

5. What is the product of $(-2 + 6i)$ and $(3 + 4i)$?

$$\begin{aligned}
 & (-2+6i)(3+4i) \\
 &= -6 - 8i + 18i + 24i^2 \\
 &= -6 - 8i + 18i - 24 \\
 &= -30 + 10i
 \end{aligned}$$

5-1) $(2-i)(2+i)$

$$4 + 2i - 2i - i^2$$

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

5-2) $(5-2i)(3+4i)$

$$15 + 20i - 6i - 8i^2$$

$$15 + 14i + 8 = 14i + 23$$

5-3) $(1-i)^3$

$$(1-i)(1-i)(1-i)$$

$$(1-i+i^2)(1-i)$$

$$(1-2i)(1-i)$$

$$1 - i - 2i + 2i^2 = 1 - 3i - 2 = -1 - 3i$$

6. Express $\frac{3}{3-i}$ in simplest $a+bi$ form.

$$\frac{3(3+i)}{(3-i)(3+i)} = \frac{3(3+i)}{3^2 - i^2} = \frac{3(3+i)}{9+1}$$

$$= \frac{9+3i}{10}$$

Handwritten notes: A red arrow points from the denominator $(3-i)(3+i)$ to the expansion $3^2 + 3i - 3i - i^2$, which is boxed in green. Another blue arrow points from the final fraction $\frac{9+3i}{10}$ to the table below.

$a+bi$	$\frac{a}{c}$
$\frac{9}{10} + \frac{3}{10}i$	$\frac{3i}{10}$

Simplify

b-1) $\frac{2-i}{3+2i} \cdot \frac{3-2i}{3-2i} = \frac{6-4i-3i+2i^2}{9-4i^2} = \frac{6-7i-2}{9+4} = \frac{4-7i}{13}$

b-2) $\frac{4-3i}{2i} \cdot \frac{2i}{2i} = \frac{8i-6i^2}{4i^2} = \frac{6+8i}{-4}$

$$= \frac{6+8i}{-4} = -\frac{3+4i}{2}$$

$$= -\frac{3+4i}{2}$$

7. Express **each** complex number and their **sum** on the given complex plane.

