Practice Exercises

A. Determine if each geometric series has a sum. If the sum exists, find the sum.

1. $4+1\frac{1}{4}+\ldots$
2. $4+2+1+\ldots$
3. $16+8+4+2+\ldots$
4. $1+\frac{1}{3}+\frac{1}{9}+\frac{1}{27}+\ldots$
5. $16+1.6+0.16+\ldots$

B. In each infinite geometric series, find the specified unknown.

1. $S=45;\ a_1=15;\ r=?$
2. $S=28;\ r=\frac{1}{7};\ a_1=?$

3. $S = 80;\ \ r = \frac{1}{5};\ \ a_1 = ?$

4. $S = \frac{1}{3};\ \ a_1 = \frac{3}{10};\ \ r = ?$

5. $S = \frac{4\sqrt{3}}{3};\ \ r = \frac{1}{4};\ \ a_1 = ?$

Problem Set

A. Determine if each geometric series has a sum. If the sum exists, find the sum.

1. $1+(-\frac{1}{2})+\frac{1}{4}+(-\frac{1}{8})\ldots$
2. $4+2.4+1.44+\ldots$
3. $6+2+\frac{2}{3}+\frac{2}{9}+\ldots$
4. $(-5)+(-0.5)+(-0.05)+\ldots$
5. $1+(-\frac{1}{3})+\frac{1}{9}+(-\frac{1}{27})+\ldots$

B. In each infinite geometric series, find the specified unknown.

1. $S=-10;\ \ a_1=-5;\ \ r=?$
2. $S=-52;\ \ a_1=-65;\ \ r=?$

3. $S = -\frac{2}{5};\ \ a_1 = -\frac{1}{4};\ \ r = ?$

4. $S = -36;\ \ a_1 = -60;\ \ r = ?$

5. $S = 384;\ \ r = \frac{1}{3};\ \ a_1 = ?$

Problem Set

A.

1. $a = 1$
   $r = -\frac{1}{2} \div 1 = -\frac{1}{2}$
   $S = \frac{a}{1-r}$
   $S = \frac{1}{1-(-\frac{1}{2})}$
   $S = \frac{1}{\frac{3}{2}}$
   $S = \frac{2}{3}$

2. $a = 4$
   $r = 2.4 \div 4 = 0.6$
   $S = \frac{a}{1-r}$
   $S = \frac{4}{1-0.6}$
   $S = \frac{4}{0.4}$
   $S = 10$

3. $a = 6$
   $r = 2 \div 6 = \frac{1}{3}$
   $S = \frac{a}{1-r}$
   $S = \frac{6}{1-\frac{1}{3}}$

$$S = \frac{6}{\frac{2}{3}}$$

$$S = 6\left(\frac{3}{2}\right)$$

$$S = 9$$

4. $a = -5$

$$r = -0.5 \div (-5) = 0.1$$

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

$$S = \frac{-5}{1-0.1}$$

$$S = \frac{-5}{0.9}$$

$$S = -5.6$$

5. $a = 1$

$$r = -\frac{1}{3} \div 1 = -\frac{1}{3}$$

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

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

$$S = \frac{1}{\frac{4}{3}}$$

$$S = \frac{3}{4}$$

B.

1. $S = \frac{a}{1-r}$

$$(1-r)\left[-10 = \frac{-5}{1-r}\right]$$

$$-10+10r=-5$$
$$10r=-5+10$$
$$\frac{10r}{10}=\frac{5}{10}$$
$$r=\frac{1}{2}$$

2. $$S=\frac{a}{1-r}$$
$$(1-r)\left[-52=\frac{-65}{1-r}\right]$$
$$-52+52r=-65$$
$$52r=-65+52$$
$$\frac{52r}{52}=\frac{-13}{52}$$
$$r=-\frac{1}{4}$$

3. $$S=\frac{a}{1-r}$$
$$(1-r)\left[-\frac{2}{5}=\frac{-\frac{1}{4}}{1-r}\right]$$
$$-\frac{2}{5}+\frac{2}{5}r=-\frac{1}{4}$$
$$\frac{2}{5}r=-\frac{1}{4}+\frac{2}{5}$$
$$\frac{5}{2}\left[\frac{2}{5}r=\frac{3}{20}\right]$$
$$r=\frac{3}{8}$$

4. $$S=\frac{a}{1-r}$$

$$(1-r)\left[-36=\frac{-60}{1-r}\right]$$

$$-36+36r=-60$$

$$36r=-60+36$$

$$\frac{36r}{36}=\frac{-24}{36}$$

$$r=-\frac{2}{3}$$

5. $S=\dfrac{a}{1-r}$

$$384=\frac{a}{1-\frac{1}{3}}$$

$$\frac{2}{3}\left[384=\frac{a}{\frac{2}{3}}\right]$$

$$a=256$$