

## Exercise 2A

1d.  $\sqrt{16} = 4$   
 e.  $\sqrt{64} = 8$   
 f.  $\sqrt{36} = 6$   
 g.  $5 \times 3 = 15$   
 h.  $6 \times 5 = 30$   
 j.  $6 \times \sqrt{100} = 60$   
 l.  $9 \times 3 = 27$   
 n.  $2^4 \times 3 = 16 \times 3 = 48$   
 p.  $\sqrt[4]{625} = 5$

2d.  $\sqrt{32} = \sqrt{16 \times 2} = 4\sqrt{2}$   
 f.  $\sqrt{45} = \sqrt{9 \times 5} = 3\sqrt{5}$   
 h.  $\sqrt{50} = \sqrt{25 \times 2} = 5\sqrt{2}$   
 j.  $\sqrt{72} = \sqrt{36 \times 2} = 6\sqrt{2}$   
 l.  $\sqrt{675} = \sqrt{225 \times 3} = 15\sqrt{3}$

3d.  $\sqrt{32} - \sqrt{8} = 4\sqrt{2} - 2\sqrt{2} = 2\sqrt{2}$   
 e.  $\sqrt{50} - \sqrt{18} - \sqrt{8} = 5\sqrt{2} - 3\sqrt{2} - 2\sqrt{2} = 0$   
 f.  $\sqrt{27} + \sqrt{27} = 3\sqrt{3} + 3\sqrt{3} = 6\sqrt{3}$   
 g.  $\sqrt{99} + \sqrt{44} + \sqrt{11} = 3\sqrt{11} + 2\sqrt{11} + \sqrt{11} = 6\sqrt{11}$   
 h.  $8\sqrt{2} + 2\sqrt{8} = 8\sqrt{2} + 2\sqrt{4 \times 2} = 8\sqrt{2} + 4\sqrt{2} = 12\sqrt{2}$   
 i.  $2\sqrt{20} + 3\sqrt{45} = 2\sqrt{4 \times 5} + 3\sqrt{9 \times 5} = 4\sqrt{5} + 9\sqrt{5} = 13\sqrt{5}$   
 j.  $\sqrt{52} - \sqrt{13} = \sqrt{4 \times 13} - \sqrt{13} = 2\sqrt{13} - \sqrt{13} = \sqrt{13}$   
 k.  $20\sqrt{5} + 5\sqrt{20} = 20\sqrt{5} + 5\sqrt{4 \times 5} = 20\sqrt{5} + 10\sqrt{5} = 30\sqrt{5}$   
 l.  $\sqrt{16 \times 3} + \sqrt{4 \times 6} - \sqrt{25 \times 3} + \sqrt{16 \times 6} = 4\sqrt{3} + 2\sqrt{6} - 5\sqrt{3} + 4\sqrt{6} = 6\sqrt{6} - \sqrt{3}$

4d.  $\sqrt{25} = 5$   
 e.  $\sqrt{25} = 5$   
 f.  $\sqrt{9} = 3$   
 g.  $\sqrt{\frac{1}{16}} = \frac{1}{4}$   
 h.  $\sqrt{\frac{1}{4}} = \frac{1}{2}$

8a.  $x\sqrt{2} = 10$   
 $x = \frac{10}{\sqrt{2}} = 5\sqrt{2}$

b.  $(2y\sqrt{2} - 3 = \frac{5y}{\sqrt{2}} + 1) \times \sqrt{2}$

$4y - 3\sqrt{2} = 5y + \sqrt{2}$   
 $-3\sqrt{2} - \sqrt{2} = y$   
 $y = -4\sqrt{2}$

5l.  $\frac{4\sqrt{6}}{\sqrt{5}} \times \frac{\sqrt{5}}{\sqrt{5}} = \frac{4\sqrt{30}}{5}$

m.  $\frac{7\sqrt{2}}{2\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}} = \frac{7\sqrt{6}}{6}$

n.  $\frac{4\sqrt{2}}{\sqrt{12}} = \frac{4}{\sqrt{6}} \times \frac{\sqrt{6}}{\sqrt{6}} = \frac{4}{6}\sqrt{6} = \frac{2}{3}\sqrt{6}$

o.  $\frac{9}{2}\sqrt{\frac{12}{18}} = \frac{9}{2}\sqrt{\frac{2}{3} \times \frac{3}{3}} = \frac{9}{2}\sqrt{\frac{6}{9}} = \frac{9}{6}\sqrt{6} = \frac{3}{2}\sqrt{6}$

p.  $\frac{2}{9}\sqrt{\frac{18}{12}} = \frac{2}{9}\sqrt{\frac{3}{2} \times \frac{2}{2}} = \frac{2}{9} \cdot \frac{1}{2}\sqrt{6} = \frac{1}{9}\sqrt{6}$

6a.  $\sqrt{75} + \sqrt{12} = 5\sqrt{3} + 2\sqrt{3} = 7\sqrt{3}$

b.  $6 + 4\sqrt{3} - 6 = 4\sqrt{3}$

c.  $\frac{12}{3}\sqrt{3} - 3\sqrt{3} = \sqrt{3}$

d.  $\frac{2}{3}\sqrt{3} + \sqrt{\frac{1}{3} \times \frac{3}{3}} = \frac{2}{3}\sqrt{3} + \frac{1}{3}\sqrt{3} = \sqrt{3}$

e.  $\sqrt{16} \times \sqrt{27} = 4 \times 3\sqrt{3} = 12\sqrt{3}$

f.  $6 - 3\sqrt{3} - 2\sqrt{3} + 3 - \sqrt{81} = 9 - 5\sqrt{3} - 9 = -5\sqrt{3}$

7. Area =  $4\sqrt{5} \times \sqrt{10} = 4\sqrt{50} = 4\sqrt{25 \times 2} = 20\sqrt{2}$

Diagonal AC =  $\sqrt{(4\sqrt{5})^2 + (\sqrt{10})^2} = \sqrt{16 \times 5 + 10} = \sqrt{90} = 3\sqrt{10}$

c.  $z\sqrt{32} - 16 = z\sqrt{8} - 4$   
 $z \times 4\sqrt{2} - 16 = z \times 2\sqrt{2} - 4$   
 $4z\sqrt{2} - 2z\sqrt{2} = 16 - 4$   
 $2z\sqrt{2} = 12$   
 $z = \frac{12}{2\sqrt{2}} = \frac{6}{\sqrt{2}} = 3\sqrt{2}$

9a.  $\sqrt[3]{24} = \sqrt[3]{8 \times 3} = 2\sqrt[3]{3}$

b.  $\sqrt[3]{81} + \sqrt[3]{3} = \sqrt[3]{27 \times 3} + \sqrt[3]{3} = 3\sqrt[3]{3} + \sqrt[3]{3} = 4\sqrt[3]{3}$

c.  $(\sqrt[3]{3})^4 = 3\sqrt[3]{3}$

d.  $\sqrt[3]{3000} - \sqrt[3]{375} = 10\sqrt[3]{3} - 5\sqrt[3]{3} = 5\sqrt[3]{3}$

$$10 \text{ a. } c = \sqrt{12^2 + 8^2} \\ = \sqrt{208} = 4\sqrt{13}$$

$$\text{b. } c^2 = 200 + 75 = 275 \\ c = \sqrt{275} = 5\sqrt{11}$$

$$\text{c. } b^2 = 96 - 36 = 60 \\ b = \sqrt{60} = 2\sqrt{15}$$

$$\text{d. } b^2 = 63 - 18 = 45 \\ b = \sqrt{45} = 3\sqrt{5}$$

$$11 \text{ a. } \sqrt{104} = \sqrt{4 \cdot 26} = 2 \sqrt{26} \text{ (5099019513593)} \\ \approx 10.198039027186 \approx 10.1980390272 \text{ (10 dp)}$$

$$\text{b. } \sqrt{650} = 5\sqrt{26} = 5.099019513593$$

$$\text{c. } \frac{13}{26}\sqrt{26} = \frac{1}{2}\sqrt{26} = \frac{2.5495097561965}{2} \approx 2.5495097568 \text{ (10 dp)}$$

$$12 \quad \begin{array}{l} 7x - 3\sqrt{5}y = 9\sqrt{5} \quad | \div 3\sqrt{5} | \quad \frac{7}{3\sqrt{5}}x - y = 3 \\ 2\sqrt{5}x + y = 34 \end{array} \quad \begin{array}{l} 2\sqrt{5}x + y = 34 \quad + \\ \hline \frac{7}{15}\sqrt{5}x + 2\sqrt{5}x = 37 \\ \frac{37}{15}\sqrt{5}x = 37 \\ x = \frac{15}{\sqrt{5}} = \underline{\underline{3\sqrt{5}}} \end{array}$$

$$7(3\sqrt{5}) - 3\sqrt{5}y = 9\sqrt{5} \\ 12\sqrt{5} = 3\sqrt{5}y \\ y = \frac{12\sqrt{5}}{3\sqrt{5}} = \underline{\underline{4}}$$

$$16 \text{ a. } \frac{1}{2-\sqrt{3}} \times \frac{2+\sqrt{3}}{2+\sqrt{3}} = 2+\sqrt{3}$$

$$\text{b. } \frac{1}{3\sqrt{5}-5} \times \frac{3\sqrt{5}+5}{3\sqrt{5}+5} = \frac{3\sqrt{5}+5}{45-25} = \frac{1}{20}(3\sqrt{5}+5)$$

$$\text{c. } \frac{4\sqrt{3}}{2\sqrt{6}+3\sqrt{2}} \times \frac{2\sqrt{6}-3\sqrt{2}}{2\sqrt{6}-3\sqrt{2}} = \frac{8\sqrt{18}-12\sqrt{6}}{24-18} = \frac{24\sqrt{2}-12\sqrt{6}}{6} \\ = \underline{\underline{4\sqrt{2}-2\sqrt{6}}}$$