Questions from Homework

2 d) $\sqrt{3} + 2\sqrt{3} + 3\sqrt{3} + \ldots$

Given:

$a = \sqrt{3}$

$d = 2\sqrt{3} - \sqrt{3}$

$d = \sqrt{3}$

$S_{20} = ?$

$n = 20$

$S_n = \frac{n}{2}[2a + (n-1)d]$

$S_{20} = \frac{20}{2}[2(\sqrt{3}) + (20-1)(\sqrt{3})]$

$S_{20} = 10[2\sqrt{3} + 19\sqrt{3}]$

$S_{20} = 10(21\sqrt{3})$

$\boxed{S_{20} = 210\sqrt{3}}$

③ d) $\frac{1}{6} + \frac{1}{3} + \frac{1}{2} + \ldots + \frac{5}{3}$

$a = \frac{1}{6}$

$d = \frac{1}{3} - \frac{1}{6}$

$= \frac{2}{6} - \frac{1}{6} = \frac{1}{6}$

$t_n = \frac{5}{3}$

(i) Find n:

$t_n = a + (n-1)d$

$\frac{5}{3} = \frac{1}{6} + (n-1)\frac{1}{6}$

$\frac{5}{3} = \cancel{\frac{1}{6}} + \frac{n}{6} - \cancel{\frac{1}{6}}$

$6 \cdot \frac{5}{3} = \frac{n}{\cancel{6}} \cdot \cancel{6}$

$10 = n$

(ii) Find S_n or S_{10}:

$S_n = \frac{n}{2}[a + t_n]$

$S_{10} = \frac{10}{2}\left[\frac{1}{6} + \frac{5}{3}\right]$

$S_{10} = 5\left(\frac{1}{6} + \frac{10}{6}\right)$

$S_{10} = 5\left(\frac{11}{6}\right)$

$\boxed{S_{10} = \frac{55}{6}}$

Questions from Homework

6) Given:

$d=3$

$t_{13}=25$

$S_{13}=?$

① Find a:

$t_n=a+(n-1)d$

$t_{13}=a+(13-1)(3)$

$25 \, {\scriptstyle -36} = a+36 \, {\scriptstyle -36}$

$\boxed{-11=a}$

② Find S_n

$S_n=\frac{n}{2}(a+t_n)$

$S_{13}=\frac{13}{2}(-11+25)$

$S_{13}=\frac{13}{\cancel{2}}(\cancel{14})^{7}$

$\boxed{S_{13}=91}$

7) Given:

$t_2=-1$ | $t_{12}=19$

$t_2=a+(2-1)d$ | $t_{12}=a+(12-1)d$

$t_2=a+d$ | $t_{12}=a+11d$

$-1=a+d$ | $19=a+11d$

$a+d=-1$ | $a+11d=19$

Elimination by Subtraction

$$\begin{array}{r} a+11d=19 \\ (-)\;a+d=-1 \\ \hline 10d=20 \end{array}$$

$\frac{10d}{10}=\frac{20}{10}$

$\boxed{d=2}$

$a+d=-1$

$a+2 \, {\scriptstyle -2} = -1 \, {\scriptstyle -2}$

$\boxed{a=-3}$

$S_{13}=\frac{13}{2}[2(-3)+(13-1)(2)]$

$S_{13}=\frac{13}{2}[-6+24]$

$S_{13}=\frac{13}{\cancel{2}}(\cancel{18})^{9}$

$\boxed{S_{13}=117}$

8) Given:

a) $t_{12}=15$

$t_{12}=a+(12-1)d$

$t_{12}=a+11d$

$a+11d=15$

$S_{15}=105$

$S_{15}=\frac{15}{2}[2a+(15-1)d]$

$S_{15}=\frac{15}{2}(2a+14d)$

$105=15a+105d$

$15a+105d=105 \quad \div 15$

$a+7d=7$

Elimination

$$\begin{array}{r} a+11d=15 \\ (-)\;a+7d=7 \\ \hline 4d=8 \end{array}$$

$\frac{4d}{4}=\frac{8}{4}$

$\boxed{d=2}$

$a+7d=7$

$a+7(2)=7$

$a+14 \, {\scriptstyle -14} = 7 \, {\scriptstyle -14}$

$\boxed{a=-7}$

$t_1=-7$

$t_2=-5$

$t_3=-3$

$-7-5-3-1+1+3+5\ldots$

Geometric Series

A Geometirc Series is the sum of the terms of a finite Geometric Sequence. (Remember geometric sequences
have a common ratio, $r = t_2 \div t_1$)

$2+6+18+54+162+486.$

3 3 3 3 3

$t_4 = 54$

$S_4 = 80$

To find the sum of a geometric series we use the following formula:

$$S_n = \frac{a(r^n - 1)}{r - 1}$$

Try solving the series above!

Geometric Series

$$S_n = \frac{a(r^n - 1)}{r - 1}$$

Find the indicated sum for the following series:

$S_7 = 1+3+9+\ldots$

a = 1
r = 3
n = 7

$$S_7 = \frac{(1)[(3)^7 - 1]}{3 - 1}$$

$$S_7 = \frac{1(2187 - 1)}{2}$$

$$S_7 = \frac{2186}{2} = 1093$$

$-\frac{1}{2}$ $-\frac{1}{2}$ $-\frac{1}{2}$

$S_8 = 8-4+2-1+\ldots$

a = 8
r = -½
n = 8

$$S_n = \frac{a(r^n - 1)}{r - 1}$$

$$S_8 = \frac{(8)[(-\frac{1}{2})^8 - 1]}{-\frac{1}{2} - 1}$$

$$S_8 = \frac{8\left(\frac{1}{256} - \frac{1}{1}\right)}{-\frac{1}{2} - \frac{1}{1}}$$

$$S_8 = \frac{8\left(\frac{1}{256} - \frac{256}{256}\right)}{-\frac{1}{2} - \frac{2}{2}}$$

$$S_8 = 8\left(-\frac{255}{256}\right) \div -\frac{3}{2}$$

$$S_8 = 8\left(-\frac{255}{256}\right)\left(-\frac{2}{3}\right)$$

$$S_8 = \frac{4080}{768} = \frac{85}{16}$$

Geometric Series

$$S_n = \frac{a(r^n - 1)}{r - 1}$$

Find the sum of the following series:

$$\underline{2} \overset{2}{\frown} 4 \overset{2}{\frown} 8 + \ldots 1024$$

a = 2
r = 2
t_n = 1024
n =
S_n =

① Find n

$t_n = ar^{n-1}$

$\frac{1024}{2} = \frac{(\cancel{2})(2)^{n-1}}{\cancel{2}}$

$512 = (2)^{n-1}$

$\frac{\log 512}{\log 2} = 9$

$(\cancel{2})^9 = (\cancel{2})^{n-1}$

$9^{+1} = n - 1^{+1}$

$10 = n$

② Find S_{10}

$S_{10} = \frac{(2)[(2)^{10} - 1]}{2 - 1}$

$S_{10} = \frac{2(1024 - 1)}{1}$

$\boxed{S_{10} = 2046}$

Homework

Do #1 - 8 #1 Do not find S_n
Omit #4