WARM-UP

Determine the **recursion formula** and **explicit formula** for the *nth* term for the arithmetic sequence if the first term is -2 and consecutive terms decrease by 5.

UNIT #7: Sequences and Series

Arithmetic Series

Learning Goal:

I will learn how to find the sum of an arithmetic series by applying one of two formulas.

Lesson: Arithmetic Series

An arithmetic series is the **sum** of the terms of an arithmetic sequence.

ie. an arithmetic sequence is 2, 5, 8, 11...
ie. an arithmetic series is **2 + 5 + 8 + 11**...

For these series, the sum of the first four terms is:
S_4 = **2 + 5 + 8 + 11**
= **26**

Formula 1:

$$S_n = \frac{n}{2}(a + t_n)$$

MEMORIZE!

Where S_n is the sum of **n** terms, **a** is the first term, **n** is the number of terms, t_n is the final term.

Example 1:
Find the sum of the series (-4) + (-7) + (-10)....+ (-118) which has 39 terms.

Example 2:
Find the sum of the first eight terms of the arithmetic series given the first term is -3 and the t_8 = 39.

Formula 2:
We can substitute t_n in formula 1 with the arithmetic sequence formula $t_n = a + (n-1)d$ to give:

$$S_n = \frac{n}{2}(a + t_n)$$

$$S_n = \frac{n}{2}[(a + (a + (n-1)d)] \longrightarrow$$ Simplify the expression to

$$\boxed{S_n = \frac{n}{2}[2a + (n-1)d]}$$ **MEMORIZE!**

Example 3:
For the series 7 + 13 + 19 + 25...determine the sum of the first 100 terms.

Example 4:
Find the sum of 5 + 8 + 11+ . . . + 107

First, we have to find the number of terms in the series.

$t_n = a + (n-1)\,d$

Then use the formula for sum of a series:

$S_n = \frac{n}{2}(2a + (n-1)d)$

Example 5:
Ryan has a new job that pays $24 000 the first year. He will receive an increase of $800 at the end of each year for four years.

a) What will Ryan's income be the fifth year?

b) What will his total income be for this first five years?

UNIT 7: Sequences and Series

Arithmetic Series

Learning Goal:

I will learn how to find the sum of an arithmetic series by applying one of two formulas.

Success Criteria:

To be successful, I must be able to...

- describe the difference between an arithmetic sequence and series
- find the sum of an arithmetic series using the formula

$S_n = \frac{n}{2}(a + t_n)$ OR $S_n = \frac{n}{2}[2a + (n-1)d]$

Bring canned goods!!!

Practice Work

p. 469 #1-4 (every other)
#6, 10, 11, 15, 16, 19