$$x^2 + 2x + 3 = 0$$

$$\Rightarrow x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$a = 1$
$b = 2$
$c = 3$

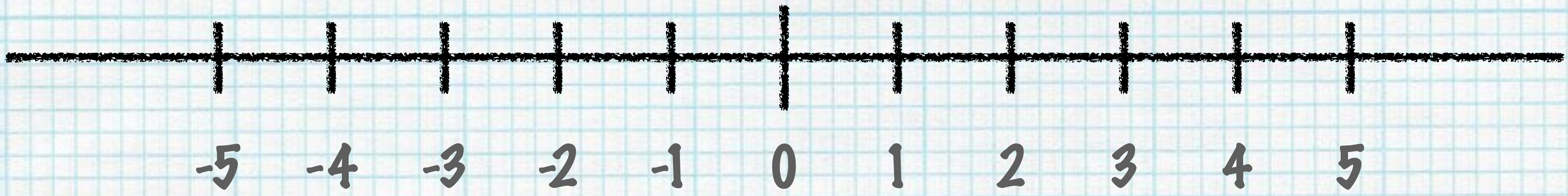
$$= -1 \pm \sqrt{-2}$$

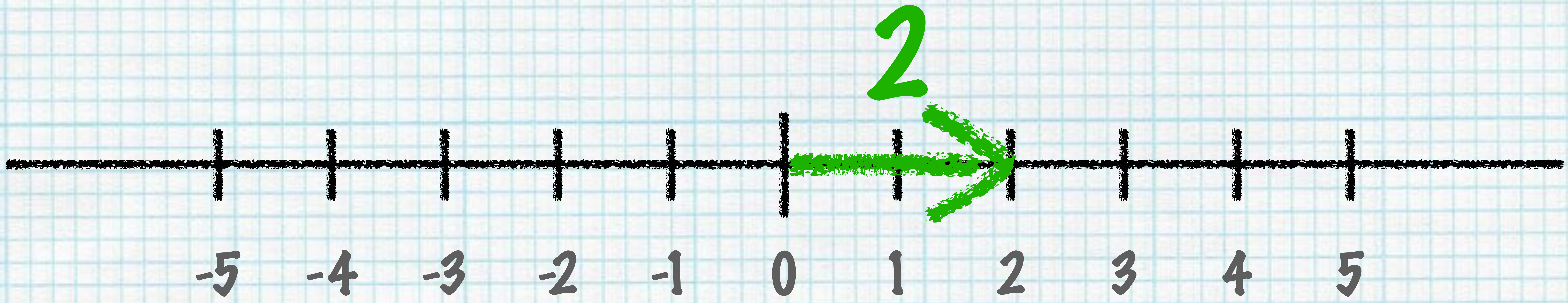
$i = \sqrt{-1}$

$$= -1 \pm \sqrt{2}\, i$$

$$e^{i\pi} = -1$$

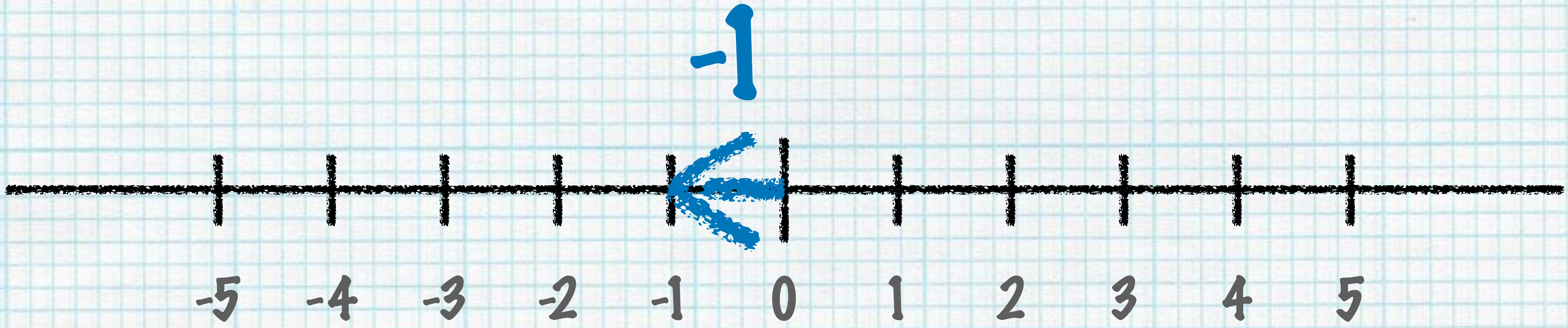
$$e^{i\theta} = \cos\theta + i\sin\theta$$


-5 -4 -3 -2 -1 0 1 2 3 4 5

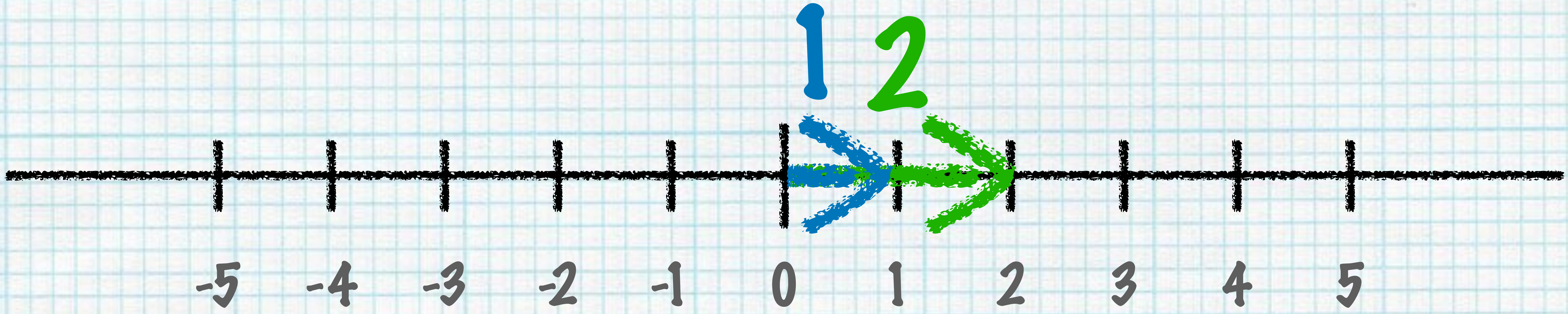


2
-5 -4 -3 -2 -1 0 1 2 3 4 5

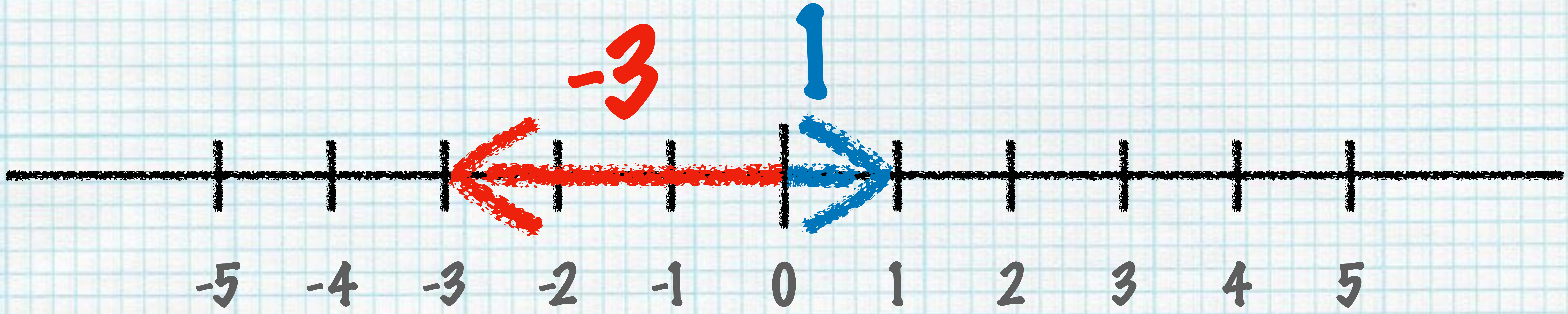

3
-5
-4
-3
-2
-1
0
1
2
3
4
5


-1
-5 -4 -3 -2 -1 0 1 2 3 4 5

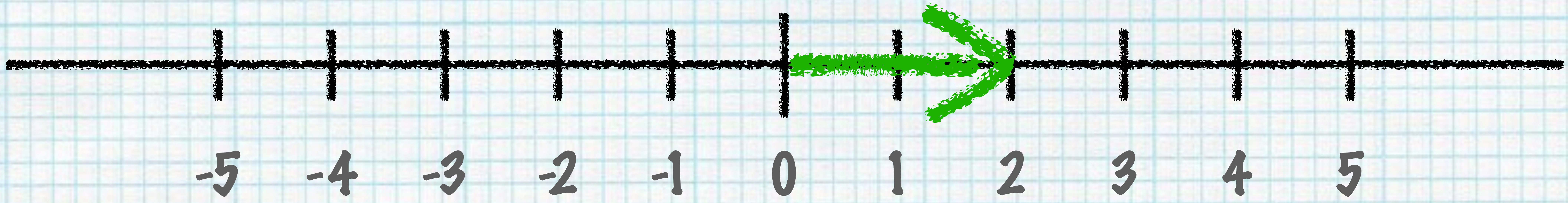
$$2 + 3 + -1 = 4$$



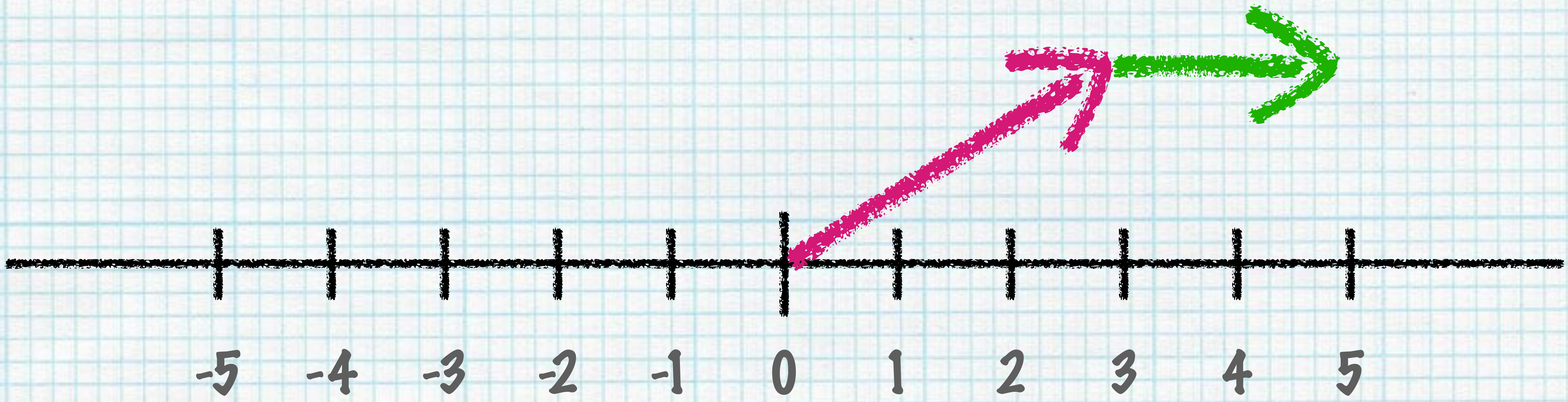
1
2
-5 -4 -3 -2 -1 0 1 2 3 4 5

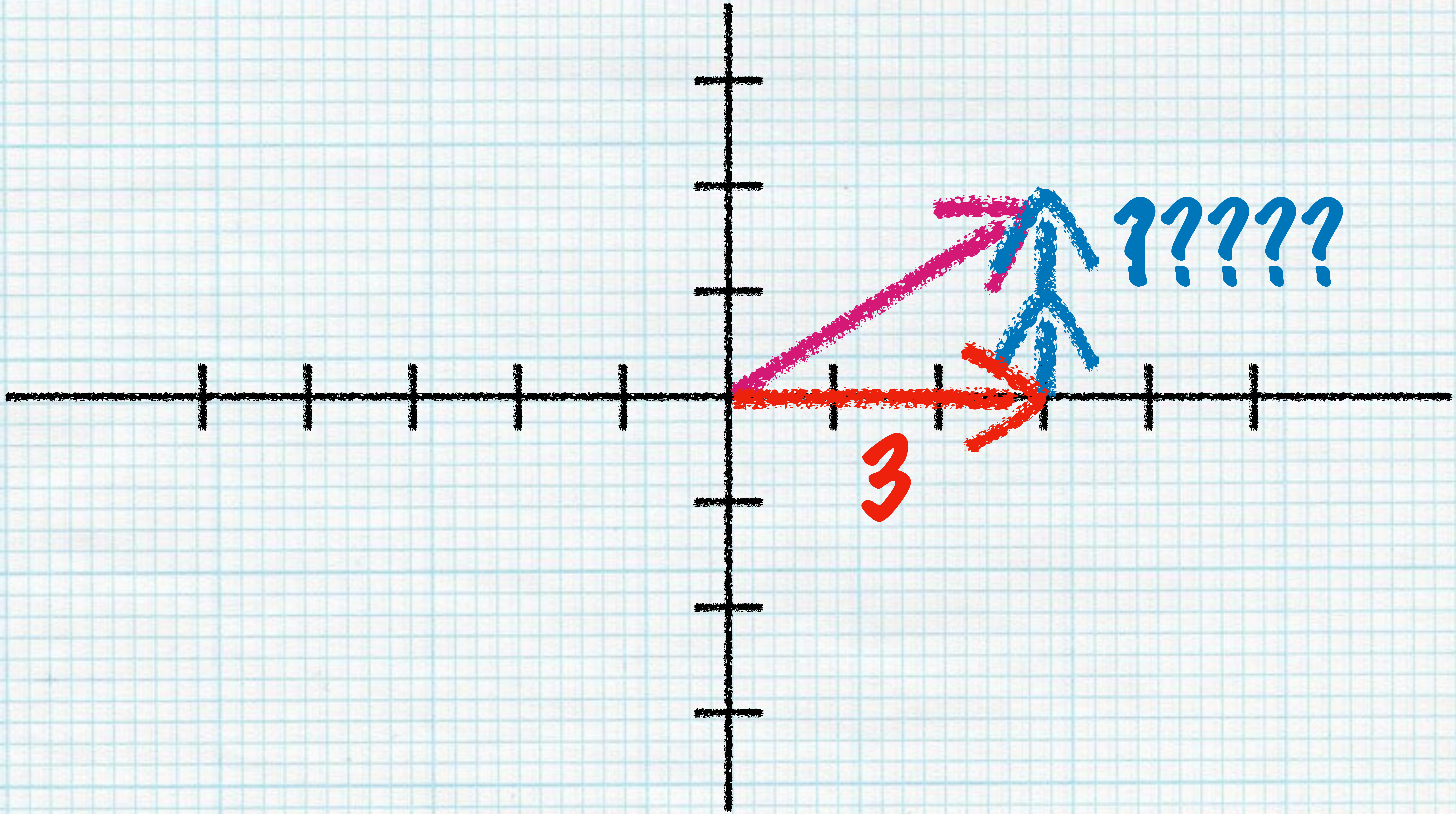

-3
1
-5
-4
-3
-2
-1
0
1
2
3
4
5

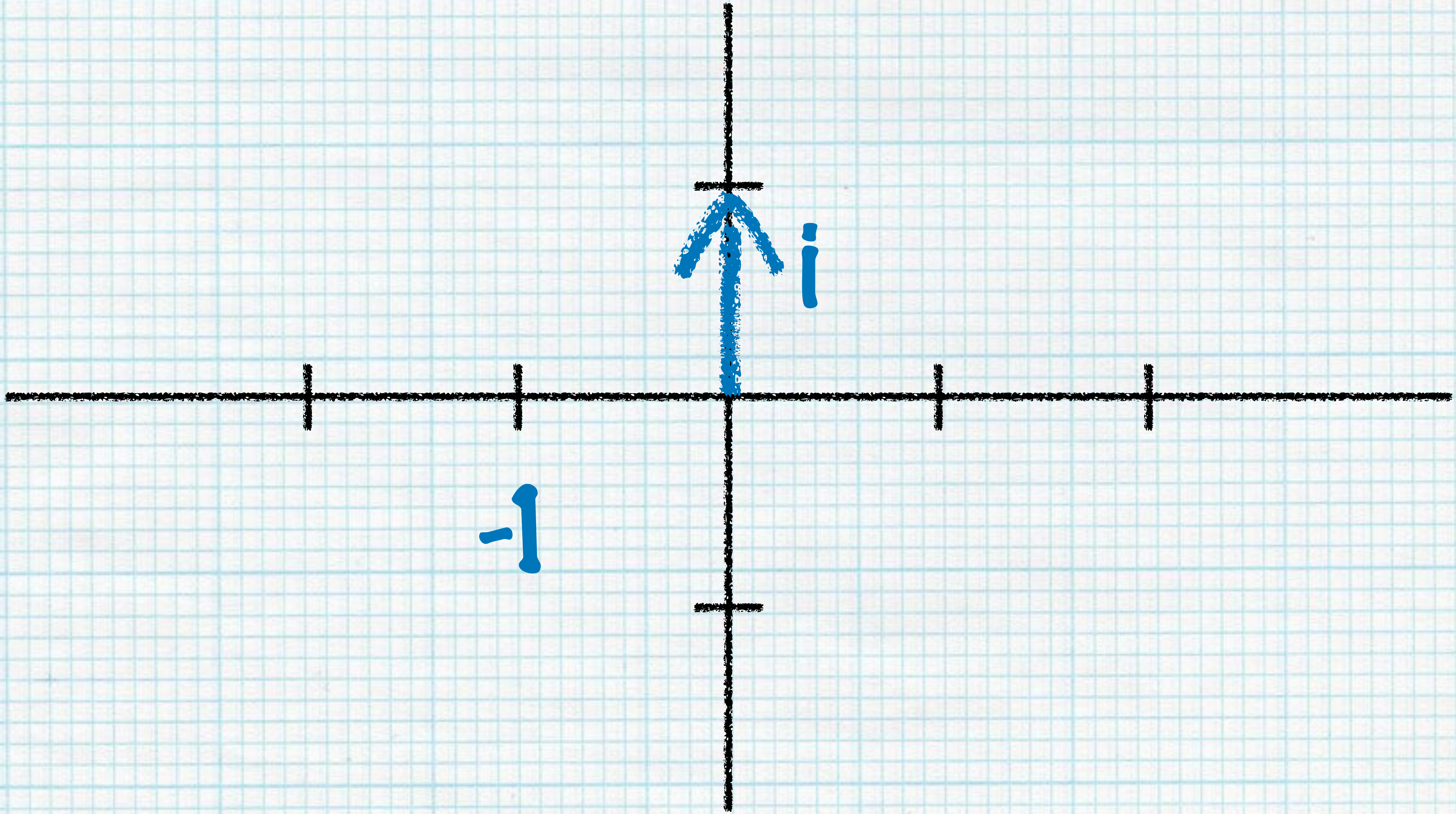
$$2 \times 2 \times -1 = -4$$

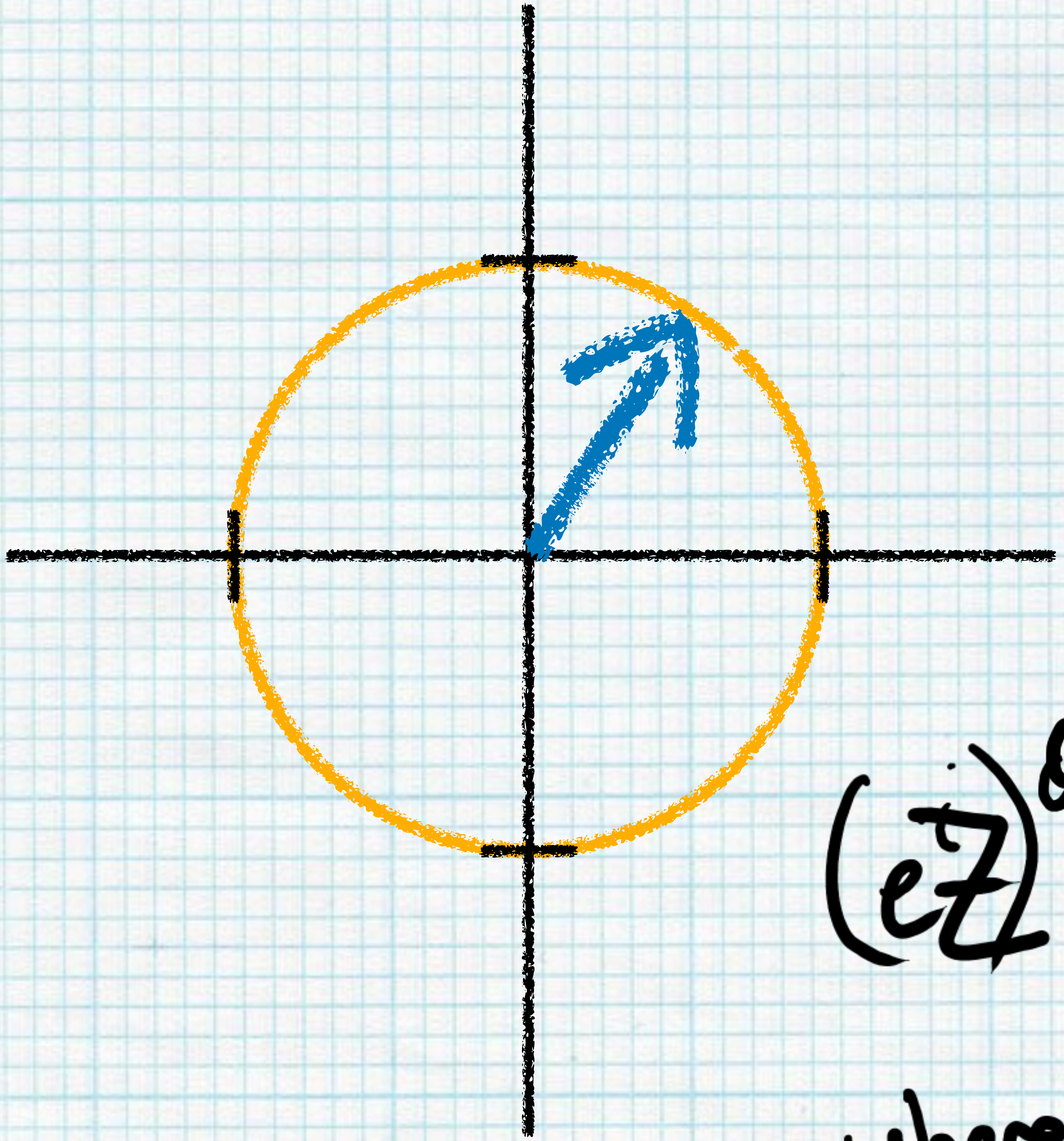



??????
-5 -4 -3 -2 -1 0 1 2 3 4 5


-5
-4
-3
-2
-1
0
1
2
3
4
5


??????
3


i
-1



$$(e^{iZ})^{\theta} = \cos\theta + i\sin\theta$$

where Z = SOMETHING???

Defining complex numbers by geometry	Defining complex numbers by polynomials
Starts with a natural generalisation of real numbers	Starts with the obviously silly idea that -1 has a square root
Defined by the most useful property of complex numbers	Defined by the least useful property of complex numbers
Derives the polynomial definition extremely naturally	Derives the geometrical definition after several pages of algebra

Sources etc at

andrewt.net/complex-numbers

if I remembered to upload them