

Lesson 1.3: Geometric Sequences



Practice Solutions – V

1. Determine if the following sequences are geometric or not. Justify your decisions. For the sequences that are geometric, determine the general term and the next two terms in the sequence.

a. 3, 6, 9, 12, ...

$$r = \frac{t_n}{t_{n-1}}$$

$$r = \frac{6}{3} = 2$$

$$r = \frac{9}{6} = \frac{3}{2}$$

r is not constant; therefore, the sequence is not geometric.

b. 12 288, 3 072, 768, 192, ...

$$r = \frac{t_n}{t_{n-1}}$$

$$r = \frac{3\,072}{12\,288} = \frac{1}{4}$$

$$r = \frac{768}{3\,072} = \frac{1}{4}$$

$$r = \frac{192}{768} = \frac{1}{4}$$

Because $r = \frac{1}{4}$, this is a geometric sequence.

$$t_n = t_1 r^{n-1}$$

$$t_n = 12\,288 \left(\frac{1}{4}\right)^{n-1}$$

The next two terms are:

$$t_5 = 192 \left(\frac{1}{4}\right) = 48$$

$$t_6 = 48 \left(\frac{1}{4}\right) = 12$$

c. $1, -3, 9, -27, \dots$

$$r = \frac{t_n}{t_{n-1}}$$

$$r = \frac{-3}{1} = -3$$

$$r = \frac{9}{-3} = -3$$

$$r = \frac{-27}{9} = -3$$

Because $r = -3$, this is a geometric sequence.

$$t_n = t_1 r^{n-1}$$

$$t_n = 1(-3)^{n-1}$$

$$t_n = (-3)^{n-1}$$

The next two terms are:

$$t_5 = -27(-3) = 81$$

$$t_6 = 81(-3) = -243$$

2. Given that the following sequences are geometric, determine the missing terms.

a. $_, _, _, -567, 1701$

First, determine the value of r .

$$r = \frac{t_n}{t_{n-1}}$$

$$r = \frac{1701}{-567} = -3$$

Then, work backwards by dividing by -3 .

$$t_3 = -567 \div -3 = 189$$

$$t_2 = 189 \div -3 = -63$$

$$t_1 = -63 \div -3 = 21$$

The sequence is $21, -63, 189, -567, 1701$.

b. __, __, 16.25, __, 65

Either set up two equations to solve for r , or in this case because it is a relatively short sequence, note that the two terms given are two steps from each other; therefore,

$$r^2 = \frac{65}{16.25}$$

$$r = \pm \sqrt{\frac{65}{16.25}}$$

$$r = \pm 2$$

Note that there are two possible answers to this question because $(-2)^2 = (2)^2$.

Then, fill in the blanks using multiplication and division. There will be two possible sequences, one where $r = -2$ and one where $r = 2$.

$$r = 2:$$

$$t_2 = 16.25 \div 2 = 8.125$$

$$t_1 = 8.125 \div 2 = 4.0625$$

$$t_4 = 16.25(2) = 32.5$$

$$r = -2:$$

$$t_2 = 16.25 \div (-2) = -8.125$$

$$t_1 = -8.125 \div (-2) = 4.0625$$

$$t_4 = 16.25(-2) = -32.5$$

The two possible sequences are 4.0625, 8.125, 16.25, 32.5, 65 and 4.0625, -8.125, 16.25, -32.5, 65.

Please return to *Unit 1: Sequences and Series Lesson 1.3* to continue your exploration.