Practice Exercises

A. Find the common ratio and the next three terms of each geometric sequence.

1. $2, 6, 18, 54, \ldots$
2. $\frac{1}{8}, \frac{1}{4}, \frac{1}{2}, \ldots$
3. $4, 12, 36, \ldots$
4. $0.02, 0.2, 2, \ldots$
5. $3x^3, 6x^5, 12x^7, \ldots$

B. Find the specified term of each geometric sequence.

1. $3, 6, 12, \ldots \quad a_7$
2. $4, 20, 100, \ldots \quad a_8$
3. $7, -7, 7, \ldots \quad a_{17}$
4. $3, 1.2, 0.48, \ldots \quad a_{10}$

5. $1, \frac{3}{2}, \frac{9}{4}, \ldots \quad a_{11}$

Solve each problem completely.

1. The first term of a geometric sequence is 8, and the second term is 4. Find the fifth term.
2. The first term of a geometric sequence is 3, and the third term is $\frac{4}{3}$. Find the fifth term.
3. The common ratio in a geometric sequence is $\frac{2}{5}$ and the fourth term is $\frac{5}{2}$. Find the third term.
4. Which term of the geometric sequence 2, 6, 18,... is 118098?
5. The second and fifth terms of a geometric sequence are 10 and 1250, respectively. Is 31,250 a term of this sequence? If so, which term is it?

Problem Set

A. Find the common ratio and the next three terms of each geometric sequence.

1. $4, 8, 16, 32, \ldots$
2. $\frac{4}{9}, \frac{4}{3}, 4, \ldots$
3. $1, -5, 25, \ldots$
4. $-5, -0.5, -0.05, \ldots$
5. $x, 5x^2y, 25x^3y^2, \ldots$

B. Find the specified term of each geometric sequence.

1. $64, -32, 16, \ldots \quad a_7$
2. $2, -10, 50, \ldots \quad a_8$
3. $2, -6, 18, \ldots \quad a_{13}$
4. $3, 1.2, 0.48, \ldots \quad a_{10}$

5. $\frac{1}{16}, \frac{1}{8}, \frac{1}{4}, \ldots \quad a_9$

C. Solve each problem completely.

1. The first term of a geometric sequence is -2, and the third term is $-\frac{1}{2}$. Find the fifth term.
2. The common ratio in a geometric sequence is $\frac{2}{3}$ and the fourth term is 1. Find the third term.
3. The common ratio in a geometric sequence is $\frac{3}{4}$ and the fifth term is $\frac{81}{16}$. Find the first three terms.
4. Which term of the geometric sequence 3, 6, 12,... is 768?
5. The common ratio in a geometric sequence is $\frac{3}{2}$ and the fifth term is 1. Find the first three terms.

Problem Set

A.

1. $r = 8 \div 4 = 2$
   $a_5 = (32)(2) = 64$
   $a_6 = (64)(2) = 128$
   $a_7 = (128)(2) = 256$
2. $r = \frac{4}{3} \div \frac{4}{9} = 3$
   $a_5 = (4)(3) = 12$
   $a_6 = (12)(3) = 36$
   $a_7 = (36)(3) = 108$
3. $r = -5 \div 1 = -5$
   $a_5 = (25)(-5) = -125$
   $a_6 = (-125)(-5) = 625$
   $a_7 = (625)(-5) = -3125$
4. $r = -0.5 \div -5 = 0.1$
   $a_5 = (-0.05)(0.1) = -0.005$
   $a_6 = (-0.005)(0.1) = -0.0005$
   $a_7 = (-0.0005)(0.1) = -0.00005$
5. $r = 5x^2y \div x = 5xy$
   $a_5 = (25x^3y^2)(5xy) = 125x^4y^3$
   $a_6 = (125x^4y^3)(5xy) = 625x^5y^4$
   $a_7 = (625x^5y^4)(5xy) = 3125x^6y^5$

B.

1. $a_1 = 64,\ n = 7,\ a_7 = ?$

$r = -32 \div 64 = -\frac{1}{2}$

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

$a_7 = (64)\left(-\frac{1}{2}\right)^{7-1}$

$a_7 = (64)\left(-\frac{1}{2}\right)^{6}$

$a_7 = (64)\left(\frac{1}{64}\right)$

$a_7 = 1$

2. $a_1 = 2,\ n = 8,\ a_8 = ?$

$r = -10 \div 2 = -5$

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

$a_8 = (2)(-5)^{8-1}$

$a_8 = (2)(-5)^{7}$

$a_8 = (2)(-78,125)$

$a_8 = -156,250$

3. $a_1 = 2,\ n = 13,\ a_{13} = ?$

$r = -6 \div 2 = -3$

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

$a_{13} = (2)(-3)^{13-1}$

$a_{13} = (2)(-3)^{12}$

$a_{13} = (2)(531,441)$

$a_{13} = 1,062,882$

4. $a_1 = 3,\ n = 10,\ a_{10} = ?$

$r = 1.2 \div 3 = 0.4$

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

$a_{10} = (3)(0.4)^{10-1}$

$a_{10} = (3)(0.4)^{9}$

$$a_{10} = (3)(0.000262144)$$
$$a_{10} = 0.000786432$$

5. $a_1 = \frac{1}{16}, n = 9, a_9 = ?$

$$r = \frac{1}{8} \div \frac{1}{16} = 2$$
$$a_n = a_1 r^{n-1}$$
$$a_9 = \left(\frac{1}{16}\right)(2)^{9-1}$$
$$a_9 = \left(\frac{1}{16}\right)(2)^{8}$$
$$a_9 = \left(\frac{1}{16}\right)(256)$$
$$a_9 = 16$$

C.

1. $a_1 = -2, a_3 = -\frac{1}{2},$
$a_5 = ?, r = ?, n = 5$

$$r = \sqrt[n-k]{\frac{a_n}{a_k}}$$
$$r = \sqrt[3-1]{\frac{a_3}{a_1}}$$
$$r = \sqrt[2]{\frac{-\frac{1}{2}}{-2}}$$
$$r = \sqrt{\frac{1}{4}}$$
$$r = \frac{1}{2}$$
$$a_n = a_1 r^{n-1}$$

$$a_5 = (-2)\left(\frac{1}{2}\right)^{5-1}$$

$$a_5 = (-2)\left(\frac{1}{2}\right)^{4}$$

$$a_5 = (-2)\left(\frac{1}{16}\right)$$

$$a_5 = -\frac{1}{8}$$

2. $a_4 = 1,\ a_3 = ?,\ n = 3$

$$a_1 = ?,\ r = \frac{2}{3}$$

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

$$a_4 = a_1\left(\frac{2}{3}\right)^{4-1}$$

$$1 = a_1\left(\frac{2}{3}\right)^{3}$$

$$1 = a_1\left(\frac{8}{27}\right)$$

$$a_1 = \frac{27}{8}$$

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

$$a_3 = \left(\frac{27}{8}\right)\left(\frac{2}{3}\right)^{3-1}$$

$$a_3 = \left(\frac{27}{8}\right)\left(\frac{2}{3}\right)^{2}$$

$$a_3 = \left(\frac{27}{8}\right)\left(\frac{4}{9}\right)$$

$$a_3 = \left(\frac{108}{72}\right)$$

3. $a_1 = ?,\ a_2 = ?, a_3 = ?,$
$a_5 = \frac{81}{16},\ r = \frac{3}{4}$
$a_n = a_1 r^{n-1}$
$a_5 = a_1 \left(\frac{3}{4}\right)^{5-1}$
$\frac{81}{16} = a_1 \left(\frac{3}{4}\right)^4$
$\frac{81}{16} = a_1 \left(\frac{81}{256}\right)$
$a_1 = 16$
$a_2 = (16)\left(\frac{3}{4}\right) = 12$
$a_3 = (12)\left(\frac{3}{4}\right) = 9$

4. $a_1 = 3,\ a_n = 768,$
$r = 6 \div 3 = 2,\ n = ?$
$a_n = a_1 r^{n-1}$
$\frac{768}{3} = \frac{(3)(2)^{n-1}}{3}$
$256 = 2^{n-1}$
$2^8 = 2^{n-1}$
$8 = n - 1$
$n = 9$

5. $a_1 = ?,\ a_2 = ?,\ a_3 = ?,$
$a_5 = 1,\ r = \frac{3}{2}$
$a_n = a_1 r^{n-1}$

$$a_5 = a_1 \left(\frac{3}{2}\right)^{5-1}$$

$$1 = a_1 \left(\frac{3}{2}\right)^4$$

$$1 = a_1 \left(\frac{81}{16}\right)$$

$$a_1 = \frac{16}{81}$$

$$a_2 = \left(\frac{16}{81}\right)\left(\frac{3}{2}\right) = \frac{8}{27}$$

$$a_3 = \left(\frac{8}{27}\right)\left(\frac{3}{2}\right) = \frac{4}{9}$$