11.2 Arithmetic Series

std. 22.0

ex. 1 **Find the sum of the 1st 10 positive even integers.**

n

$2+4+6+8+10+12+14+16+18+20$

-22 -22 -22 -22 -22

$= 5(22) = 110$

$n = \frac{10}{2}(a_1 + a_{10})$

sum of the 1st *n* terms of an arithmetic series: $S_A = n\left(\frac{a_1 + a_n}{2}\right)$ ☆

$500\left(\frac{1001}{2}\right)$

ex. 2 **Given the series 20 + 18 + 16 + 14 + . . .**

a) find the sum of the 1st 200 terms

$a_{200} = 20 + 199(-2)$

$S_A = n\left(\frac{a_1 + a_n}{2}\right) = 200\left(\frac{20 + -378}{2}\right)$

b) find *n* such that $S_n = -760$

$n = 40$

$S_A = n\left(\frac{a_1 + a_n}{2}\right)$

$-760 = n\left(\frac{20 + 22 - 2n}{2}\right)$

$-760 = n\left(\frac{42 - 2n}{2}\right)$

$100(-358)$

$= -35{,}800$

$a_n = 20 + (n-1)(-2)$

$-760 = 21n - n^2$

$n^2 - 21n - 760 = 0$

$(n - 40)(n + 19) = 0$

ex. 3 **Find the sum** $\sum_{i=1}^{50} 20-5i = 15+10+5+\cdots$

$S_A = 50\left(\frac{15+-230}{2}\right)$ $(a_{50} = 20-5(50))$

$-5,375$

ex. 4 **The bottom row of a store display has 30 cases of water. Each row has 1 less case than the row below it.**

a) Which row has 16 cases? $n = 15^{th}$ row

$30, 29, 28, \ldots, 16$

$16 = 30+(n-1)(-1)$ a_n

b) How many cases in the 1st 8 rows? $S_8 = 8\left(\frac{30+23}{2}\right) = 212$ cases

$a_8 = 30+7(-1)$