

Summations – Day 2
Unit 6: Representations of Linear Relations

Evaluate the related series of each sequence.

1. 9, 13, 17, 21, 25, 29 $9 + 13 + 17 + 21 + 25 + 29 = \boxed{114}$	2. -44, -53, -62, -71, -80, -89, -98 $-44 - 53 - 62 - 71 - 80 - 89 - 98 = \boxed{-497}$
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Evaluate each arithmetic series described.

3. $(-49) + (-59) + (-69) + (-79) \dots, n = 19$ $S_{19} = \boxed{-2641}$	4. $31 + 37 + 43 + 49 \dots, n = 14$ $S_{14} = \boxed{980}$
5. $6 + 8 + 10 + 12 \dots, n = 9$ $S_9 = \boxed{126}$	6. $29 + 36 + 43 + 50 \dots, n = 9$ $S_9 = \boxed{513}$
7. $\sum_{m=1}^{40} (7m - 12)$ $d = 7$ $n = 40$ $a_1 = 7(1) - 12$ $a_1 = 7 - 12$ $a_1 = -5$ $S_n = \frac{n}{2} (2 \cdot a_1 + (n-1) \cdot d)$ $S_{40} = \frac{40}{2} (2 \cdot -5 + (40-1) \cdot 7)$ $S_{40} = 20(-10 + (39)(7))$ $S_{40} = 20(-10 + 273)$ $S_{40} = 20(263)$ $S_{40} = \boxed{5260}$	8. $\sum_{i=1}^{12} (2i - 8)$ $d = 2$ $n = 12$ $a_1 = 2(1) - 8$ $a_1 = 2 - 8$ $a_1 = -6$ $S_n = \frac{n}{2} (2 \cdot a_1 + (n-1) \cdot d)$ $S_{12} = \frac{12}{2} (2 \cdot -6 + (12-1) \cdot 2)$ $S_{12} = 6(-12 + (11)(2))$ $S_{12} = 6(-12 + 22)$ $S_{12} = 6(10)$ $S_{12} = \boxed{60}$
9. $\sum_{n=1}^{25} (4n + 2)$ $d = 4$ $n = 25$ $a_1 = 4(1) + 2$ $a_1 = 4 + 2$ $a_1 = 6$ $S_n = \frac{n}{2} (2 \cdot a_1 + (n-1) \cdot d)$ $S_{25} = \frac{25}{2} (2 \cdot 6 + (25-1) \cdot 4)$ $S_{25} = 12.5(12 + (24)(4))$ $S_{25} = 12.5(12 + 96)$ $S_{25} = 12.5(108)$ $S_{25} = \boxed{1350}$	10. $\sum_{n=1}^5 (6n - 4)$ $d = 6$ $n = 5$ $a_1 = 6(1) - 4$ $a_1 = 6 - 4$ $a_1 = 2$ $S_n = \frac{n}{2} (2 \cdot a_1 + (n-1) \cdot d)$ $S_5 = \frac{5}{2} (2 \cdot 2 + (5-1) \cdot 6)$ $S_5 = 2.5(4 + (4)(6))$ $S_5 = 2.5(4 + 24)$ $S_5 = 2.5(28)$ $S_5 = \boxed{70}$

Evaluate each arithmetic series described.

11. $a_1 = -2, a_n = 12, n = 8$

$$S_8 = \frac{n}{2} (a_1 + a_n)$$

$$S_8 = \frac{8}{2} (-2 + 12)$$

$$S_8 = 4(10)$$

$$S_8 = 40$$

12. $a_1 = -7, a_n = -133, n = 15$

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

$$S_{15} = \frac{15}{2} (-7 - 133)$$

$$S_{15} = 7.5(-140)$$

$$S_{15} = -1050$$

13. $a_1 = 1, a_n = 13, n = 7$

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

$$S_7 = \frac{7}{2} (1 + 13)$$

$$S_7 = 3.5(14)$$

$$S_7 = 49$$

14. $a_1 = -13, a_n = -33, n = 11$

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

$$S_{11} = \frac{11}{2} (-13 - 33)$$

$$S_{11} = 5.5(-46)$$

$$S_{11} = -253$$

15. $a_1 = 11, a_n = 354, n = 50$

$$S_{50} = \frac{n}{2} (a_1 + a_n)$$

$$S_{50} = \frac{50}{2} (11 + 354)$$

$$S_{50} = 25(365)$$

$$S_{50} = 9125$$

16. $a_1 = 22, a_n = 70, n = 13$

$$S_{13} = \frac{n}{2} (a_1 + a_n)$$

$$S_{13} = \frac{13}{2} (22 + 70)$$

$$S_{13} = 6.5(92)$$

$$S_{13} = 598$$

17. $a_1 = 2, d = 10, n = 50$

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

$$S_{50} = \frac{50}{2} (2 \cdot 2 + (50-1) \cdot 10)$$

$$S_{50} = 25(4 + (49)(10))$$

$$S_{50} = 25(4 + 490)$$

$$S_{50} = 25(494) = 12350$$

18. $a_1 = 7, d = 6, n = 11$

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

$$S_{11} = \frac{11}{2} (2 \cdot 7 + (11-1) \cdot 6)$$

$$S_{11} = 5.5(14 + (10)(6))$$

$$S_{11} = 5.5(14 + 60)$$

$$S_{11} = 5.5(74) = 407$$

19. $a_1 = 19, d = 7, n = 9$

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

$$S_9 = \frac{9}{2} (2 \cdot 19 + (9-1) \cdot 7)$$

$$S_9 = 4.5(38 + (8)(7))$$

$$S_9 = 4.5(38 + 56)$$

$$S_9 = 4.5(94) = 423$$

20. $a_1 = 32, d = 10, n = 40$

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

$$S_{40} = \frac{40}{2} (2 \cdot 32 + (40-1) \cdot 10)$$

$$S_{40} = 20(64 + (39)(10))$$

$$S_{40} = 20(64 + 390)$$

$$S_{40} = 20(454) = 9080$$

③ Information Needed

$$d = -59 - (-49) = -10$$

$$a_1 = -49$$

$$n = 19$$

Using the formula

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

$$S_{19} = \frac{19}{2} (2 \cdot -49 + (19-1) \cdot -10)$$

$$S_{19} = 9.5 (-98 + (18)(-10))$$

$$S_{19} = 9.5 (-98 - 180)$$

$$S_{19} = 9.5 (-278)$$

$$S_{19} = -2641$$

④ Information Needed

$$d = 37 - (31) = 6$$

$$a_1 = 31$$

$$n = 14$$

Using the formula

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

$$S_{14} = \frac{14}{2} (2 \cdot 31 + (14-1) \cdot 6)$$

$$S_{14} = 7 (62 + (13)(6))$$

$$S_{14} = 7 (62 + 78)$$

$$S_{14} = 7 (140)$$

$$S_{14} = 980$$

⑤ Information Needed

$$d = 8 - (6) = 2$$

$$a_1 = 6$$

$$n = 9$$

Using the formula

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

$$S_9 = \frac{9}{2} (2 \cdot 6 + (9-1) \cdot 2)$$

$$S_9 = 4.5 (12 + (8)(2))$$

$$S_9 = 4.5 (12 + 16)$$

$$S_9 = 4.5 (28)$$

$$S_9 = 126$$

⑥ Information Needed

$$d = 36 - (29) = 7$$

$$a_1 = 29$$

$$n = 9$$

Using the formula

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

$$S_9 = \frac{9}{2} (2 \cdot 29 + (9-1) \cdot 7)$$

$$S_9 = 4.5 (58 + (8)(7))$$

$$S_9 = 4.5 (58 + 56)$$

$$S_9 = 4.5 (114)$$

$$S_9 = 513$$