13.4 (Page 608) Geometric Sequences

A GEOMETRIC SEQUENCE is one in which each term after the first is found by multiplying the previous term by a constant called the common ratio (r).

The common ratio is found by dividing any term by the previous term.

13.4 (Page 608) Geometric Sequences

Find the common ratio and the next two terms for each geometric sequence:

4, 16, 64, 256, 1024, ...

×4 ×4 ×4 ×4

$r = \frac{16}{4} = 4$

256 × 4 = 1024

13.4 (Page 608) Geometric Sequences

Find the common ratio and the next two terms for each geometric sequence:

$\div 3$

$81, 27, 9, \underline{\quad 3 \quad}, \underline{\quad 1 \quad}, \ldots$

$\times \frac{1}{3}$

$r = \frac{27}{81} = \frac{3}{9} = \frac{1}{3}$

13.4 (Page 608) Geometric Sequences

Formula for the n^{th} Term of a Geometric Sequence:

The n^{th} term, a_n, of a geometric sequence with first term, a_1, and common ratio, r, is given by either formula.

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

13.4 (Page 608) Geometric Sequences

Write the first six terms of the described sequence:

$a_1 = 4$ and $r = 3$

4, 12, 36, 108, 324, 972, ...

×3 ×3 ×3 ×3 ×3

13.4 (Page 608) Geometric Sequences

Write the first six terms of the described sequence:

$a_1 = 125$ and $r = \frac{-2}{5}$

$a_1 = 125$

$a_2 = 125 \cdot \frac{-2}{5} = 25 \cdot -2 = -50$

$a_3 = -50 \cdot \frac{-2}{5} = -10 \cdot -2 = 20$

$a_4 = 20 \cdot \frac{-2}{5} = 4 \cdot -2 = -8$

$a_5 = -8 \cdot \frac{-2}{5} = 16/5$

$a_6 = \frac{16}{5} \cdot \frac{-2}{5} = -32/25$

13.4 (Page 608) Geometric Sequences

Find the n^{th} term of the geometric sequence described:

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

$a_4 = 10$

$a_5 = 10 \cdot \frac{1}{2} = \boxed{5}$

13.4 (Page 608) Geometric Sequences

Find the n^{th} term of the geometric sequence described:

$a_6 = 5$ $n = 9$ $r = 3$

$a_6 = 5$

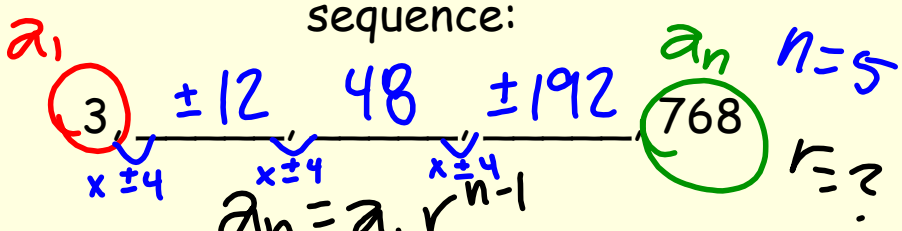
$a_7 = 5 \cdot 3 = 15$

$a_8 = 15 \cdot 3 = 45$

$a_9 = 45 \cdot 3 = \boxed{135}$

13.4 (Page 608) Geometric Sequences

Find the missing geometric means for the sequence:



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

$768 = 3r^{5-1}$

$768 = 3r^4$

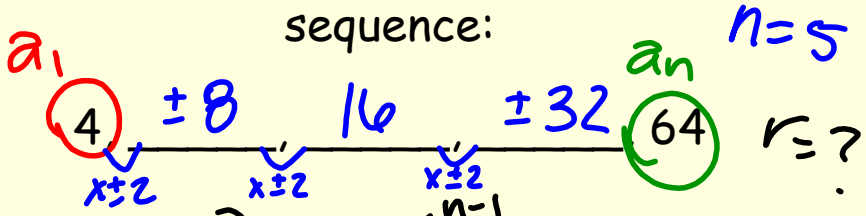
$\frac{768}{3} = \frac{3r^4}{3}$

$\sqrt[4]{256} = \sqrt[4]{r^4}$

$r = \pm 4$

13.4 (Page 608) Geometric Sequences

Find the missing geometric means for the sequence:



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

$64 = 4r^{5-1}$

$64 = 4r^4$

$\frac{64}{4} = \frac{4r^4}{4}$

$\sqrt[4]{16} = \sqrt[4]{r^4}$

$r = \pm 2$