§11-1 & 11-2 Arithmetic Sequences and Series

Goal: Use arithmetic _____, find arithmetic _____ and sums of arithmetic _____. Use _____ notation.

Defn. **Arithmetic sequence** is a sequence in which each _____after the first is found by _____a constant, called the **common difference** *d*, to the _____term.

Formula: *n*th Term of an Arithmetic Sequence The *n*th term *an* of an arithmetic sequence with first term, a_1, and common difference, *d*, is given by a_n = _____.

Ex 1. Find the next four terms of the arithmetic sequence -8, -6, -4, ...

Try: Find the next four terms of the arithmetic sequence 5, 3, 1, ...

Ex 2. Write an equation for the nth term of the arithmetic sequence -8, -6, -4, ...

Try. Write an equation for the nth term of the arithmetic sequence 5, 3, 1, ...

Ex 3. Find the three arithmetic means between 21 and 45.

Try. Find the three arithmetic means between 13 and 25.

Defn. A series is an indicated **sum** of the _____ of a sequence.
Since 18, 22, 26, 30 is an **arithmetic** sequence, 18 + 22 + 26 + 30 is an **arithmetic series**.

Formula: The sum S_n of the first n terms of a geometric series is given by:

S_n = _____ or S_n =_____

Ex 4. Find the sum of the first 20 even numbers, beginning with 2.

Try. Find the sum of the first 15 counting numbers, beginning with 1.

Ex 5. Find the first four terms of an arithmetic series in which $a_1 = 14$, $a_n = 29$, and $S_n = 129$.

Ex 6. Evaluate $\sum_{k=3}^{10}(2k+1)$.

Try. $\sum_{i=5}^{10}(2i+3)$

§11-2 & 11-4 Geometric Sequences and Series

Goal: Find _____ _____ and _____ of geometric series.

Defn. *A* **geometric sequence** is a sequence in which each term after the first is found by multiplying the previous term by a constant *r* called the **common ratio**. The missing term(s) between two nonsuccessive terms of a geometric sequence are called **geometric means**.

Formula: *n*th Term of an Geometric Sequence The *n*th term *an* of an geometric sequence

with first term, a_1, and common ratio, *r*, is given by a_n = _____.

Defn. **Geometric Series:** The _____ of the first ___ terms of a geometric sequence

Formula: The sum S_n of the first n terms of a geometric series is given by:

S_n = _____ or S_n =_____

Note: In this formula r ≠ _____! Why? _____

Ex 1. What is the missing term in the geometric sequence 324, 108, 36, 12, ____?

Ex 2. Find the sixth term of a geometric sequence for which $a_1 = -3$ and $r = -2$.

Ex 3. Write an equation for the nth term of the geometric sequence 5, 10, 20, 40, … .

Ex 4. Find the seventh term of a geometric sequence for which $a_3 = 96$ and $r = 2$.

Ex 5. Find three geometric means between 12 and 0.75.

Ex 6. Find S_n if $a_1 = 5$, $r = 2$, $n = 14$.

Ex 7. Find the sum of the geometric series 54 +36 + 24 + 16 + … to 6 terms.

Ex 8. Evaluate $\sum_{n=1}^{12} 3 \cdot 2^{n-1}$

Ex 9. Find the sum of a geometric series for which $a_1 = 6$ and $r = \frac{-1}{6}$.

Ex 10. Find a_1 in a geometric series for which $S_n = 765$ and $r = 2$.

§11-5 Infinite Geometric Series

Goal: Find the _____ of an infinite geometric series and write _____ _____ as fractions

Defn. Infinite Geometric Series: the sum (___) of _____ of the terms of a geometric sequence.

Defn. Partial sum of an infinite geometric series: S_n for the first ___ terms of an infinite geometric series.

Defn. Convergent Series: An infinite series that has a _____.
A series with a common ratio whose absolute value is _____ _____ 1.

Formula: The sum S of an infinite geometric series with $-1 < r < 1$ is given by: S = _____.

Find the sum of each infinite geometric series if it exists:

a) $a_1 = 36, r = \frac{2}{3}$

b) $a_1 = 18, r = -1.5$

c) $-\frac{4}{3} + 4 - 12 + 36 - 108 + \ldots$

d) $3 - \frac{3}{2} + \frac{3}{4} - \frac{3}{8} + \ldots$

e) $\sum_{n=1}^{\infty} 5 \cdot \left(\frac{1}{2}\right)^{n-1}$

f) $\sum_{n=1}^{\infty} 11 \cdot \left(\frac{1}{3}\right)^{n-1}$

Repeating Decimals: To write repeating decimals as fractions, use the rule of _____.

g) Write $0.\overline{25}$ as a fraction

h) Write $0.\overline{7}$ as a fraction

i) Write $0.\overline{105}$ as a fraction