Problem I.1 ... useful butter
3 points; (chybí statistiky)

Jarda decided to bake a cake but he found out that the battery in his kitchen scale was dead, so he can't weigh 300 g of flour. However, he had the idea that he could use a block of butter instead. The packaging said its weight is $m = 250$ g. Fortunately, he found a suitable spring and a stopwatch. He put a heap of flour in a very light bowl, attached it to the spring, perturbed it and measured the period of oscillations $T_1 = 2.8$ s. He repeated the same process with the cube of butter and measured $T_2 = 2.3$ s. How much flour does Jarda need to add or remove?

<div align="right"><i>When Jarda gets kicked out of Matfyz, he will open a bakery.</i></div>

For a period of the oscillation of flour hanged on the spring holds a well-known equation

$$T_1 = 2\pi\sqrt{\frac{m_m}{k}}\,,$$

where k is a spring constant, and m_m is the mass of the flour. Similarly, the period of oscillation of the butter is

$$T_2 = 2\pi\sqrt{\frac{m}{k}}\,.$$

From the previous equations, we get

$$m_m = m\frac{T_1^2}{T_2^2} \doteq 0.37\,\text{kg}\,.$$

Hence, Jarda has to remove 70 g of flour before he can process the dough.

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