

# Grams and Kilograms

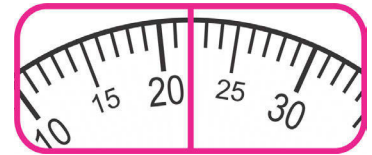
We can measure objects using different types of scales, to find out how heavy they are.

In this lesson we will use scales that show kilograms (kg) and grams (g). Those are units for mass. The **mass** of an object means how much material (or substance or “stuff”) is in it. And the more material is in it, the heavier it is!

- A **gram** (abbreviated “g”) is a very small unit of mass. One large paperclip has a mass of about 1 gram.
- A **kilogram** (kg) is a larger unit of mass. For example, a baby might have a mass of 4 kg. A liter (or a quart) bottle of water has a mass of 1 kg.
- A thousand grams make one kilogram: **1,000 g = 1 kg.**

In this lesson, you will need:

- A bathroom scale that measures in kilograms. An analog scale is great; digital is fine.
- A kitchen scale that measures in grams. An analog scale is great; digital is fine, too.
- Paperclips, thumbtacks, pencils, and other small objects.
- A book, water bottle, or other object with a mass of (approximately) 1 kg.
- An object with a mass of 100 g (a small apple, tomato, or a potato will do).
- Objects to weigh.



## 1. Let's weigh stuff!

- a. How many paperclips do you need to make the scale show 10 grams?

Use both small and large paperclips if you have them.

Note: one paperclip may not make a scale to show anything, because it may be less than one gram. (Small paperclips are about 1/4 to 1/3 of a gram.)

- b. Place 20 paperclips on the scale. Then do the same with 20 thumbtacks.

Which is heavier, *one* paperclip or *one* thumbtack?

- c. Estimate (make a guess) the mass of a ruler and a pencil. Then check with the scale.

(Note to the teacher: Technically speaking, scales measure weight, not mass. Weight of an object is a force; it is how much gravity pulls on an object. Scales measure the pull of gravity on an object. But, scales we will be using here do not show a measurement of force (which would be in Newtons) but use kilograms or grams which are units of mass. In other words, the scales use gravity to indirectly measure an object's mass. In this lesson, it is alright to use the word “weight” since that is common in everyday usage, and since that is what scales in reality do measure. However, it is also good to get students used to the word and idea of “mass”.)

2. Use a kitchen scale and find:

- a. an object with a mass of 50 grams;
- b. an object with a mass of 100 grams;
- c. a book or another object with a mass of 1,000 grams (1 kilogram).

3. Estimate (in grams) the mass of various small items your teacher presents to you. Then check their mass using a kitchen scale.

Item	Estimated mass	Mass
	_____ g	_____ g

4. Now use a bathroom scale that measures in kilograms. Estimate the mass of various things and people. Then check their mass using the bathroom scale.

Thing/person	Estimated mass	Mass
	_____ kg	_____ kg