IMAGINARY GHOSTS

In primary school, mathematics is very concrete. For example, the four operations (and their properties) are described with examples taken from real-life situations. Adding 2 apples and 3 apples make 5 apples while subtracting 3 apples from 5 apples makes 2 apples. Giving to 2 children 3 candies each gives a total of 6 distributed candies. Distributing equally 7 candies among 2 children gives 3 candies for each child and 1 candy that is left over.
Afterwards one could have for example 1,2 kilos of apples and 3/4 of a pizza and so on. Real-life examples can be found for percentages and proportions and so on.

Exiting the realm of real numbers makes it virtually impossible to find real-life examples for the given numbers. And pupils need the psychological acceptance of complex numbers. They might think, for example “We understood natural numbers with counting objects. That’s OK. We understood negative numbers with temperatures below 0 and rational numbers with pizza slices. A bit harder, but still OK. But now you are exaggerating with abstract mathematics: sorry but imaginary numbers simply do not exist and that’s the end of the story.”

With complex numbers, we count and do algebra with numbers that only exist in the realm of our imagination. The so-called imaginary numbers are not real. Does this make any sense?

Before introducing the complex numbers, the teachers could point out that ghosts do not exist but we may speak about them. It also makes sense, mathematically, to say that

$$2 \text{ ghosts} + 3 \text{ ghosts} = 5 \text{ ghosts}.$$

Then they could tell the pupils that the imaginary unit i is a friendly and helpful ghost. So that

$$2i + 3i = 5i$$

kind of makes sense in its own way.