

# Friendly mathematical exercises

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Mathematical exercises may fail to be realistic. Eugenia Cheng, for instance, likes to mention a problem where someone goes and buys 75 watermelons. If you think about it, the situation is absurd, unless we are speaking of a catering service that could maybe do such a purchase for real.

Most pupils may not notice the weird scenarios because they are busy solving the problem (for example, calculating the total price). In case they do notice, they might just raise an eyebrow and ignore the matter. Or laugh about it. However, some pupils may be unsettled by an impossible situation or an improbable coincidence, like all apples weighing precisely 200 grams. They might think that the idealisation is, in fact, a *lie*.

Some pupils are less inclined than others to omit details, or they may approach problems with a more practical mindset. They may also have questions that go beyond the scope of the exercise. For instance, in a math problem, it may not matter whether you buy bread at the bakery first or milk at the supermarket. But in real life, it could matter, like if the bakery closing earlier than the supermarket forces you to buy the bread first.

Another issue is the lack of information, which forces pupils to make unspoken assumptions. For example, if you buy 2 apples and then you buy 3 apples,

how many apples do you have? Probably, the expected answer is 5. However, did you maybe buy more apples because you have eaten the first two? Or, how many apples did you have prior to these purchases? The average pupil might just play Sherlock Holmes when guessing what the teacher wants to hear.

The oversimplification may be necessary to make the exercises. For example, we may need to assume that two quantities are perfectly proportional. This may force us to assume, for example, that all cows make the same amount of milk, and the same amount of milk every day. To accept that, one can maybe think that we are reasoning with average values.

Occasionally, the teacher could (and should) challenge the pupils to ask all the questions that are usually put under the carpet. This is because the oversimplification and the unspoken conventions may simply kill the critical spirit. It is a crucial ability to focus on the essential, and it is also necessary to simplify overly complex problems, however one should bear in mind what is true and what is an approximation or a simplification or a supposition.

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