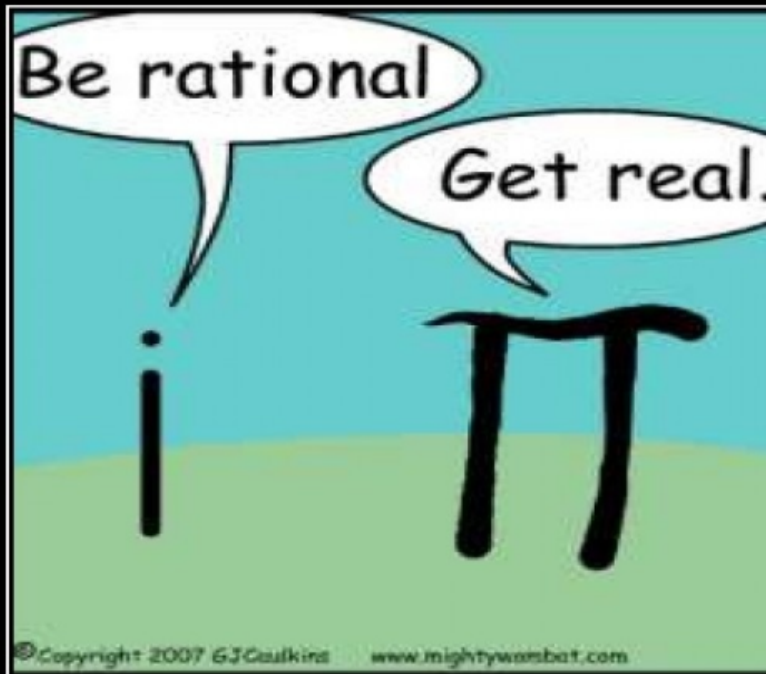




Complex Numbers

1.5





MATH JOKES

If you get them, you probably don't have friends.

Complex Numbers

- $x^2 + 1 = 0$

$$x^2 = -1$$
$$x = \pm\sqrt{-1}$$

- Imaginary Unit, i :

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

$$\sqrt{-7} = \sqrt{-1}\sqrt{7}$$
$$= i\sqrt{7}$$

$$\sqrt{-25} = 5i$$

- Complex Numbers:

reals + imag.

- Standard Form:

$$\text{real} \rightarrow a + bi \leftarrow \text{imag.}$$

$$13 = 13 + 0i$$

$$4i = 0 + 4i$$

- Equality of Complex Numbers:

$$a + bi = c + di$$

only if

$$a = c$$

$$b = d$$

Ex 1) Add or subtract the following complex numbers.

$$\text{a) } (6 - 3i) + (1 + 2i) = 7 - i$$

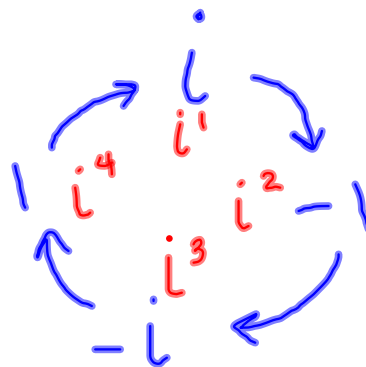
$$\text{b) } (5 - i) - (2 - 4i) = 3 + 3i$$

Multiplying Complex Numbers

Circle of
i's

$i^1 = i$ $\sqrt{-1}$	$i^7 = \underline{i^3} = -i$
$i^2 = \underline{-1}$ $\sqrt{-1}\sqrt{-1}$	$i^8 = \underline{i^4} = 1$
$i^3 = \underline{-i}$ $\sqrt{-1}\sqrt{-1}\sqrt{-1} =$	$i^9 = \underline{i^1} = i$
$i^4 = \underline{1}$ $\sqrt{-1}\sqrt{-1}\sqrt{-1}\sqrt{-1}$	$i^{10} = \underline{i^2} = -1$
$i^5 = \underline{i}$ $\sqrt{-1}\sqrt{-1}\sqrt{-1}\sqrt{-1}\sqrt{-1}$	$i^{11} = \underline{i^3} = -i$
$i^6 = \underline{i^2} = -1$	$i^{12} = \underline{i^4} = 1$

Pattern:



$$l = l = -1$$

$$4 \sqrt[9]{38} \\ \underline{36} \\ 2$$

$$\sqrt[3]{387} = \sqrt[3]{3} = -\sqrt[3]{3}$$

$$\begin{array}{r} 96 \\ 4 \overline{) 387} \\ \underline{36} \\ 27 \\ \underline{-24} \\ 3 \end{array}$$

Ex 2) Multiply the following complex numbers.

<p>a) $2(17 - 5i)$</p> <p>$34 - 10i$</p>	<p>c) $(1 + 7i)^2$</p>
<p>b) $(3 - i)(5 + 4i)$</p> <p>$15 + 12i - 5i - 4i^2$</p> <p>$19 + 7i$</p>	<p>d) $(4 + 5i)(4 - 5i)$</p> <p>$16 - 20i + 20i - 25i^2$</p> <p>41</p>

$$\frac{1}{3 + \sqrt{2}} \cdot \frac{3 \cdot \sqrt{2}}{3 - \sqrt{2}}$$

Complex Conjugates:

$$(a+bi)(a-bi)$$

Ex 3) Find the quotient of the following:

$$\begin{aligned} \text{a) } \frac{5}{3i} \cdot \frac{i}{i} \\ = \frac{5i}{3i^2} = \frac{-5i}{3} \end{aligned}$$

$$\begin{aligned} \text{b) } \frac{2-i}{4+3i} \cdot \frac{4-3i}{4-3i} \\ = \frac{8-10i+3i^2}{16-9i^2} \xrightarrow{-3} \xrightarrow{+9} \\ = \frac{5-10i}{25} \\ = \frac{1-2i}{5} \end{aligned}$$

MATH DAYS

Celebrate mathematical holidays with this handy list!

Symbol	Value	Day
π	3.14159...	March 14 (any year)
e	2.71828...	February 7, 1828
ϕ	1.61803...	January 6, 1803
$\sqrt{23}$	4.79583...	April 7, 9:58am
i	$\sqrt{-1}$ (imaginary)	The day that people like math jokes



people DO SO
like math jokes!
GOD!!!

Solve:

$$x^2 + 6x + 10 = 0$$

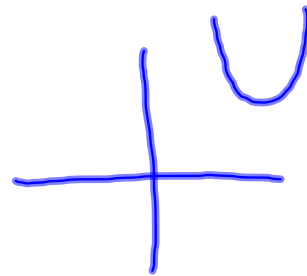
$$36 - 4(1)(10) = -4$$

$$\underbrace{x^2 + 6x + 9}_{(x+3)^2} = -10 + 9$$

$$(x+3)^2 = -1$$

$$x+3 = \pm i$$

$$x = -3 \pm i$$



Solve:

$$n^2 - n + 2 = 0$$

HW:

Pg 131 #9-14, 18-32 evens,
37,49,50,57,58,66-70,86

$$x^4 - 81$$

$$\frac{(x^2 - 9)(x^2 + 9)}{\quad}$$

$$(x - 3)(x + 3) (x - 3i)(x + 3i)$$

$$x^2 + 9 = 0$$

$$x^2 = -9$$

$$x = \pm 3i$$

Attachments

Me Singing A Whole New World Disney_#39;s Aladdin Nick Piter.flv