More interesting: multiplication

let's multiply those two from the last slide: $(1+3i)(2+2i)$

you have to distribute the multiplication: $1(2+2i)+3i(2+2i)$

$$2+2i+3i(2)+3i(2i)$$

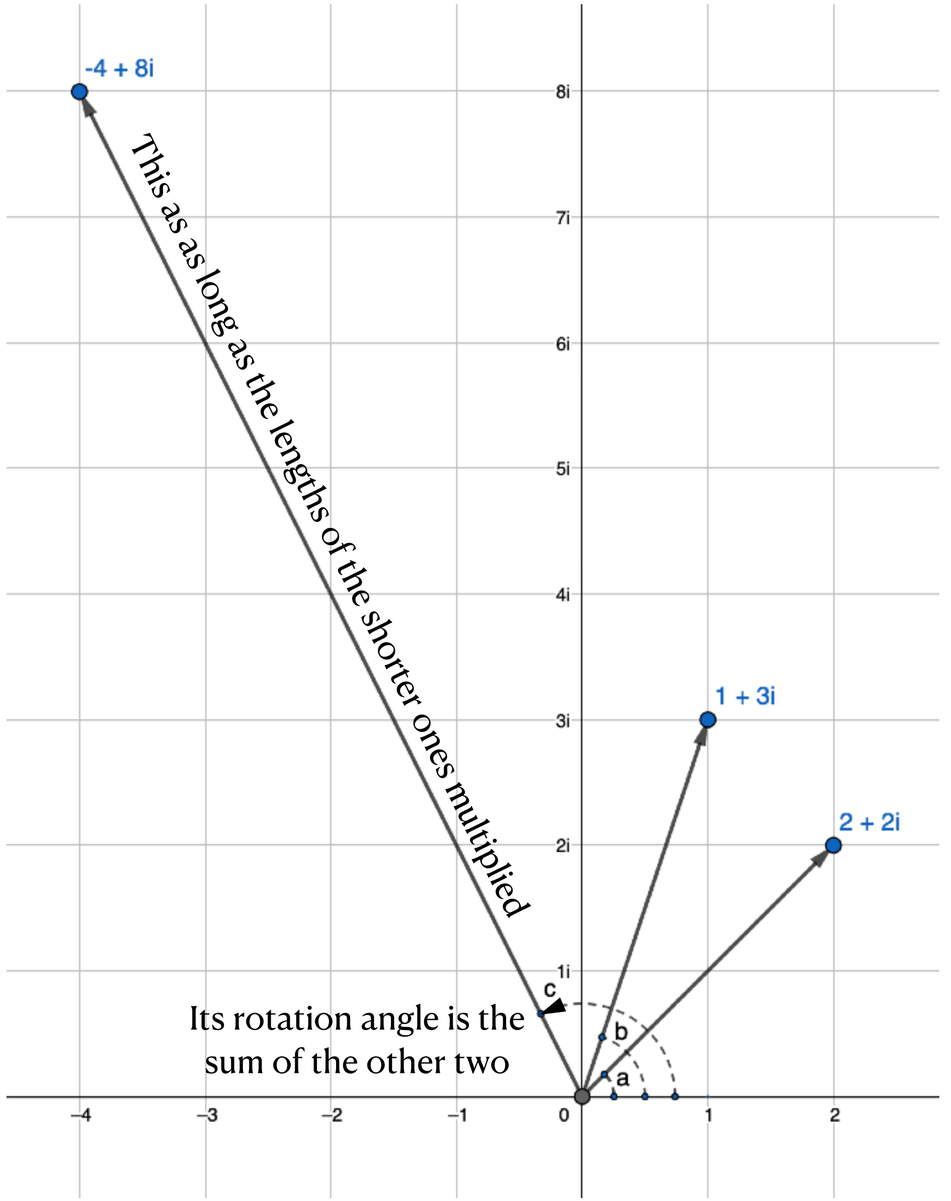
$$2+2i+6i+6i^2$$

combine the 2i and 6i and remember, $i^2 = -1$: $2+8i+6(-1)$

$$-4+8i$$

geometric facts about this product!! i'm not going to do the math for them but trust me!!

- the length of -4 + 8i is the length of 1 + 3i times the length of 2 + 2i!
- each vector has an angle from the x-axis, represented in the picture by a, b and c. the angle for the product is the *sum* of the angles for the two shorter vectors, i.e. c = a + b! so multiplying complex numbers basically adds their rotation angles from the x-axis



$i^2 = -1$, geometrically speaking

a more concrete and simple example of complex multiplication

i (aka 0 + 1i) is right here.
its length is 1 and its rotation angle is $\pi/2$ radians

from the last slide, $i^2 = i \times i$ should have

- length = (length of i) × (length of i)
- rotation angle = (rotation angle to i) + (rotation angle to i)

length: 1×1 = yep, still 1
rotation angle = $\pi/2 + \pi/2 = \pi$
that puts us right here at -1!