Imaginary Numbers - Complex Numbers

Solve: $x^2 + 1 = 0$

$x^2 = -1$ **No real solution**

Introducing square roots of negative numbers – imaginary numbers

$$i^2 + 1 = 0$$
$$i^2 = -1$$

$$i = \sqrt{-1}$$

$$\forall x \in R, \; x > 0, \; \sqrt{-x} = \sqrt{x}\, i$$

Examples: $\sqrt{-4} = 2i$ $\therefore (2i)^2 = -4$

$\sqrt{-25} = 5i$ $\therefore (5i)^2 = -5$

$\sqrt{-18} = 3\sqrt{2}\, I$ $\therefore (3\sqrt{2}\, i)^2 = -18$

$$i = \sqrt{-1}$$
$$i^2 = -1$$
$$i^3 = -i$$
$$i^4 = 1$$

When you simplify successive powers of I, the values repeat in cycles of 4