Bell Work

1. Find the zeros for function below. Show all work.

   $f(x) = x^2 + 4x - 96$

2. Add $(5 + 6i) + (-3 - 10i)$.

3. Subtract $(-12 + 4i) - (8 - 3i)$.

4. What is the complex conjugate of $7 + i$?

Multiplying and Dividing Complex Numbers

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

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

$$i^3 = i^2 \cdot i = -1 \cdot i = -i$$

$$i^4 = i^2 \cdot i^2 = -1 \cdot -1 = 1$$

$$i^5 = i^4 \cdot i = 1 \cdot i = i$$

$$i^6 = i^4 \cdot i^2 = 1 \cdot -1 = -1$$

$$i^7 = i^4 \cdot i^3 = 1 \cdot -i = -i$$

$$i^8 = i^4 \cdot i^4 = 1 \cdot 1 = 1$$

$$i^9 = i$$

$$i^{10} = -1$$

$$i^{11} = -i$$

$$i^{12} = 1$$

$$i^{13} = i$$

$$i^{14} = -1$$

$$i^{15} = -i$$

$$i^{16} = 1$$

The pattern repeats.

Multiplying and Dividing Complex Numbers

$$i^{17} = i^{16} \cdot i = 1 \cdot i = i$$

$$i^{23} = i^{20} \cdot i^3 = 1 \cdot i^3 = -i$$

$$i^{56} = (i^4)^{14} = 1^{14} = 1$$

$$i^{91} = i^{88} \cdot i^3 = 1 \cdot i^3 = -i$$

$$\boxed{\begin{aligned} i &= i \\ i^2 &= -1 \\ i^3 &= -i \\ i^4 &= 1 \end{aligned}}$$

Remember this chart.

$$2i(3+5i) = 6i + 10i^2 = 6i + 10(-1)$$
$$= 6i - 10 = -10 + 6i$$

$$-4i(7-2i) = -28i + 8i^2 = -28i + 8(-1)$$
$$= -28i - 8 = -8 - 28i$$

$$3i(-9-i) = -27i - 3i^2 = -27i - 3(-1)$$
$$= -27i + 3 = 3 - 27i$$

Multiplying and Dividing Complex Numbers

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

$$= 6-5i-4(-1)$$

$$= 6-5i+4$$

$$= 10-5i$$

FOIL

- First
- Outside
- Inside
- Last

$$(-5+3i)(4-2i) = -20+10i+12i-6i^2$$

$$= -20+22i-6(-1)$$

$$= -20+22i+6$$

$$= -14+22i$$

FOIL
- First
- Outside
- Inside
- Last

Multiplying and Dividing Complex Numbers

$$(4-3i)(6-2i) = 24-8i-18i+6i^2$$

$$= 24-26i+6(-1)$$

$$= 24-26i-6$$

$$= 18-26i$$

FOIL

- First
- Outside
- Inside
- Last

Multiplying and Dividing Complex Numbers

$$\frac{6-i}{3+2i}\cdot\frac{3-2i}{3-2i}=\frac{18-12i-3i+2i^2}{9-6i+6i-4i^2}$$

Multiply by the conjugate of the denominator.

$$=\frac{18-15i-2}{9+4}$$

$$=\frac{16-15i}{13}=\frac{16}{13}-\frac{15}{13}i$$

$$\frac{1+4i}{5-2i} \cdot \frac{5+2i}{5+2i} = \frac{5+2i+20i+8i^2}{25+10i-10i-4i^2}$$

Multiply by the conjugate of the denominator.

$$= \frac{5+22i-8}{25+4}$$

$$= \frac{-3+22i}{29} = -\frac{3}{29} + \frac{22}{29}i$$

$$\frac{3-2i}{6+i} \cdot \frac{6-i}{6-i} = \frac{18-3i-12i+2i^2}{36-6i+6i-i^2}$$

Multiply by the conjugate of the denominator.

$$= \frac{18-15i-2}{36+1}$$

$$= \frac{16-15i}{37} = \frac{16}{37} - \frac{15}{37}i$$

Assignment:

Multiplying and Dividing Complex Numbers Worksheet