

UNIT ONE

Scientific and Indigenous measurements

Scientific Measurements

Introduction

Making observation is common experience in science. Similarly, it is usual asking the basic questions like how big an object is? How tall are you? To answer these questions, measurements have to be made. Measurement is the process of obtaining the magnitude of a quantity relative to an agreed standard.

In this section both the indigenous and modern methods of measurement will be discussed. The indigenous method of measurement refers to a measurement practiced locally while the modern method refers to a measurement applied by the scientific community.

Indigenous Methods of Measurements

An indigenous method of measurement refers to measurement methods that are practiced locally for a long period of time and are passed from generations to generation. In this section, we will pay attention to the measurement of length, mass, and time.

A. Length

Length is a measure of the distance between two points. In Ethiopia we use different indigenous units of length measurement. The commonly used ones are:

1. **Hand-span:** The hand-span is the measure from the tip of your little finger to the tip of your thumb when your hand is stretched out. Fig 1.1 (a).
2. **Digit:** A digit is the width of an adult human male fingertip, Fig 1.1 (b).
3. **Cubit:** A measure of distance from the tip of one's elbow to the tip of the middle finger when your arm is extended, Fig 1.1 (c).
4. **Foot:** A measure of distance from the back of the heel to the tip of the big toe, Fig 1.1 (d).
5. **Pace:** A linear distance measure of a person's extended walk. A pace is a unit of length consisting either of one normal walking step. The pace is the distance measured from the heel of one foot to the heel of the same foot when it next touched the ground, Fig 1.1 (e).
6. **Arm span:** Arm span also known as fathom is the distance from the middle fingertip of the left hand to that of the right hand when you stretch your arms out as far as they can reach, Fig 1.1 (f).

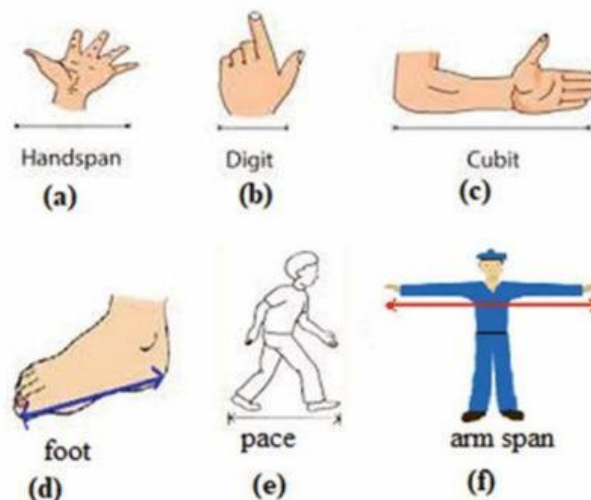


Figure 1.1 Indigenous Measurement Length

B. Mass

The amount of matter present in a substance is called mass. Like length, there is also an indigenous method of measuring mass. The following are some examples of the indigenous unit of mass measurement used in Ethiopia.

1. **Weqet**- Weqet is a mass measuring unit usually used to measure the mass of powder of gold in local markets.
2. **Quntal** – Quntal (may be taken from the English word quintal) is a bag used to measure the mass of grains. It is equal to a hundred kilogram.
3. **Feresula**:- is used to measure the mass of pepper and coffee. It is equal to 17 kilogram.



C. Time

Time is the measure of the duration for an interval. There is also an indigenous method of measuring time. Our elders were used the shadow of a tree to measure time. As the

position of the Sun changes from morning to evening the length of the shadow of a tree varies. In the morning and late in the afternoon, the length of the shadow is high. At noon when the Sun is overhead no shadow will be seen. Using this fact they could tell the approximate time of the day by just looking at the position of the shadow of a tree found at or near their home.

D. Volume

Volume is the measure of the space occupied by an object. In the local markets of Addis Ababa the following tools are used for different size volume measurements.

1. Jog: A plastic cup used for measuring the volume of liquids.
2. Tassa: A can used to measure cereals, pulses ,liquids and solids.
3. Sini: A small ceramic cup often used for measuring coffee, pulses and spices.
4. Birchiko: A glass often for measuring pulses and liquids.
5. Kubaya: A mug, often used for measuring cereals, pulses and liquids.



Choo Figure 1.3 Some examples of Indigenous volume measurements

Part A: General Concepts

1. What is measurement?
 - a) Comparing objects by appearance
 - b) Guessing the size of objects
 - c) The process of obtaining the magnitude of a quantity relative to an agreed standard
 - d) Observing without standards
2. Which of the following are the two methods of measurement?
 - a) Modern and simple
 - b) Local and foreign
 - c) Indigenous and modern
 - d) Standard and non-standard
3. Indigenous methods of measurement are:
 - a) Recent scientific inventions
 - b) Locally practiced and passed from generations
 - c) The same in all countries
 - d) Not used in Ethiopia
4. Which physical quantities are discussed in indigenous measurement?
 - a) Length, mass, and time
 - b) Speed, velocity, and acceleration
 - c) Energy, power, and force
 - d) Weight, density, and pressure

Part B: Indigenous Length Measurement

5. A hand-span is measured from:

- a) Heel to toe
- b) Elbow to fingertip
- c) Little finger to thumb when stretched
- d) Shoulder to wrist

6. A digit is defined as:

- a) The width of an adult human fingertip
- b) The distance of one pace
- c) The length of an arm
- d) The span of two feet

7. The cubit is the distance from:

- a) Shoulder to wrist
- b) Elbow to middle fingertip
- c) Heel to toe
- d) Thumb to little finger

8. The foot as a unit of measurement is:

- a) Distance from elbow to wrist
- b) Heel to big toe
- c) Distance of a step
- d) Span of arms

9. A pace is measured as:

- a) Distance from fingertip to fingertip
- b) Distance between two consecutive steps of the same foot
- c) Distance from heel to toe
- d) Distance from elbow to wrist

10. Arm span (fathom) is measured as:

- a) From shoulder to wrist
- b) From fingertip to fingertip when arms are stretched

c) From elbow to fingertip

d) From heel to toe

Part C: Indigenous Mass Measurement

11. What is “Weqet” used for?

a) Measuring coffee

b) Measuring gold powder

c) Measuring grains

d) Measuring time

12. Quntal is equal to:

a) 10 kg

b) 17 kg

c) 50 kg

d) 100 kg

13. Feresula is commonly used to measure:

a) Coffee and pepper

b) Gold powder

c) Time

d) Cereals and pulses

14. One Feresula is equal to:

a) 17 kg

b) 100 kg

c) 10 kg

d) 50 kg

Part D: Indigenous Time Measurement

15.How did elders measure time?

- a) By counting steps
- b) By using shadows of trees
- c) By measuring distance
- d) By burning candles

16.At noon, the shadow of a tree is:

- a) Longest
- b) Shortest
- c) Not seen at all
- d) Constant

Part E: Indigenous Volume Measurement

17.Which tool is a plastic cup used to measure liquids?

- a) Kubaya
- b) Sini
- c) Tassa
- d) Jog

18.Tassa is used to measure:

- a) Gold
- b) Coffee only
- c) Cereals, pulses, liquids, and solids
- d) Spices only

19. A small ceramic cup used for coffee and spices is called:

- a) Birchiko
- b) Sini
- c) Kubaya
- d) Jog

20. Which tool is a mug used for cereals, pulses, and liquids?

- a) Sini
- b) Kubaya
- c) Birchiko
- d) Jog