



Name _____ Date _____ Period _____

GEOMETRIC SEQUENCE AND SERIES WORKSHEET

The **common ratio** of a sequence is the common multiplier.

The **general term of a geometric sequence** is given by $a_n = a_1 r^{n-1}$
 where a_1 is the **first term** and r is the **common ratio**.

The sum of the first n terms of a geometric series is given by $S_n = \frac{a_1(1-r^n)}{r-1}$.

Determine whether each sequence is a geometric sequence. If so, identify the common ratio, r , and give the next three terms.

1. 3, 6, 12, 24, ...

2. 2, 6, 18, 54, ...

3. 9, 3, 1, $\frac{1}{3}$, ...

4. 2, 4, 6, 8, ...

5. 1, -4, 16, -64, ...

6. 2, 3, 4.5, 6.75, ...

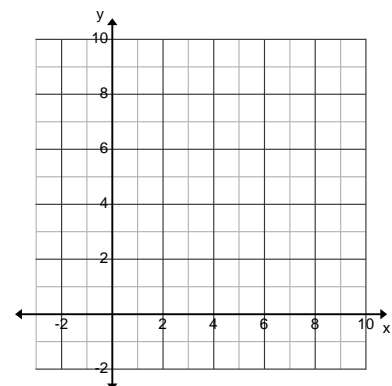
7. 10, 2, $\frac{2}{5}$, $\frac{2}{25}$, ...

8. 6, 42, 294, ...

9. 16, 20, 25, 31.25, ...

10. Graph the sequence in #6 on the graph provided.

How are the graphs of geometric sequences different from arithmetic sequences?



11. Find the 10th and the n th term of the following geometric sequence

5, 20, 80, 320, ...

12. The n th term of a geometric sequence is $4 \cdot 3^{n-2}$. Find the first and the 10th terms.

13. The sixth term of a geometric sequence is 1215 and the third term is 45. Find the first term and the common ratio.

14. A population of ants is growing at a rate of 8% a year. If there are 160 ants in the initial population, find the number of ants after 6 years.

15. Find which term in the geometric sequence 1, 3, 9, 27, ... is the first to exceed 7,000.

16. Find the sum of the following geometric series:

a) $7 + 14 + 28 + 56 + \dots + 7168$

b) $729 - 243 + 81 - 27 + \dots$ (12 terms)

17. The common ratio of a geometric sequence is 3 and the sum of the first five terms is 968. Find the value of the first term.

18. You have won a contest sponsored by a local radio station. If you are given the choice of the two payment plans listed below, which plan will pay you more? How much more?
- a) \$1 on the first day, \$2 on the second day, \$3 on the third day, etc., for two weeks.
 - b) \$0.01 on the first day, \$0.02 on the second day, \$0.04 on the third day, etc. for two weeks.
19. A culture of bacteria doubles every two hours. If there are 500 bacteria at the beginning, how many bacteria will there be after 24 hours?
20. Once a week Mrs. Baker makes sugar cookies. The first week she makes the recipe, she uses the full 2 cups of sugar called for. Each week after that, she reduces the amount of sugar by one third.
- a. How much sugar does she use for the cookies on the fifth week?
 - b. How much sugar does she use for cookies in a six month period (half a year)?
21. Derive the sum of the geometric series.