

Section 1 Vocabulary

A. Read the text and look at the pictures.



The basis of science and technology is **measurement**. Scientists and technicians must be able to measure **physical objects** and **events**. Measurement is especially important in the laboratory. Experiments involve measuring **mass**, **length**, **time**, **temperature**, **pressure** or other **quantities**. The results are useless, however, unless **standard units of measurement** are used. One system of standard units is the **SI**. The **kilogram (kg)**, the **meter (m)** and the **second (s)** are basic SI units. The SI unit for temperature is the kelvin but **degrees Celsius (°C)** is more common outside the laboratory. Similarly, the SI unit for pressure is the **pascal** but **bars**, **millibars** and **hectopascals (hPa)** are more common.

There are special devices for taking measurements. For example, **Vernier calipers** are used to measure small widths and diameters while a **traveling microscope** is used to measure small lengths. A **top-pan balance** or a **spring balance** can be used to measure mass or weight (see note on page 26). **Stopwatches** are used to measure time. The read out can be analog or digital.

**Thermometers** are used to measure temperature while **barometers** are used to measure pressure. **Measuring flasks** are used for volume, measured in **liters (l)**.

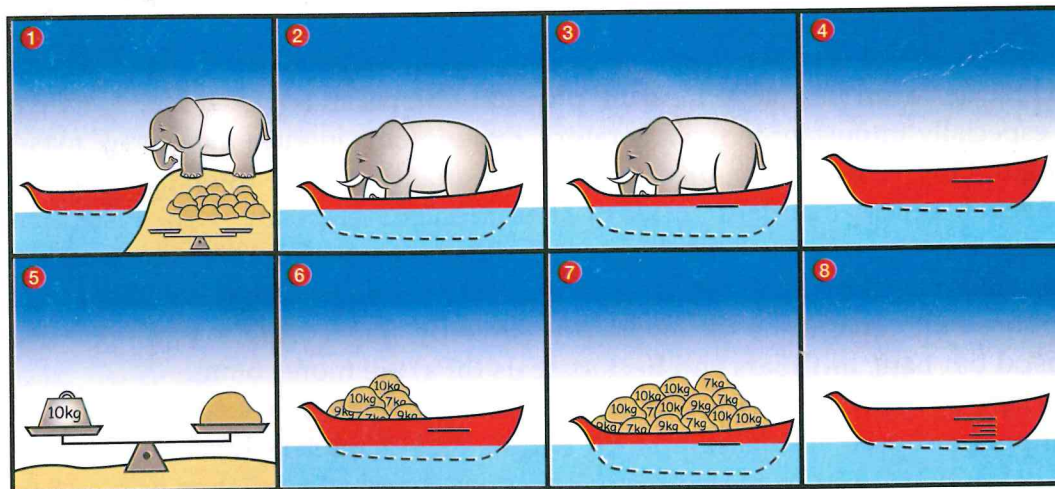
Note: Mass is the amount of matter in an object and is measured in kilograms. Gravitational force gives the mass its weight. Weight is a force and is measured in newtons, using a newtonmeter. However, in everyday language, we often talk about measuring the weight of an object rather than its mass and we record that weight in kilograms.

**B. Look at the table. Fill in the missing information.**

Item being measured	Measuring device	Possible unit of measurement	Abbreviation
	calipers; traveling microscope		mm
		degrees Celsius	
mass	spring balance	grams	
time	stopwatch	seconds, minutes, hours	s, m, h
	measuring flask		l
pressure		hectopascals	



**Section 2 Reading**



When vets need to give medicine to a large animal, they must know how much the animal weighs. But how can you weigh an elephant? There is no top-pan balance big enough for the elephant to sit on. You need a huge pair of scales which is strong enough to hang the elephant from...or you could use a small pair of scales, a boat, and a pile of stones.

First, put the elephant into a boat. The boat goes down in the water. Mark a line on the side of the boat at the level of the water with a marker pen. Take the elephant out of the boat. The boat goes up in the water. Weigh large stones and write the weight on each stone. Put the stones into the boat until it goes down to the level of the mark. Add up the weights, and you have the weight of the elephant.

You could go further. Write the weight of the elephant next to the mark on the side of the boat. Take out stones in groups of 10 kilos. Make a new line and write the weight each time. Continue until there are no more stones in the boat. You have now calibrated the boat. You have a measuring device for animals or other heavy items.

**A. Choose the best answer in each case.**

- Vets are:
  - scientists
  - people who look after animals
  - doctors for animals
  - a kind of animal
- It is difficult to weigh elephants because:
  - they are so big
  - they are so heavy
  - they are wild
  - they are so big and so heavy
- What happens when you take the elephant out of the boat?
  - the boat goes down in the water
  - the boat goes up in the water
  - the water goes into the boat
  - the line goes under the water
- You put stones into the boat until:
  - the line is under the water
  - you have no more stones
  - the line is at the same level as the water
  - the boat goes down in the water
- Calibrate* means:
  - write weights on stones
  - mark up a measuring device with a scale
  - draw lines on a boat
  - make a measuring device

**B. Study ways of talking about place and movement.**

Study Figure 1. Talk about things in the room.

Example: *The window is next to the door. The air-conditioner is above the whiteboard.*

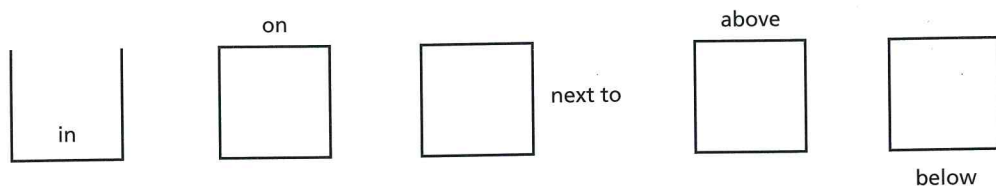


Figure 1: Talking about place

Study Figure 2. Talk about things you did yesterday.

Example: *I came to college in the morning. I went up the stairs.*

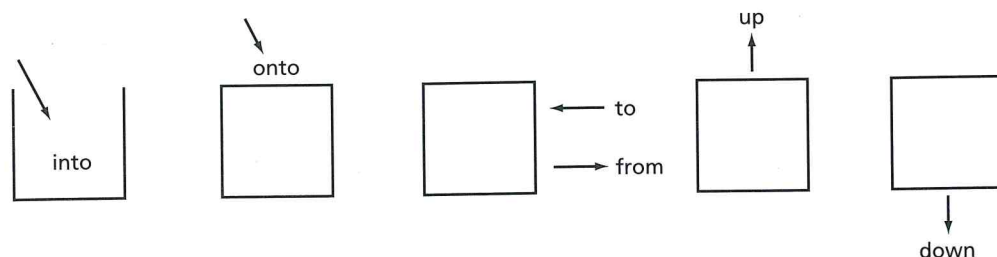


Figure 2: Talking about movement

**C. Complete this text with a suitable word in each space.**

First, put the elephant \_\_\_\_\_ a boat. The boat goes \_\_\_\_\_ in the water. Mark a line \_\_\_\_\_ the side of the boat with a marker pen. Take the elephant \_\_\_\_\_ of the boat. The boat goes up \_\_\_\_\_ the water. Weigh large stones and write the weight \_\_\_\_\_ each stone. Put the stones \_\_\_\_\_ the boat until it goes down \_\_\_\_\_ the level of the mark. Write the weight of the elephant \_\_\_\_\_ to the mark on the side of the boat.

**Section 3 Listening**

**A. Listen and complete the summary of the reading text in Section 2. Write one word in each space.**

To weigh something very heavy:

- \_\_\_\_\_ the item in a boat.
- Draw a line on the side of the boat at the \_\_\_\_\_ of the water.
- \_\_\_\_\_ the item out of the boat.
- Put weights into the boat until it goes down to the level of the \_\_\_\_\_.
- Add \_\_\_\_\_ the weights in the boat.

**B. Listen to the lecture. What is the man talking about? Circle one of the words or phrases in the box.**

boats / elephants / human bodies / animals / stones

**C. Listen again and complete the summary. Write one word or number in each space.**

The lowest mass of the \_\_\_\_\_ body is 283 grams. The highest is 442 \_\_\_\_\_. The minimum length is 0.7 \_\_\_\_\_, while the maximum is \_\_\_\_\_ meters. The normal \_\_\_\_\_ is 36.8°C but the lowest ever recorded was \_\_\_\_\_ and the highest was \_\_\_\_\_. The volume of blood varies with \_\_\_\_\_. The average is 70 \_\_\_\_\_ per \_\_\_\_\_.