Arithmetic Sequences and Series Homework

Find the common difference for each arithmetic sequence:

1. $2, 6, 10, 14, \ldots$
2. $-7, -2, 3, 8, \ldots$
3. $714, 711, 708, 705, \ldots$

Write the first six terms or each arithmetic sequence with the given forst term, a_1, and common difference, d.

4. $a_1 = 200,\ d = 20$
5. $a_1 = -7,\ d = 4$
6. $a_1 = 300,\ d = -90$
7. $a_1 = \frac{5}{2},\ d = -\frac{1}{2}$
8. $a_1 = -0.4,\ d = -1.6$

Write a formula for the general term (the nth term) of each arithmetic sequence. Then use the formula for a_n to find a_{20}, the 20th term of the sequence.

9. $1, 5, 9, 13, \ldots$
10. $7, 3, -1, -5, \ldots$
11. $-20, -24, -28, -32, \ldots$
12. $a_1 = -\frac{1}{3}, d = \frac{1}{3}$
13. $a_1 = 4,\ d = -0.3$

14. Find the sum of the first 20 terms of the arithmeitc sequence: $4, 10, 16, 22, ...$
15. Find the sum of the first 50 terms of the arithmetic sequence: $-10, -6, -2, 2, \ldots$
16. Find $1 + 2 + 3 + 4 + \ldots + 100$, the sum of the first 100 natural numbers.
17. Find the sum of the first 60 positive even integers.
18. Find the sum of the even integers bewteen 21 and 45.

Write out the first three terms and the last term. Then use the formula for the sum of the first n terms of an arithmetic sequence to find the indicated sum.

19. $\sum_{i=1}^{17}(5i + 3)$
20. $\sum_{i=1}^{30}(-3i + 5)$
21. $\sum_{i=1}^{100}4i$

22. Company A pays $24,000 yearly with raises of $1600 per year. Company B pays $28,000 yearly with raises of $1000 per year. Which company will pay more in year 10? How much more?

23. A company offers a starting yearly salary of $33,000 with raises of $2500 per year. Find the total salary over a ten-year period.

24. A theater has 30 seats in the first row, 32 seats in the second row, increasing by 2 seats each row for a total of 26 rows. How many seats are there in the theater?

Answers:

1. 4
2. 5
3. -3
4. $200, 220, 240, 260, 280, 300$
5. $-7, -3, 1, 5, 9, 13$
6. $300, 210, 120, 30, -60, -150$
7. $\frac{5}{2}, 2, \frac{3}{2}, 1, \frac{1}{2}, 0$
8. $-0.4, -2, -3.6, -5.2, -6.8, -8.4$
9. $a_n = 4n - 3,\ a_{20} = 77$
10. $a_n = 11 - 4n,\ a_{20} = -69$
11. $a_n = -4n - 16,\ a_{20} = -96$
12. $a_n = \frac{1}{3}n - \frac{2}{3},\ a_{20} = 6$
13. $a_n = 4.3 - 0.3n, a_{20} = -1.7$
14. 1220
15. 4400
16. 5050
17. 3660
18. 396
19. $8 + 13 + 18 + \ldots + 88 = 816$
20. $2 + (-1) + (-4) + \ldots + (-85) = -1245$
21. $4 + 8 + 12 + \ldots + 400 = 20200$
22. Company A will pay $1400 more in year 10.
23. The total salary over a ten-year period is $442,500.
24. There are 1430 seats in the theater.