10.2 ARithMetiC SeQUenCes & SeRies

Essential Question:

How can I find the nth term and partial sum of an arithmetic sequence?

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Direct Formula: (nth term) = common difference (slope)

$$a_n = a + d(n-1)$$

a_n: nth term; a: first term (a_1); n: term #

EX 1. 2, 5, 8, 11, ... (+3 +3 +3)

$a=2$, $d=3$

$a_n = 2+3(n-1)$

$a_n = 3n-1$

EX 2. 4, 8, 12, 16, ... (+4 +4 +4) Find 10th term

$a_{10} = 4 + 4(10-1) = \boxed{40}$

EX 3. Find the nth term for 7, 5, 3, ... (-2 -2)

$a=7$, $d=-2$

$a_n = 7 + (-2)(n-1)$

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Series - adding terms of sequence

PARTIAL SUM FORMULAS

Sum of first n terms $S_n = n\left(\frac{a + a_n}{2}\right)$ OR $S_n = \frac{n}{2}\left[2a + d(n-1)\right]$

EX 4. Find the SUM of the first 30 odd numbers. 1, 3, 5, 7, ... (+2 +2 +2)

$S_{30} = \frac{30}{2}\left[2(1) + 2(30-1)\right] = 15(2+2(29)) = 900$

$S_{30} = 30\left(\frac{1+59}{2}\right)$

$a_{30} = 1 + 2(30-1)$
$= 1 + 2(29) = 59$

$= 30(30) = 900$