

AFM HW 4 - GEOMETRIC SEQUENCES

NAME Key F116

Determine whether each sequence is arithmetic, geometric, or neither. If it is arithmetic then state the common difference, if it is geometric then state the common ratio.

1. 5, 7, 9, 11, 13 ...

A $d=2$

2. 3, 9, 27, 81 ...

G $r=3$

3. 7, 49, 343 ...

G $r=7$

4. 8, 6.5, 5, 3.5, 2 ...

A $d=-1.5$

5. 15, 17, 20, 22, 24 ...

neither

6. -9, -2, 5, 12, 19 ...

A $d=7$

7. $\frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \frac{1}{5}, \dots$

neither

8. 5, -25, 125, -625 ...

G $r=-5$

9. 1, 16, 81, 256, 625 ...

neither

Solve each of the following geometric sequences.

10. In a geometric sequence, the first term is 2 and the common ratio is -3. State the next three terms.

2, $\underline{-6}$, $\underline{18}$, $\underline{-54}$

11. Find the common ratio and the next two terms for the geometric sequence 25, -5, 1, ...

$r=-1/5$

$\underline{-1/5}$, $\underline{1/25}$

12. Find the 12th term of the geometric sequence -2, 4, -8, ...

$a_{12} = -2(-2)^{12-1}$

$a_{12} = 4096$

13. In a geometric progression, the first term is 125 and the common ratio is $\frac{2}{5}$. Find the 8th term.

$a_8 = 125(\frac{2}{5})^{8-1}$

$a_8 = \frac{128}{625}$

14. Write the first 4 terms of the geometric sequence whose 5th term is 6 and whose common ratio is $-\frac{1}{3}$.

$a_5 = a_1(-\frac{1}{3})^{5-1}$

$6 = a_1(-\frac{1}{3})^4$

$6 = a_1(\frac{1}{81})$

$a_1 = 486$

$\underline{486}$, $\underline{-162}$, $\underline{54}$, $\underline{-18}$

15. Find the first term in a geometric progression whose common ratio is 2 and whose 6th term is 96.

$$a_6 = a_1 (2)^{6-1}$$

$$96 = a_1 (2)^5$$

$$96 = a_1 (32) \Rightarrow a_1 = 3$$

16. The 3rd term of a geometric progression is 54 and the 6th term is -2. What are the first two terms?

Step 1 manipulate eqn: $a_n = a_3 (r)^{n-3}$

$$a_n = 54(r)^{n-3}$$

Step 2 find d $a_6 = 54(r)^{6-3} \rightarrow \frac{-2}{54} = r^3$
 $-2 = 54r^3 \rightarrow r = -\frac{1}{3}$

Step 3 find a₁: $a_1 = 54(-\frac{1}{3})^{1-3}$

$$a_1 = 486$$

$$486, -162$$

17. The 3rd term of a geometric progression is 12 and the 5th term is 48. Find the first two terms.

manipulate eqn: $a_n = a_3 (r)^{n-3}$
 $a_n = 12(r)^{n-3}$

find d: $a_5 = 12(r)^{5-3} \rightarrow 48 = 12r^2$
 $4 = r^2 \rightarrow r = \pm 2$

find a₁: $a_1 = 12(2)^{1-3} \rightarrow a_1 = 3$
 $a_1 = 12(-2)^{1-3} \rightarrow a_1 = 3$

$$3, 6 \text{ or } 3, -6$$

18. Which term is $\frac{1}{64}$ in the geometric progression 64, 32, 16, ... ?

$a_n \rightarrow \frac{1}{64} = 64(\frac{1}{2})^{n-1}$

$$\frac{1}{4096} = (\frac{1}{2})^{n-1}$$

$$\log_{\frac{1}{2}} \frac{1}{4096} = n-1$$

$$12 = n-1$$

$$n = 13$$

19. Which term is $\frac{1}{625}$ in the geometric progression 3125, 625, 125, ... ?

$$\frac{1}{625} = 3125(\frac{1}{5})^{n-1}$$

$$\frac{1}{1953125} = (\frac{1}{5})^{n-1}$$

$$\log_{\frac{1}{5}} \frac{1}{1953125} = n-1$$

$$9 = n-1$$

$$n = 10$$