LESSON MAKER PRO

Power Shift Lab

Reveal the factor for one time unit.

HIGH SCHOOL · HSA-SSE.B.3c

CCSS.Math.Content.HSA-SSE.B.3c "Use the properties of exponents to transform expressions for exponential functions. For example the expression 1.15 t can be rewritten as (1.15 1/12) 12t &asymp..."

NAME _____ DATE _____

REWRITE THE BASE

If a base can be written as b^n, then $(b^n)^{(t/n)} = b^t$. To reveal the factor for one time unit, rewrite the base as a perfect power and simplify the exponent. You can also use $a^{(kt)} = (a^k)^t$.

WORKED EXAMPLE

Rewrite $216^{(t/3)}$ in the form b^t.

1. $216 = 6^3$.
2. $216^{(t/3)} = (6^3)^{(t/3)}$.
3. $(6^3)^{(t/3)} = 6^{(3t/3)}$.
4. $6^{(3t/3)} = 6^t$.

Answer: 6^t

PRACTICE 6 problems

1 Rewrite $16^{(t/4)}$ in the form b^t.

ANSWER _____

2 Rewrite $81^{(t/2)}$ in the form b^t.

ANSWER _____

3 Rewrite $125^{(2t/3)}$ in the form b^t.

ANSWER _____

4 Rewrite $49^{(3t/2)}$ in the form b^t.

ANSWER _____

5 Rewrite $(1/8)^{(t/3)}$ in the form b^t.

ANSWER _____

6 Rewrite $121^{(t/2)}$ in the form b^t.

ANSWER _____

APPLY IT Show your work

1 A student uses a repeated zoom effect in a video project. The displayed size after t stages is modeled by $S = S0 * 16^{(t/4)}$, where S0 is the original size. Rewrite the model to show the factor applied at each stage. State the factor.

WORK SPACE

ANSWER _____

2 During a game tournament, a bonus score is modeled by $P = P0 * (1/8)^{(t/3)}$, where t is the number of rounds. Rewrite the model to show the factor applied each round. State the factor.

WORK SPACE

ANSWER _____

CHALLENGE One step up

Rewrite $16^{(3t/4)} * 8^{(t/3)}$ in the form b^t, where b is an integer. Explain your reasoning.

WORK SPACE AND ANSWER

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Rewrite $16^{(t/4)}$ in the form b^t.	**2^t**
2	Rewrite $81^{(t/2)}$ in the form b^t.	**9^t**
3	Rewrite $125^{(2t/3)}$ in the form b^t.	**25^t**
4	Rewrite $49^{(3t/2)}$ in the form b^t.	**343^t**
5	Rewrite $(1/8)^{(t/3)}$ in the form b^t.	**$(1/2)^t$**
6	Rewrite $121^{(t/2)}$ in the form b^t.	**11^t**

PART 2 · APPLY IT

1. **S = S0 * 2^t; the factor is 2 per stage.** Since $16 = 2^4$, $16^{(t/4)} = (2^4)^{(t/4)} = 2^t$. The size is multiplied by 2 at each stage.
2. **P = P0 * $(1/2)^t$; the factor is 1/2 per round.** Because $1/8 = (1/2)^3$, $(1/8)^{(t/3)} = ((1/2)^3)^{(t/3)} = (1/2)^t$. The bonus score is multiplied by 1/2 each round.

CHALLENGE

16^t. Since $16^{(3t/4)} = 8^t$ and $8^{(t/3)} = 2^t$, the product is $8^t * 2^t = 16^t$.

Accept any equivalent exponential form, such as $(2^4)^t$ for 16^t when it is mathematically equivalent. For the word problems, accept the rewritten model and the stated per-unit factor.