Complex Numbers

A <u>complex number</u> is any number that can be written in the form $a+bi$, where a & b are real numbers and i is the imaginary unit.

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

Operations on Complex Numbers

$$(4+3i)-(5-6i)=\boxed{-1+9i}$$

$$(7+\sqrt{-25})+(2-\sqrt{-16})=(7+5i)+(2-4i)=\boxed{9+i}$$

FOIL

$$(1+3i)(4-i)=4-i+12i-3i^2(-1)=4+11i+3=\boxed{7+11i}$$

$$\frac{6+5i}{1-2i}\left(\frac{1+2i}{1+2i}\right)=\frac{6+12i+5i+10i^2(-1)}{1+2i-2i-4i^2(-1)}=\frac{6+17i-10}{1+4}=\boxed{\frac{-4+17i}{5}}$$

$x^2 - 8x + 17 = 0$

$x^2 - 8x + \underline{16} = -17 + 16$

$\sqrt{(x-4)^2} = \sqrt{-1}$

$x - 4 = \pm\sqrt{-1}\,i$

$\boxed{x = 4 \pm i}$

$x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

$x = \dfrac{8 \pm \sqrt{(-8)^2 - 4(1)(17)}}{2(1)}$

$x = \dfrac{8 \pm \sqrt{64 - 68}}{2}$

$x = \dfrac{8 \pm \sqrt{-4}}{2}$ $\quad 4 \;\; 1 \;\; i$ $\quad 2 \;\; 1$

$\boxed{x = 4 \pm i}$

Solve for x in simplest a+bi form.

$x^2 + 36 = 7 - 10x$

$x^2 + 10x + 29 = 0$

$x^2 + 10x + \underline{25} = -29 + 25$

$\sqrt{(x+5)^2} = \sqrt{-4}$

$x + 5 = \pm 2i$

$\boxed{x = -5 \pm 2i}$