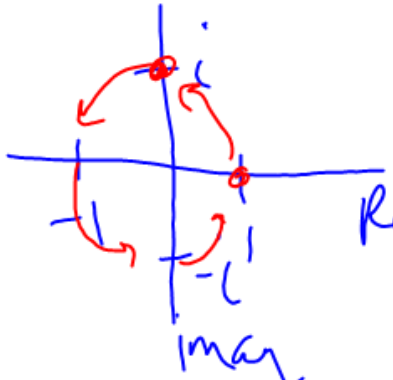
12.7 every power of i simplifies

$\sqrt{-1} = i$

$i^2 = -1$

$i^3 = -i$

$i^4 = 1$



$i^{27} = i^4 \cdot i^4 \cdot i^4 \cdot i^4 \cdot i^4 \cdot i^4 \cdot i^3 = -i$

$4\overline{)27}$ R3, 24, 3

6

$i^{81} = 1$

$4\overline{)81}$ 20 R1, 80, 1

$i^{73} = i$

$4\overline{)73}$ 18 R1, 4, 33 32

Q: $\sqrt{x-4} + \sqrt{x+4} = 4$

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

$$x - 4 = 16 - 8\sqrt{x+4} + x + 4$$

$$x - 4 = 20 - 8\sqrt{x+4} + x$$

$-x \quad -20 \qquad -20 \qquad -x$

$$-24 = -8\sqrt{x+4}$$

$-8 \qquad -8$

$$3^2 = \sqrt{x+4}^2$$

$$9 = x + 4$$

$$5 = x$$

i^{118}

$4\overline{)118}$ 29 R2

116

2

$= i^2 = -1$

$\sqrt{-4} \cdot \sqrt{-9} \neq \sqrt{-4 \cdot -9}$

$2i \cdot 3i \neq \sqrt{36}$

$6i^2 = 6 \cdot -1 \neq 6$

-6

$\sqrt{-2} \cdot \sqrt{-8}$

$i\sqrt{2} \cdot i\sqrt{8}$

$i^2\sqrt{16}$

-4

$3\sqrt{-3} \cdot 2\sqrt{-6}$

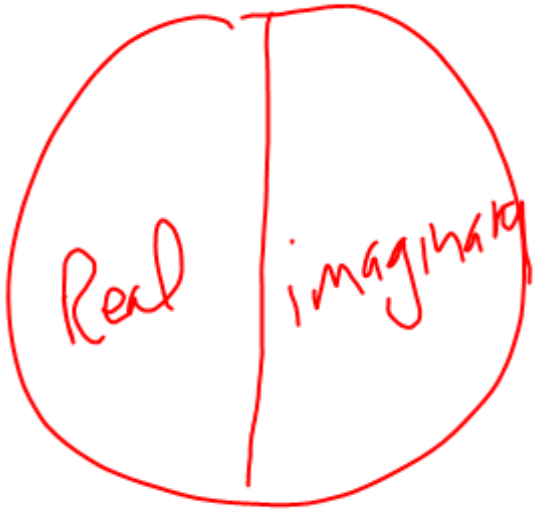
$3i\sqrt{3} \cdot 2i\sqrt{6}$

$6i^2 \cdot \sqrt{18}$

$18 = 2 \cdot 3^2$

$6 \cdot -1 \cdot 3\sqrt{2}$

$-18\sqrt{2}$



Complex #'s

$3 + 2i$

1 Complex

$a + bi$

arithmetic

$(7+3i) + (5-2i)$

$12 + i$

$(2-8i) + (-6+4i)$

$-4 - 12i$

$a+bi$

$5(3-2i) = 15-10i$

$2i(4+3i) = 8i + 6i^2$

-6

$-6+8i$

$(2+5i)(3-2i) = 6-4i+15i-10i^2$

$+10$

$16+11i$

$$(2-7i)(1+3i) = 2 + 6i - 7i - 21i^2 \quad +21$$

$$= 23 - i$$

Divide $\frac{10+5i}{5} = \frac{10}{5} + \frac{5i}{5} \rightarrow 2+i$

$a+bi$

$$\frac{12 + 7i}{2}$$ Divide $\rightarrow$ $\frac{12}{2} + \frac{7}{2}i$

$\rightarrow$ $6 + \frac{7}{2}i$

$a + bi$

$$\frac{(6+3i)i}{3i \cdot i} \rightarrow \frac{6i + 3i^2}{3i^2} \quad (-3)$$

$$\frac{6i-3}{-3} \rightarrow \frac{6i}{-3} - \frac{3}{-3} \rightarrow 1 - 2i$$

$(2+10i)i$ divide $a+bi$

$5ii$

$\frac{10}{5}=2$

$\frac{2i+10i^2}{5i^2-5}$ $\rightarrow$ $\frac{2i}{-5}+\frac{-10}{-5}=$ $\boxed{2-\frac{2}{5}i}$

Divide

$$\frac{(3+2i)(5+3i)}{(5-3i)(5+3i)} \rightarrow \frac{15+9i+10i-6}{25+9}$$

$$\frac{9+19i}{34} \rightarrow \boxed{\frac{9}{34}+\frac{19}{34}i}$$

$a + bi$

$$\frac{(7-2i)(0-4i)}{(0+4i)(0-4i)} \rightarrow \frac{-28i+8i}{-16i^2}$$

Back

-8

16

$$\frac{-28i}{16} + \frac{-8}{16} \rightarrow -\frac{1}{2} - \frac{7}{4}i$$

$$\frac{(7-2i)i}{4i \cdot i} \rightarrow \frac{7i-2i^2}{4i^2} \rightarrow \frac{7i}{-4} + \frac{2}{-4}$$

$+2$

-4

$$\frac{(3-5i)(5-2i)}{(5+2i)(5-2i)}$$ Divide and write as $a+bi$

$$\frac{15-6i-25i+\cancel{10i^2}^{-10}}{25-\cancel{4i^2}^{+4}} \rightarrow \frac{5-31i}{29}$$

$$\rightarrow \boxed{\frac{5}{29}-\frac{31}{29}i}$$