LESSON MAKER PRO

Spot the Multiplier

Practice, apply, and explain exponential sequences.

HIGH SCHOOL · A2.A.3.2

A2.A.3.2 "Recognize that geometric sequences are exponential using equations, tables, graphs, and verbal descriptions. Given the formula $f(x) = a(r)^x$, find the next term and define the meaning of a and r within the context of the problem."

NAME _____ DATE _____

THE BIG IDEA

In $f(x) = a(r)^x$, a is the value when x = 0, and r is the factor multiplied at each step. In a table or graph, compare outputs at consecutive x-values to find r, then multiply by r to find the next term.

WORKED EXAMPLE

Use the table to find a, r, and f(3).

SEQUENCE VALUES

x	f(x)
0	11
1	55
2	275

1. 55 / 11 = 5, and 275 / 55 = 5, so r = 5.
2. When x = 0, f(x) = 11, so a = 11.
3. f(3) = 275 × 5 = 1,375.

Answer: a = 11, r = 5, and f(3) = 1,375.

PRACTICE 6 problems

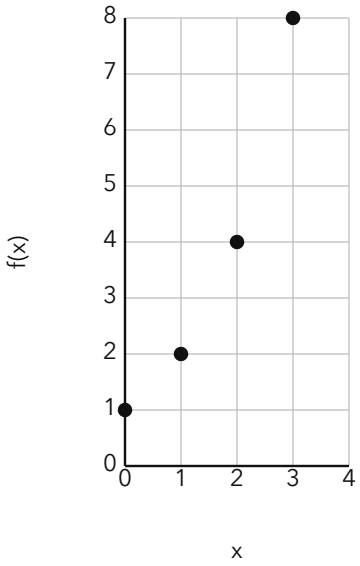
1 Use the table to find a and r. Then find f(3).

SEQUENCE VALUES

x	f(x)
0	6
1	18
2	54

ANSWER _____

2 Use the plotted points to find a and r. Then find f(4).



ANSWER _____

3 For $f(x) = 9(1/2)^x$, find r and f(3).

ANSWER _____

4 A game starts with 10 badges when x = 0. The badge count triples each round. Write a formula in the form $f(x) = a(r)^x$, then find f(2).

ANSWER _____

5 A sequence begins 48, 24, 12. Find r and the next term.

ANSWER _____

6 For a video edit, $f(x) = 3(2)^x$ gives the number of clips after x rounds. Find f(4), and explain what a and r mean here.

ANSWER _____

APPLY IT Show your work

1 A song clip has 25 new shares during hour 0. During each following hour, it gets three times as many new shares as during the hour before. Write a formula for the new shares during hour x, then find the new shares during hour 3.

WORK SPACE

ANSWER _____

2 A gaming video gets 160 new viewers on day 0. Each following day, it gets half as many new viewers as on the day before. Write a formula for the new viewers on day x, then find the new viewers on day 3.

WORK SPACE

ANSWER _____

CHALLENGE One step up

The table starts at x = 1, so the starting value is hidden. Find a, r, and f(4). Explain how you found a.

SEQUENCE VALUES

x	f(x)
1	12
2	36
3	108

WORK SPACE AND ANSWER

ANSWER KEY # Spot the Multiplier

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Use the table to find a and r. Then find f(3).	**a = 6, r = 3, and f(3) = 162.**
2	Use the plotted points to find a and r. Then find f(4).	**a = 1, r = 2, and f(4) = 16.**
3	For $f(x) = 9(1/2)^x$, find r and f(3).	**r = 1/2 and f(3) = 9/8.**
4	A game starts with 10 badges when x = 0. The badge count triples each round. Write a formula in the form $f(x) = a(r)^x$, then find f(2).	**$f(x) = 10(3)^x$; f(2) = 90 badges.**
5	A sequence begins 48, 24, 12. Find r and the next term.	**r = 1/2; the next term is 6.**
6	For a video edit, $f(x) = 3(2)^x$ gives the number of clips after x rounds. Find f(4), and explain what a and r mean here.	**f(4) = 48 clips. a = 3 is the starting number of clips, and r = 2 means the number doubles each round.**

PART 2 · APPLY IT

1. **$f(x) = 25(3)^x$; 675 new shares during hour 3.** Here a = 25 new shares during hour 0 and r = 3. Multiply 25 by 3 three times to get 675.
2. **$f(x) = 160(1/2)^x$; 20 new viewers on day 3.** Here a = 160 new viewers on day 0 and r = 1/2. Halve 160 three times to get 20.

CHALLENGE

r = 3, a = 4, and f(4) = 324. The output at x = 0 is 12 / 3 = 4.

Accept equivalent numerical forms, such as 1.125 for 9/8. In the word problems, answers must describe new shares or viewers during the stated hour or day, not a cumulative total.