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For each of these we have:

$$x = a + bi$$

$$y = c + di$$

Addition is defined as:

$$x + y = a + bi + c + di$$

$$x + y = (a + c) + (b + d)i$$

Subtraction is defined as:

$$x - y = a + bi - c - di$$

$$x - y = (a - c) + (b - d)i$$

Multiplication is defined as:

$$xy = (a + bi)(c + di)$$

$$xy = ac - bd + adi + bci$$

$$xy = (ac - bd) + (ad + bc)i$$

Division is defined as:

$$\frac{x}{y} = \frac{a + bi}{c + di}$$

$$\frac{x}{y} = \frac{(a + bi)(c - di)}{(c + di)(c - di)}$$

$$\frac{x}{y} = \frac{(ac + bd) + (bc - ad)i}{c^2 + d^2}$$