Disguised Quadratics

Starter

1. **(Review of last lesson)** For what values of k does the equation $x^2 + (3k-1)x + 10 + 2k = 0$ have real roots.

2. Solve the equations:
(a) $u^2 - 5u - 36 = 0$ (b) $y^4 - 5y^2 - 36 = 0$ (c) $a - 5\sqrt{a} - 36 = 0$

Notes

The quadratic equations in question 2 from the starter are similar because the coefficients are the same.

In (b), let $u = y^2$ to get $u^2 - 5u - 36 = 0$

$u = 9$ or $u = -4$
$y^2 = 9$ or $y^2 = -4$
$y = \pm 3$ or No real solution

It is clear there is no real number that can be squared to get -4 so $y^2 = -4$ has no solution.

In (c), let $u = \sqrt{a}$ to get $u^2 - 5u - 36 = 0$

$u = 9$ or $u = -4$
$\sqrt{a} = 9$ or $\sqrt{a} = -4$
$a = 81$ or $a = 16$???

It is not quite so clear, but one of these values is incorrect. There isn't a real number that can be square rooted to get -4. Therefore. $a = 16$ is not a solution.

N.B. No solutions come from $x^2 = -k$ or $\sqrt{x} = -k$, where $k > 0$

E.g. 1 Solve:
(a) $x - 2\sqrt{x} - 3 = 0$ (b) $x^4 - 24x^2 - 25 = 0$ (c) $p^6 - 7p^3 - 8 = 0$

Type 2: Rearranging to form a quadratic equation

N.B. We only multiply by x^2 when we have an inequality

E.g. 2 Solve $x + 1 = \dfrac{6}{x}$.

Working: Multiply by x and expand:

$x^2 + x = 6$
$\therefore x^2 + x - 6 = 0$
$(x+3)(x-2) = 0$
$x = -3$ or $x = 2$

E.g. 3 Solve $x - 2 = \dfrac{4}{x+1}$

E.g. 3 Solve $2^{2x} - 9 \times 2^x + 8 = 0$.
Hint: let $u = 2^x$

E.g. 4 $2^{2x} - 2^{x+1} + 1 = 0$

Hint: rewrite 2^{x+1} as 2×2^{x}

Video: Disguised quadratics

Solutions to Starter and E.g.s

Exercise

p50 3F Qu 1i, 2-8