Summations

Unit 6: Representations of Linear Relations

Evaluate the related series of each sequence.

1. 26, 34, 42, 50, 58

$26+34+42+50+58 = \boxed{210}$

2. 16, 23, 30, 37, 44, 51

$16+23+30+37+44+51 = \boxed{201}$

Evaluate each arithmetic series described.

3. $43 + 52 + 61 + 70 \ldots, n = 9$

$\boxed{S_9 = 711}$

4. $7 + 15 + 23 + 31 \ldots, n = 15$

$\boxed{S_{15} = 945}$

5. $6 + 10 + 14 + 18 \ldots, n = 13$

$\boxed{S_{13} = 390}$

6. $17 + 26 + 35 + 44 \ldots, n = 9$

$\boxed{S_9 = 477}$

7. $\sum_{n=1}^{12}(4n - 9)$

$d = 4$

$n = 12$

$a_1 = 4(1) - 9$

$a_1 = 4 - 9$

$\boxed{a_1 = -5}$

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

$S_{12} = \frac{12}{2}(2 \cdot (-5) + (12-1) \cdot 4)$

$S_{12} = 6(-10 + (11)(4))$

$S_{12} = 6(-10 + 44)$

$S_{12} = 6(34)$

$\boxed{S_{12} = 204}$

8. $\sum_{i=1}^{7}(3i + 5)$

$d = 3$

$n = 7$

$a_1 = 3(1) + 5$

$a_1 = 3 + 5$

$\boxed{a_1 = 8}$

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

$S_7 = \frac{7}{2}(2 \cdot 8 + (7-1) \cdot 3)$

$S_7 = 3.5(16 + (6)(3))$

$S_7 = 3.5(16 + 18)$

$S_7 = 3.5(34)$

$\boxed{S_7 = 119}$

9. $\sum_{n=1}^{25}(9n - 10)$

$d = 9$

$n = 25$

$a_1 = 9(1) - 10$

$a_1 = 9 - 10$

$\boxed{a_1 = -1}$

$S_{25} = \frac{n}{2}(2 \cdot a_1 + (n-1) \cdot d)$

$S_{25} = \frac{25}{2}(2 \cdot -1 + (25-1) \cdot 9)$

$S_{25} = 12.5(-2 + (24)(9))$

$S_{25} = 12.5(-2 + 216)$

$S_{25} = 12.5(214)$

$\boxed{S_{25} = 2675}$

10. $\sum_{m=1}^{25}(9m - 16)$

$d = 9$

$n = 25$

$a_1 = 9(1) - 16$

$a_1 = 9 - 16$

$\boxed{a_1 = -7}$

$S_{25} = \frac{n}{2}(2 \cdot a_1 + (n-1) \cdot d)$

$S_{25} = \frac{25}{2}(2 \cdot -7 + (25-1) \cdot 9)$

$S_{25} = 12.5(-14 + (24)(9))$

$S_{25} = 12.5(-14 + 216)$

$S_{25} = 12.5(202)$

$\boxed{S_{25} = 2525}$

Evaluate each arithmetic series described.

11. $a_1 = 37, a_n = 97, n = 7$

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

$S_7 = \frac{7}{2}(37 + 97)$

$S_7 = 3.5(134)$

$\boxed{S_7 = 469}$

12. $a_1 = 14, a_n = 38, n = 7$

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

$S_7 = \frac{7}{2}(14 + 38)$

$S_7 = 3.5(52)$

$\boxed{S_7 = 182}$

13. $a_1 = 46, a_n = 136, n = 11$

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

$S_{11} = \frac{11}{2}(46 + 136)$

$S_{11} = 5.5(182)$

$\boxed{S_{11} = 1001}$

14. $a_1 = 10, a_n = 25, n = 6$

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

$S_6 = \frac{6}{2}(10 + 25)$

$S_6 = 3(35)$

$\boxed{S_6 = 105}$

15. $a_1 = -9, a_n = -87, n = 14$

$S_{14} = \frac{n}{2}(a_1 + a_n)$

$S_{14} = \frac{14}{2}(-9 - 87)$

$S_{14} = 7(-96)$

$\boxed{S_{14} = -672}$

16. $a_1 = 8, a_n = 200, n = 25$

$S_{25} = \frac{n}{2}(a_1 + a_n)$

$S_{25} = \frac{25}{2}(8 + 200)$

$S_{25} = 12.5(208)$

$\boxed{S_{25} = 2600}$

17. $a_1 = 14, d = 3, n = 11$

$S_{11} = \frac{n}{2}(2 \cdot a_1 + (n-1) \cdot d)$

$S_{11} = \frac{11}{2}(2 \cdot 14 + (11-1) \cdot 3)$

$S_{11} = 5.5(28 + (10)(3))$

$S_{11} = 5.5(28 + 30)$

$S_{11} = 5.5(58) = \boxed{319}$

18. $a_1 = 42, d = 9, n = 10$

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

$S_{10} = \frac{10}{2}(2 \cdot 42 + (10-1) \cdot 9)$

$S_{10} = 5(84 + (9)(9))$

$S_{10} = 5(84 + 81)$

$S_{10} = 5(165) = \boxed{825}$

19. $a_1 = 7, d = 5, n = 7$

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

$S_7 = \frac{7}{2}(2 \cdot 7 + (7-1) \cdot 5)$

$S_7 = 3.5(14 + (6)(5))$

$S_7 = 3.5(14 + 30)$

$S_7 = 3.5(44) = \boxed{154}$

20. $a_1 = -11, d = -5, n = 12$

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

$S_{12} = \frac{12}{2}(2 \cdot -11 + (12-1) \cdot -5)$

$S_{12} = 6(-22 + (11)(5))$

$S_{12} = 6(-22 - 55)$

$S_{12} = 6(-77) = \boxed{-462}$

③ Information Needed:

$d = 52 - (43) = 9$

$a_1 = 43$

$n = 9$

Using the formula:

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

$S_n = \frac{9}{2}(2 \cdot 43 + (9-1) \cdot 9)$

$S_n = 4.5(86 + (8)(9))$

$S_n = 4.5(86 + 72)$

$S_n = 4.5(158)$

$\boxed{S_n = 711}$

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④ Information Needed:

$d = 15 - (7) = 8$

$a_1 = 7$

$n = 15$

Using the formula:

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

$S_n = \frac{15}{2}(2 \cdot 7 + (15-1) \cdot 8)$

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

$S_n = 7.5(14 + 112)$

$S_n = 7.5(126)$

$\boxed{S_n = 945}$

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⑤ Information Needed:

$d = 10 - (6) = 4$

$a_1 = 6$

$n = 13$

Using the formula:

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

$S_n = \frac{13}{2}(2 \cdot 6 + (13-1) \cdot 4)$

$S_n = 6.5(12 + (12)(4))$

$S_n = 6.5(12 + 48)$

$S_n = 6.5(60)$

$\boxed{S_n = 390}$

⑥ Information Needed:

$d = 26 - (17) = 9$

$a_1 = 17$

$n = 9$

Using the formula:

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

$S_n = \frac{9}{2}(2 \cdot 17 + (9-1) \cdot 9)$

$S_n = 4.5(34 + 8(9))$

$S_n = 4.5(34 + 72)$

$S_n = 4.5(106)$

$\boxed{S_n = 477}$