Find the following complex numbers in the standard form a + bi:

a) (5 + 3i) + (3 − 7i)   b) (5 + 3i)(3 − 7i)   c) $\frac{5+3i}{3-7i}$

Problem Solving - What are the terms/strategies I may need? What do I know?

If v and w are complex numbers such that $v = a + bi \text{ and } w = c + di$

Then, $v + w = (a + c) + (b + d)i$

$v - w = (a - c) + (b - d)i$

$vw = (a + bi)(c + di) = ac + adi + bci - bd = (ac - bd) + (ad + bc)i$

$\frac{v}{w} = \frac{a+bi}{c+di} = \frac{a+bi}{c+di} * \frac{c-di}{c-di} = \frac{(ac-bd)}{c^2+d^2} + \frac{(ad+bc)i}{c^2+d^2}$ (multiplying the conjugate)

Property of Complex numbers: $i^2 = -1$

Find the following complex numbers in the standard form a + bi:

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Steps & Process

a) $(5 + 3i) + (3 − 7i) = (5 + 3) + (3 - 7)i$
$$= 8 - 4i$$

b) $(5 + 3i)(3 − 7i)$ $= 3*5 + 3*3i + 5*(−7)i − 21i^2$
$$= 15 - 26i + 21$$
$$= 36-26i$$

c) $\frac{5+3i}{3-7i} = \frac{5+3i}{3-7i} * \frac{3+7i}{3+7i}$

$$= \frac{15+35i+9i+21i^2}{9+21i-21i-49i^2}$$

$$= \frac{15+44i-21}{9+49} \qquad = \frac{-6}{58} + \frac{44}{58}i \; = \frac{-3}{29} + \frac{22}{29}i$$

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Solidify Understanding – Explain why the steps makes sense by connecting to math you know.

Why do we use the conjugate when dividing complex numbers?

Why do we have the property that $i^2 = -1$?

Can we convert these complex values into polar form?

For Video Please click the link below:

[Video](#)