

Exponent Power Moves

Rewrite exponential expressions to reveal a simpler growth pattern.

HIGH SCHOOL • AII-A.SSE.3.c

AII-A.SSE.3.c "Use the properties of exponents to rewrite exponential expressions."

NAME _____

DATE _____

REWRITE THE BASE

A power raised to another power multiplies its exponents. When bases can be rewritten using the same base, add exponents when multiplying and subtract exponents when dividing.

WORKED EXAMPLE

Rewrite $248832^{x/8}$ using base 12.

1. Recognize that $248832 = 12^5$.
2. Replace the original base: $(12^5)^{x/8}$.
3. Multiply the exponents: $12^{5x/8}$.

Answer: $12^{5x/8}$

PRACTICE 6 problems

1 Rewrite $81^{x/4}$ using base 3.

ANSWER _____

2 Simplify $(6^2)^{4x}$.

ANSWER _____

3 Rewrite $16^{7x/4}$ using base 2.

ANSWER _____

4 Simplify $(9^x \cdot 9^{2x}) / 9^{x/6}$.

ANSWER _____

5 Rewrite 49^{2x} in the form c^x , where c is a constant.

ANSWER _____

6 Rewrite $27^{4x/3}$ in the form c^x , where c is a constant.

ANSWER _____

APPLY IT Show your work

- 1** A video creator models a channel's campaign multiplier after x weeks as $64^{x/6}$. Rewrite the expression so that x is the exponent. What weekly growth factor does the new form show?

WORK SPACE

ANSWER _____

- 2** In a game, a bonus multiplier after x completed levels is modeled by $16^{x/4}$. Rewrite the expression so that x is the exponent. What does the new form show about each completed level?

WORK SPACE

ANSWER _____

CHALLENGE One step up

Rewrite $(64^{x/3} \cdot 4^{x/2}) / 2^x$ in the form c^x , where c is a constant. Explain how you combined the exponents.

WORK SPACE AND ANSWER

PART 1 • PRACTICE

#	PROBLEM	ANSWER
1	Rewrite $81^{x/4}$ using base 3.	3^x
2	Simplify $(6^2)^{4x}$.	6^{8x}
3	Rewrite $16^{7x/4}$ using base 2.	2^{7x}
4	Simplify $(9^x \cdot 9^{2x}) / 9^{x/6}$.	$9^{17x/6}$
5	Rewrite 49^{2x} in the form c^x , where c is a constant.	2401^x
6	Rewrite $27^{4x/3}$ in the form c^x , where c is a constant.	81^x

PART 2 • APPLY IT

- 2^x ; the multiplier is 2 each week.** Write 64 as 2^6 . Then $(2^6)^{x/6} = 2^x$, so each additional week has a factor of 2.
- 2^x ; the bonus multiplier doubles for each completed level.** Write 16 as 2^4 . Then $(2^4)^{x/4} = 2^x$, which shows a factor of 2 per level.

CHALLENGE

4^x . Since $64^{x/3} = 2^{2x}$ and $4^{x/2} = 2^x$, the quotient is $2^{2x} \div 2^x = 2^{2x-x} = 2^x = 4^x$.

Accept any algebraically equivalent exponential form. For the challenge, students should show that they rewrote all bases as powers of 2 and used exponent addition and subtraction correctly.