLENGE

$4^{-2} = x$, so $x = 1/16$. Then $(1/16)^{-1/2} = 4$, so $\log_x(4) = -1/2$.

For problems that ask students to find x, require both the exponential equation and the value. Accept equivalent fraction notation.