
Exercise 1D

Answer.1. ADD

- i) $(2\sqrt{3} - 5\sqrt{2}) + (\sqrt{3} + 2\sqrt{2}) = (2\sqrt{2} - 5\sqrt{2}) + (2\sqrt{3} + \sqrt{3})$
 $= \sqrt{2}(2 - 5) + \sqrt{3}(2 + 1)$
 $= (-3\sqrt{2}) + 3\sqrt{3}$
 $= 3(\sqrt{3} - \sqrt{2})$
- ii) $(2\sqrt{2} + 5\sqrt{3} - 7\sqrt{5}) + (3\sqrt{3} - \sqrt{2} + \sqrt{5}) = (2\sqrt{2} - \sqrt{2} + 5\sqrt{3} + 3\sqrt{3} + \sqrt{5} - 7\sqrt{5})$
 $= (\sqrt{2}(2 - 1) + \sqrt{3}(5 + 3) + \sqrt{5}(1 - 7))$
 $= \sqrt{2} + 8\sqrt{3} - 6\sqrt{5}$
- iii) $\left(\frac{2}{3}\sqrt{7} - \frac{1}{2}\sqrt{2} + 6\sqrt{11}\right) + \left(\frac{1}{3}\sqrt{7} + \frac{3}{2}\sqrt{2} - \sqrt{11}\right) =$
 $\left(\frac{2}{3}\sqrt{7} + \frac{1}{3}\sqrt{7} + \frac{3}{2}\sqrt{2} - \frac{1}{2}\sqrt{2} + 6\sqrt{11} - \sqrt{11}\right)$
 $= \left(\sqrt{7}\left(\frac{2}{3} + \frac{1}{3}\right) + \sqrt{2}\left(\frac{3}{2} - \frac{1}{2}\right) + \sqrt{11}(6 - 1)\right)$
 $= (\sqrt{7} + \sqrt{2} + 5\sqrt{11})$

Answer.2. MULTIPLY

- i) $(3\sqrt{5}) \times (2\sqrt{5}) = (3 \times 2 \times \sqrt{5} \times \sqrt{5})$
 $= (6 \times \sqrt{25})$
 $= (6 \times 5) = 30 \quad \{\sqrt{25} = 5\}$
- ii) $(6\sqrt{15}) \times 4(\sqrt{3}) = (6 \times 4 \times \sqrt{15} \times \sqrt{3})$
 $= (24 \times \sqrt{5} \times \sqrt{3} \times \sqrt{3})\{\sqrt{15} = \sqrt{5} \times \sqrt{3}\}$
 $= (24 \times 3 \times \sqrt{5})\{\sqrt{3} \times \sqrt{3} = \sqrt{9} = 3\}$
 $= 72\sqrt{5}$
- iii) $(2\sqrt{6}) \times (3\sqrt{3}) = (2 \times 3 \times \sqrt{6} \times \sqrt{3})$
 $= (6 \times \sqrt{2} \times \sqrt{3} \times \sqrt{3})\{\sqrt{6} = \sqrt{3} \times \sqrt{2}\}$
 $= (6 \times 3 \times \sqrt{2})\{\sqrt{3} \times \sqrt{3} = \sqrt{9} = 3\}$
 $= 18\sqrt{2}$
- iv) $(3\sqrt{8}) \times (3\sqrt{2}) = (3 \times 3 \times \sqrt{8} \times \sqrt{2})$
 $= (9 \times \sqrt{16})$
 $= (9 \times 4)\{\sqrt{16} = 4\}$
 $= 36$
- v) $(\sqrt{10}) \times (\sqrt{40}) = (\sqrt{2} \times \sqrt{5}) \times (\sqrt{2} \times \sqrt{2} \times \sqrt{2} \times \sqrt{5})$

$$\begin{aligned}
 &= ((\sqrt{2} \times \sqrt{2}) \times (\sqrt{2} \times \sqrt{2}) \times (\sqrt{5} \times \sqrt{5})) \\
 &= (2 \times 2 \times 5) \{ \sqrt{2} \times \sqrt{2} = \sqrt{4} = 2, \sqrt{5} \times \sqrt{5} = \sqrt{25} = 5 \} \\
 &= 20
 \end{aligned}$$

$$\begin{aligned}
 \text{vi)} \quad (3\sqrt{28}) \times (2\sqrt{7}) &= (3 \times 2 \times \sqrt{28} \times \sqrt{7}) \\
 &= (6 \times \sqrt{196}) \\
 &= (6 \times 14) \{ \sqrt{196} = 14 \} \\
 &= 84
 \end{aligned}$$

Answer.3. DIVIDE

$$\begin{aligned}
 \text{i)} \quad (16\sqrt{6}) \div (4\sqrt{2}) &= \frac{16\sqrt{6}}{4\sqrt{2}} = \frac{16 \times \sqrt{2} \times \sqrt{3}}{4 \times \sqrt{2}} \{ \sqrt{6} = \sqrt{2} \times \sqrt{3} \} \\
 &= 4\sqrt{3}
 \end{aligned}$$

$$\begin{aligned}
 \text{ii)} \quad (12\sqrt{15}) \div (4\sqrt{3}) &= \frac{12\sqrt{15}}{4\sqrt{3}} = \frac{12 \times \sqrt{3} \times \sqrt{5}}{4 \times \sqrt{3}} \{ \sqrt{15} = \sqrt{3} \times \sqrt{5} \} \\
 &= 4\sqrt{3}
 \end{aligned}$$

$$\begin{aligned}
 \text{iii)} \quad (18\sqrt{21}) \div (6\sqrt{7}) &= \frac{18\sqrt{21}}{6\sqrt{7}} = \frac{18 \times \sqrt{7} \times \sqrt{3}}{6 \times \sqrt{7}} \{ \sqrt{21} = \sqrt{7} \times \sqrt{3} \} \\
 &= 3\sqrt{3}
 \end{aligned}$$

Answer.4. Simplify

$$\begin{aligned}
 \text{i)} \quad (3 - \sqrt{11})(3 + \sqrt{11}) &= 3 \times 3 + 3 \times \sqrt{11} - \sqrt{11} \times 3 - \sqrt{11} \times \sqrt{11} \\
 &= 9 + 3\sqrt{11} - 3\sqrt{11} - 11 \{ \sqrt{11} \times \sqrt{11} = \sqrt{121} = 11 \} \\
 &= -2
 \end{aligned}$$

$$\begin{aligned}
 \text{ii)} \quad (-3 + \sqrt{5})(-3 - \sqrt{5}) &= (-3 \times -3 + (-3) \times \sqrt{5} - \sqrt{5} \times -3 - \sqrt{5} \times \sqrt{5}) \\
 &= (9 - 3\sqrt{5} + 3\sqrt{5} - 5) \{ \sqrt{5} \times \sqrt{5} = \sqrt{25} = 5 \} \\
 &= 4
 \end{aligned}$$

$$\begin{aligned}
 \text{iii)} \quad (3 - \sqrt{3})^2 &= (a - b)^2 = a^2 + b^2 - 2ab \\
 \text{Here, } a &= 3 \text{ and } b = \sqrt{3} \\
 &= 3^2 + (\sqrt{3})^2 - 2(3 \times \sqrt{3}) \\
 &= 9 + 3 - 6\sqrt{3} \{ \sqrt{3} \times \sqrt{3} = \sqrt{9} = 3 \} \\
 &= 12 - 6\sqrt{3}
 \end{aligned}$$

$$\text{iv) } (\sqrt{5} - \sqrt{3})^2 = (a - b)^2 = a^2 + b^2 - 2ab$$

Here, $a = \sqrt{5}$ and $b = \sqrt{3}$

$$\begin{aligned} &= (\sqrt{5})^2 + (\sqrt{3})^2 - 2(\sqrt{5} \times \sqrt{3}) \\ &= 5 + 3 - 2\sqrt{15} \{ \sqrt{5} \times \sqrt{5} = \sqrt{25} = 5, \sqrt{3} \times \sqrt{3} = \sqrt{3} = 3 \} \\ &= 8 - 2\sqrt{15} \end{aligned}$$

$$\text{v) } (5 + \sqrt{7})(2 + \sqrt{5}) = (5 \times 2 + 5 \times \sqrt{5} + \sqrt{7} \times 2 + \sqrt{7} \times \sqrt{5}) \\ = (10 + 5\sqrt{5} + 2\sqrt{7} + \sqrt{35})$$

$$\text{vi) } (\sqrt{5} - \sqrt{2})(\sqrt{2} - \sqrt{3}) = (\sqrt{5} \times \sqrt{2} - \sqrt{5} \times \sqrt{3} - (-\sqrt{2}) \times \sqrt{2} - (-\sqrt{2}) \times \sqrt{3}) \\ = (\sqrt{10} - \sqrt{15} - 2 + \sqrt{6}) \{ \sqrt{2} \times \sqrt{2} = \sqrt{4} = 2 \}$$

$$\begin{aligned} \text{Answer.5. } (3 + \sqrt{3})(2 + \sqrt{2})^2 &= (3 + \sqrt{3})(2^2 + \sqrt{2}^2 + 2(2 \times \sqrt{2})) \\ &= (3 + \sqrt{3})(4 + 2 + 4\sqrt{2}) \{ \sqrt{2} \times \sqrt{2} = \sqrt{4} = 2 \} \\ &= (3 + \sqrt{3})(6 + 4\sqrt{2}) \\ &= (3 \times 6 + 3 \times 4\sqrt{2} + \sqrt{3} \times 6 + \sqrt{3} \times 4\sqrt{2}) \\ &= (18 + 12\sqrt{2} + 6\sqrt{3} + 4\sqrt{6}) \end{aligned}$$

Answer.6.

$$\begin{aligned} \text{i) } (5 - \sqrt{5})(5 + \sqrt{5}) &= (5^2 - \sqrt{5}^2) \{ (a + b)(a - b) = (a^2 - b^2) \} \\ &= (25 - 5) = 5 \{ \sqrt{5} \times \sqrt{5} = \sqrt{25} = 5 \} \end{aligned}$$

It is Rational number.

$$\begin{aligned} \text{ii) } (\sqrt{3} + 2)^2 &= (a + b)^2 = a^2 + b^2 + 2ab \\ &= \sqrt{3}^2 + 2^2 + 2(\sqrt{3} \times 2) \\ &= 3 + 2 + 4\sqrt{3} \{ \sqrt{2} \times \sqrt{2} = \sqrt{4} = 2 \} \\ &= 6 + 4\sqrt{3} \end{aligned}$$

It is Irrational number.

$$\begin{aligned} \text{iii) } \frac{2\sqrt{13}}{3\sqrt{52} - 4\sqrt{117}} &= \frac{2\sqrt{13}}{3 \times \sqrt{4} \times \sqrt{13} - 4 \times \sqrt{9} \times \sqrt{13}} \\ &= \frac{2\sqrt{13}}{3 \times 2 \times \sqrt{13} - 4 \times 3 \times \sqrt{13}} = \frac{2\sqrt{13}}{\sqrt{13}(6 - 12)} = \frac{2}{-6} = -0.\bar{3} \end{aligned}$$

It is Rational number.

$$\begin{aligned} \text{iv) } \sqrt{8} + 4\sqrt{32} - 6\sqrt{2} &= \sqrt{2} \times \sqrt{4} + 4 \times \sqrt{4} \times \sqrt{4} \times \sqrt{2} - 6\sqrt{2} \\ &= 2\sqrt{2} + 16\sqrt{2} - 6\sqrt{2} \end{aligned}$$

$$= \sqrt{2}(2 + 16 - 6) = 12\sqrt{2}$$

It is irrational number.

Answer.7.

$$\begin{aligned} \text{i)} \quad (5 + \sqrt{11})(5 - \sqrt{11}) &= (a^2 - b^2) = (5^2 - \sqrt{11}^2) \\ &= (25 - 11)\{\sqrt{11} \times \sqrt{11} = \sqrt{121} = 11\} \end{aligned}$$

= 14 chocolates

- ii) She wanted to make others children happy by distributing chocolates and she has caring nature.

Answer.8,

$$\begin{aligned} \text{i)} \quad (3\sqrt{45} - \sqrt{125} + \sqrt{200} - \sqrt{50}) &= (3 \times \sqrt{9} \times \sqrt{5} - \sqrt{25} \times \sqrt{5} + \sqrt{2} \times \sqrt{25} \times \sqrt{4} - \sqrt{25} \times \sqrt{2}) \\ &= (3 \times 3 \times \sqrt{5} - 5\sqrt{5} + 5 \times 2\sqrt{2} - 5\sqrt{2}) \\ &= (9\sqrt{5} - 5\sqrt{5} + 10\sqrt{2} - 5\sqrt{2}) \\ &= (4\sqrt{5} + 5\sqrt{2}) \end{aligned}$$

$$\begin{aligned} \text{ii)} \quad \left(\frac{2\sqrt{3}}{\sqrt{6}} - \frac{3\sqrt{140}}{\sqrt{28}} + \frac{\sqrt{55}}{\sqrt{99}}\right) &= \left(\frac{2 \times \sqrt{2} \times \sqrt{3} \times \sqrt{10}}{\sqrt{2} \times \sqrt{3}} - \frac{3 \times \sqrt{4} \times \sqrt{7} \times \sqrt{5}}{\sqrt{4} \times \sqrt{7}} + \frac{\sqrt{5} \times \sqrt{11}}{\sqrt{9} \times \sqrt{11}}\right) \\ &= \left(2\sqrt{5} - 3\sqrt{5} + \frac{\sqrt{5}}{3}\right) = \left(-\sqrt{5} + \frac{\sqrt{5}}{3}\right) \end{aligned}$$

Make denominator same, multiply it by 3

$$= \left(\frac{-3\sqrt{5} + \sqrt{5}}{3}\right) = -\frac{2}{3}$$

$$\begin{aligned} \text{iii)} \quad \sqrt{72} + \sqrt{800} - \sqrt{18} &= (\sqrt{2} \times \sqrt{4} \times \sqrt{9} + \sqrt{2} \times \sqrt{16} \times \sqrt{25} - \sqrt{2} \times \sqrt{9}) \\ &= (2 \times 3 \times \sqrt{2} + 4 \times 5\sqrt{2} - 3\sqrt{2}) \\ &= (6\sqrt{2} + 20\sqrt{2} - 3\sqrt{2}) \\ &= 23\sqrt{2} \end{aligned}$$