



Rationalisation Ex 3.1 Q4

Answer :

(i) We know that $(a + b)^2 = a^2 + b^2 + 2ab$. We will use this property to simplify the expression $(\sqrt{3} + \sqrt{7})^2$.

$$\begin{aligned}\therefore (\sqrt{3} + \sqrt{7})^2 &= (\sqrt{3})^2 + (\sqrt{7})^2 + 2 \times \sqrt{3} \times \sqrt{7} \\ &= \sqrt{3} \times \sqrt{3} + \sqrt{7} \times \sqrt{7} + 2 \times \sqrt{3} \times \sqrt{7} \\ &= \sqrt{3 \times 3} + \sqrt{7 \times 7} + 2 \times \sqrt{3 \times 7} \\ &= (3^2)^{\frac{1}{2}} + (7^2)^{\frac{1}{2}} + 2\sqrt{21} \\ &= 3^1 + 7^1 + 2\sqrt{21} \\ &= 10 + 2\sqrt{21}\end{aligned}$$

Hence the value of expression is $10 + 2\sqrt{21}$

(ii) We know that $(a - b)^2 = a^2 + b^2 - 2ab$. We will use this property to simplify the expression $(\sqrt{5} - \sqrt{3})^2$.

$$\begin{aligned}\therefore (\sqrt{5} - \sqrt{3})^2 &= (\sqrt{5})^2 + (\sqrt{3})^2 - 2 \times \sqrt{5} \times \sqrt{3} \\ &= \sqrt{5} \times \sqrt{5} + \sqrt{3} \times \sqrt{3} - 2 \times \sqrt{5} \times \sqrt{3} \\ &= \sqrt{5 \times 5} + \sqrt{3 \times 3} - 2 \times \sqrt{5 \times 3} \\ &= (5^2)^{\frac{1}{2}} + (3^2)^{\frac{1}{2}} - 2\sqrt{15} \\ &= 5^1 + 3^1 - 2\sqrt{15} \\ &= 8 - 2\sqrt{15}\end{aligned}$$

Hence the value of expression is $8 - 2\sqrt{15}$

(iii) We know that $(a + b)^2 = a^2 + b^2 + 2ab$. We will use this property to simplify the expression $(2\sqrt{5} + 3\sqrt{2})^2$.

$$\begin{aligned}\therefore (2\sqrt{5} + 3\sqrt{2})^2 &= (2\sqrt{5})^2 + (3\sqrt{2})^2 + 2 \times 2\sqrt{5} \times 3\sqrt{2} \\ &= 2\sqrt{5} \times 2\sqrt{5} + 3\sqrt{2} \times 3\sqrt{2} + 2 \times 2\sqrt{5} \times 3\sqrt{2} \\ &= 2 \times 2\sqrt{5 \times 5} + 3 \times 3\sqrt{2 \times 2} + 2 \times 2 \times 3\sqrt{5 \times 2} \\ &= 4(5^2)^{\frac{1}{2}} + 9(2^2)^{\frac{1}{2}} + 12\sqrt{10} \\ &= 4 \times 5^1 + 9 \times 2^1 + 12\sqrt{10} \\ &= 20 + 18 + 12\sqrt{10} \\ &= 38 + 12\sqrt{10}\end{aligned}$$

Hence the value of expression is $38 + 12\sqrt{10}$.

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