## Radical Expressions

Ex: $\sqrt{48} = \sqrt{4}\sqrt{12} = 2\sqrt{12} = 4\sqrt{3}$

$\sqrt{4} = 2$

Ex: $\sqrt{3-2\sqrt{2}} = \sqrt{a} - \sqrt{b} = \sqrt{2}-1$ ?  $\approx 0.414$

$\qquad\qquad\qquad\qquad\qquad = 1-\sqrt{2}$ ?  $\approx -0.414$

$3-2\sqrt{2} = a - 2\sqrt{ab} + b$

$3 = a+b \qquad 2\sqrt{2} = 2\sqrt{ab} \qquad a=1, b=2$

$\qquad\qquad\qquad 2 = ab \qquad\quad a=2, b=1$

Ex: $\sqrt{x^2+9} = 2x-3 \qquad \sqrt{16+9} = 2\cdot4-3$

$\quad\quad\; 3 \qquad -3$

$\qquad\quad 9 \qquad 9 \qquad\qquad\qquad 5 \qquad 5 \quad \checkmark$

$x^2+9 = (2x-3)^2$

$\qquad\qquad\qquad\qquad\qquad \sqrt{0^2+9} = 2\cdot0-3$

$x^2+9 = 4x^2-12x+9 \qquad\qquad 3 = -3 \quad \times$

$\qquad\qquad\qquad\qquad\qquad\qquad a=4 \checkmark$

$0 = 3x^2-12x = 3x(x-4) \qquad x= \cancel{0}, 4$

## Rationalizing Denominators

Ex: $\dfrac{1}{(\sqrt{6}-\sqrt{5})}\dfrac{(\sqrt{6}+\sqrt{5})}{(\sqrt{6}+\sqrt{5})} = \dfrac{\sqrt{6}+\sqrt{5}}{6-5} = \sqrt{6}+\sqrt{5}$

$\qquad\qquad\qquad\qquad\qquad\quad \underbrace{6-5}_{=1}$

$(a-b)(a+b) = a^2-b^2$

Ex: $\dfrac{1}{\sqrt{1}+\sqrt{2}} + \dfrac{1}{\sqrt{2}+\sqrt{3}} + \dfrac{1}{\sqrt{3}+\sqrt{4}} + \cdots + \dfrac{1}{\sqrt{99}+\sqrt{100}}$

$\dfrac{1}{\sqrt{1}+\sqrt{2}}\dfrac{(\sqrt{1}-\sqrt{2})}{(\sqrt{1}-\sqrt{2})} = \dfrac{\sqrt{1}-\sqrt{2}}{\underbrace{1-2}_{-1}} = \sqrt{2}-\sqrt{1}$

$\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad = \sqrt{100}-\sqrt{1} = 9$

$\sqrt{2}-\sqrt{1} + \sqrt{3}-\sqrt{2} + \sqrt{4}-\sqrt{3} + \cdots + \sqrt{100}-\sqrt{99}$