Precalculus

Name Key

Arithmetic Series

Date

Find the sum of the series associated with the given sequence.

1) $11, \frac{25}{2}, 14, \frac{31}{2}, 17$ $d=\frac{3}{2}$

$S_5=\frac{5}{2}(11+17)$

$\boxed{S_5=70}$

2) $-11, -13, -15, -17, -19$

$S_5=\frac{5}{2}(-11+-19)$

$S_5=\frac{5}{2}(-30)=\boxed{-75}$

3) $-\frac{7}{3}, -\frac{2}{3}, 1, \frac{8}{3}, \frac{13}{3}, 6$

$S_6=\frac{6}{2}(-\frac{7}{3}+6)$

$S_6=\boxed{-25}$

4) $9.5, 11.8, 14.1, 16.4, 18.7$

$S_5=\frac{5}{2}(9.5+18.7)$

$S_5=\boxed{70.5}$

Evaluate each arithmetic series described.

5) $\sum_{n=4}^{23}\left(-\frac{13}{10}+\frac{1}{2}n\right)$ $a_4=-\frac{13}{10}+\frac{1}{2}(4)=.7$ $a_{23}=-\frac{13}{10}+\frac{1}{2}(23)=10.2$

$S_{20}=\frac{20}{2}(.7+10.2)$

$S_{20}=\boxed{72\frac{2}{3}}$

6) $\sum_{i=4}^{17}(2i-5)$ $a_4=2(4)-5=3$ $a_{17}=2(17)-5=29$

$S_{14}=\frac{14}{2}(3+29)$

$S_{14}=\boxed{224}$

7) $\sum_{i=4}^{18}(5i+5)$ $a_4=5(4)+5=25$ $a_{18}=5(18)+5=95$

$S_{15}=\frac{15}{2}(25+95)=\boxed{900}$

8) $\sum_{i=1}^{17}(6-2i)$ $a_1=6-2(1)=4$ $a_{17}=6-2(17)=-28$

$S_{17}=\frac{17}{2}(4+-28)=\boxed{-204}$

9) $\sum_{m=5}^{24}(9m-1)$ $a_5=9(5)-1=44$ $a_{24}=9(24)-1=215$

$S_{20}=\frac{20}{2}(44+215)$

$S_{20}=\boxed{2590}$

10) $\sum_{n=1}^{33}(0.8n+6.3)$ $a_1=.8(1)+6.3=7.1$ $a_{33}=.8(33)+6.3=34.3$

$S_{33}=\frac{33}{2}(7.1+34.3)$

$S_{33}=\boxed{683.1}$

11) $a_1=7,\ d=6,\ n=9$

$a_9=7+6(9-1)=55$

$S_9=\frac{9}{2}(7+55)$

$S_9=\boxed{279}$

12) $a_1=-3,\ d=-4,\ n=9$

$a_9=-3-4(9-1)=-35$

$S_9=\frac{9}{2}(-3+-35)$

$S_9=\boxed{-171}$

$d = 2$

13) $4 + 6 + 8 + 10..., \; n = 17$

$a_{17} = 4 + 2(17-1) = 68$

$S_{17} = \frac{17}{2}(4 + 68)$

$S_{17} = \boxed{612}$

14) $31 + 38 + 45 + 52..., \; n = 18$

$a_{18} = 31 + 7(18-1) = 150$

$S_{18} = \frac{18}{2}(31 + 150)$

$S_{18} = \boxed{1629}$

Evaluate each series.

15) $\sum_{m=1}^{7} (3m^2 + 3)$

$= 6 + 15 + 30 + 52 + 78 + 111 + 150$

$= \boxed{442}$

16) $\sum_{n=4}^{9} (30 - n^2)$

$= 14 + 5 + -6 + -19 + -34 + -51$

$= \boxed{-91}$

Determine the number of terms *n* in each arithmetic series.

17) $a_1 = 6, \; a_n = 31, \; S_n = 111$

$111 = \frac{n}{2}(6 + 31)$

$222 = n(37)$

$n = 6$ **6 terms**

18) $14 + 24 + 34 + 44..., \; S_n = 2180$

$2180 = \frac{n}{2}(14 + a_n)$

$2180 = \frac{n}{2}(14 + 4 + 10n)$

$4360 = 10n^2 + 18n$

$0 = 10n^2 + 18n - 4360$

$a_n = 14 + 10(n-1)$

$a_n = 14 + 10n - 10$

$a_n = 4 + 10n$

$n = 20$

20 terms

Rewrite each series using sigma notation.

19) $5 + 10 + 15 + 20$

$\sum_{n=1}^{4} 5n$

20) $5 + 8 + 11 + 14 + 17 + 20$

$\sum_{n=1}^{6} 3n + 2$

Determine the number of terms *n* in each arithmetic series.

21) $11.3 + 12.2 + 13.1 + 14..., \; S_n = 134.1$

$134.1 = \frac{n}{2}(11.3 + a_n)$

$a_n = 11.3 + .9(n-1)$

$a_n = 10.4 + .9n$

$134.1 = \frac{n}{2}(11.3 + 10.4 + .9n)$

$268.2 = 21.7n + .9n^2$

$0 = .9n^2 + 21.7n - 268.2$

$n = 9$

9 terms

22) $9 + 12 + 15 + 18..., \; S_n = 561$

$561 = \frac{n}{2}(9 + a_n)$

$a_n = 9 + 3(n-1)$

$a_n = 6 + 3n$

$561 = \frac{n}{2}(9 + 6 + 3n)$

$1122 = 15n + 3n^2$

$0 = 3n^2 + 15n - 1122$

$n = 17$

17 terms