LESSON MAKER PRO

Power Equation Quest

Rewrite, match bases, and solve for x.

HIGH SCHOOL · MA.912.AR.5.1

MA.912.AR.5.1 "Solve one-variable exponential equations using the properties of exponents."

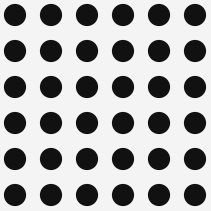
NAME _____ DATE _____

MATCH THE BASES

Rewrite both sides as powers with the same positive base, other than 1. Then set the exponents equal and solve for x. Use exponent rules such as $(a^m)^n = a^{mn}$ when needed.

WORKED EXAMPLE

Use the dot array to identify the base. Solve $(\text{base})^{x+1} = 216$.

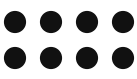


1. There are 6 dots in each row, so the equation is $6^{x+1} = 216$.
2. Rewrite 216 as 6^3.
3. Set the exponents equal: $x + 1 = 3$.
4. Solve: $x = 2$.

Answer: x = 2

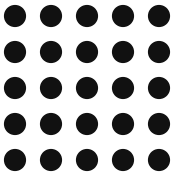
PRACTICE 6 problems

1 The dot array shows the value on the right side of the equation. Solve 2^x = (value shown).



ANSWER _____

2 The dot array shows the value on the right side of the equation. Solve 5^x = (value shown).



ANSWER _____

3 Solve $7^{x-1} = 49$.

ANSWER _____

4 Solve $4^{2x+1} = 64$.

ANSWER _____

5 Solve $27^{x} = 9^{x+2}$.

ANSWER _____

6 Solve $(1/2)^{x-1} = 1/8$.

ANSWER _____

APPLY IT Show your work

1 A student's video post has 5 views when it is shared. Each sharing round doubles the number of views. The model is $5(2^x) = 640$, where x is the number of sharing rounds. How many sharing rounds are needed?

WORK SPACE

ANSWER _____

2 A gaming club starts with 8 teams in an online bracket. Each new round has four times as many teams as the round before. The model is $8(4^x) = 2048$, where x is the number of new rounds. How many new rounds are modeled?

WORK SPACE

ANSWER _____

CHALLENGE One step up

Solve $8^{x+1} = 4^{2x-1}$. Explain why you can set the new exponents equal after rewriting both sides with base 2.

WORK SPACE AND ANSWER

ANSWER KEY # Power Equation Quest

HIGH SCHOOL · MA.912.AR.5.1

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	The dot array shows the value on the right side of the equation. Solve 2^x = (value shown).	**x = 3**
2	The dot array shows the value on the right side of the equation. Solve 5^x = (value shown).	**x = 2**
3	Solve $7^{x - 1} = 49$.	**x = 3**
4	Solve $4^{2x + 1} = 64$.	**x = 1**
5	Solve $27^x = 9^{x + 2}$.	**x = 4**
6	Solve $(1/2)^{x - 1} = 1/8$.	**x = 4**

PART 2 · APPLY IT

1. **7 sharing rounds** Divide by 5 to get $2^x = 128$. Since $128 = 2^7$, x = 7.
2. **4 new rounds** Divide by 8 to get $4^x = 256$. Since $256 = 4^4$, x = 4.

CHALLENGE

x = 5. Rewrite the equation as $2^{3x + 3} = 2^{4x - 2}$. Because the bases are the same and are not 1, set 3x + 3 = 4x - 2, so x = 5.

Accept equivalent work that correctly rewrites both sides with a common base before equating exponents. For the challenge, the explanation should state that equal powers with the same valid base have equal exponents.