LESSON MAKER PRO

Log and Power Paths

Solve equations, then check whether each answer makes sense.

HIGH SCHOOL · MA.912.AR.5.2

MA.912.AR.5.2 "Solve one-variable equations involving logarithms or exponential expressions. Interpret solutions as viable in terms of the context and identify any extraneous solutions."

NAME _____ DATE _____

SOLVE, THEN CHECK

For log_b(A) = c, rewrite the equation as A = b^c, then solve for x. For exponential equations, rewrite both sides with the same base when possible. Every logarithm argument must be greater than 0, so check each solution in the original equation.

WORKED EXAMPLE

Solve log_3(x - 5) = 2.

1. Rewrite: x - 5 = 3^2.
2. Evaluate: x - 5 = 9.
3. Add 5: x = 14.
4. Check: 14 - 5 is positive.

Answer: x = 14

PRACTICE 6 problems

1 Solve 4^(x - 1) = 64.

ANSWER _____

2 Solve log_6(x + 7) = 4.

ANSWER _____

3 Solve log_8(64x) = 4.

ANSWER _____

4 Solve log_6(x + 4) = log_6(7x - 20).

ANSWER _____

5 Solve log_4(x - 12) = log_4(6x - 72). Identify any extraneous solution.

ANSWER _____

6 Solve 6^(x - 1) = 216.

ANSWER _____

APPLY IT Show your work

1 An online student club has 10 followers. After a video goes viral, its follower count is modeled by F = 10(4^w), where w is the number of weeks after posting. When will the model predict 2,560 followers? Is the time value viable?

WORK SPACE

ANSWER _____

2 At a school concert, a sound meter reads 60 decibels. Use L = 10 log(I/I0), where I is the sound intensity and I0 is a reference intensity. How many times I0 is I? Is the ratio viable?

WORK SPACE

ANSWER _____

CHALLENGE One step up

CHALLENGE

Solve log_4(x - 1) + log_4(x - 7) = log_4(16). Identify any extraneous solution.

_____

_____

ANSWER KEY

Log and Power Paths

HIGH SCHOOL · MA.912.AR.5.2

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Solve 4^(x - 1) = 64.	**x = 4**
2	Solve log_6(x + 7) = 4.	**x = 1289**
3	Solve log_8(64x) = 4.	**x = 64**
4	Solve log_6(x + 4) = log_6(7x - 20).	**x = 4**
5	Solve log_4(x - 12) = log_4(6x - 72). Identify any extraneous solution.	**No real solution. x = 12 is extraneous.**
6	Solve 6^(x - 1) = 216.	**x = 4**

PART 2 · APPLY IT

1. **w = 4 weeks, viable.** Set 10(4^w) equal to 2,560 and divide by 10 to get 4^w = 256. Since 4^4 = 256 and a nonnegative number of weeks is meaningful, w = 4 is viable.
2. **I is 1,000,000 times I0, and the ratio is viable.** Substitute 60 for L, then divide by 10 to get log(I/I0) = 6. Therefore I/I0 = 10^6 = 1,000,000, which is positive and viable.

CHALLENGE

x = 9. x = -1 is extraneous.

Accept equivalent exact forms for the exponential and logarithmic solutions. Require students to reject x = 12 in problem 5 because both logarithm arguments are 0, and reject x = -1 in the challenge because the logarithm arguments are not positive.