LESSON MAKER PRO

Series Sum Sprint

Use geometric-series formulas for finite and infinite sums.

HIGH SCHOOL · MA.912.AR.10.4

MA.912.AR.10.4 "Recognize and apply the formula for the sum of a finite or an infinite geometric series to solve mathematical and real-world problems."

NAME _____ DATE _____

SUM IT UP

For a finite geometric series with first term a1, common ratio r, and n terms, use S_n = a1(1-r^n)/(1-r). For an infinite geometric series, use S = a1/(1-r) only when |r| < 1.

WORKED EXAMPLE

Find the sum of the first 4 terms of a geometric series with a1 = 9 and r = -1/3.

1. Identify a1 = 9, r = -1/3, and n = 4.
2. S_4 = 9[1-(-1/3)^4]/[1-(-1/3)].
3. S_4 = 9(1-1/81)/(4/3) = 20/3.

Answer: 20/3

PRACTICE 6 problems

1 Find the sum of the first 6 terms of a geometric series with a1 = 5 and r = 1/2.

ANSWER _____

2 Find the sum of the first 5 terms of a geometric series with a1 = 7 and r = -2.

ANSWER _____

3 Find the sum of the infinite geometric series with a1 = 12 and r = 1/6.

ANSWER _____

4 Find the sum of the first 2 terms of the series 150 + 30 + 6 + ...

ANSWER _____

5 An infinite geometric series has sum 30 and common ratio 1/5. Find its first term.

ANSWER _____

6 Find the sum of the first 7 terms of a geometric series with a1 = 2 and r = -1/2.

ANSWER _____

APPLY IT Show your work

1 A student earns $160 from a design job in the first month. Each following month, the student earns half as much as the month before. How much will the student earn during the first 6 months?

WORK SPACE

ANSWER _____

2 A music app gives 60 bonus points on the first day of a promotion. Each new day's bonus is 2/3 of the previous day's bonus. If the pattern continues forever, how many total bonus points will the app give?

WORK SPACE

ANSWER _____

CHALLENGE One step up

CHALLENGE

The sum of the first n terms of the geometric series 2 + 6 + 18 + ... is 728. Find n.

_____

_____

ANSWER KEY

Series Sum Sprint

HIGH SCHOOL · MA.912.AR.10.4

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Find the sum of the first 6 terms of a geometric series with a1 = 5 and r = 1/2.	**315/32**
2	Find the sum of the first 5 terms of a geometric series with a1 = 7 and r = -2.	**77**
3	Find the sum of the infinite geometric series with a1 = 12 and r = 1/6.	**72/5**
4	Find the sum of the first 2 terms of the series 150 + 30 + 6 + ...	**180**
5	An infinite geometric series has sum 30 and common ratio 1/5. Find its first term.	**24**
6	Find the sum of the first 7 terms of a geometric series with a1 = 2 and r = -1/2.	**43/32**

PART 2 · APPLY IT

1. **$315** Use a1 = 160, r = 1/2, and n = 6 in the finite geometric-series formula. The sum is 160(1-(1/2)^6)/(1-1/2) = 315.
2. **180 points** Because |2/3| < 1, use the infinite geometric-series formula. The sum is 60/(1-2/3) = 180.

CHALLENGE

n = 6

Accept equivalent fraction forms and mixed numbers where appropriate. For infinite-series items, students should use the formula only when the common ratio has absolute value less than 1.