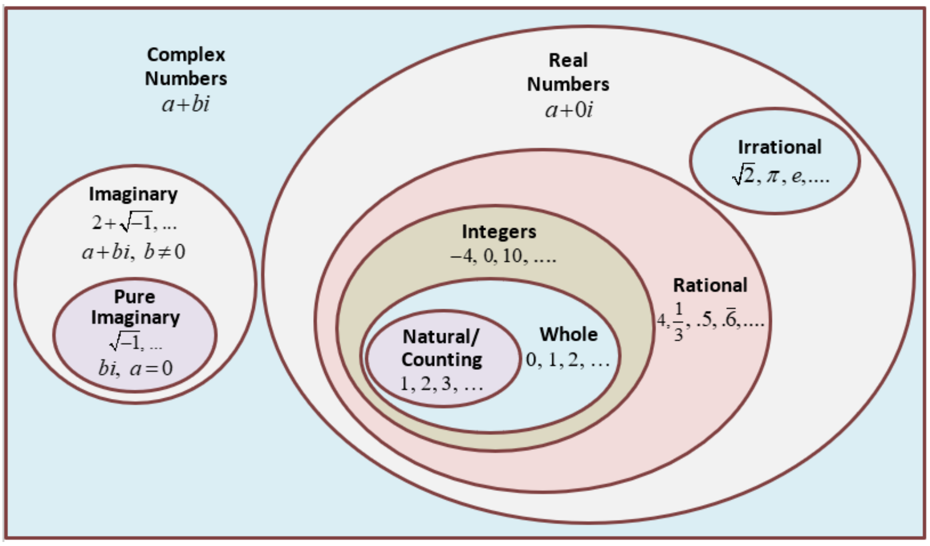
Complex Numbers Guided Notes

What is a complex number?

$a + bi$ or $a - bi$

Where a is the real part and b is the imaginary part



What is an imaginary number?

Solve: $x^2 + 1 = 0$

So $x = \pm\sqrt{-1}$

And $\sqrt{-1} = i$

So $i^2 = -1$

Exercise: Simplify the following and find a pattern

$i =$	$i^6 =$
$i^2 =$	$i^7 =$
$i^3 =$	$i^8 =$
$i^4 =$	$i^9 =$
$i^5 =$	$i^{10} =$

Trick: There are 4 possible solutions to powers of i. so to calculate powers of i, i^n

Divide n by 4 and find the remainder. If r = 1, then $i^1 = i$, if r = 2, then $i^2 = -1$, if r = 3, then $i^3 = -1$, and if r = 0, then $i^0 = 1$

Example: Find $i^{13}, i^{10}, i^{16}, i^{23}$

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Imaginary numbers, also called complex numbers, are used in real-life applications, such as electricity, as well as quadratic equations. Imaginary numbers are particularly applicable in electricity, specifically alternating current (AC) electronics. AC electricity changes between positive and negative in a sine wave. Combining AC currents can be very difficult because they may not match properly on the waves. Using imaginary currents and real numbers helps those working with AC electricity do the calculations and avoid electrocution.

Simplifying square roots with 'i' : Separate the negative as -1 inside the radical and take out as 'i'

a.) $\sqrt{-25}$ b.) $\sqrt{-20}$ c.) $\sqrt{-7}$

Adding and Subtracting Complex Numbers: combine like terms and distribute the minus.

a.) $(3-4i)+(-2+5i)$ b.) $(-6+3i)-(4-2i)$

Multiplying Complex Numbers: Distribute or FOIL and convert i^2 to -1

a.) $3i(2+3i)$ b.) $(4+5i)(6-3i)$ c.) $(3+2i)(3-2i)$

Solving with complex solutions:

a.) $4x^2+20=0$ b.) $(x-4)^2+16=0$ c.) $x^2+4x+20=0$