

11.4

NAME \_\_\_\_\_

DATE \_\_\_\_\_

## Reteaching Worksheet

### Infinite Geometric Series

An infinite geometric series is a geometric series in which the number of terms is unlimited. In an infinite geometric series for which  $|r| < 1$ , the values of the terms approach zero as  $n$  increases. The sum of the first  $n$  terms approaches a specific number,  $S$ , which is called the sum of the infinite geometric series.

#### Sum of an Infinite Geometric Series

The sum,  $S$ , of an infinite geometric series, where the common ratio is  $-1 < r < 1$ , is given by the following formula.

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

**Example:** Find the sum of the infinite geometric series

$$20 - 10 + 5 - 2\frac{1}{2} + 1\frac{1}{4} + \dots$$

$$a_2 = a_1 r$$

$$-10 = 20r$$

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

$$S = \frac{20}{1 - (-\frac{1}{2})} = \frac{40}{3}$$

The sum is  $\frac{40}{3}$ .

Find the sum of each infinite geometric series, if it exists.

1.  $a_1 = -7, r = \frac{5}{8}$

2.  $a_1 = 4, r = \frac{1}{2}$

3.  $\frac{2}{9} + \frac{5}{27} + \frac{25}{162} + \dots$

4.  $15 + 10 + 6\frac{2}{3} + \dots$

5.  $a_1 = 6, r = \frac{2}{5}$

6.  $18 - 9 + 4\frac{1}{2} - 2\frac{1}{4} + \dots$

7.  $\frac{1}{10} + \frac{1}{20} + \frac{1}{40} + \dots$

8.  $6 - 12 + 24 - 48 + \dots$

Find the first four terms of each infinite geometric series described below.

9.  $S = -16, r = \frac{1}{4}$

10.  $S = 48, r = -\frac{2}{3}$

11.  $S = \frac{33}{4}, r = \frac{1}{3}$

12.  $S = 5, r = \frac{1}{5}$

13.  $S = \frac{20}{3}, r = -\frac{1}{2}$

14.  $S = \frac{1}{12}, r = -\frac{1}{3}$