

## Review Exercise Set 26

Exercise 1: Write the first five terms of the geometric sequence that has the given first term and common ratio.

$$a_1 = 60 \text{ and } r = -\frac{1}{2}$$

Exercise 2: Write the formula for the general term of the given geometric sequence.

$$1, -4, 16, -64, \dots$$

Exercise 3: Find the indicated term of the given geometric sequence.

$$\frac{1}{2}, \frac{1}{4}, \frac{1}{8}, \frac{1}{16}, \dots ; a_9 = ?$$

Exercise 4: Find the sum of the given finite geometric series.

$$\sum_{n=1}^8 2(3)^{n-1}$$

Exercise 5: Find the sum of the given infinite geometric series.

$$\sum_{n=0}^{\infty} \left(\frac{2}{3}\right)^n$$

## Review Exercise Set 26 Answer Key

Exercise 1: Write the first five terms of the geometric sequence that has the given first term and common ratio.

$$a_1 = 60 \text{ and } r = -\frac{1}{2}$$

Substitute  $a_1$  and  $r$  into the general formula for geometric sequence

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

$$a_n = 60 \left(-\frac{1}{2}\right)^{n-1}$$

Substitute 1 through 5 for  $n$

$$a_1 = 60 \left(-\frac{1}{2}\right)^{1-1}$$

$$a_2 = 60 \left(-\frac{1}{2}\right)^{2-1}$$

$$a_3 = 60 \left(-\frac{1}{2}\right)^{3-1}$$

$$a_1 = 60 \left(-\frac{1}{2}\right)^0$$

$$a_2 = 60 \left(-\frac{1}{2}\right)^1$$

$$a_3 = 60 \left(-\frac{1}{2}\right)^2$$

$$a_1 = 60 (1)$$

$$a_2 = 60 \left(-\frac{1}{2}\right)$$

$$a_3 = 60 \left(\frac{1}{4}\right)$$

$$a_1 = 60$$

$$a_2 = -30$$

$$a_3 = 15$$

$$a_4 = 60 \left(-\frac{1}{2}\right)^{4-1}$$

$$a_5 = 60 \left(-\frac{1}{2}\right)^{5-1}$$

$$a_4 = 60 \left(-\frac{1}{2}\right)^3$$

$$a_5 = 60 \left(-\frac{1}{2}\right)^4$$

$$a_4 = 60 \left(-\frac{1}{8}\right)$$

$$a_5 = 60 \left(\frac{1}{16}\right)$$

$$a_4 = -\frac{15}{2}$$

$$a_5 = \frac{15}{4}$$

The first five terms of the geometric sequence are 60, -30, 15,  $-\frac{15}{2}$ , and  $\frac{15}{4}$ .

Exercise 2: Write the formula for the general term of the given geometric sequence.

$$1, -4, 16, -64, \dots$$

Find the common ratio

$$a_2 \div a_1 = -4 \div 1 = -4$$

$$a_3 \div a_2 = 16 \div -4 = -4$$

$$a_4 \div a_3 = -64 \div 16 = -4$$

$$r = -4$$

Find the formula for the general term

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

$$a_n = (1)(-4)^{n-1}$$

$$a_n = (-4)^{n-1}$$

Exercise 3: Find the indicated term of the given geometric sequence.

$$\frac{1}{2}, \frac{1}{4}, \frac{1}{8}, \frac{1}{16}, \dots ; a_9 = ?$$

Find the common ratio

$$a_2 \div a_1 = \frac{1}{4} \div \frac{1}{2} = \frac{1}{4} \times 2 = \frac{1}{2}$$

$$a_3 \div a_2 = \frac{1}{8} \div \frac{1}{4} = \frac{1}{8} \times 4 = \frac{1}{2}$$

$$a_4 \div a_3 = \frac{1}{16} \div \frac{1}{8} = \frac{1}{16} \times 8 = \frac{1}{2}$$

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

Find the formula for the general term

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

$$a_n = \left(\frac{1}{2}\right) \left(\frac{1}{2}\right)^{n-1}$$

$$a_n = \left(\frac{1}{2}\right)^{1+n-1}$$

$$a_n = \left(\frac{1}{2}\right)^n$$

Exercise 3 (Continued):

Find the 9th term

$$a_9 = \left(\frac{1}{2}\right)^9$$

$$a_9 = \frac{1}{512}$$

Exercise 4: Find the sum of the given finite geometric series.

$$\sum_{n=1}^8 2(3)^{n-1}$$

Find the first term by letting  $n = 1$

$$a_1 = 2(3)^{1-1}$$

$$a_1 = 2(3)^0$$

$$a_1 = 2(1)$$

$$a_1 = 2$$

Find the partial sum of the series

$$a_1 = 2; n = 8; r = 3$$

$$S_n = \frac{a_1(1-r^n)}{1-r}$$

$$S_8 = \frac{(2)(1-3^8)}{1-3}$$

$$S_8 = \frac{(2)(1-6561)}{-2}$$

$$S_8 = (-1)(-6560)$$

$$S_8 = 6560$$

Exercise 5: Find the sum of the given infinite geometric series.

$$\sum_{n=0}^{\infty} \left(\frac{2}{3}\right)^n$$

Find the first term by letting  $n = 1$

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

$$a_1 = \frac{2}{3}$$

Find the sum

$$S_n = \frac{a_1}{1-r}$$

$$S_n = \frac{\frac{2}{3}}{1-\frac{2}{3}}$$

$$S_n = \frac{\frac{2}{3}}{\frac{1}{3}}$$

$$S_n = \frac{2}{3} \times \frac{3}{1}$$

$$S_n = 2$$