Section 4 – Topic 5
Complex Numbers – Part 1

Consider $\sqrt{n}$.

The square root of a number, n, is the number that gives n when multiplied by itself.

Consider $\sqrt{n}$, where $n < 0$.

Why does $\sqrt{n}$ not exist in this case?

We can't take the square root of a negative number

To work with such radicals, the imaginary number has been defined as $i = \sqrt{-1}$.

$i = \sqrt{-1}$

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

$i^2 = -1$

We are going to discuss imaginary numbers to help solve quadratic equations in later videos.

Complete the following imaginary number equations.

$i = i$	$i^5 = i$
$i^2 = -1$	$i^6 = -1$
$i^2 \cdot i^1$ $\quad i^3 = -i$	$i^7 = -i$
$i^2 \cdot i^2$ $\quad i^4 = 1$	$i^8 = 1$

$i^9 = i$ $\quad i^{10} = -1$ $\quad i^{11} = -i$ $\quad i^{12} = 1$

Let's Practice!

1. i^{15} $\cancel{i^{12}} \cdot i^{3} = -i$
2. i^{30} $\cancel{i^{28}}\, i^{2} = -1$
3. $i^{41} = \cancel{i^{40}} \cdot i = i$
4. $i^{56} = 1$

Try It!

5. $i^{24} = 1$
6. i^{63} $i^{60}\, i^{3} = -i$
7. $i^{74} = i^{72}\, i^{2} = -1$
8. $i^{17} = i^{16}\, i = i$

$\sqrt{-1} = i$

$\sqrt{-4} = i\sqrt{4} = 2i$

$$\frac{\sqrt{4}}{\sqrt{-4}} = \frac{2 \cdot i}{2i \cdot i} = \frac{\cancel{2}i}{\cancel{2}i^2} = \frac{i}{-1} = -i$$