Number Systems Worksheet 3

Add

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

(ii) $(2\sqrt{2}+5\sqrt{3}-7\sqrt{5})$ and $(3\sqrt{3}-\sqrt{2}+\sqrt{5})$

(iii) $\left(\frac{2}{3}\sqrt{7}-\frac{1}{2}\sqrt{2}+6\sqrt{11}\right)$ and $\left(\frac{1}{3}\sqrt{7}+\frac{3}{2}\sqrt{2}-\sqrt{11}\right)$

(iv) $(3\sqrt{2}+7\sqrt{3})$ and $(\sqrt{2}-5\sqrt{3})$

Multiply

(i) $3\sqrt{5}$ by $2\sqrt{5}$

(ii) $6\sqrt{15}$ by $4\sqrt{3}$

(iii) $2\sqrt{6}$ by $3\sqrt{3}$

(iv) $3\sqrt{8}$ by $3\sqrt{2}$

(v) $\sqrt{10}$ by $\sqrt{40}$

(vi) $3\sqrt{28}$ by $2\sqrt{7}$

Divide

(i) $16\sqrt{6}$ by $4\sqrt{2}$

(ii) $12\sqrt{15}$ by $4\sqrt{3}$

(iii) $18\sqrt{21}$ by $6\sqrt{7}$

Simplify

(i) $(3-\sqrt{11})(3+\sqrt{11})$

(ii) $(-3+\sqrt{5})(-3-\sqrt{5})$

(iii) $(3-\sqrt{3})^2$

(iv) $(\sqrt{5}-\sqrt{3})^2$

(v) $(5+\sqrt{7})(2+\sqrt{5})$

(vi) $(\sqrt{5}-\sqrt{2})(\sqrt{2}-\sqrt{3})$

(vii) $(3+\sqrt{3})(2+\sqrt{2})^2$

(viii) $\frac{\sqrt{72}}{5\sqrt{72}+3\sqrt{288}-2\sqrt{648}}$

(ix) $3\sqrt{45}-\sqrt{125}+\sqrt{200}-\sqrt{50}$

(x) $\frac{2\sqrt{30}}{\sqrt{6}}-\frac{3\sqrt{140}}{\sqrt{28}}+\frac{\sqrt{55}}{\sqrt{99}}$

(xi) $\sqrt{72}+\sqrt{800}-\sqrt{18}$

(xii) $\frac{\sqrt{a^2-b^2}+a}{\sqrt{a^2+b^2}+b}\div\frac{\sqrt{a^2+b^2}-b}{a-\sqrt{a^2-b^2}}$

(xiii) $\frac{7\sqrt{3}-5\sqrt{2}}{\sqrt{48}+\sqrt{18}}$

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

(xv) $\frac{4+\sqrt{5}}{4-\sqrt{5}}+\frac{4-\sqrt{5}}{4+\sqrt{5}}$

(xvi) $\frac{1}{\sqrt{3}-\sqrt{2}}-\frac{2}{\sqrt{5}-\sqrt{3}}+\frac{3}{\sqrt{5}-\sqrt{2}}$

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

Rationalize the denominator of

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

(ii) $\frac{1}{8+5\sqrt{2}}$

(iii) $\frac{6}{\sqrt{5}+\sqrt{2}}$

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

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

(vi) $\frac{1+\sqrt{2}}{2-\sqrt{2}}$

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

(viii)

Find the rational number a and b such that

(i) $\frac{\sqrt{2}-1}{\sqrt{2}+1}=a+b\sqrt{2}$

(ii) $\frac{2-\sqrt{5}}{2+\sqrt{5}}=a\sqrt{5}+b$

(iii) $\frac{\sqrt{3}+\sqrt{2}}{\sqrt{3}-\sqrt{2}}=a+b\sqrt{6}$

(iv) $\frac{5+2\sqrt{3}}{7+4\sqrt{3}}=a+b\sqrt{2}$

Prove that

(i) $\frac{1}{1+\sqrt{2}}+\frac{1}{\sqrt{2}+\sqrt{3}}+\frac{1}{\sqrt{3}+\sqrt{4}}+\frac{1}{\sqrt{4}+\sqrt{5}}+\frac{1}{\sqrt{5}+\sqrt{6}}+\frac{1}{\sqrt{6}+\sqrt{7}}+\frac{1}{\sqrt{7}+\sqrt{8}}+\frac{1}{\sqrt{8}+\sqrt{9}}=2$