Geometric Progressions Ex 20.4 Q 11

$$
\begin{aligned}
0.\bar{3} &= 0.3333\ldots \\
&= 0.3 + 0.03 + 0.003 + \ldots \\
&= \frac{3}{10} + \frac{3}{10^2} + \frac{3}{10^3} + \ldots \\
&= \frac{3}{10}\left(1 + \frac{1}{10} + \frac{1}{10^2} + \ldots\right) \\
&= \frac{3}{10}\left(\frac{1}{1 - \frac{1}{10}}\right) \\
&= \frac{3}{10} \times \frac{10}{9} \\
&= \frac{3}{9} \\
0.\bar{3} &= \frac{1}{3}
\end{aligned}
$$

$$
\begin{aligned}
0.\overline{231} &= 0.231231231\ldots \\
&= 0.231 + 0.000231 + 0.000000231 \\
&= \frac{231}{10^3} + \frac{231}{10^6} + \frac{231}{10^9} + \ldots \\
&= \frac{231}{10^3}\left(1 + \frac{1}{10^3} + \frac{1}{10^6} + \ldots\right) \\
&= \frac{231}{1000}\left(\frac{1}{1 - \frac{1}{1000}}\right) \\
0.\overline{231} &= \frac{231}{999}
\end{aligned}
$$

$$
\begin{aligned}
3.5\bar{2} &= 3 + 0.52222\ldots \\
&= 3 + 0.5 + 0.02 + 0.002 + 0.0002 + \ldots \\
&= 3.5 + \frac{2}{10^2} + \frac{2}{10^3} + \frac{2}{10^4} + \ldots \\
&= 3.5 + \frac{2}{10^2}\left(1 + \frac{1}{10} + \frac{1}{10^2} + \ldots\right) \\
&= \frac{35}{10} + \frac{2}{100}\left(\frac{1}{1 - \frac{1}{10}}\right) \\
&= \frac{35}{10} + \frac{2}{100} \times \left(\frac{10}{9}\right) \\
&= \frac{35}{10} + \frac{2}{90} \\
&= \frac{315 + 2}{90} \\
3.5\bar{2} &= \frac{317}{90}
\end{aligned}
$$

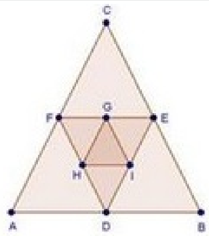
The rational number can be written as:

$$0.6\overline{8} = 0.6 + 0.08 + 0.008 + 0.0008 + \cdots\infty$$
$$= \frac{3}{5} + 8[0.01 + 0.001 + 0.0001 + \cdots\infty]$$
$$= \frac{3}{5} + 8\left[\frac{1}{100} + \frac{1}{1000} + \cdots\infty\right]$$

This is an infinite GP with first term $\frac{1}{100}$ and common ratio $\frac{1}{10}$

$$= \frac{3}{5} + 8 \cdot \frac{1}{100} \cdot \frac{1}{1 - \frac{1}{10}}$$
$$= \frac{3}{5} + \frac{4}{45}$$
$$= \frac{31}{45}$$

Geometric Progressions Ex 20.4 Q12



Side of triangle $= 18$ cm.

$AD = BD = 9$ cm.

$DE = BD = 9$ cm.

$GI = IF = \frac{9}{2}$ cm.

Sides of the triangles are $18, 9, \frac{9}{2}$.........

(i) sum of perimeters of the equilateral triangle $= \left(54 + 27 + \frac{27}{2} + \ldots\ldots\right)$

$$= \frac{54}{1 - \frac{1}{2}}$$
$$= 54 \times 2$$

Perimeter $= 108$ cm.

(ii) sum of area of equilateral triangle

$$= \left[\frac{\sqrt{3}}{4}(18)^2 + \frac{\sqrt{3}}{4}(9)^2 + \frac{\sqrt{3}}{4}\left(\frac{9}{2}\right)^2 + \ldots\ldots\right]$$
$$= \frac{\sqrt{3}}{4}\left[324 + 81 + \frac{81}{4} + \ldots\ldots\right]$$
$$= \frac{\sqrt{3}}{4}\left[\frac{324}{1 - \frac{1}{4}}\right]$$
$$= \frac{\sqrt{3}}{4}\left[\frac{324 \times 4}{3}\right]$$
$$= \sqrt{3}(108)$$

Geometric Progressions Ex 20.4 Q13

$$S = a + ar + ar^2 + ar^3 + \ldots\ldots.$$

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

$$S_1 = a^2 + a^2r^2 + a^2r^4 + a^2r^6 \ldots\ldots$$

$$S_1 = \frac{a^2}{1-r^2} - - - - - (2)$$

$$S^2 = \frac{a^2}{(1-r)^2}$$

$$S^2 = \frac{S_1(1-r^2)}{(1-r^2)}$$

$$(1-r)S^2 = S_1(1+r)$$

$$S^2 - S^2r = S_1 + S_1r$$

$$S_1r + S^2r = S^2 - S_1$$

$$r = \frac{S^2 - S_1}{S_1 + S^2}$$

Put r in equation (1)

$$S(1-r) = a$$

$$a = S\left[1 - \frac{S^2 - S_1}{S^2 + S_1}\right]$$

$$a = S\left[\frac{S^2 + S_1 - S^2 + S_1}{S^2 + S_1}\right]$$

$$a = \frac{2SS_1}{S^2 + S_1}$$

RD Sharma Class 11 Solutions

*********** END **********