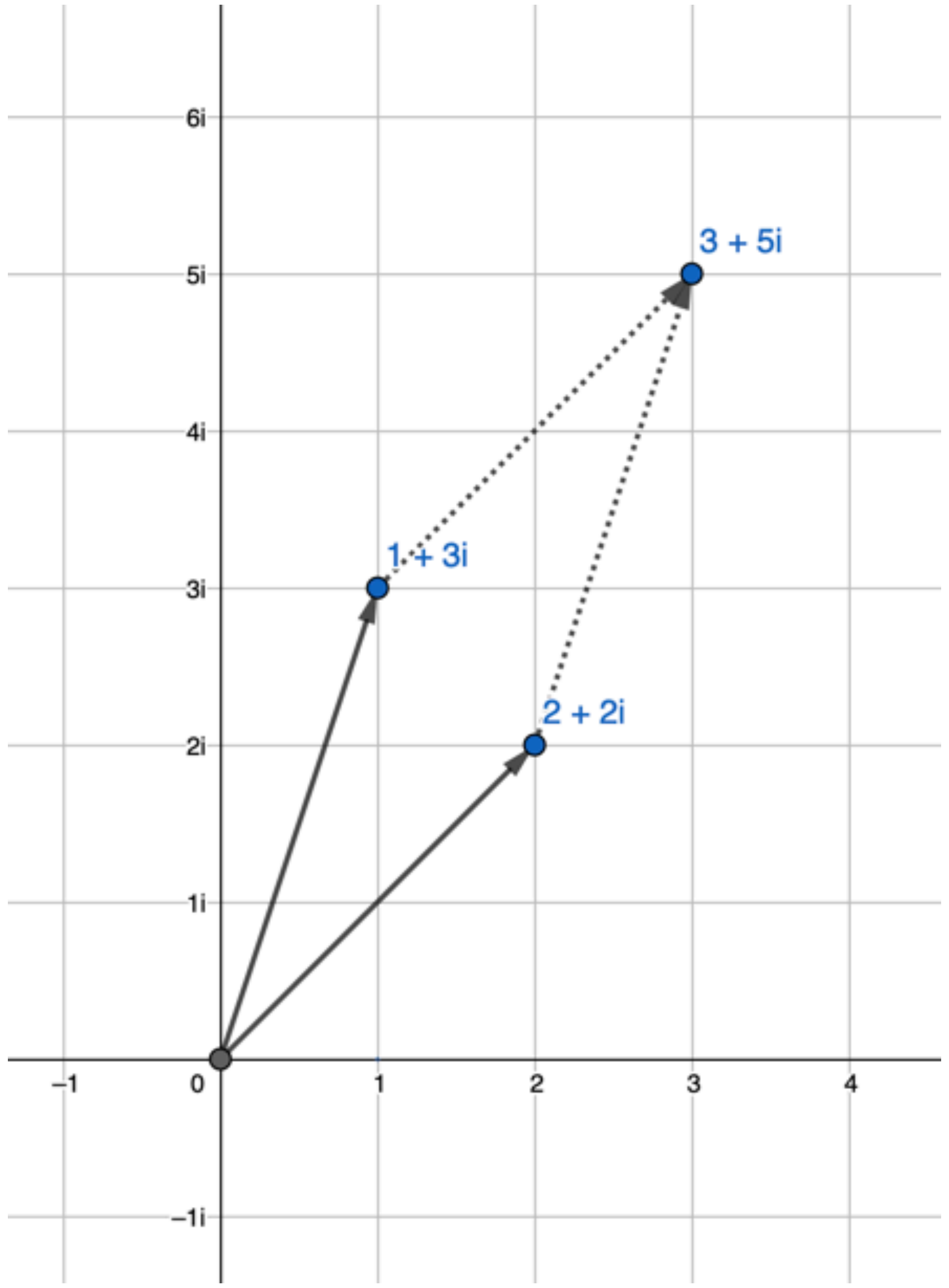
Geometry with "complex" numbers

They're not really *that* complex

"complex" numbers are numbers with a "real part" and an "imaginary part" like 1 + 4i or 2 + 2i

We can draw them by putting the "real part" on the x-axis and the "imaginary part" on the y-axis... then each number is a "vector" pointing from the origin (0, 0) to some other point



Then adding them is the same as taking one line segment and putting it at the end of the other. wherever you end up is the sum

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