

Exercise 1E

Question 8:

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

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

$$\begin{split} \frac{\sqrt{3}-1}{\sqrt{3}+1} &= \frac{\sqrt{3}-1}{\sqrt{3}+1} \times \frac{\sqrt{3}-1}{\sqrt{3}-1} \\ &= \frac{\left(\sqrt{3}-1\right)^2}{\left(\sqrt{3}\right)^2-\left(1\right)^2} \\ &= \frac{\left(\sqrt{3}\right)^2-2\left(\sqrt{3}\right)\left(1\right)+1^2}{3-1} \\ &= \frac{3-2\sqrt{3}+1}{2} = \frac{4-2\sqrt{3}}{2} \\ &= \frac{2\left(2-\sqrt{3}\right)}{2} = \left(2-\sqrt{3}\right). \end{split}$$

Question 9:

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

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

Therefore, we have,
$$\frac{3 - 2\sqrt{2}}{3 + 2\sqrt{2}} = \frac{3 - 2\sqrt{2}}{3 + 2\sqrt{2}} \times \frac{3 - 2\sqrt{2}}{3 - 2\sqrt{2}}$$
$$= \frac{\left(3 - 2\sqrt{2}\right)^2}{\left(3 + 2\sqrt{2}\right)\left(3 - 2\sqrt{2}\right)}$$
$$= \frac{9 - 12\sqrt{2} + 8}{\left(3\right)^2 - \left(2\sqrt{2}\right)^2} = \frac{17 - 12\sqrt{2}}{9 - 8}$$
$$= \frac{17 - 12\sqrt{2}}{1} = 17 - 12\sqrt{2}.$$

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