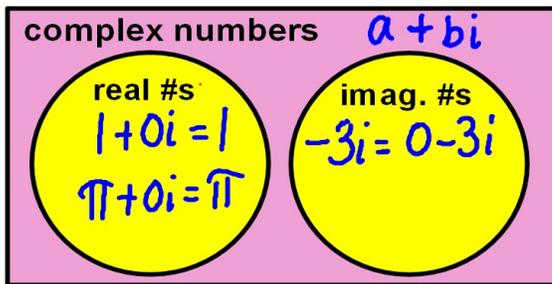Alg 2 standards
5.0 and 6.0

i is the **imaginary unit**

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

$a + bi$ is a **complex number** in standard form

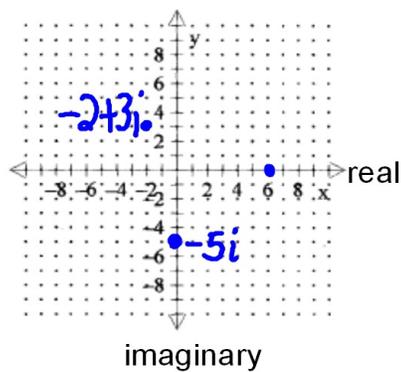a is the real part and bi is the imaginary part

complex numbers $a + bi$

real #s
$1 + 0i = 1$
$\pi + 0i = \pi$

imag. #s
$-3i = 0 - 3i$

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ex. 1   graph $-2 + 3i$ and $-5i$ in the complex plane

$6 = 6 + 0i$

$-2 + 3i$

real

$-5i$

imaginary

Simplify:

ex. 2 $2i - (3+4i) + (8-9i)$

$2i - 3 - 4i + 8 - 9i = \quad 5 - 11i$

ex. 3 $\sqrt{-32} = \sqrt{-1} \cdot \sqrt{32} = i \cdot 4\sqrt{2} = 4\sqrt{2}\,i$

$$4i\sqrt{2}$$

ex. 4 $\sqrt{-20} \cdot \sqrt{-3}$

$i\sqrt{20} \cdot i\sqrt{3} = i^2 \cdot 2\sqrt{15} = -2\sqrt{15}$

$\underset{2\sqrt{5}}{} \qquad \underset{(-1)}{}$

ex. 5 $\sqrt{\dfrac{-3}{8}} = \dfrac{i\sqrt{3}}{2\sqrt{2}} \cdot \dfrac{\sqrt{2}}{\sqrt{2}} = \dfrac{i\sqrt{6}}{4}$ or $\dfrac{\sqrt{6}}{4}i$

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ex. 6 $i^{14} = \left(i^2\right)^7 = (-1)^7 = -1$

ex. 7 $i^{77} = \left(i^2\right)^{38} \cdot i = (-1)^{38} i = i$

Solve for *x* over the complex numbers:

ex. 8 $5(x-3)^2 = -20$

$\sqrt{(x-3)^2} = \sqrt{-4} \quad i\sqrt{4}$

$x - 3 = \pm 2i$

$x = 3 \pm 2i$