LESSON MAKER PRO

Ratio Road Trip

Build, model, and solve geometric sequences.

HIGH SCHOOL · MA.912.AR.10.2

MA.912.AR.10.2 "Given a mathematical or real-world context, write and solve problems involving geometric sequences."

NAME _____ DATE _____

THE BIG IDEA

In a geometric sequence, you multiply each term after the first by the same common ratio. Use $a_n = a_1 * r^{(n-1)}$ to find any term. When the ratio is negative, the signs of the terms alternate.

WORKED EXAMPLE

A geometric sequence has $a_1 = 5$ and $r = 2$. Find a_5.

1. Use $a_n = a_1 * r^{(n-1)}$.
2. $a_5 = 5 * 2^{(5-1)}$
3. $a_5 = 5 * 2^4 = 5 * 16$

Answer: $a_5 = 80$

PRACTICE 6 problems

1 Find the next two terms: 6, 18, 54, ...

ANSWER _____

2 For a geometric sequence, $a_1 = 9$ and $r = 1/3$. Find a_3.

ANSWER _____

3 Write an explicit rule for the sequence 10, -30, 90, -270, ...

ANSWER _____

4 A geometric sequence has $a_1 = 12$ and $a_3 = 108$. The common ratio is positive. Find a_6.

ANSWER _____

5 What term number is 3159 in the sequence 13, 39, 117, ...?

ANSWER _____

6 A geometric sequence is defined by $a_1 = 14$ and $a_n = -6a_{(n-1)}$. Find a_3.

ANSWER _____

APPLY IT Show your work

1 A student's art video gets 32 reposts on its first day. Each day, the number of reposts is 3 times the number from the day before. Write an expression for the number of reposts on day 7, then find the number of reposts.

WORK SPACE

ANSWER _____

2 An online game offers 729 points at level 1. Each new level offers 1/3 as many points as the level before it. Write an expression for the points at level 7, then find the number of points.

WORK SPACE

ANSWER _____

CHALLENGE One step up

A geometric sequence has $a_3 = 54$ and $a_6 = 1{,}458$. The common ratio is positive. Find a_1 and r. Explain how you used the two given terms.

WORK SPACE AND ANSWER

ANSWER KEY # Ratio Road Trip

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Find the next two terms: 6, 18, 54, ...	**162, 486**
2	For a geometric sequence, $a_1 = 9$ and $r = 1/3$. Find a_3.	**1**
3	Write an explicit rule for the sequence 10, -30, 90, -270, ...	**$a_n = 10(-3)^{(n-1)}$**
4	A geometric sequence has $a_1 = 12$ and $a_3 = 108$. The common ratio is positive. Find a_6.	**2916**
5	What term number is 3159 in the sequence 13, 39, 117, ...?	**The sixth term, a_6**
6	A geometric sequence is defined by $a_1 = 14$ and $a_n = -6a_{(n-1)}$. Find a_3.	**504**

PART 2 · APPLY IT

1. **$32*3^6 = 23{,}328$ reposts** Day 7 is the seventh term, so multiply the first-day amount by 3 six times. Compute $32*3^6 = 23{,}328$.
2. **$729*(1/3)^6 = 1$ point** Level 7 is found by multiplying 729 by 1/3 six times. Since $3^6 = 729$, the result is 1.

CHALLENGE

$a_1 = 6$ and $r = 3$. From $a_6/a_3 = r^3$, $1{,}458/54 = 27 = 3^3$, so $r = 3$. Then $54 = a_1*3^2$, so $a_1 = 6$.

Accept equivalent explicit rules, such as $10(-3)^{(n-1)}$. For items that state the ratio is positive, accept only the positive common ratio.