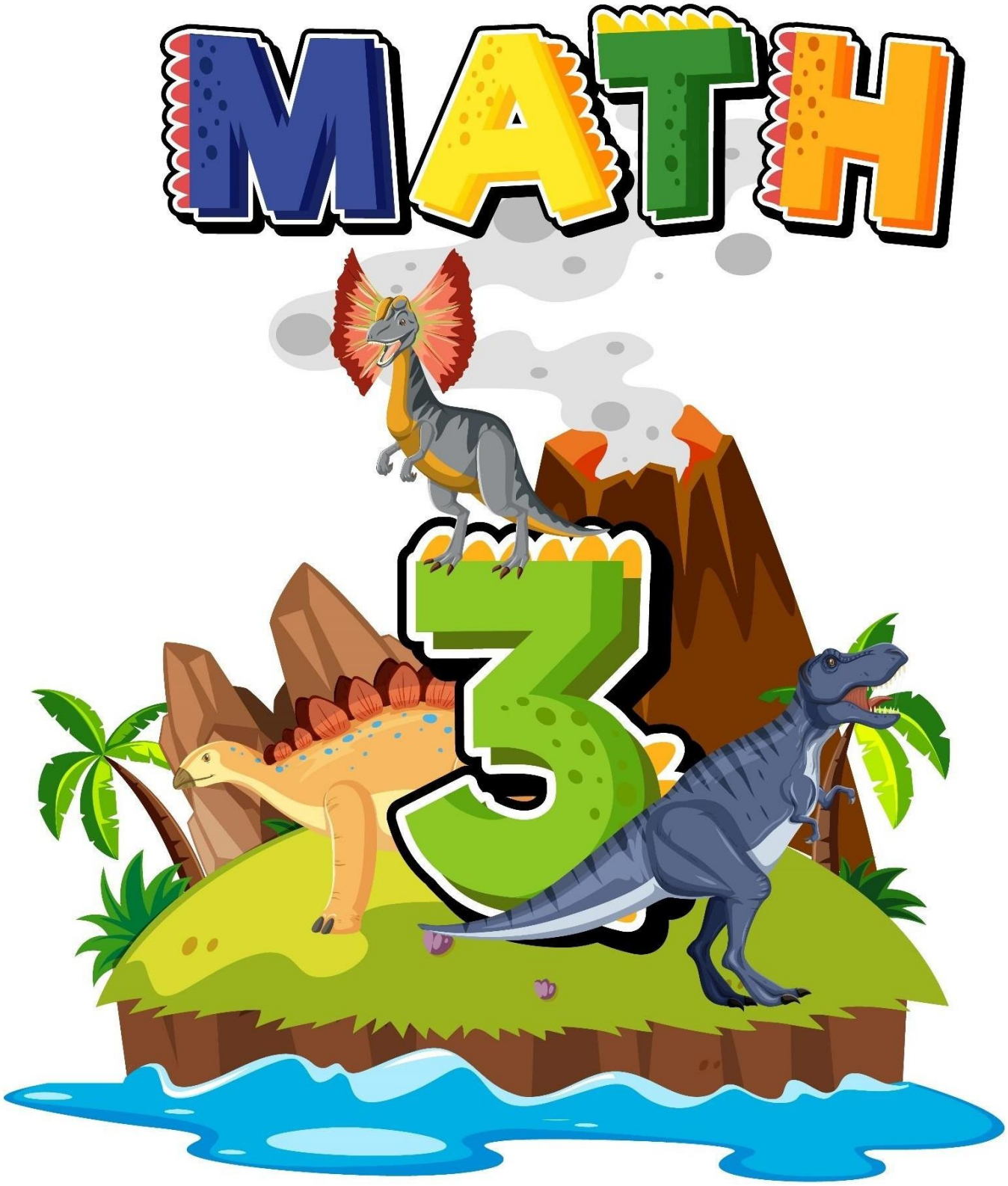

CHAPTER 10: MEASUREMENT LENGTH, WEIGHT AND CAPACITY

MEASUREMENT LENGTH, WEIGHT AND CAPACITY

➢ INTRODUCTION

Measurement is the elementary information about everything. The term measurement is derived from the Latin word measure. Length, weight and volume are measured in appropriate units. SI unit stands for International system for units. Conversion of Measuring Units Length, weight and Volume

- **Non-standard Units of Length:**
  - Length → fingers, hand span, cubit, pace etc.
- **Standard Units of Length:**
  Meter is a standard unit for measuring length.
  - 1 meter = 10 decimetres
  - 1 decimeter = 10 centimetres
  - 1 metre = 100 centimetres
- **Non-standard Units for Mass:**
  - Mass → marbles, stones, beads etc.
- **Standard Units for Mass:**
  - Kilogram is a standard unit of mass.
  - 1 kilogram = 1000 grams
- **Non - Standard Units of Capacity:**
  - Capacity → Cup, bottle, tumbler etc.
- **Standard Units of Capacity:**
  - Liter is a standard unit of capacity.
    1 liter = 1000 milliliters

Length	Weight	Volume
1km = 1000m	1kg = 1000g	1kl = 1000l
1hm = 100m	1hg = 100g	1hl = 100l
1dam = 10m	1dag = 10g	1dal = 10l
1dm = 0.1m	1dg = 0.1g	1dl = 0.1l
1cm = 0.01m	1cg = 0.01g	1cl = 0.01l
1mm = 0.001m	1mg = 0.001g	1ml = 0.001l

❖ Conversion between Meters and Centimeters

Following are the steps for the conversion of meters into centimeters and centimeters into meters.

Step 1: Meters are converted into centimeters multiplying by 100.

Step 2: Centimeters are converted into meters dividing by 100.

Example:

1. Convert 225 meters into centimeters.

(a) 22500cm

(b) 4500cm

(c) 2250cm

(d) All the above

(e) All of these

Answer: (a)

Explanation: 1 meter = 100 centimeter so, 225 meter = 22500 centimeters.

Conversion of Kilometers and Meters

Following are the steps for the conversion of kilometers into meters.

Step 1: Convert kilometers into meters by multiplying the number of kilometers by 1,000 (1 km = 1,000 meters).

Step 2: Convert the kilometers and meters into meters by multiplying the number of kilometers by 1,000 and then add the number of meters.

Example:

2. Convert 6 km 340 m in centimeters.(a)

657800 cm

(b) 625000 cm

(c) 634000cm

(d) All the above

(e) None of these

Answer: (c)

Explanation:

6 km 340 m = 6340 m = 634000 cm.

➢ MEASUREMENT OF MASS

The standard unit for the measurement of mass is kilogram (kg) and gram (g).

Mass of small object is measured in grams. 1 kilogram = 1000 grams. Therefore, one gram is thousandths part of one kilogram.

Addition of Measured Masses

❖ Addition by Conversion

Following steps are used for the addition of two or more masses:

Step 1: Convert kilograms into grams by multiplying thousand.

Step 2: Add them by simple addition.

Step 3: Express resulting numbers in gram.

Questions:

1. The weights of three boys are 25 kg 400 grams, 30 kg 500 grams and 20 kg 234 grams. Find the total weight of the boys?

(a) 76 kg 134 grams

(b) 78 kg 150 grams

(c) 70 kg 500 grams

(d) None of these

(e) All of these

Answer: (a)

Explanation:

25400 grams

30500 grams

$$\text{Sum of their weights} = \frac{20234 \text{ grams}}{76134 \text{ grams}}$$

❖ Addition without Conversion

The following steps are used for the addition of two or more masses:

Step 1: Arrange vertically kg under kg and grams under grams of all the given masses.

Step 2: Add them by simple addition method starting from right.

Step 3: If carry is generated then add generated carry to the next addition.

2. Add the following weights without conversion: 32 kg 930 grams and 22 kg grams?

(a) 55kg

(b) 78kg

(c) 70kg

(d) None of these

(e) All of these

Answer:(a)

Explanation:

	32 kg 930 grams
+	**22 kg 70 grams**
	55 kg 000 grams

Subtraction of Measured Masses

❖ Subtraction by Conversion

The following steps are used for finding the difference between two masses:

Step 1: Convert the masses into grams.

Step 2: Subtract the smaller mass from bigger mass.

Step 3: Express the resulting numbers in grams.

3. The weight of an unloaded truck is 1120 kg and its weight is increased by 2230 kg 560 grams on loading iron rods and cements. If the weight of iron rods is 1123 kg 300 grams then find the weight of cements in the loaded truck.

(a) 1176 kg 176 grams

(b) 1107 kg 260 grams

(c) 1170 kg 500 grams

(d) none of these

(e) All of these

Answer: (b)

Explanation:

Weight of cements in the loaded truck

$$= \begin{array}{r} 2230560 \text{ grams} \\ -\ 1123300 \text{ grams} \\ \hline 1107260 \text{ grams} \end{array}$$

= 1107 kg 260 grams.

❖ Subtraction without Conversion

The following steps are used for the subtraction of masses:

Step 1: Arrange vertically kg under kg and grams under grams of the given masses.

Step 2: Subtract smaller from bigger mass starting from right or grams.

Step 3: Take borrow if required.

4. Subtract the weight of a boy 25 kg 300 grams from the weight of a man 55 kg 100 grams.

(a) 17 kg 7 grams

(b) 10 kg 6 grams

(c) 29 kg 800 grams

(d) none of these

(e) All of these

Answer: (c)

Explanation:

$$\begin{array}{r} 55 \text{ kg } 100 \text{ grams} \\ -\ 25 \text{ kg } 300 \text{ grams} \\ \hline 29 \text{ kg } 800 \text{ grams} \end{array}$$

❖ Multiplication of Measured Masses

The following steps are used for finding the product:

Step 1: Arrange the masses vertically.

Step 2: Multiply the masses by simple multiplication from right or grams.

Step 3: first three digits from the right of the product is in grams and remaining numbers are in kilograms.

5. The weight of a cartoon of apple is 22 kg 320 grams. What will be the weight of 16 such cartoons?

(a) 176 kg 76 grams

(b) 107 kg 60 grams

(c) 357 kg 120 grams

(d) none of these

(e) All of these

Answer: (c)

Explanation:

$$\begin{array}{r} 22320 \\ \times 16 \\ \hline 133920 \\ 223200 \\ \hline 357120 \end{array}$$

= 357 kg 120 grams.

❖ **Division of Measured Masses**

Following steps are used or the division:

Step 1: Arrange the measured mass in division.

Step 2: Divide by simple division method.

Step 3: Quotient is the division of the mass.

6. The weight of an iron ball is 30 kg 51 grams. Find the third part of total weight of the ball?

(a) 10 kg 17 grams

(b) 10 kg 60 grams

(c) 7 kg 12 grams

(d) none of these

(e) All of these

Answer: (a)

Explanation:

Third part of the ball is obtained by dividing the weight of the ball by 3

$$
\begin{array}{r}
10 \text{ kg } 17 \text{ grams} \\
3\overline{)30 \text{ kg } 51 \text{ grams}} \\
\underline{3} \\
0 \\
\underline{0} \\
05 \\
\underline{03} \\
21 \\
\underline{21} \\
00
\end{array}
$$

= 10 kg 17 grams.

➢ VOLUME

Volume is the amount of space occupied by an object or a material. Units of volume can be liters and mil liters for liquids. For solids cubic centimeters or cubic meters are used as a unit of volume.

Items that may require liters to measure them are:

- A carton of ice cream.
- Amounts of water consumed in a day by a human being eg: Neha drinks 5 liters of water a day.

Items that may require milliliters to measure them are:

- A glass of water.
- A bottle of perfume.

To explain the concept of volume more clearly, few items are shown with varying capacities. Like a bottle of water. Milk carton, glass, juice pack, a big water bottle.