

SURDS : 1 : SOLUTIONS

$$\begin{aligned} 1) \ a) \quad & \sqrt{18} \\ &= \sqrt{9} \sqrt{2} \\ &= 3\sqrt{2} \end{aligned}$$

$$\begin{aligned} b) \quad & \sqrt{300} \\ &= \sqrt{100} \sqrt{3} \\ &= 10\sqrt{3} \end{aligned}$$

$$\begin{aligned} c) \quad & \sqrt{288} \\ &= \sqrt{144} \sqrt{2} \\ &= 12\sqrt{2} \end{aligned}$$

$$\begin{aligned} d) \quad & \sqrt{75} \\ &= \sqrt{25} \sqrt{3} \\ &= 5\sqrt{3} \end{aligned}$$

$$\begin{aligned} 2) \ a) \quad & \frac{1}{\sqrt{2}} \\ &= \frac{1}{\sqrt{2}} \times \frac{\sqrt{2}}{\sqrt{2}} \\ &= \frac{\sqrt{2}}{2} \end{aligned}$$

$$\begin{aligned} b) \quad & \frac{3}{\sqrt{7}} \\ &= \frac{3}{\sqrt{7}} \times \frac{\sqrt{7}}{\sqrt{7}} \\ &= \frac{3\sqrt{7}}{7} \end{aligned}$$

$$\begin{aligned} c) \quad & \frac{2}{5\sqrt{2}} \\ &= \frac{2}{5\sqrt{2}} \times \frac{\sqrt{2}}{\sqrt{2}} \\ &= \frac{2\sqrt{2}}{10} \\ &= \frac{\sqrt{2}}{5} \end{aligned}$$

$$\begin{aligned} d) \quad & \frac{6}{5\sqrt{3}} \\ &= \frac{6}{5\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}} \\ &= \frac{6\sqrt{3}}{15} \\ &= \frac{2\sqrt{3}}{5} \end{aligned}$$

$$\begin{aligned} 3) \ a) \quad & (\sqrt{2}+1)(\sqrt{2}-1) \\ &= 2 - \sqrt{2} + \sqrt{2} - 1 \\ &= 1 \end{aligned}$$

$$\begin{aligned} b) \quad & (5-2\sqrt{3})(5+2\sqrt{3}) \\ &= 25 + 10\sqrt{3} - 10\sqrt{3} - 12 \\ &= 13 \end{aligned}$$

$$\begin{aligned} 4) \ a) \quad & \sqrt{3} + 2\sqrt{3} - 7\sqrt{3} \\ &= -4\sqrt{3} \end{aligned}$$

$$\begin{aligned} b) \quad & \sqrt{12} + \sqrt{3} \\ &= 2\sqrt{3} + \sqrt{3} \\ &= 3\sqrt{3} \end{aligned}$$

$$\begin{aligned} c) \quad & \sqrt{8} - \sqrt{2} \\ &= 2\sqrt{2} - \sqrt{2} \\ &= \sqrt{2} \end{aligned}$$

$$\begin{aligned} d) \quad & \sqrt{18} - \sqrt{8} \\ &= 3\sqrt{2} - 2\sqrt{2} \\ &= \sqrt{2} \end{aligned}$$

$$\begin{aligned} e) \quad & \frac{6}{\sqrt{2}} - \frac{16}{\sqrt{8}} \\ &= \frac{6\sqrt{2}}{2} - \frac{16\sqrt{8}}{8} \\ &= 3\sqrt{2} - 2\sqrt{8} \\ &= 3\sqrt{2} - 2(2\sqrt{2}) \\ &= 3\sqrt{2} - 4\sqrt{2} \\ &= -\sqrt{2} \end{aligned}$$

$$f) \frac{5}{2\sqrt{3}} + \sqrt{12}$$

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

$$= \frac{5\sqrt{3}}{6} + \frac{12\sqrt{3}}{6}$$

$$= \frac{17\sqrt{3}}{6}$$

$$g) \begin{aligned} & 3\sqrt{x} - 5\sqrt{x} \\ &= -2\sqrt{x} \end{aligned}$$

$$5) \quad a) \frac{1}{(1+\sqrt{3})} \times \frac{(1-\sqrt{3})}{(1-\sqrt{3})}$$

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

$$= \frac{1-\sqrt{3}}{-2}$$

$$= \frac{\sqrt{3}-1}{2}$$

$$b) \frac{2}{(\sqrt{2}-1)} \times \frac{(\sqrt{2}+1)}{(\sqrt{2}+1)}$$

$$= \frac{2(\sqrt{2}+1)}{2+\sqrt{2}-\sqrt{2}-1}$$

$$= \frac{2\sqrt{2}+2}{1}$$

$$= 2\sqrt{2}+2$$

$$c) \frac{-3}{(2\sqrt{3}+5)} \times \frac{(2\sqrt{3}-5)}{(2\sqrt{3}-5)}$$

$$= \frac{-3(2\sqrt{3}-5)}{12-10\sqrt{3}+10\sqrt{3}-25}$$

$$= \frac{-3(2\sqrt{3}-5)}{-13}$$

$$= \frac{3(2\sqrt{3}-5)}{13}$$

$$\text{OR} \quad \frac{6\sqrt{3}}{13} - \frac{15}{13}$$

$$d) \frac{4}{(5-3\sqrt{2})} \times \frac{(5+3\sqrt{2})}{(5+3\sqrt{2})}$$

$$= \frac{4(5+3\sqrt{2})}{25+15\sqrt{2}-15\sqrt{2}-18}$$

$$= \frac{4(5+3\sqrt{2})}{7}$$

$$\text{OR} \quad \frac{20}{7} + \frac{12\sqrt{2}}{7}$$

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

$$= \frac{2(\sqrt{2}-\sqrt{3})}{2-\sqrt{6}+\sqrt{6}-3}$$

$$= \frac{2(\sqrt{2}-\sqrt{3})}{-1}$$

$$= -2(\sqrt{2}-\sqrt{3})$$

$$= 2(\sqrt{3}-\sqrt{2})$$

$$= 2\sqrt{3}-2\sqrt{2}$$

$$f) \frac{\sqrt{5}-\sqrt{3}}{\sqrt{3}}$$

$$= \frac{(\sqrt{5}-\sqrt{3})}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}}$$

$$= \frac{\sqrt{15}-3}{3}$$

OR

$$= \frac{-\sqrt{15}}{3} - 1$$