NAME_____ DATE_____ SCORE_____

Series and Sigma Notation; Sums of Arithmetic and Geometric Series

Use sigma notation to write each series.

1. $-2 + 1 + 4 + \cdots + 13$ $\sum_{n=1}^{6} 3n-5$
2. $5 + 4 + 3 + \cdots + (-10)$ $\sum_{n=1}^{16} 6-n$
3. $-1 + 1 + 3 + \cdots + 21$ $\sum_{n=1}^{12} 2n-3$
4. $9 + 4 + (-1) + \cdots + (-126)$ $\sum_{n=1}^{28} 14-5n$
5. $\frac{14}{3} + \frac{13}{3} + \frac{12}{3} + \cdots + \left(-\frac{7}{3}\right)$ $\sum_{n=1}^{23} 5-\frac{1}{3}n$
6. $-1.8 + (-1.6) + (-1.4) + \cdots + 0.8$ $\sum_{n=1}^{14} 0.2n-2$
7. $81 + 27 + \cdots + \frac{1}{3}$ $\sum_{n=1}^{6} 81\left(\frac{1}{3}\right)^{n-1}$
8. $\frac{1}{8} + \frac{1}{4} + \cdots + 64$ $\sum_{n=1}^{10} \frac{1}{8}(2)^{n-1}$
9. $80 + 60 + 45 + \cdots$ $\sum_{n=1}^{\infty} 80\left(\frac{3}{4}\right)^{n-1}$
10. $75 + 30 + 12 + \cdots$ $\sum_{n=1}^{\infty} 75\left(\frac{2}{5}\right)^{n-1}$

Find the sum, S_n, of the following arithmetic series.

11. $t_1 = 8, t_{14} = 99, n = 14$ 749
12. $n = 20, t_1 = 82, t_{20} = -32$ 500
13. $t_1 = 2, d = -2, n = 40$ -1480
14. $t_1 = -10, t_2 = -4, n = 25$ 1550
15. $t_1 = \frac{1}{8}, t_3 = \frac{9}{8}, n = 16$ 62
16. $t_2 = 3m, t_3 = m, n = 20$ $-280m$
17. $\sum_{r=1}^{12} 5r$ 390
18. $\sum_{m=1}^{20} 3m - 2$ 590
19. $\sum_{j=1}^{15} 15 - 2j$ -15
20. $\sum_{k=1}^{30} 4(25 - k)$ 1140
21. $\sum_{i=1}^{9} \frac{i}{3}$ 15
22. $\sum_{s=1}^{661} \frac{3}{4}s$ $1372\frac{1}{2}$

Find the sum of each geometric series.

23. $t_1 = 1, r = 4, n = 6$ 1365
24. $t_1 = 5, r = -2, n = 7$ 215
25. $t_1 = 1000, r = \frac{1}{10}, n = 5$ $1111\frac{1}{10}$
26. $t_1 = 10, r = 3, n = 6$ 3640

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Infinite Geometric Series

Find the sum of each infinite geometric series. If the series has no sum, so state.

1. $36 + 12 + 4 + \cdots$ 54
2. $50 + 10 + 2 + \cdots$ $\frac{125}{2}$
3. $16 - 8 + 4 - \cdots$ $\frac{32}{3}$
4. $\frac{9}{10} - \frac{3}{5} + \frac{2}{5} - \cdots$ $\frac{27}{50}$
5. $\frac{8}{9} - \frac{4}{3} + 2 - \cdots$ no sum
6. $6\sqrt{3} + 6 + 2\sqrt{3} + \cdots$ $9(\sqrt{3}+1)$

Solve the following problems, some of which are based on arithmetic series and some of which are based on geometric series.

7. In a grocery store display, there are 9 boxes of tissues in the top level and 10 more boxes in each successive level down to the floor. If there are 10 levels, how many boxes are in the display? 540
8. During the first week of January, Sue took \$10 from her home cash box for hobby expenses. She increased each monthly withdrawal by \$5 over the preceding month. If she started with \$500 on the first of January, how much did she have on the last day of December? \$50
9. To join the Friendship Club, Mark must introduce himself to 5 more people on each day than on the previous day. Starting with 5 on the first day, how many new people will Mark have met by the end of the 30th day of the month? 2325
10. On the first day of production, the inspectors rejected 384 faulty radios. Each day after that, the number of rejects was half the previous day's rejects. After 7 days of production, how many faulty radios had been rejected in all? 762
11. In January, Edna could do only one sit-up. With continued practice, she has tripled the number of sit-ups she can do every month. How many sit-ups did Edna do for the entire year? 265,720
12. A water main broke and was shut off slowly to prevent further breaks. The first hour, the water reached as far as 1 km from the break. Each succeeding hour, the water traveled $\frac{2}{3}$ of the previous hour's distance. What will be the radius of the farthest extent of the water? 3 km