

Homework Sheet – Surds

1. Simplify fully:

(a) $\sqrt{5} \times \sqrt{3}$ (b) $\sqrt{7} \times \sqrt{2}$ (c) $\sqrt{2} \times \sqrt{8}$ (d) $\sqrt{3} \times \sqrt{12}$

(e) $\frac{\sqrt{24}}{\sqrt{8}}$ (f) $\frac{\sqrt{20}}{\sqrt{5}}$

2. Express in the form \sqrt{a} :

(a) $2\sqrt{3}$ (b) $7\sqrt{3}$ (c) $3\sqrt{5}$ (d) $2\sqrt{6}$

3. Express in the form $a\sqrt{b}$ where a and b are integers:

(a) $\sqrt{18}$ (b) $\sqrt{27}$ (c) $\sqrt{32}$ (d) $\sqrt{98}$

4. Express in the form $\frac{\sqrt{a}}{b}$ where a and b are integers.

(a) $\frac{1}{\sqrt{2}}$ (b) $\frac{1}{2\sqrt{3}}$ (c) $\frac{1}{3\sqrt{2}}$ (d) $\frac{2}{\sqrt{6}}$

5. (a) Write $\sqrt{12} + \sqrt{27}$ in the form $p\sqrt{3}$ where p is an integer.

(b) Simplify fully $\frac{\sqrt{8} \times \sqrt{50}}{\sqrt{5}}$

(c) Find the value of x if $\frac{\sqrt{x} \times \sqrt{20}}{\sqrt{2}} = 4\sqrt{10}$

(d) Solve the equation $5\sqrt{x} - 4 = 3\sqrt{x} + 6$

6. Expand and simplify:

(a) $(\sqrt{6} + \sqrt{3})^2$ (b) $(\sqrt{3} + \sqrt{2})(\sqrt{3} - \sqrt{2})$

(c) $(\sqrt{5} - \sqrt{2})(\sqrt{2} - \sqrt{5})$ (d) $(\sqrt{7} - 3)(\sqrt{7} + 5)$

7. Show that $1 + (2 + \sqrt{3})^2 = (\sqrt{2} + \sqrt{6})^2$

Surds Answers and Mark Scheme

Q	Answer	Mark	Comments
1(a)	$\sqrt{15}$	B1	
1(b)	$\sqrt{14}$	B1	
1(c)	$\sqrt{16} = 4$	B1	
1(d)	$\sqrt{36} = 6$	B1	
1(e)	$\sqrt{3}$	B1	
1(f)	$\sqrt{4} = 2$	B1	
2(a)	$\sqrt{12}$	B1	
2(b)	$\sqrt{147}$	B1	
2(c)	$\sqrt{45}$	B1	
2(d)	$\sqrt{24}$	B1	
3(a)	$3\sqrt{2}$	B1	
3(b)	$3\sqrt{3}$	B1	
3(c)	$4\sqrt{2}$	B1	
3(d)	$7\sqrt{2}$	B1	
4(a)	$\frac{\sqrt{2}}{2}$	B1	
4(b)	$\frac{\sqrt{3}}{6}$	B1	
4(c)	$\frac{\sqrt{2}}{6}$	B1	
4(d)	$\frac{2\sqrt{6}}{6} = \frac{\sqrt{6}}{3}$	B1	

Q	Answer	Mark	Comments
5(a)	$2\sqrt{3} + 3\sqrt{3}$ $= 5\sqrt{3} \quad p = 5$	M1 A1	
5(b)	$\sqrt{8} \times \sqrt{10} = \sqrt{80}$ $= 4\sqrt{5}$	M1 A1	
5(c)	$\sqrt{x} \times \sqrt{10} = 4\sqrt{10}$ $x = 16$	M1 A1	
5(d)	$2\sqrt{x} = 10$ $\sqrt{x} = 5$ $x = 25$	M1 M1 A1	
6(a)	$6 + 2\sqrt{6} \sqrt{3} + 3$ $= 9 + 2\sqrt{18}$ $= 9 + 6\sqrt{2}$	M1 A1	
6(b)	$3 - 2$ $= 1$	M1 A1	
6(c)	$-5 + 2\sqrt{10} - 2$ $= 2\sqrt{10} - 7$	M1 A1	
6(d)	$7 + 5\sqrt{7} - 3\sqrt{7} - 15$ $2\sqrt{7} - 8$	M1 A1	
7.	$(2 + \sqrt{3})^2 = 4 + 4\sqrt{3} + 3$ $= 7 + 4\sqrt{3}$ $1 + 7 + 4\sqrt{3}$ $= 8 + 4\sqrt{3}$ $(\sqrt{2} + \sqrt{6})^2 = 2 + 2\sqrt{2} \sqrt{6} + 6 = 8 + 2\sqrt{12}$ $= 8 + 4\sqrt{3}$	M1 A1 A1 M1 A1	