Bell Work:

Given two terms of an arithmetic sequence, find a_1 and d.

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

$a_3 = 5$ $a_5 = 11$

n

$5 = a_1 + (3-1)(3)$

$5 = a_1 + 6$

$a_1 = -1$

$\frac{11+5}{2} = 8 = a_4$

$\frac{11-5}{2} = \frac{6}{2} = 3$

$d = 3$

Geometric Sequences

Determine whether each sequence is geometric. If so, find the common ratio.

4, 8, 12, 16,...

No

1, 0.5, 0.25, 0.125,...

Yes

$r = \frac{1}{2}$

64, −32, 16, −8,...

Yes

$\div 2 \cdot -\frac{1}{2}$

$r = -\frac{1}{2}$

Geometric Sequence formulas

Recursive → $a_n = a_{n-1} \cdot r$

Explicit → $a_n = a_1 \cdot r^{n-1}$

a_1 = first term

r = common ratio

n = term #

$n = 10$

Find the tenth term of each geometric sequence.

$a_1 (r)^{n-1}$

$-5, 25, -125, \ldots$

$a_n = -5(-5)^9$

$a_{10} = 9765625$

$0.3, 0.6, 1.2, \ldots$

$a_{10} = 0.3(2)^9$

$a_n = 153.6$

$\frac{1}{4}, \frac{1}{2}, 1, \ldots$

$a_{10} = \frac{1}{4}(2)^9$

$a_{10} = 128$

2.5%

The deer population in an area is increasing. This year, the population was 1.025 times last year's population of 2537.

a. Assuming that the population increases at the same rate for the next few years, write an explicit formula for the sequence.

b. Find the expected deer population for the fourth year of the sequence.

a) $a_n = 2537(1.025)^{n-1}$

b) $a_4 = 2537(1.025)^3$

$a_4 = 2733$ deer

Find the missing term of each geometric sequence. It could be the geometric mean or its opposite.

9, ■, 16, ...

$9 \cdot 16 = 144$

$\sqrt{144} = \pm 12$

3, ■, 12, ...

$\sqrt{36} = \pm 6$

4, ■, 5.76, ...

$\sqrt{23.04}$

± 4.8

Identify each sequence as *arithmetic*, *geometric*, or *neither*. Then find the next two terms.

-1 -2 -3

1, 0, −2, −5, …

Neither

−9, −14

−3, 2, 7, 12, …

Arithmetic

17, 22

1, −2, 3, −4, …

neither

5, −6

Write an explicit formula for each sequence. Then generate the first three terms.

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

$a_1 = 5, r = 3$

$a_n = 5(3)^{n-1}$

5, 15, 45

$a_1 = -2, r = -3$

$a_n = -2(-3)^{n-1}$

-2, 6, -18

$a_1 = 2187, r = \frac{1}{3}$

$a_n = 2187\left(\frac{1}{3}\right)^{n-1}$

2187, 729, 243

Find the missing terms of each geometric sequence. (*Hint:* The geometric mean of positive first and fifth terms is the third term. Some terms might be negative.)

$\sqrt{-9(-2304)} = 144$

$\sqrt{-9(-144)}$

$\sqrt{-144(-2304)}$

$a_1 = -9$

$a_2 = \pm 36$

$a_3 = -144$

$a_4 = \pm 576$

$a_5 = -2304$