## Junior QA Engineer Technical Task Yevhen Kravets

### Task 1: Mechanical Scales Estimate with Reasoning

To successfully complete this task, I conducted in-depth research and analysis of the Czech Republic's weighing scales market, based on which I made approximate calculations of the number of mechanical scales currently in use.

As first step of investigation I have collected necessary data for my calculations. This data is key to making a more accurate estimate of the number of mechanical scales. Below is the information obtained: total population, total households in Czech Republic year 2025 and chart No. 1 represents age categories.

- Total population: ~10.9 million

- Total households: ~4.61 million

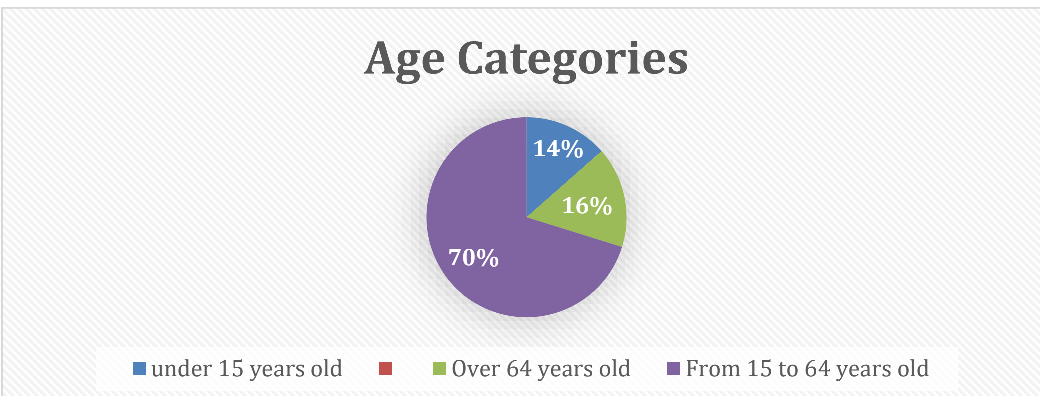


Chart 1

Secondly to find percentage of mechanical to digital scale, tendency shows domination of digital scales around 74% to 26%. Assuming that the older generation tends to use mechanical scales, we can make an approximate calculation of their use in households.

- Assume ~40% of households have kitchen scales: ≈1.84M

- Of those ~20% still use mechanical scales: ≈0.36M

- Assume ~50% of households have bathroom scales: ≈2.3M

- Of those ~25% still use mechanical versions: ≈0.57M

Thirdly I decided to estimate amount of small business, markets and agricultural usage

Farms often use mechanical platform scales for livestock, crops, and feed. There are approximately 33,200 agricultural enterprises in the Czech Republic. Assuming that each farm has 1–2 mechanical scales, the total number of scales on farms is ≈ 33–66 thousand.

Most large retail chains use digital systems, but small retailers and farmers' markets may still use mechanical platform scales. There are an estimated 40,000 small grocery stores/markets, and assuming that 10–25% of them still use mechanical scales, that amounts to approximately 4,000–10,000.

Estimated Total:

- Households: 0. 36M (kitchen) + 0.57M (bathroom) =0.93M.

- Farms: 33k–66k.

- Small business: 4k–10k.

Final Estimate: ~0.98 to 0.99 million mechanical scales in use.

## Task 2: Electric Scooter Safety Testing

Goal: Ensure the product is safe under real-world conditions and complies with standards

To produce all necessary test I analyzed the electric scooter's components, typical usage scenarios, and potential failure points. I categorized safety risks into major areas: electrical, mechanical, braking, stability, user interface, and environmental exposure, each category reflects a specific aspect of how the scooter functions in real-life conditions.

The selected tests cover both functional testing (e.g. braking distance, throttle behavior) and non-functional testing (e.g. water resistance, durability).

This structured approach ensures we verify: Safety, Reliability and Usability

Based on this analysis, I defined several focused testing categories. First, electrical safety is critical, especially given the risks associated with lithium-ion batteries. The scooter must undergo tests for battery overcharge protection, short circuit resistance, and thermal stress behavior. The charger must be tested for overvoltage safety, and all internal wiring should be checked for insulation integrity to avoid any exposed conductors. These measures help prevent electrical fires and shocks.

Next, mechanical durability must be validated through structural stress tests. The scooter's frame should be tested for load-bearing strength, resistance to road vibration, and its ability to withstand drops from about one meter. Moving parts, like folding joints and suspension components, must also be evaluated to ensure they can handle long-term use without failure.

Braking performance is another critical area. The stopping distance needs to be measured under emergency conditions, and the brakes must retain their performance even after repeated use to avoid brake fade. There should also be redundancy—meaning at least one brake must remain functional if the other fails—to guarantee user safety at all times.

In terms of handling and stability, tests must confirm the scooter remains balanced when tilted and that it handles predictably during turns or at speed, even with different rider weights. Poor handling could result in accidents, especially in urban environments.

User interface and safety features should also be assessed. The lighting system must provide proper visibility in low-light conditions and meet at least an IPX4 protection rating. The dashboard should clearly display key information such as speed and battery level, and the throttle must respond smoothly to avoid sudden or unsafe acceleration. These aspects are essential for intuitive and safe operation.

Finally, environmental testing ensures the scooter functions reliably across different weather conditions. It should be resistant to splashes and light rain (IPX4 or higher), operational in temperatures ranging from –10°C to +45°C, and protected against dust and corrosion that could affect performance over time.

This structured testing approach aligns with the core principles of quality assurance: identifying risk, simulating real-world use, and validating compliance with safety standards such as UL 2272 and EN 17128.

Through this method, we can confidently release a product that is safe, reliable, and user-friendly.