Sec 11-3: Geometric Sequence

Created by multiplying each term by the same number to get the next term..

The ratio between consecutive terms is constant.

r = Common Ratio

$$r = \frac{\text{Any term}}{\text{Previous term}} = \frac{a_n}{a_{n-1}}$$

Given the following Geometric Sequence

9, x , 1296, ...   Find the value of x

One method:

$9 \cdot r \cdot r = 1296$

$9r^2 = 1296$

$r^2 = 144$

$r = \pm 12$

Now multiply 9 by both 12 and -12

another method

$\frac{x}{9} = \frac{1296}{x}$

$\sqrt{x^2} = \sqrt{11664}$

$x = \pm 108$

x = 108 or -108

+x is called the Geometric Mean of 9 and 1296.

The Geometric Mean of any two number, a & b, is always found by...

a, x, b

$\frac{x}{a} = \frac{b}{x}$

$\sqrt{x^2} = \sqrt{ab}$

$x = \sqrt{ab}$

The geometric mean of two #'s is always the square root of their product.

Find the missing terms of this Geometric Sequence:

12, ____, ____, ____ , 3072

One method

$\sqrt{12 \cdot 192}$ $\sqrt{192 \cdot 3072}$

12, ±48, 192, ±768, 3072

$\sqrt{12 \cdot 3072}$

another method

12, ±48, 192, ±768, 3072

$12 \cdot r \cdot r \cdot r \cdot r = 3072$

$\frac{12r^4}{12} = \frac{3072}{12}$

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

$r = \pm 4$

find the missing terms by multiplying by ±4

192 can't be negative because if r is neg the signs will alternate and if the 1st term is pos the 2nd will be neg & the 3rd will go back to pos.

Find the missing terms of this Geometric Sequence:

$$6, \overset{\times 3}{\underline{18}}, \overset{\times 3}{\underline{54}}, \overset{\times 3}{\underline{162}}, \overset{\times 3}{\underline{486}}, \overset{\times 3}{1458}$$

$6 \cdot r$

$$\frac{6r^5}{6} = \frac{1458}{6}$$

$$\sqrt[5]{r^5} = \sqrt[5]{243}$$

$$r = 3$$

r can't be -3 because that would mean that 1458 would have to be negative. Also, there is only <u>one</u> odd root of a number.