

Name: Key

Problem Set 4.6

Follow all directions and show all of your work in order to receive full credit. You may use a calculator.

1 - 2] Write the next term in the sequence. Then write the explicit formula for the sequence.

1) 2, 4, 6, 8, ...

2) 4, 12, 36, 108, ...

Next term: 10

Next term: 324

$a_n =$ $2n$

$a_n =$ $4(3)^{n-1}$

3 - 6] Write the series using sigma notation.

3) $4 + 12 + 36 + 108 + \dots$ *infinite*
geometric $r=3$

4) $6 + 11 + 16 + 21 + 26 + \dots + 46$
arithmetic $d=5$

$$\begin{aligned} 5n+1 &= 46 \\ 5n &= 45 \\ n &= 9 \end{aligned}$$

$$\sum_{n=1}^{\infty} 4(3)^{n-1}$$

$$\sum_{n=1}^9 5n+1$$

5) $10 + 5 + 2.5 + 1.25 + \dots$
geometric *infinite*
 $r=1/2$

6) $\frac{5}{2} - \frac{10}{6} + \frac{20}{18} - \frac{40}{54} + \dots - \frac{320}{2187}$

geometric
 $r=-2/3$

$$\begin{aligned} \left(\frac{5}{2}\right)\left(-\frac{2}{3}\right)^{n-1} &= \frac{-320}{2187} \\ \downarrow \\ n &= 8 \end{aligned}$$

$$\sum_{n=1}^{\infty} 10\left(\frac{1}{2}\right)^{n-1}$$

$$\sum_{n=1}^8 \left(\frac{5}{2}\right)\left(-\frac{2}{3}\right)^{n-1}$$

7 - 18] State whether the series is arithmetic, geometric, or neither in the space provided. Then find the sum of the series, showing all of your work in the provided space. If there is no sum write "no sum." Box your final answer.

$$7) \sum_{k=1}^{18} 5\left(\frac{4}{7}\right)^{k-1}$$

$$= 5\left(\frac{1-(4/7)^{18}}{1-(4/7)}\right)$$

$$= \boxed{11.6466}$$

geometric

$$8) \sum_{n=1}^4 n^2 = 1+4+9+16$$

$$= \boxed{30}$$

neither

$$9) \sum_{n=3}^6 \frac{1}{n-2} =$$

$$1 + \frac{1}{2} + \frac{1}{3} + \frac{1}{4} =$$

$$\boxed{25/12}$$

neither

$$10) \sum_{n=1}^{12} 4(2)^n$$

$$= 8\left(\frac{1-2^{12}}{1-2}\right)$$

$$= \boxed{32,760}$$

geometric

$$11) \sum_{n=1}^{42} \frac{1}{2}n - 7$$

$$= \left(\frac{42}{2}\right)(-6.5 + 14)$$

$$= \boxed{157.5}$$

arithmetic

$$12) \sum_{n=1}^{200} n$$

$$= \left(\frac{200}{2}\right)(1+200)$$

$$= \boxed{20100}$$

arithmetic

$$13) \sum_{n=1}^{230} 3 =$$

$$3+3+3+\dots+3+3$$

$$3(230) = \boxed{690}$$

neither

$$14) \sum_{n=2}^{10} \frac{1}{2}\left(\frac{2}{3}\right)^n$$

$$= \frac{2}{9}\left(\frac{1-(2/3)^9}{1-(2/3)}\right) = \boxed{0.649325}$$

geometric

$$15) \sum_{n=0}^{150} 2n+7$$

$$= \left(\frac{151}{2}\right)(7+307) = \boxed{23707}$$

arithmetic

$$16) \sum_{n=1}^{\infty} 3(6)^{n-1}$$

↑
no sum b/c $r > 1$

(infinite)
geometric

$$17) \sum_{n=1}^{\infty} 5\left(\frac{1}{3}\right)^{n-1}$$

$$= \frac{5/2}{1-1/3} = \frac{5/2}{2/3} = \boxed{15/4}$$

(infinite)
geometric

$$18) \sum_{n=1}^{\infty} 9\left(\frac{4}{5}\right)^n$$

$$= \frac{36/5}{1-4/5} = \frac{36/5}{1/5} = \boxed{36}$$

(infinite)
geometric