**Stealth Quadratics**

Some equations have quadratic "hidden" inside.

e.g. Solve $x^4 - 6x^2 + 9 = 0$

Let $u = x^2$, $u^2 = x^4$

1. Substitute $u = \text{the term where } x \text{ would normally be}$

2. Rewrite out equations using this substitution.

$(u-3)(u-3) = 0$

3. Solve for $u$

$u = 3$

$x^2 = 3$

4. "Un-substitute" then solve for $x$

$\Rightarrow x = \pm \sqrt{3}$

e.g. Solve $x + 8\sqrt{x} - 20 = 0$

Let $u = \sqrt{x}$ $\Rightarrow$ $u^2 = x$

$u^2 + 8u - 20 = 0$

$(u+10)(u-2) = 0$

$u = -10 \quad u = 2$

$x = (-10)^2 \quad x = (2)^2$

$\Rightarrow x = 100 \quad x = 4$

Not valid as the square root of a number must be positive.
e.g. Solve $x^4 + 8x^2 + 12 = 0$

Let $u = x^2$, $u^2 = x^4$

$= u^2 + 8u + 12 = 0$
$= (u + 2)(u + 6) = 0$

$u = -2, u = -6$

$\Rightarrow x^2 = -2$ or $x^2 = -6$

No real roots because a square number can never be negative.