

$$\textcircled{a} \quad 30 - 5 + \frac{5}{6} \dots$$

$$S_7 = ? \quad S_7 = \frac{30 \left( \left( \frac{-1}{6} \right)^7 - 1 \right)}{-\frac{1}{6} - 1}$$

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

$$a = 30$$

$$n = 7$$

$$S_7 = \frac{30 \left( \frac{-1}{279936} - 1 \right)}{-\frac{1}{6} - \frac{6}{6}}$$

$$S_7 = \frac{30 \left( \frac{-1}{279936} - \frac{279936}{279936} \right)}{-\frac{7}{6}}$$

$$S_7 = \frac{30}{1} \left( \frac{-279937}{279936} \right) \times -\frac{6}{7}$$

$$S_7 = \frac{50388660}{1959552}$$

$$S_7 = \frac{199955}{7776} \quad \text{or} \quad 25 \frac{5555}{7776}$$

$$⑥ \quad S_7 = 1093$$

$$r = \frac{1}{3}$$

$$n = 7$$

$$a = ?$$

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

$$1093 = \frac{a\left(\left(\frac{1}{3}\right)^7 - 1\right)}{\frac{1}{3} - 1}$$

$$1093 = a \left( \frac{\frac{1}{2187} - \frac{2187}{2187}}{\frac{1}{3} - \frac{3}{3}} \right)$$

$$1093 = a \left( \frac{-2186}{2187} \right) \times -\frac{3}{2}$$

$$1093 = \frac{6558a}{4374}$$

$$6558a = 4780782$$

$$a = 729$$

$$b) \quad t_4 = ?$$

$$a = 729$$

$$r = \frac{1}{3}$$

$$n = 4$$

$$t_4 = (729) \left(\frac{1}{3}\right)^{4-1}$$

$$t_4 = 729 \left(\frac{1}{27}\right)$$

$$t_4 = \frac{729}{27}$$

$$t_4 = 27$$

$$\begin{aligned}
 \textcircled{2} \text{ a) } n &= ? & t_n &= a + (n-1)d \\
 a &= 3 & 39 &= 3 + (n-1)4 \\
 d &= 4 & 36 &= 4n - 4 \\
 t_n &= 39 & 40 &= 4n \\
 & & 10 &= n
 \end{aligned}$$

3, 7, 11, 15, 19, 23, 27, 31, 35, 39

$$\textcircled{1} \text{ b) } t_9 = -6 \quad t_{10} = -12$$

$$t_9 = a + 8d \quad t_{10} = a + 11d$$

$$a + 8d = -6 \quad a + 11d = -12$$

$$\begin{array}{l}
 a + 11d = -12 \\
 \text{c) } \underline{a + 8d = -6} \\
 \hline
 3d = -6 \\
 \boxed{d = -2}
 \end{array}
 \rightarrow
 \begin{array}{l}
 a + 8(-2) = -6 \\
 a - 16 = -6 \\
 \boxed{a = 10}
 \end{array}
 \quad
 \begin{array}{l}
 t_n = a + (n-1)d \\
 t_n = 10 + (n-1)(-2) \\
 t_n = 10 - 2n + 2 \\
 t_n = 12 - 2n
 \end{array}$$

$$\textcircled{6} \text{ b) } t_5 = 8 \quad t_{10} = \frac{1}{4} \quad t_3 = ?$$

$$t_5 = ar^4 \quad t_{10} = ar^9$$

$$ar^4 = 8 \quad ar^9 = \frac{1}{4}$$

$$\begin{array}{l}
 ar^9 = \frac{1}{4} \\
 \underline{ar^4 = 8} \\
 \hline
 r^5 = \frac{1}{32} \\
 \boxed{r = \frac{1}{2}}
 \end{array}
 \rightarrow
 \begin{array}{l}
 a\left(\frac{1}{2}\right)^4 = 8 \\
 a\left(\frac{1}{16}\right) = 8 \\
 \frac{a}{16} = 8
 \end{array}
 \quad
 \begin{array}{l}
 t_3 = (128)\left(\frac{1}{8}\right) \\
 t_3 = 128\left(\frac{1}{4}\right) \\
 t_3 = 32
 \end{array}$$

$$\textcircled{1} \text{ b) } \underline{2} + \frac{2}{3} + \frac{2}{9} + \frac{2}{27} + \dots$$

$$a = 2$$

$$r = \frac{1}{3}$$

$$S_n = \frac{2\left(\frac{1}{3}^n - 1\right)}{\frac{1}{3} - 1}$$

$$= \frac{2\left(\frac{1}{3}^n - 1\right)}{-\frac{2}{3}}$$

$$= 2\left(\frac{1}{3}^n - 1\right) \times \frac{3}{-2}$$

$$= -3\left(\frac{1}{3}^n - 1\right)$$

③ c) 81 + 27 + 9 ...

$a = 81$

$r = \frac{1}{3}$

$n = 6$

$$S_6 = \frac{81 \left( \left( \frac{1}{3} \right)^6 - 1 \right)}{\frac{1}{3} - 1}$$

$$= \frac{81 \left( \frac{1}{729} - \frac{729}{729} \right)}{\frac{1}{3} - \frac{3}{3}}$$

$$= \frac{\cancel{81} \left( \frac{-728}{\cancel{729}} \right)}{-\frac{2}{3}}$$

$$\frac{-2184}{-18}$$

$$= \frac{-728}{9} \times \frac{\cancel{3}^1}{-\cancel{2}^1}$$

$$= \boxed{\frac{364}{3}} = \boxed{121 \frac{1}{3}}$$

$$\textcircled{a} \quad 30 - 5 + \frac{5}{6} - \dots$$

$$a = 30$$

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

$$S_7 = ?$$

$$n = 7$$

$$S_7 = \frac{30 \left( \left( -\frac{1}{6} \right)^7 - 1 \right)}{-\frac{1}{6} - 1}$$

$$= \frac{30 \left( \frac{-1}{279936} - \frac{279936}{279936} \right)}{-\frac{1}{6} - \frac{6}{6}}$$

$$= \frac{30 \left( \frac{-279937}{279936} \right)}{-\frac{7}{6}}$$

$$= \frac{-8398110}{279936} \times \frac{6}{-7}$$

$$= \frac{-50388660}{-1959552}$$

$$= \boxed{\frac{199955}{7776}}$$

or  $\boxed{25 \frac{5555}{7776}}$

$$\textcircled{6} S_7 = 1093$$

$$r = \frac{1}{3}$$

$$a = ?$$

$$1093 = \frac{a \left( \left( \frac{1}{3} \right)^7 - 1 \right)}{\frac{1}{3} - 1}$$

$$1093 = \frac{a \left( \frac{1}{2187} - \frac{2187}{2187} \right)}{\frac{1}{3} - \frac{3}{3}}$$

$$1093 = \frac{a \left( \frac{-2186}{2187} \right)}{-\frac{2}{3}}$$

$$1093 = \frac{-2186a}{2187} \times \frac{3}{-2}$$

$$1093 = \frac{6558a}{4374}$$

$$6558a = 4780782$$

$$\boxed{a = 729}$$

$$b) t_1 = 729$$

$$t_2 = 243$$

$$t_3 = 81$$

$$\boxed{t_4 = 27}$$

$$729 + 243 + 81 + 27 \dots$$

$$⑥ \quad S_7 = 1093$$

$$r = \frac{1}{3}$$

$$a = ?$$

$$n = 7$$

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

$$1093 = \frac{a\left(\left(\frac{1}{3}\right)^7 - 1\right)}{\frac{1}{3} - 1}$$

$$1093 = \frac{a\left(\frac{1}{2187} - \frac{2187}{2187}\right)}{\frac{1}{3} - \frac{3}{3}}$$

$$1093 = \frac{a\left(\frac{-2186}{2187}\right)}{-\frac{2}{3}}$$

$$1093 = \frac{-2186a}{2187} \times \frac{3}{-2}$$

$$1093 = \frac{-6558a}{-4374}$$

$$-6558a = -4780782$$

$$a = 729$$

$$b) \quad t_n = ar^{n-1}$$

$$t_4 = 729\left(\frac{1}{3}\right)^{4-1}$$

$$t_4 = 729\left(\frac{1}{3}\right)^3$$

$$t_4 = 729\left(\frac{1}{27}\right)$$

$$t_4 = 27$$



Ex 10.9

⑤ b)  $1 + \frac{5}{2} + \frac{25}{4} + \dots + \frac{15625}{64}$

$S_n = ?$

$a = 1$

$r = \frac{5}{2}$

$t_n = \frac{15625}{64}$

Solve for  $n$ :

$t_n = ar^{n-1}$

$\frac{15625}{64} = \cancel{1} \left( \frac{5}{2} \right)^{n-1}$

$\frac{15625}{64} = \left( \frac{5}{2} \right)^{n-1}$

$\left( \frac{5}{2} \right)^6 = \left( \frac{5}{2} \right)^{n-1}$

$6 = n - 1$

$7 = n$

Find  $S_7$ :

$S_7 = \frac{1 \left( \left( \frac{5}{2} \right)^7 - 1 \right)}{\frac{5}{2} - 1}$

$= \frac{1 \left( \frac{78125}{128} - \frac{128}{128} \right)}{\frac{5}{2} - \frac{2}{2}}$

$= \left( \frac{77997}{128} \right) \div \left( \frac{3}{2} \right)$

$= \frac{77997}{128} \times \frac{2}{3}$

$= \frac{155994}{384} = \boxed{\frac{25999}{64}}$

Ex 10.9

②  $S_7 = ?$

$n = 7$

$a = 30$

$r = \frac{-5}{30} = -\frac{1}{6}$

$30 - 5 + \frac{5}{6} - \dots$

$$S_7 = \frac{30 \left( \left( -\frac{1}{6} \right)^7 - 1 \right)}{-\frac{1}{6} - 1}$$

$$= \frac{30 \left( \frac{-1}{279936} - \frac{279936}{279936} \right)}{-\frac{1}{6} - \frac{6}{6}}$$

$$= 30 \left( \frac{-279937}{279936} \right) \left( -\frac{6}{7} \right)$$

$$= \frac{50\,388\,660}{1959\,552}$$

$$= \frac{199955}{776}$$

①  $a = 3$

$t_7 = 192$

$S_8 = ?$

$r = \pm 2$

Find  $r$ :

$$t_n = ar^{n-1}$$

$$192 = 3r^{7-1}$$

$$\frac{192}{3} = \frac{3r^6}{3}$$

$$64 = r^6$$

$$\pm 2 = r$$

If  $r = 2$

$$S_8 = \frac{3(2)^8 - 1}{2 - 1}$$

$$= \frac{3(256 - 1)}{1}$$

$$= 3(255)$$

$$= 765$$

If  $r = -2$

$$S_8 = \frac{3(-2)^8 - 1}{-2 - 1}$$

$$= \frac{3(256 - 1)}{-3}$$

$$= -255$$

## Review

$$\textcircled{10} \quad t_7 = 192$$

$$a = t_1 = 3$$

$$S_8 = ?$$

$$t_7 = ar^{7-1}$$

$$t_7 = ar^6$$

$$ar^6 = 192$$

$$3r^6 = 192$$

$$r^6 = 64$$

$$r = \pm 2$$

$$S_8 = \frac{3(2^8 - 1)}{2 - 1}$$

$$= \frac{3(256 - 1)}{1}$$

$$= 3(255)$$

$$= 765$$

$$S_8 = \frac{3((-2)^8 - 1)}{(-2) - 1}$$

$$= \frac{3(256 - 1)}{-3}$$

$$= \frac{3(255)}{-3}$$

$$= -255$$

