

Assignment 6 Roots and Radicals

1. $\sqrt{18}$

$$18 \Rightarrow 2 \times 3 \times 3$$

$$\therefore \sqrt{18} = \sqrt{2 \times 3^2} \Rightarrow 3\sqrt{2} //$$

2. $\sqrt{72}$

$$\sqrt{72} = \sqrt{2 \times 2 \times 2 \times 3 \times 3}$$

$$= \sqrt{2^3 \times 2 \times 3^2} \Rightarrow 2 \times 3 \sqrt{2}$$
$$= 6\sqrt{2} //$$

3. $\sqrt{96}$ $\Rightarrow \sqrt{2 \times 2 \times 2 \times 2 \times 2 \times 3}$

$$= \sqrt{2^4 \cdot 2 \cdot 3} \Rightarrow 4\sqrt{6}$$

4. $\sqrt{216}$

$$\sqrt{216} = \sqrt{2 \times 2 \times 2 \times 3 \times 3 \times 3}$$

$$= \sqrt{2^3 \times 2 \times 3^3} \Rightarrow 2 \times 3 \sqrt{2 \times 3}$$
$$\Rightarrow 6\sqrt{6}$$

5. $\sqrt{45} = \sqrt{3 \times 3 \times 5}$

$$= 3\sqrt{5}$$

6. $9\sqrt{245}$

$$245 = 7^2 \times 5$$

$$9\sqrt{7^2 \times 5} \Rightarrow 9 \times 7 \sqrt{5}$$
$$\Rightarrow 63\sqrt{5} //$$

7. $7\sqrt{600}$

$$\sqrt{600} \Rightarrow \sqrt{2^3 \times 3 \times 5^2} \Rightarrow 2 \times 5 \sqrt{2 \times 3}$$

$$= 7 \times 2 \times 5 \sqrt{6}$$

$$= 70\sqrt{6} //$$

$$8. 2\sqrt{200}$$

$$\begin{aligned} 2\sqrt{200} &= 2 \times \sqrt{2^3 \times 5^2} \\ &= 2 \times 2 \times 5 \sqrt{2} \\ &= 20\sqrt{2} \end{aligned}$$

Multiply and simplify the roots

$$9. \sqrt{5} * \sqrt{5}$$

$$\sqrt{5} \cdot \sqrt{5} = \sqrt{25} \Rightarrow 5$$

$$10. \sqrt{6} \cdot \sqrt{2}$$

$$\begin{aligned} &= \sqrt{2 \cdot 3} \cdot \sqrt{2} \Rightarrow \sqrt{2 \times 2 \times 3} \\ &= 2\sqrt{3} \end{aligned}$$

$$11. (-7 + \sqrt{3})(4 + \sqrt{3})$$

$$\Rightarrow (-7 \times 4) + (-7\sqrt{3}) + (4\sqrt{3}) + (\sqrt{3} \cdot \sqrt{3})$$

$$\Rightarrow -28 - 3\sqrt{3} + 3$$

$$\Rightarrow -25 - 3\sqrt{3}$$

$$12. (7 + \sqrt{6})(1 + \sqrt{6})$$

$$\Rightarrow (7 \times 1) + 7\sqrt{6} + 1\sqrt{6} + (\sqrt{6} \cdot \sqrt{6})$$

$$= 7 + 8\sqrt{6} + 6$$

$$= 13 + 8\sqrt{6}$$

Add or subtract roots

$$13. -5\sqrt{3} - 3\sqrt{3}$$

$$\text{add similar elements } -5\sqrt{3} - 3\sqrt{3} = -8\sqrt{3}$$

$$14. -4\sqrt{6} - \sqrt{6} \Rightarrow -5\sqrt{6}$$

$$15. -3\sqrt{27} - 3\sqrt{27} - 3\sqrt{27} = -9\sqrt{27}$$

$$16. -2\sqrt{45} - 3\sqrt{20} - 2\sqrt{6}$$

$$-2\sqrt{45} = -2 \times \sqrt{3^2 \times 5} \Rightarrow -6\sqrt{5}$$

$$-3\sqrt{20} = -3 \sqrt{2^2 \times 5} \Rightarrow -6\sqrt{5}$$

$$~~-2\sqrt{6}~~ \quad \square$$

$$\Rightarrow -6\sqrt{5} - 6\sqrt{5} - 2\sqrt{6}$$

Add similar elements.

$$\Rightarrow \underline{\underline{-12\sqrt{5} - 2\sqrt{6}}}$$