Lesson 1.10 Notes

Each of the tables below represents a geometric sequence. Find the missing terms in the sequence.

To find missing terms, we need to undo operations. Let's think about the explicit formula for a geometric sequence. $This\ term = common\ ratio^{number\ of\ terms} \cdot f(0)$. If we don't have $f(0)$, we can think about using $f(1)$ as long as we use the difference between 1 and the term number we have. So, it might look something like:

$$Last\ term = common\ ratio^{difference\ between\ number\ of\ terms} \cdot first\ term$$

x	1	2	3
y	3		12

$12 = r^2 \cdot 3$ $\quad 4 = r^2$ $\quad \sqrt[2]{4} = r$ $\quad 2 = r$ We are multiplying by 2.

The missing term is 6.

Is the missing term that you identified the only answer? Why or why not?

The missing term of 6 is not the only answer. The missing term could also be -6 and we could have a common ratio of -2.

x	1	2	3	4
y	7			875

$875 = r^3 \cdot 7$ $\quad 125 = r^3$ $\quad \sqrt[3]{125} = r$ $\quad 5 = r$ We are multiplying by 5.

The missing terms are 35 and 175.

Is the missing term that you identified the only answer? Why or why not?

The terms are the only possible answer. We cannot multiply by a -5 because that would cause the 875 to be negative.

x	1	2	3	4	5
y	6				96

$96 = r^4 \cdot 6$ $\quad 16 = r^4$ $\quad \sqrt[4]{16} = r$ $\quad 2 = r$ We are multiplying by 2.

The missing terms are 12, 24, and 48.

Is the missing term that you identified the only answer? Why or why not?

The missing terms are not the only answer. The missing terms could also be -12, 24, and -48 and we could have a common ratio of -2.

x	1	2	3	4	5	6
y	4					972

$972 = r^5 \cdot 4$ $\quad 243 = r^5$ $\quad \sqrt[5]{243} = r$ $\quad 3 = r$ We are multiplying by 3.

The missing terms are 12, 36, 108, and 324.

Is the missing term that you identified the only answer? Why or why not?

The terms are the only possible answer. We cannot multiply by a -3 because that would cause the 972 to be negative.

Describe the method used to find the missing terms in a geometric sequence.

$$Last\ term = common\ ratio^{difference\ between\ number\ of\ terms} \cdot first\ term$$

How can you tell if there will be more than one solution for the geometric means?

If the number of missing terms is an odd number, there is more than one possible solution. If the number of missing terms is an even number, there is only one possible solution.

Other important notes:

For the set of sequences, find the first five terms. Compare the arithmetic sequences and geometric sequences. Which grows faster? When?

1) Arithmetic Sequence: $f(1) = 3$, common difference, $d = 5$

Geometric Sequence: $g(1) = 2$, common ratio, $r = 4$

Arithmetic:	Geometric:
$f(1) = 3$	$g(1) = 2$
$f(2) = 8$	$g(2) = 8$
$f(3) = 13$	$g(3) = 32$
$f(4) = 18$	$g(4) = 128$
$f(5) = 23$	$g(5) = 496$

Which value do you think will be more, $f(100)$ or $g(100)$? Why?

$g(100)$ will be larger than $f(100)$ because we are multiplying by a number larger than 1, so it will grow much faster than any arithmetic sequence.

Each of the tables below represents a geometric sequence. Find the missing terms in the sequence, showing your method.

1. .

1	9
2	18
3	36
4	72
5	144

$144 = r^4 \cdot 9$

$16 = r^4$

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

$2 = r$

2. .

1	4
2	12
3	36
4	108
5	324

$36 = r^2 \cdot 4$

$9 = r^2$

$\sqrt[2]{9} = r$

$3 = r$

Given the following information, determine the explicit equation for each geometric sequence.

1) $f(1) = 6,\ f(n) = 2f(n-1)$

The common ratio is 2. $f(0) = \frac{6}{2} = 3.$ Explicit Equation: $f(x) = 2^x \cdot 3$

2) $f(n) = 5f(n-1),\ f(1) = \frac{2}{3}$

The common ratio is 5. $f(0) = \frac{2}{3} \div 5 = \frac{2}{3} \cdot \frac{1}{5} = \frac{2}{15}.$ Explicit Equation: $f(x) = 5^x \cdot \frac{2}{15}$