Surds with Algebra

(a) Given that $(3 + \sqrt{a})(4 + \sqrt{a}) = 17 + b\sqrt{a}$ 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 $\sqrt{25a^2} + \dfrac{2ab\sqrt{75}}{\sqrt{3b^2}}$ 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 $\dfrac{5\sqrt{d}}{2+\sqrt{d}}$

(b) Rationalise the denominator of $\dfrac{2e+\sqrt{f}}{e-\sqrt{f}}$ 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) $3x^2 + 5\sqrt{5}x = 10$