**Surds with Algebra**

(a) Given that $\left(3+\sqrt{a}\right)\left(4+\sqrt{a}\right)=17+b\sqrt{a}$ find the values of $a$ and $b$.

(b) Given that $(5-\sqrt{x})^{2}=y-10\sqrt{2}$ find the values of $x$ and $y$.

(c) Given that $(c-\sqrt{d})^{2}=39-12\sqrt{d}$, find the values of $c$ and $d$.

(a) Find the nth term of the sequence $\sqrt{2} \sqrt{8} \sqrt{18} \sqrt{32}$

(b) Find the nth term of the sequence

$$20 17+\sqrt{5} 14+\sqrt{20} 11+\sqrt{45}$$

(a) Show that $\sqrt{25a^{2}}+\frac{2ab\sqrt{75}}{\sqrt{3b^{2}}}$ is always a multiple of $5$, given that $a$ and $b$ are integers.

(b) Show that $\sqrt{2}(c\sqrt{8}-d\sqrt{50})$ is always even when $c $and $d$ are integers.

(a) Given that $d$ is a prime number, rationalise the denominator of $\frac{5\sqrt{d}}{2+\sqrt{d}}$

(b) Rationalise the denominator of $\frac{2e+\sqrt{f}}{e-\sqrt{f}}$ where $e$ is an integer and $f$ is a prime number.

Solve, giving your answer in its simplest form:

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

(b) $3x-\sqrt{5}=\sqrt{5}x+1$

(c) $x^{2}-2\sqrt{3}x+3=0$

(d) $2x^{2}+\sqrt{7}x-7=0$

(e) $3x^{2}+5\sqrt{5}x=10$

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