1) Multiply the following and express the answers as mixed radicals in simplest form.

a) $3\sqrt{7}\left(4\sqrt{2}\right)$ b) $5\sqrt{2}\left(-6\sqrt{32}\right)$ c) $\left(7\sqrt{10}\right)\left(3\sqrt{5}\right)$ d) $\left(2\sqrt{6}\right)\left(5\sqrt{24}\right)$

2) Expand and simplify where possible.

a) $\sqrt{2}\left(\sqrt{5}+\sqrt{7}\right)$ b) $\sqrt{7}\left(\sqrt{3}-13\right)$ c) $\sqrt{6}\left(\sqrt{2}+\sqrt{3}\right)$

d) $-4\sqrt{5}\left(2\sqrt{3}-\sqrt{5}\right)$ e) $2\sqrt{6}\left(3\sqrt{6}-5\sqrt{8}\right)$ f) $5\sqrt{2}\left(3\sqrt{18}+7\sqrt{2}-4\sqrt{8}\right)$

g) $\sqrt{a}\left(3\sqrt{a}-1\right)$ h) $b\sqrt{2}\left(b\sqrt{6}-2b+7\right)$ i) $5\sqrt[3]{2a}\left(\sqrt[3]{4a}+3\sqrt[3]{28}\right)$

j) $\left(\sqrt{3}+1\right)\left(\sqrt{3}+2\right)$ k) $\left(\sqrt{7}+5\right)\left(\sqrt{7}-5\right)$ l) $\left(6-4\sqrt{2}\right)\left(2-5\sqrt{2}\right)$

m) $\left(\sqrt{3}-2\sqrt{5}\right)\left(2\sqrt{3}+3\sqrt{5}\right)$ n) $\left(3\sqrt{x}+5\right)\left(2\sqrt{x}-1\right)$ o) $\left(\sqrt{14}+\sqrt{7}\right)\left(\sqrt{14}-\sqrt{7}\right)$

p) $\left(\sqrt{13}-2\right)\left(\sqrt{13}+2\right)$ q) $\left(\sqrt{5}-2\sqrt{2}\right)\left(\sqrt{5}+2\sqrt{2}\right)$ r) $\left(4\sqrt{a}+3\sqrt{b}\right)\left(4\sqrt{a}-3\sqrt{b}\right)$

Answers

1) a) $12\sqrt{14}$ b) -240 c) $105\sqrt{2}$ d) 120

2) a) $\sqrt{10}+\sqrt{14}$ b) $\sqrt{21}-13\sqrt{7}$ c) $2\sqrt{3}+3\sqrt{2}$ d) $-8\sqrt{15}+20$ e) $36-40\sqrt{3}$ f) 80 g) $3a-\sqrt{a}$
h) $2b^2\sqrt{3}-2b^2\sqrt{2}+7b\sqrt{2}$ i) $10\sqrt[3]{a^2}+30\sqrt[3]{7a}$ j) $5+3\sqrt{3}$ k) -18 l) $52-38\sqrt{2}$ m) $-24-\sqrt{15}$
n) $6x+7\sqrt{x}-5$ o) 7 p) 9 q) -3 r) $16a-9b$