EXERCISE 1.4

Express $0.6+0.\overline{7}+0.4\overline{7}$ in the form p/q, where *p* and *q* are integers and *q* ≠ 0. Solution:

Let x = 0.6
Multiply by 10 on L.H.S and R.H.S,
10x = 6
x = 6/10
x = 3/5
So, the p/q form of 0.6 = 3/5
Let y = 0.77777…
Multiply by 10 on L.H.S and R.H.S,
10y = 7.7777…
10y – y = 7.7777777……. – 0.7777777…………..
9y = 7
y = 7/9
So the p/q form of 0.7777… = 7/9
Let z = 0.47777…
Multiply by 10 on L.H.S and R.H.S,
10z = 4.7777…
10z – z = 4.7777777… – 0.47777777…
9z = 4.2999
z ≈ 4.3/9
z = 43/90
So the p/q form of 0.4777… = 43/90
Therefore, p/q form of $0.6+0.\overline{7}+0.4\overline{7}$ is,
x+y+z = 3/5 + 7/9 + 43/90
= (54 + 70 + 43)/90
= 167/90

1. Simplify:

$$\frac{7\sqrt{3}}{\sqrt{10}+\sqrt{3}}-\frac{2\sqrt{5}}{\sqrt{6}+5}-\frac{3\sqrt{2}}{\sqrt{15}+3\sqrt{2}}$$

Solution:

$$\frac{7\sqrt{3}}{\sqrt{10}+\sqrt{3}}-\frac{2\sqrt{5}}{\sqrt{6}+5}-\frac{3\sqrt{2}}{\sqrt{15}+3\sqrt{2}}$$

Let us first make the denominators same,

To make the denominators same, Cross multiply the first and second terms of the equation.

$$\Rightarrow \frac{7\sqrt{3} \times (\sqrt{6} + \sqrt{5}) - (\sqrt{10} + \sqrt{3}) \times 2\sqrt{5}}{(\sqrt{10} + \sqrt{3}) \times (\sqrt{6} + \sqrt{5})} - \frac{3\sqrt{2}}{\sqrt{15} + 3\sqrt{2}}$$

$$\Rightarrow \frac{7\sqrt{3} \times \sqrt{6} + 7\sqrt{3} \times \sqrt{5} - (2\sqrt{5} \times \sqrt{10} + 2\sqrt{5} \times \sqrt{3})}{(\sqrt{10} + \sqrt{3}) \times (\sqrt{6} + \sqrt{5})} - \frac{3\sqrt{2}}{\sqrt{15} + 3\sqrt{2}}$$

$$\Rightarrow \frac{21\sqrt{2} + 7\sqrt{15} - 10\sqrt{2} - 2\sqrt{15}}{2\sqrt{15} + 5\sqrt{2} + 3\sqrt{2} + \sqrt{15}} - \frac{3\sqrt{2}}{\sqrt{15} + 3\sqrt{2}}$$

$$\Rightarrow \frac{11\sqrt{2} - 5\sqrt{15}}{3\sqrt{15} + 8\sqrt{2}} - \frac{3\sqrt{2}}{\sqrt{15} + 3\sqrt{2}}$$

Now, again make the denominators same by cross-multiplying the obtained term and the third term of the given equation in the question.

$$\Rightarrow \frac{(11\sqrt{2} - 5\sqrt{15}) \times (\sqrt{15} + 3\sqrt{2}) - (3\sqrt{15} + 8\sqrt{2}) \times (3\sqrt{2})}{(3\sqrt{15} + 8\sqrt{2}) \times \sqrt{15} + 3\sqrt{2}}$$

$$\Rightarrow \frac{11\sqrt{30} + 66 - 75 - 15\sqrt{30} - 9\sqrt{30} - 48}{45 + 9\sqrt{30} + 8\sqrt{30} + 48}$$

$$\Rightarrow \frac{-13\sqrt{30} - 57}{17\sqrt{30} + 93}$$

2. If √2 =1.414, √3 =1.732, then find the value of

$$\frac{4}{3\sqrt{3} - 2\sqrt{2}} + \frac{3}{3\sqrt{3} + 2\sqrt{2}}$$

Solution:

$$\frac{4}{3\sqrt{3} - 2\sqrt{2}} + \frac{3}{3\sqrt{3} + 2\sqrt{2}}$$

Let us first make the denominators same by cross multiplication method

$$\Rightarrow \frac{4 \times (3\sqrt{3} + 2\sqrt{2}) + 3 \times (3\sqrt{3} - 2\sqrt{2})}{(3\sqrt{3} - 2\sqrt{2}) \times (3\sqrt{3} + 2\sqrt{2})}$$

Observing the denominator, we can say that,
Denominators is of the form,
$(a + b) \times (a - b) = (a^2 - b^2)$
Here $a = 3\sqrt{3}$
$b = 2\sqrt{2}$

$a^2 = (3\sqrt{3})^2 = 27$

$b^2 = (2\sqrt{2})^2 = 8$

$$\Rightarrow \frac{12\sqrt{3} + 8\sqrt{2} + 9\sqrt{3} - 6\sqrt{2}}{27 - 8}$$

$$\Rightarrow \frac{21\sqrt{3} + 2\sqrt{2}}{19}$$