

## 10-3A Geometric Sequences

- students will use and find terms of a geometric sequence
- A.SSE.4

**definition of a geometric sequence:** a sequence in which each term after the first is found by multiplying the previous term by a constant called the common ratio.

**common ratio (r):** divide any term by the previous term.

$$r = \frac{a_4}{a_3}$$

**nth term of a geometric sequence:** the  $n^{\text{th}}$  term,  $a_n$ , of a geometric sequence with first term  $a_1$  and common ratio  $r$  is given by the formula:

$$a_n = a_{n-1}r \quad \text{or} \quad a_n = a_1 r^{n-1}$$

**geometric mean(s):** the missing term(s) between two nonconsecutive terms in a geometric sequence.

$$a_1, \text{---} \text{---} \text{---} a_n$$

$$(n-1) \cdot d$$

$$\begin{array}{l} a_1 = 3 \\ a_2 = 6 \\ a_3 = 9 \end{array} \left. \begin{array}{l} \\ \\ \end{array} \right\} \times 3$$

$$a_n = a_1 + (n-1)d$$

$$a_n = 3 + (n-1)3$$

$$3 + 3n - 3$$

$$\sum_{n=1}^{\infty} 3n$$

$$n=1$$

## Examples

Find the  $n$ th term of the geometric sequence.

$$n = 9 - 6 + 1$$

$$n = 4$$

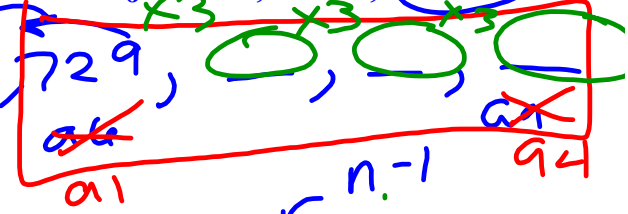
1.  $a_4 = 10, n = 5, r = \frac{1}{2}$

$$a_5 = a_4 \cdot r$$

$$a_5 = 10 \left(\frac{1}{2}\right)$$

$$a_5 = 5$$

2.  $a_6 = 729, n = 9, r = 3$



$$a_n = a_1 \cdot r^{n-1}$$

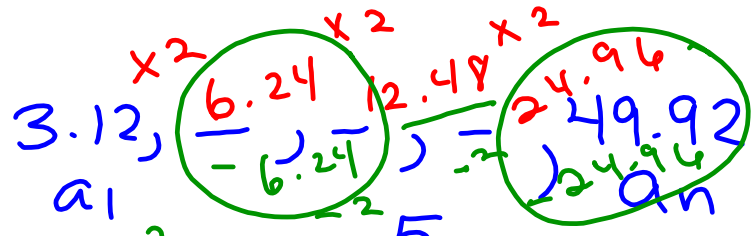
$$a_4 = 729 \cdot 3^{4-1}$$

$$a_4 = 729 \cdot 3^3$$

$$a_4 = 729 \cdot 27$$

$$a_n = 191683$$

3. Find the 3 geometric means between 3.12 and 49.92.



$$\{6.24, 12.48, 24.96\}$$

$$a_n = a_1 \cdot r^{n-1}$$

$$49.92 = \frac{3 \cdot 12 \cdot r^{5-1}}{r^3}$$

$$r = \pm 2$$

$$a_1 = 5$$
$$r = 2$$

$$q = 3^{n-1}$$

$$3^2 = 3^{n-1}$$

$$a_n = a_1 \cdot r^{n-1}$$

$$a_n = 5 \cdot 2^{n-1}$$

$$\log 5 = \log 3^{n-1}$$

$$3 + 5x + 4 = 0$$

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**18-22 all**  
**24-40 evens**

