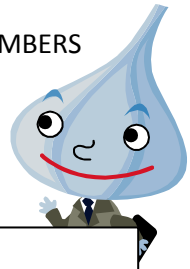
ALGEBRA II DIVIDING WITH IMAGINARY NUMBERS

*Why would it be impossible to divide **by** a negative square root? Answer: it's imaginary! Therefore, we must eliminate any i's (or complex numbers) from the denominator in any & all fractions.*



Does this sound weird to you? Remember, I don't make up the rules for math!

Examples: 1) How can I (without erasing it!) get rid of the "i" from the bottom of the fraction: $\frac{7}{3i}$

*remember you can multiply the bottom by anything you want as long as you do the same to the top

Short cut: remember, i^2 just changes the sign of the coefficient preceeding it.

2) $\frac{1}{2i}$ $\bullet i = i$ $\bullet i = 2i^2$ $= \frac{i}{2(-1)} = -\frac{i}{2}$

3) $\frac{5}{-i}$ $\bullet \frac{i}{i} = \frac{5i}{-i^2}$ $= \frac{5i}{-1(-1)} = 5i$

4) $\frac{2+4i}{5i}$ $\bullet \frac{i}{i} = \frac{2i+4i^2}{5i^2}$ $= \frac{2i-4}{-5}$

Complex numbers also contain an "i", so we cannot have them in the denominator either. What would we need to do different to get rid of this "i"?

Example: 1) $\frac{5}{3-i}$

multiply by the conjugate.

$\bullet \frac{3+i}{3+i} = \frac{15+5i}{9-i^2}$ $(distribute)$ $(FOIL)$

$\frac{15+5i}{9+1} = \frac{15+5i}{10} = \frac{3+i}{2}$

2) $\frac{2i}{1+i}$

Short cut: since the O & I in FOIL always cancels, you may skip them

$\bullet \frac{1-i}{1-i} = \frac{2i-2i^2}{1-i^2}$

$\frac{2i+2}{1+1} = \frac{2i+2}{2} = i+1$

3) $\frac{5}{4-2i}$

$\bullet \frac{4+2i}{4+2i} = \frac{20+10i}{16-4i^2}$

$\frac{20+10i}{16+4} = \frac{20+10i}{20} = \frac{2+i}{2}$

4) $\frac{1-7i}{2+3i}$

No short cut: for the TOP! You must do all 4parts of FOIL.

$\bullet \frac{2-3i}{2-3i} = \frac{2-3i-14i+21i^2}{4-9i^2}$

$\frac{2-17i-21}{4+9} = \frac{-19-17i}{13}$

5) $\frac{6+i\sqrt{3}}{1-i\sqrt{3}}$

$\bullet \frac{1+i\sqrt{3}}{1+i\sqrt{3}} = \frac{6+6i\sqrt{3}+i\sqrt{3}+i^2\sqrt{9}}{1-i^2\sqrt{9}}$

$\frac{6+7i\sqrt{3}-3}{1+3} = \frac{3+7i\sqrt{3}}{4}$