Simplifying Surds

1) Simplify each of the following:

(a) $\sqrt{12}\times\sqrt{3}$ (b) $\frac{\sqrt{32}}{\sqrt{8}}$ (c) $\sqrt{20}\times\sqrt{5}$ (d) $\frac{\sqrt{48}}{\sqrt{3}}$ (e) $\sqrt{24}\times\sqrt{6}$ f $\frac{\sqrt{42}}{\sqrt{6}}$

2) Simplify each of the following:

(a) $\sqrt{75}$ (b) $\sqrt{45}$ (c) $\sqrt{32}$ (d) $\sqrt{108}$ (e) $\sqrt{80}$
(f) $\sqrt{75}+\sqrt{48}$ (g) $\sqrt{63}+\sqrt{28}$ (h) $\sqrt{50}-\sqrt{18}$ (i) $\sqrt{45}-\sqrt{20}$ (j) $\sqrt{72}+\sqrt{8}$

3) Simplify each of the following:

(a) $(2+\sqrt{5})(7-\sqrt{5})$ (b) $(5+\sqrt{3})(2+\sqrt{3})$ (c) $(1+\sqrt{2})(3-\sqrt{2})$
(d) $(5+\sqrt{7})(5-\sqrt{7})$ (e) $(4+\sqrt{20})(3-\sqrt{5})$ (f) $(5+\sqrt{18})(5+\sqrt{2})$

4) Simplify each of the following:

(a) $\frac{30}{\sqrt{5}}$ (b) $\frac{18}{\sqrt{3}}$ (c) $\frac{8}{\sqrt{2}}$ (d) $\frac{15}{\sqrt{5}}$ (e) $\frac{24}{\sqrt{6}}$
(f) $\frac{2}{\sqrt{7}}$ (g) $\frac{4}{\sqrt{8}}$ (h) $\frac{\sqrt{5}}{\sqrt{20}}$ (i) $\sqrt{75}+\frac{18}{\sqrt{3}}$ (j) $\sqrt{72}-\frac{10}{\sqrt{2}}$
(k) $\sqrt{80}+\frac{15}{\sqrt{5}}$ (l) $\sqrt{2}-\frac{\sqrt{18}}{3}$ (m) $\frac{\sqrt{45}}{\sqrt{20}}$ (n) $\frac{5\sqrt{12}}{\sqrt{75}}$ (o) $\frac{2\sqrt{162}}{\sqrt{18}}$

Simplifying Surds - Answers

1) Simplify each of the following:

(a) $\sqrt{12\times3}=\sqrt{36}=6$ (b) $\sqrt{\frac{32}{8}}=\sqrt{4}=2$ (c) $\sqrt{20\times5}=\sqrt{100}=10$
(d) $\sqrt{\frac{48}{3}}=\sqrt{16}=4$ (e) $\sqrt{24\times6}=\sqrt{144}=12$ f $\sqrt{\frac{42}{6}}=\sqrt{7}$

2) Simplify each of the following:

(a) $\sqrt{75}=\sqrt{25\times3}=5\sqrt{3}$ (b) $\sqrt{45}=\sqrt{9\times5}=3\sqrt{5}$
(c) $\sqrt{32}=\sqrt{16\times2}=4\sqrt{2}$ (d) $\sqrt{108}=\sqrt{36\times3}=6\sqrt{3}$
(e) $\sqrt{80}=\sqrt{16\times5}=4\sqrt{5}$ (f) $\sqrt{75}+\sqrt{48}=5\sqrt{3}+4\sqrt{3}=9\sqrt{3}$
(g) $\sqrt{63}+\sqrt{28}=3\sqrt{7}+2\sqrt{7}=5\sqrt{7}$ (h) $\sqrt{50}-\sqrt{18}=5\sqrt{2}+3\sqrt{2}=8\sqrt{2}$
(i) $\sqrt{45}-\sqrt{20}=3\sqrt{5}-2\sqrt{5}=\sqrt{5}$ (j) $\sqrt{72}+\sqrt{8}=6\sqrt{2}+2\sqrt{2}=8\sqrt{2}$

3) Simplify each of the following:

(a) $(2+\sqrt{5})(7-\sqrt{5})=14-2\sqrt{5}+7\sqrt{5}-5=9+5\sqrt{5}$
(b) $(5+\sqrt{3})(2+\sqrt{3})=10+5\sqrt{3}+2\sqrt{3}+3=13+7\sqrt{3}$
(c) $(1+\sqrt{2})(3-\sqrt{2})=3-\sqrt{2}+3\sqrt{2}-2=1+2\sqrt{2}$
(d) $(5+\sqrt{7})(5-\sqrt{7})=25-5\sqrt{7}+5\sqrt{7}-7=18$
(e) $(4+\sqrt{20})(3-\sqrt{5})=(4+2\sqrt{5})(3-\sqrt{5})=12-4\sqrt{5}+6\sqrt{5}-2\times5=2+2\sqrt{5}$
(f) $(5+\sqrt{18})(5+\sqrt{2})=(5+3\sqrt{2})(5+\sqrt{2})=25+5\sqrt{2}+15\sqrt{2}+3\times2=31+20\sqrt{2}$

4) Simplify each of the following:

(a) $\frac{30}{\sqrt{5}}=\frac{30\sqrt{5}}{\sqrt{5}\sqrt{5}}=6\sqrt{5}$ (b) $\frac{18}{\sqrt{3}}=6\sqrt{3}$ (c) $4\sqrt{2}$ (d) $3\sqrt{5}$
(e) $4\sqrt{6}$ (f) $\frac{2\sqrt{7}}{7}$ (g) $\frac{\sqrt{8}}{2}$ (h) $\sqrt{\frac{5}{20}}=\sqrt{\frac{1}{4}}=\frac{1}{2}$
(i) $\sqrt{75}+\frac{18}{\sqrt{3}}=5\sqrt{3}+6\sqrt{3}=11\sqrt{3}$ (j) $\sqrt{72}-\frac{10}{\sqrt{2}}=6\sqrt{2}-5\sqrt{2}=\sqrt{2}$
(k) $\sqrt{80}+\frac{15}{\sqrt{3}}=4\sqrt{5}+3\sqrt{5}=7\sqrt{5}$ (l) $\sqrt{2}-\frac{\sqrt{18}}{3}=\sqrt{2}-\frac{3\sqrt{2}}{3}=\sqrt{2}-\sqrt{2}=0$
(m) $\sqrt{\frac{45}{20}}=\sqrt{\frac{9}{4}}=\frac{3}{2}$ (n) $\frac{5\sqrt{12}}{\sqrt{75}}=\frac{5\times2\sqrt{3}}{5}\sqrt{3}=2$ (o) $\frac{2\sqrt{162}}{\sqrt{18}}=\frac{2\times9\sqrt{2}}{3\sqrt{2}}=6$