Exercise 1E

Question 10:

Consider the given equation

$$\frac{\sqrt{3}+1}{\sqrt{3}-1} = a + b\sqrt{3}$$

For rationalising the denominator of a number, we multiply its numerator and denominator by its rationalising factor.

If a and b are integers, then $(a+\sqrt{b})$ and $(a-\sqrt{b})$ are rationalising factor of each other, as $(a+\sqrt{b})(a-\sqrt{b}) = (a^2 - b)$, which is rational.

Let us rationalise the denominator of the Left hand side.

$$\Rightarrow \frac{\sqrt{3}+1}{\sqrt{3}-1} \times \frac{\sqrt{3}+1}{\sqrt{3}+1} = a + b\sqrt{3}$$

$$\Rightarrow \frac{(\sqrt{3})^2 + 2(\sqrt{3})(1) + (1)^2}{(\sqrt{3})^2 - (1)^2} = a + b\sqrt{3}$$

$$\Rightarrow \frac{3 + 2\sqrt{3} + 1}{3-1} = a + b\sqrt{3}$$

$$\Rightarrow \frac{2(2+\sqrt{3})}{2} = a + b\sqrt{3}$$

$$\Rightarrow 2 + \sqrt{3} = a + b\sqrt{3}$$

$\therefore a = 2$ and $b = 1$.

Question 11:

Consider the given equation

$$\frac{3+\sqrt{2}}{3-\sqrt{2}} = a + b\sqrt{2}$$

For rationalising the denominator of a number, we multiply its numerator and denominator by its rationalising factor.

If a and b are integers, then $(a+\sqrt{b})$ and $(a-\sqrt{b})$ are rationalising factor of each other, as $(a+\sqrt{b})(a-\sqrt{b}) = (a^2 - b)$, which is rational.

Let us rationalise the denominator of the Left hand side.

$$\Rightarrow \frac{3+\sqrt{2}}{3-\sqrt{2}} \times \frac{3+\sqrt{2}}{3+\sqrt{2}} = a + b\sqrt{2}$$

$$\Rightarrow \frac{(3+\sqrt{2})^2}{(3)^2 - (\sqrt{2})^2} = a + b\sqrt{2}$$

$$\Rightarrow \frac{(3)^2 + 2(3)(\sqrt{2}) + (\sqrt{2})^2}{9-2} = a + b\sqrt{2}$$

$$\Rightarrow \frac{11+6\sqrt{2}}{7} = a + b\sqrt{2}$$

$$\Rightarrow \frac{11}{7} + \frac{6\sqrt{2}}{7} = a + b\sqrt{2}$$

$\therefore a = \frac{11}{7}$ and $b = \frac{6}{7}$.

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