

**EXERCISE 3-4**

A 1. Simplify.

(a)  $\frac{\sqrt{14}}{\sqrt{7}}$

(b)  $\frac{\sqrt{18}}{\sqrt{3}}$

(c)  $\frac{27\sqrt{15}}{3\sqrt{5}}$

(d)  $\frac{\sqrt{28}}{\sqrt{7}}$

(e)  $\frac{\sqrt{72}}{\sqrt{24}}$

(f)  $\frac{3\sqrt{8}}{\sqrt{2}}$

(g)  $\frac{\sqrt{50}}{\sqrt{2}}$

(h)  $\frac{3\sqrt{75}}{\sqrt{3}}$

B 2. *Rationalize the denominator.*

(a)  $\frac{\sqrt{42}}{\sqrt{6}}$

(b)  $\frac{\sqrt{12}}{\sqrt{6}}$

(c)  $\frac{\sqrt{42}}{\sqrt{7}}$

(d)  $\frac{15\sqrt{20}}{\sqrt{2}}$

(e)  $\frac{20\sqrt{15}}{\sqrt{3}}$

(f)  $\frac{\sqrt{36}}{\sqrt{3}}$

(g)  $\frac{\sqrt{26}}{\sqrt{2}}$

(h)  $\frac{3\sqrt{50}}{\sqrt{10}}$

(i)  $\frac{2\sqrt{75}}{\sqrt{15}}$

(j)  $\frac{\sqrt{18+\sqrt{12}}}{\sqrt{3}}$

(k)  $\frac{15-\sqrt{75}}{5}$

(l)  $\frac{9-\sqrt{45}}{3}$

3. Rationalize the denominator:

(a)  $\frac{\sqrt{5}}{\sqrt{3}}$

(b)  $\frac{2}{\sqrt{2}}$

(c)  $\frac{3\sqrt{5}}{2\sqrt{6}}$

(d)  $\frac{4\sqrt{7}}{5\sqrt{2}}$

(e)  $\frac{3\sqrt{7}}{2\sqrt{3}}$

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

(g)  $\frac{3\sqrt{7}}{4\sqrt{2}}$

(h)  $\frac{2\sqrt{3}}{\sqrt{6}}$

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

(j)  $\frac{\sqrt{7-4}}{2\sqrt{3}}$

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

(l)  $\frac{\sqrt{5+\sqrt{7}-\sqrt{2}}}{2\sqrt{2}}$

4. Find the value of each of the following to three figure accuracy by first rationalizing the denominator.

(a)  $\frac{2}{\sqrt{3}}$

(b)  $\frac{5}{\sqrt{7}}$

(c)  $\frac{\sqrt{6}}{\sqrt{5}}$

(d)  $\frac{2\sqrt{3}}{\sqrt{7}}$

(e)  $\frac{\sqrt{3}}{2\sqrt{5}}$

(f)  $\frac{3\sqrt{5}}{4\sqrt{2}}$

(g)  $\frac{3\sqrt{6}}{2\sqrt{7}}$

(h)  $\frac{5\sqrt{3}}{3\sqrt{7}}$

(i)  $\frac{3\sqrt{21}}{\sqrt{5}}$

(j)  $\frac{7\sqrt{2}}{2\sqrt{11}}$

(k)  $\frac{5\sqrt{3}}{4\sqrt{7}}$

(l)  $\frac{7\sqrt{7}}{2\sqrt{2}}$

5. Simplify by first rationalizing the denominator.

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

(b)  $\frac{1}{\sqrt{3}+\sqrt{2}}$

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

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

(e)  $\frac{4}{\sqrt{6}-\sqrt{2}}$

(f)  $\frac{7}{2\sqrt{5}+\sqrt{2}}$

(g)  $\frac{5}{4-\sqrt{3}}$

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

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

(j)  $\frac{3\sqrt{2}}{2\sqrt{2}-3}$

(k)  $\frac{\sqrt{7}+\sqrt{5}}{\sqrt{7}-\sqrt{5}}$

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

6. Rationalize the denominator in each of the following. (All variables are positive real numbers.)

(a)  $\frac{1}{\sqrt{a}-\sqrt{b}}$

(b)  $\frac{2}{\sqrt{x}+2}$

(c)  $\frac{\sqrt{a}-\sqrt{b}}{\sqrt{a}+\sqrt{b}}$

(d)  $\frac{3\sqrt{x}}{2\sqrt{x}-3}$

(e)  $\frac{\sqrt{x}}{\sqrt{x}+1+2}$

(f)  $\frac{\sqrt{a}+\sqrt{a+b}}{\sqrt{a}-\sqrt{a+b}}$

7. Rationalize the denominator in each of the following and simplify.

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

(b)  $\frac{3\sqrt{2}-\sqrt{8}+\sqrt{18}}{(\sqrt{6}+\sqrt{3})-\sqrt{2}}$

8. Solve the following equations, giving final answers with rational denominators.

(a)  $3x = \sqrt{2}$

(b)  $x\sqrt{3} = \sqrt{2}$

(c)  $3x\sqrt{5} = \sqrt{10}$

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

(e)  $x(\sqrt{5}-\sqrt{2}) = 3$

(f)  $2x\sqrt{3}-\sqrt{2} = x+2$