

C-2 Geometric Sequences

Name Key

HOMWORK #2

Is the given sequence geometric? If so, identify the common ratio.

1. 1, 2, 4, 8, ...
 $\underbrace{1 \rightarrow 2}_{\times 2}$
 $\underbrace{2 \rightarrow 4}_{\times 2}$
 $\underbrace{4 \rightarrow 8}_{\times 2}$
 $r = 2$
 Yes

2. 1, -2, 4, -8, ...
 $\underbrace{1 \rightarrow -2}_{\times -2}$
 $\underbrace{-2 \rightarrow 4}_{\times -2}$
 $\underbrace{4 \rightarrow -8}_{\times -2}$
 $r = \frac{-2}{1} = -2$
 Yes

3. 18, -6, 2, $-\frac{2}{3}$, ...
 $r = \frac{-6}{18} = -\frac{1}{3}$
 $\underbrace{18 \rightarrow -6}_{\times -\frac{1}{3}} = 6$
 $\underbrace{-6 \rightarrow 2}_{\times -\frac{1}{3}} = 2$
 $r = -\frac{1}{3}$
 Yes

4. 10, 4, 1.6, 0.64, ...
 $\underbrace{10 \rightarrow 4}_{\times 0.4}$
 $\underbrace{4 \rightarrow 1.6}_{\times 0.4}$
 $\underbrace{1.6 \rightarrow 0.64}_{\times 0.4}$
 $r = \frac{4}{10} = \frac{2}{5} = 0.4$
 Yes $r = 0.4$ or $\frac{2}{5}$

Find the common ratio of each sequence. Then find the next term.

5. 24, 12, 6, 3, ...
 $\underbrace{24 \rightarrow 12}_{\div 2}$
 $\underbrace{12 \rightarrow 6}_{\div 2}$
 $\underbrace{6 \rightarrow 3}_{\div 2}$
 $r = \frac{12}{24} = \frac{1}{2}$ or 0.5
 $\div 1.5$

6. 2, -10, 50, -250, ...
 $\underbrace{2 \rightarrow -10}_{\times -5}$
 $\underbrace{-10 \rightarrow 50}_{\times -5}$
 $\underbrace{50 \rightarrow -250}_{\times -5}$
 $r = \frac{-10}{2} = -5$
 $-250 \cdot -5 = 1,250$

Generate the first four terms.

7. $a_1 = 5, r = -3$

a_1	a_2	a_3	a_4
5	-15	45	-135

8. $a_1 = -\frac{1}{2}, r = \frac{2}{3}$

a_1	a_2	a_3	a_4
$-\frac{1}{2}$	$-\frac{1}{3}$	$\frac{2}{9}$	$-\frac{4}{27}$

 $a_2 = -\frac{1}{2} \cdot \frac{2}{3} = -\frac{2}{6} = -\frac{1}{3}$
 $a_3 = -\frac{1}{3} \cdot \frac{2}{3} = -\frac{2}{9}$
 $a_4 = -\frac{2}{9} \cdot \frac{2}{3} = -\frac{4}{27}$

Identify each sequence as arithmetic, geometric, or neither. Then find the next two terms.

9. 45, 90, 180, 360, ...
 $\underbrace{45 \rightarrow 90}_{\times 2}$
 $\underbrace{90 \rightarrow 180}_{\times 2}$
 $\underbrace{180 \rightarrow 360}_{\times 2}$
 Geometric
 720 and 1,440

10. 25, 50, 75, 100, ...
 $\underbrace{25 \rightarrow 50}_{+25}$
 $\underbrace{50 \rightarrow 75}_{+25}$
 $\underbrace{75 \rightarrow 100}_{+25}$
 Arithmetic
 125 and 150

11. 3, -3, 3, -3, ...
 $\underbrace{3 \rightarrow -3}_{\times -1}$
 $\underbrace{-3 \rightarrow 3}_{\times -1}$
 $\underbrace{3 \rightarrow -3}_{\times -1}$
 Geometric
 3 and -3

12. 30, 35, 40, 45, ...
 $\underbrace{30 \rightarrow 35}_{+5}$
 $\underbrace{35 \rightarrow 40}_{+5}$
 Arithmetic
 50 and 55

Write a recursive and an explicit formula for each geometric sequence.

13. $a_1 = 5, r = -3$

14. $a_1 = \frac{1}{2}, r = \frac{2}{3}$

Recursive

Explicit

Recursive

Explicit

$a_1 = 5$

$a_n = 5 \cdot (-3)^{n-1}$

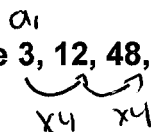
$a_1 = \frac{1}{2}$

$a_n = \frac{1}{2} \cdot \left(\frac{2}{3}\right)^{n-1}$

$a_n = a_{n-1} \cdot -3$

$a_n = a_{n-1} \cdot \frac{2}{3}$

Write an explicit formula for the geometric sequence $3, 12, 48, 192, \dots$, then find the indicated term.



$r = \frac{12}{3} = 4$

Explicit Formula

$a_n = 3 \cdot (4)^{n-1}$

15. 20th term

16. 100th term

$a_{20} = 3 \cdot (4)^{20-1}$
 $= 3 \cdot (4)^{19}$

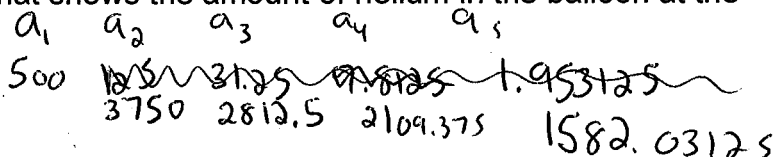
$a_{100} = 3 \cdot (4)^{100-1}$
 $\approx 1.21 \times 10^{60}$

$\approx 8.25 \times 10^{11}$

$\frac{1}{4}$ or 0.25, so $\frac{3}{4}$ remain each day

17. Suppose a balloon loses one fourth of its helium each day. The balloon starts with a volume of 5000 cm³.

a. Write the geometric sequence that shows the amount of helium in the balloon at the start of each day for five days.



b. What is the common ratio of the sequence?

$r = \frac{3}{4}$ or 0.75

c. How much helium will be left in the balloon at the start of the 5th day?

$\approx 1582 \text{ cm}^3$