

## Section 1: Surds

### Solutions to Exercise level 1

$$1. \quad (i) \quad \sqrt{8} = \sqrt{4 \times 2} = \sqrt{4} \times \sqrt{2} = 2\sqrt{2}$$

$$(ii) \quad \sqrt{50} = \sqrt{25 \times 2} = \sqrt{25} \times \sqrt{2} = 5\sqrt{2}$$

$$(iii) \quad \sqrt{48} = \sqrt{16 \times 3} = \sqrt{16} \times \sqrt{3} = 4\sqrt{3}$$

$$(iv) \quad \sqrt{216} = \sqrt{36 \times 6} = \sqrt{36} \times \sqrt{6} = 6\sqrt{6}$$

$$(v) \quad \sqrt{63} = \sqrt{9 \times 7} = \sqrt{9} \times \sqrt{7} = 3\sqrt{7}$$

$$(vi) \quad \sqrt{300} = \sqrt{100 \times 3} = \sqrt{100} \times \sqrt{3} = 10\sqrt{3}$$

$$2. \quad (i) \quad (1 + \sqrt{2}) + (3 - 2\sqrt{2}) = 1 + 3 + \sqrt{2} - 2\sqrt{2} \\ = 4 - \sqrt{2}$$

$$(ii) \quad (5\sqrt{2} - 2\sqrt{3}) - (\sqrt{2} + 3\sqrt{3}) = 5\sqrt{2} - 2\sqrt{3} - \sqrt{2} - 3\sqrt{3} \\ = 4\sqrt{2} - 5\sqrt{3}$$

$$(iii) \quad 2(\sqrt{5} - 3\sqrt{3}) + 3(2\sqrt{5} + \sqrt{3}) = 2\sqrt{5} - 6\sqrt{3} + 6\sqrt{5} + 3\sqrt{3} \\ = 8\sqrt{5} - 3\sqrt{3}$$

$$(iv) \quad \sqrt{18} + \sqrt{72} - \sqrt{98} = \sqrt{9 \times 2} + \sqrt{36 \times 2} - \sqrt{49 \times 2} \\ = 3\sqrt{2} + 6\sqrt{2} - 7\sqrt{2} \\ = 2\sqrt{2}$$

$$3. \quad (i) \quad (1 + \sqrt{2})(3 - \sqrt{2}) = 3 - \sqrt{2} + 3\sqrt{2} - 2 \\ = 1 + 2\sqrt{2}$$

$$(ii) \quad (2 - \sqrt{3})(3 + 2\sqrt{3}) = 6 + 4\sqrt{3} - 3\sqrt{3} - 2 \times 3 \\ = \sqrt{3}$$

$$(iii) \quad (3 - 2\sqrt{5})(1 - 3\sqrt{5}) = 3 - 9\sqrt{5} - 2\sqrt{5} + 6 \times 5 \\ = 33 - 11\sqrt{5}$$

## Edexcel AS Maths Surds and indices 1 Exercise solutions

$$\begin{aligned}(\text{iv}) \quad (3-\sqrt{2})^2 &= (3-\sqrt{2})(3-\sqrt{2}) \\ &= 9-3\sqrt{2}-3\sqrt{2}+2 \\ &= 11-6\sqrt{2}\end{aligned}$$

$$4. \quad (\text{i}) \quad \frac{3}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}} = \frac{3\sqrt{3}}{3} = \sqrt{3}$$

$$(\text{ii}) \quad \frac{1}{\sqrt{5}} \times \frac{\sqrt{5}}{\sqrt{5}} = \frac{\sqrt{5}}{5}$$

$$(\text{iii}) \quad \frac{1+\sqrt{2}}{\sqrt{2}} \times \frac{\sqrt{2}}{\sqrt{2}} = \frac{(1+\sqrt{2})\sqrt{2}}{2} = \frac{\sqrt{2}+2}{2}$$

$$(\text{iv}) \quad \frac{1}{\sqrt{3}+1} \times \frac{\sqrt{3}-1}{\sqrt{3}-1} = \frac{\sqrt{3}-1}{(\sqrt{3}+1)(\sqrt{3}-1)} = \frac{\sqrt{3}-1}{3-1} = \frac{\sqrt{3}-1}{2}$$

$$(\text{v}) \quad \frac{\sqrt{2}}{2-\sqrt{2}} \times \frac{2+\sqrt{2}}{2+\sqrt{2}} = \frac{\sqrt{2}(2+\sqrt{2})}{(2-\sqrt{2})(2+\sqrt{2})} = \frac{2\sqrt{2}+2}{4-2} = \frac{2\sqrt{2}+2}{2} = \sqrt{2}+1$$