Find the sum of the ~~first 5 terms. Then find r.~~ series

$\boxed{42)\ 8, 12, 18, 27, 81/2, \ldots}$ $\rightarrow r = \frac{3}{2} = 1.5$

$S_1 = 8$ $S_5 = 105.5$

$S_2 = 20$ $S_6 =$

$S_3 = 38$

$S_4 = 65$ $\boxed{S_\infty = \text{Diverges}}$

Find the sum of the ~~[illegible]~~ series. ~~[illegible]~~

41) $8, -4, 2, -1, \frac{1}{2}, \frac{-1}{4}, \frac{1}{8}, \frac{-1}{16}, \frac{1}{32}, \frac{-1}{64}, \ldots$ $r = -\frac{1}{2}$

$S_1 = 8$ $S_7 = 5.375$

$S_2 = 4$ $S_8 = 5.3125$

$S_3 = 6$ $S_9 = 5.34375$

$S_4 = 5$ $S_{10} = 5.328125$

$S_5 = 5.5$

$S_6 = 5.25$

$S_\infty = 5.33333$

$$S = \frac{a}{1-r} = \frac{8}{1-\left(-\frac{1}{2}\right)}$$

$$= \frac{8}{\left(3/2\right)}$$

41A) $8, 4, 2, 1, \frac{1}{2}, \frac{1}{4}, \frac{1}{8}, \frac{1}{16}, \frac{1}{32}, \frac{1}{64}, \ldots$

Sum of an Infinite Geometric Series

a: 1st term r = common ratio

$$S_\infty = a + \cancel{ar} + \cancel{ar^2} + \cancel{ar^3} + \cdots$$

$$-rS_\infty = \cancel{ar} + \cancel{ar^2} + \cancel{ar^3} + \cdots$$

$$S_\infty - rS_\infty = a$$

$$\frac{S_\infty(1-r)}{1-r} = \frac{a}{1-r}$$

$$\boxed{S_\infty = \frac{a}{1-r}} \quad \boxed{-1 < r < 1}$$

Find the sum of the infinite series using the formula $S = \frac{a}{1-r}$.

41) $8, -4, 2, -1, \frac{1}{2}, \frac{-1}{4}, \frac{1}{8}, \frac{-1}{16}, \frac{1}{32}, \frac{-1}{64}$

41A) $8, 4, 2, 1, \frac{1}{2}, \frac{1}{4}, \frac{1}{8}, \frac{1}{16}, \frac{1}{32}, \frac{1}{64}$

62. $\sum_{n=0}^{\infty} 2\left(\frac{-2}{3}\right)^n = \frac{a}{1-r}$

$= \frac{2}{1-(-\frac{2}{3})}$

64. $\sum_{n=1}^{\infty} \frac{1}{2}\left(4^n\right)$

Diverges

$r = 4 > 1$

64B. $\sum_{n=1}^{\infty} \frac{1}{2}(-4)^n$

64C. $\sum_{n=1}^{\infty} \frac{-1}{2}(4)^n$

70) $9 + 6 + 4 + 8/3 + \ldots$

$(n-1)\log 2 = \log 256$ $n-1 = \frac{\log 256}{\log 2}$ $n = \frac{\log 256}{\log 2} + 1$	Use summation Notation to write the sum A) $2 + 4 + 8 + \cdots + 512$ $\sum_{n=1}^{9} 2(2)^{n-1}$ $\frac{\cancel{2}(2)^{n-1}}{\cancel{2}} = \frac{512}{2}$ $2^{n-1} = 256$ $\log 2^{n-1} = \log 256$ B) $5 - 15 + 45 - \cdots + 32805$ $\sum_{n=1}^{9} (5)(-3)^{n-1}$ $\sum_{n=0}^{8} (5)(-3)^{n}$ C) $1000 + 500 + 250 + \cdots 125/64$ $\sum_{n=1}^{10} 100\left(\frac{1}{2}\right)^{n-1}$
$S_n = a_1\left(\frac{1-r^n}{1-r}\right)$ $\boxed{S_n = \frac{a(1-r^n)}{1-r}}$ 1^{st} term $= 1$ $r = -2$ $S_9 = \frac{1(1-(-2)^9)}{1-(-2)}$	Find the finite sum general rule 46. $\boxed{\sum_{n=1}^{9}(-2)^{n-1} = 171}$ 52. $\sum_{n=1}^{10} 5\left(-\frac{1}{3}\right)^{n-1}$ $n=1 \quad n=2 \quad n=3$ $1 + (-2) + 4 + (-8) + 16 + (-32) + 64 + (-128) + 256$ $\sum_{n=1}^{10} 5\left(-\frac{1}{3}\right)^{n-1}$ $a_1 = 5 \quad r = -\frac{1}{3}$ $S_{10} = \frac{5\left(1-\left(-\frac{1}{3}\right)^{10}\right)}{1-\left(-\frac{1}{3}\right)}$

$$\sum_{n=0}^{15} 2\left(\frac{3}{4}\right)^n = \frac{2\left(1-\left(\frac{3}{4}\right)^{16}\right)}{1-3/4}$$

$a_0 = 2 \quad r = \frac{3}{4}$

# of terms $= 16$