Conjugates of Complex #s

CONJUGATES

To find the conjugate of a binomial:

change the sign between 2 terms

EXAMPLES:

$a+bi \rightarrow a-bi$, $-2-3i \rightarrow -2+3i$

$2+3i \rightarrow 2-3i$, $2+\sqrt{5} \rightarrow 2-\sqrt{5}$

Why are conjugates useful?

$$\boxed{(a+b)(a-b) = a^2 - b^2}$$

$$(a+b)(a-b) = a^2 \cancel{-ab} \cancel{+ab} - b^2$$

Conjugates allow us to :

- * get rid of radicals in denominator
- * get rid of imaginary #s in denom.

Always be sure to

multiply the conjugate of the denom. to the numerator + denominator

EXAMPLES:

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

see next pg for more examples (#3 + #4)

Dividing Complex #s

1. $\frac{2}{3i}\cdot\frac{i}{i} = \frac{2i}{3i^2}$

$\frac{2i}{3(-1)} = \boxed{\frac{2i}{-3}}$

*If dividing by a monomial, you don't need the conjugate. Just multiply by i!

2. $\frac{(4+3i)}{6i}\cdot\frac{i}{i} = \frac{4i+3i^2}{6i^2} = \frac{4i+3(-1)}{6(-1)} = \boxed{\frac{-3+4i}{-6}}$

3. $\frac{(1-3i)}{(2+i)}\cdot\frac{(2-i)}{(2-i)} = \frac{2-1i-6i+3\overset{(-1)}{\cancel{i^2}}}{4\cancel{-2i+2i}-\cancel{i^2}(-1)}$

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

$= \boxed{\frac{-1-7i}{5}}$

4. $\frac{(5-6i)}{(3-3i)}\cdot\frac{(3+3i)}{(3+3i)} = \frac{15+15i-18i\overset{+18}{\cancel{-18i^2}}}{9\cancel{+9i-9i}\underset{+9}{\cancel{-9i^2}}}$ ← $-18\cdot-1$ ← $-9\cdot-1$

$\frac{33/3-3i/3}{18/3}$ simplify if all 3 #s have a common factor

$\boxed{\frac{11-i}{6}}$