Summations – Day 3

Unit 6: Representations of Linear Relations

Evaluate the related series of each sequence.

1. $30, 39, 48, 57, 66, 75, 84$

$30+39+48+57+66+75+84 = 399$

2. $22, 29, 36, 43, 50, 57, 64$

$22+29+36+43+50+57+64 = 301$

Evaluate each arithmetic series described.

3. $46 + 56 + 66 + 76 \ldots, n = 9$

$S_9 = 774$

4. $(-10) + (-14) + (-18) + (-22) \ldots, n = 7$

$S_7 = -154$

5. $20 + 28 + 36 + 44 \ldots, n = 15$

$S_{15} = 1140$

6. $6 + 10 + 14 + 18 \ldots, n = 10$

$S_{10} = 240$

7. $\sum_{i=1}^{10}(10 - 9i)$

$d = -9$

$n = 10$

$a_1 = 10 - 9(1)$

$a_1 = 10 - 9$

$a_1 = 1$

$S_{10} = \frac{n}{2}(2 \cdot a_1 + (n-1) \cdot d)$

$S_{10} = \frac{10}{2}(2 \cdot 1 + (10-1) \cdot -9)$

$S_{10} = 5(2 + (9)(-9))$

$S_{10} = 5(2 - 81)$

$S_{10} = 5(-79)$

$S_{10} = -395$

8. $\sum_{k=1}^{9}(3k - 6)$

$d = 3$

$n = 9$

$a_1 = 3(1) - 6$

$a_1 = 3 - 6$

$a_1 = -3$

$S_9 = \frac{n}{2}(2 \cdot a_1 + (n-1) \cdot d)$

$S_9 = \frac{9}{2}(2 \cdot -3 + (9-1) \cdot 3)$

$S_9 = 4.5(-6 + (8)(3))$

$S_9 = 4.5(-6 + 24)$

$S_9 = 4.5(18)$

$S_9 = 81$

9. $\sum_{i=1}^{7}(16 - 10i)$

$d = -10$

$n = 7$

$a_1 = 16 - 10(1)$

$a_1 = 16 - 10$

$a_1 = 6$

$S_7 = \frac{n}{2}(2 \cdot a_1 + (n-1) \cdot d)$

$S_7 = \frac{7}{2}(2 \cdot 6 + (7-1) \cdot -10)$

$S_7 = 3.5(12 + (6)(-10))$

$S_7 = 3.5(12 - 60)$

$S_7 = 3.5(-48)$

$S_7 = -168$

10. $\sum_{i=1}^{5}(10i - 14)$

$d = 10$

$n = 5$

$a_1 = 10(1) - 14$

$a_1 = 10 - 14$

$a_1 = -4$

$S_5 = \frac{n}{2}(2 \cdot a_1 + (n-1) \cdot d)$

$S_5 = \frac{5}{2}(2 \cdot -4 + (5-1) \cdot 10)$

$S_5 = 2.5(-8 + (4)(10))$

$S_5 = 2.5(-8 + 40)$

$S_5 = 2.5(32)$

$S_5 = 80$

Evaluate each arithmetic series described.

11. $a_1 = 7, a_n = 91, n = 15$

$S_{15} = \frac{n}{2}(a_1 + a_n)$

$S_{15} = \frac{15}{2}(7 + 91)$

$S_{15} = 7.5(98)$

$S_{15} = 735$

12. $a_1 = 22, a_n = 58, n = 10$

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

$S_{10} = \frac{10}{2}(22 + 58)$

$S_{10} = 5(80)$

$S_{10} = 400$

13. $a_1 = 2, a_n = 22, n = 6$

$S_6 = \frac{n}{2}(a_1 + a_n)$

$S_6 = \frac{6}{2}(2 + 22)$

$S_6 = 3(24)$

$S_6 = 72$

14. $a_1 = 3, a_n = 63, n = 11$

$S_{11} = \frac{n}{2}(a_1 + a_n)$

$S_{11} = \frac{11}{2}(3 + 63)$

$S_{11} = 5.5(66)$

$S_{11} = 363$

15. $a_1 = 33, a_n = 93, n = 7$

$S_7 = \frac{n}{2}(a_1 + a_n)$

$S_7 = \frac{7}{2}(33 + 93)$

$S_7 = 3.5(126)$

$S_7 = 441$

16. $a_1 = -25, a_n = -89, n = 9$

$S_9 = \frac{n}{2}(a_1 + a_n)$

$S_9 = \frac{9}{2}(-25 - 89)$

$S_9 = 4.5(-114)$

$S_9 = -513$

17. $a_1 = 20, d = 9, n = 10$

$S_{10} = \frac{n}{2}(2 \cdot a_1 + (n-1) \cdot d)$

$S_{10} = \frac{10}{2}(2 \cdot 20 + (10-1) \cdot 9)$

$S_{10} = 5(40 + (9)(9))$

$S_{10} = 5(40 + 81)$

$S_{10} = 5(121) = 605$

18. $a_1 = 17, d = 2, n = 12$

$S_{12} = \frac{n}{2}(2 \cdot a_1 + (n-1) \cdot d)$

$S_{12} = \frac{12}{2}(2 \cdot 17 + (12-1) \cdot 2)$

$S_{12} = 6(34 + (11)(2))$

$S_{12} = 6(34 + 22)$

$S_{12} = 6(56) = 336$

19. $a_1 = 29, d = 7, n = 15$

$S_{15} = \frac{n}{2}(2 \cdot a_1 + (n-1) \cdot d)$

$S_{15} = \frac{15}{2}(2 \cdot 29 + (15-1) \cdot 7)$

$S_{15} = 7.5(58 + (14)(7))$

$S_{15} = 7.5(58 + 98)$

$S_{15} = 7.5(156) = 1170$

20. $a_1 = 2, d = 3, n = 13$

$S_{13} = \frac{n}{2}(2 \cdot a_1 + (n-1) \cdot d)$

$S_{13} = \frac{13}{2}(2 \cdot 2 + (13-1) \cdot 3)$

$S_{13} = 6.5(4 + (12)(3))$

$S_{13} = 6.5(4 + 36)$

$S_{13} = 6.5(40) = 260$

③ Information Needed

$d = 56 - (46) = 10$

$a_1 = 46$

$n = 9$

Using the formula

$S_n = \frac{n}{2}(2 \cdot a_1 + (n-1) \cdot d)$

$S_n = \frac{9}{2}(2 \cdot 46 + (9-1) \cdot 10)$

$S_n = 4.5(92 + (8)(10))$

$S_n = 4.5(92 + 80)$

$S_n = 4.5(172)$

$\boxed{S_n = 774}$

---

④ Information Needed

$d = -14 - (-10) = -4$

$a_1 = -10$

$n = 7$

Using the formula

$S_n = \frac{n}{2}(2 \cdot a_1 + (n-1) \cdot d)$

$S_n = \frac{7}{2}(2 \cdot -10 + (7-1) \cdot -4)$

$S_n = 3.5(-20 + (6)(-4))$

$S_n = 3.5(-20 - 24)$

$S_n = 3.5(-44)$

$\boxed{S_n = -154}$

---

⑤ Information Needed

$d = 28 - (20) = 8$

$a_1 = 20$

$n = 15$

Using the formula

$S_n = \frac{n}{2}(2 \cdot a_1 + (n-1) \cdot d)$

$S_n = \frac{15}{2}(2 \cdot 20 + (15-1) \cdot 8)$

$S_n = 7.5(40 + (14)(8))$

$S_n = 7.5(40 + 112)$

$S_n = 7.5(152)$

$\boxed{S_n = 1140}$

⑥ Information Needed

$d = 10 - (6) = 4$

$a_1 = 6$

$n = 10$

Using the formula

$S_n = \frac{n}{2}(2 \cdot a_1 + (n-1) \cdot d)$

$S_n = \frac{10}{2}(2 \cdot 6 + (10-1) \cdot 4)$

$S_n = 5(12 + (9)(4))$

$S_n = 5(12 + 36)$

$S_n = 5(48)$

$\boxed{S_n = 240}$