

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

বিস্মিল্লাহির রাহমানির রাহীম



উদ্দাম

একাডেমিক এন্ড এডমিশন কেয়ার

Class interval	x_i	f_i	$f_i x_i$
20-25	22.5	10	225

$$\frac{\sum f_i x_i}{\sum f_i} = \text{Average frequency}$$

① Mode frequency
② Average frequency
③ Histogram
④ $\frac{20+25}{2}$



আসসালামু আলাইকুম
Chapter - 3

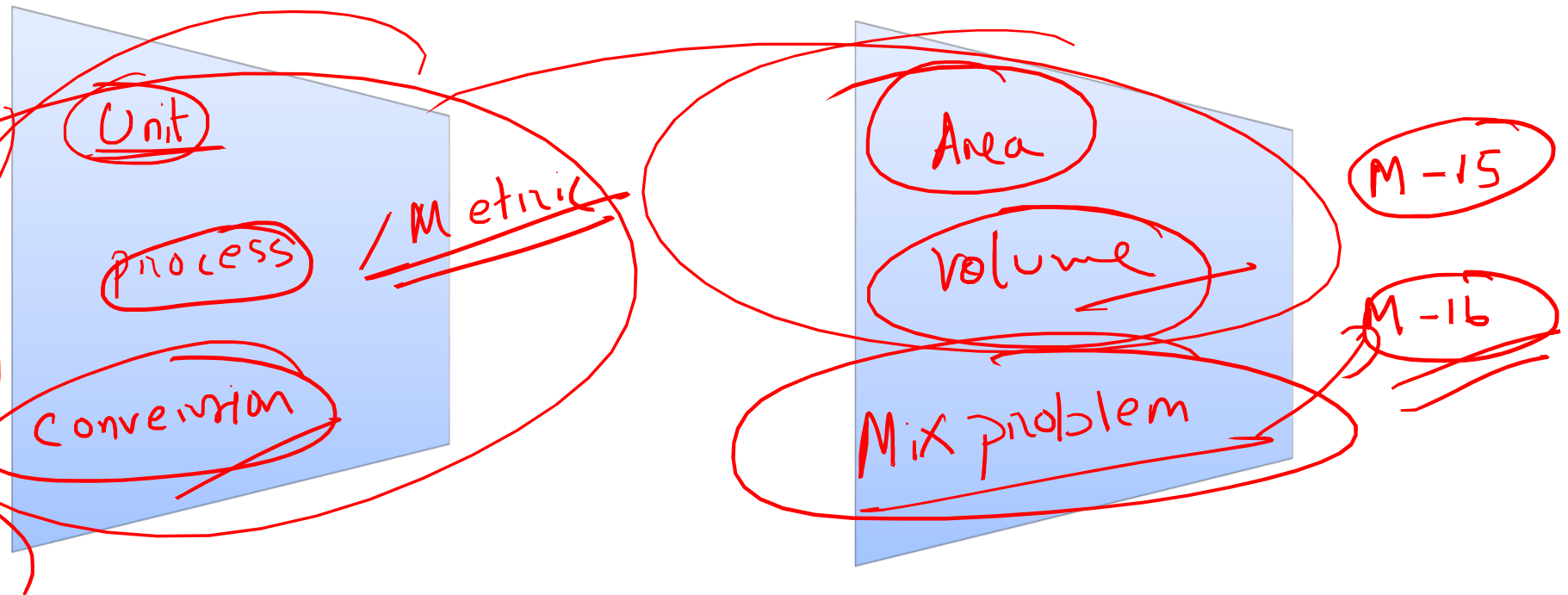
TAHSIN ANJUM



একাডেমিক এন্ড এডমিশন
কেয়ার



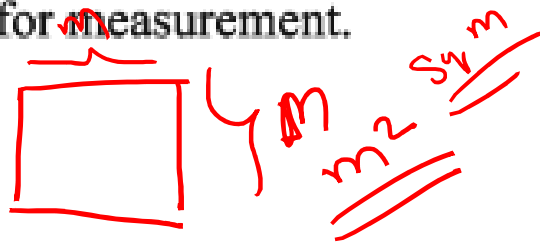
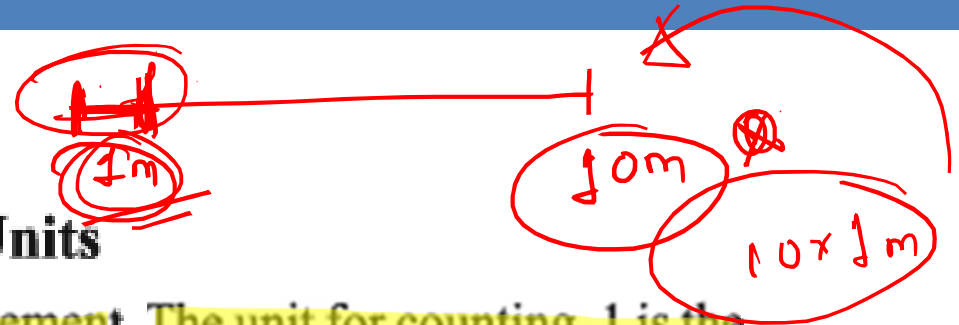
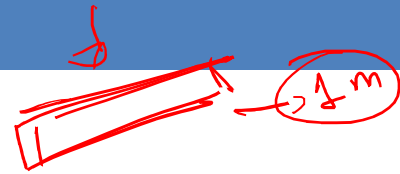
What will we learn from chapter-3 ?



Chapter-3

3.1 Concept of Measurement and Units

A unit is required in any counting or measurement. The unit for counting, 1 is the first natural number. For measuring length a definite length is chosen to be 1 unit. Similarly, a definite weight is chosen to be a unit weight which is known as the unit of weight. Again, the unit for measuring the volume of liquid is also determined in such a way. A square with a side of 1 unit length is taken to be the unit of area and is termed as 1 square unit. Similarly, the volume of a cube with sides of 1 unit length is called 1 cube unit. In all cases, the concept of whole measurement is obtained through units. But there are different units in different countries for measurement.



$$1 \text{ kg} \times 50$$

When did Bangladesh start metric system ?

A) 1 July ,1980

B) 1 July ,1981

C) 1 July ,1982

D) 2 July ,1983



Chapter-3

3.2 Measurement in Metric System

\$ dollar → Turn

The different systems of measurement in different countries cause problems in international trades and transactions. That is why, the system international (SI) or the metric system has been used for measurement in trade and transaction. The characteristic of this system is that it is a system of multiples of ten. In this system the measurement of fractions can easily be expressed by the decimal fraction. In the eighteenth century it was first introduced in France.

Chapter-3

$$1000.000\text{mm} = 1\text{ km}$$

From Greek			Unit	From Latin		
thousand	hundred	ten		One tenth	One hundredth	One thousandth
1000 kilo	100 hecto	10 deca	1 metre gram litre	$\frac{1}{10} = .1$ deci	$\frac{1}{100} = .01$ centi	$\frac{1}{1000} = .001$ milli

$$1000\text{ m} = 1\text{ km}$$

$$100\text{ cm} = 1\text{ m}$$

$$1000\text{ mm} = 1\text{ m}$$

Chapter-3

$$1 \text{ km} = 1000000 \text{ m}$$

$$1 \text{ m} = 1000 \text{ mm}$$

E+

For example, 5 km. 4 hm. 7 deca.m 6m. 9 deci.m 2 cm 3 mm

$$= (50,00,000 + 4,00,000 + 70,000 + 6,000 + 900 + 20 + 3) \text{ mm}$$

$$= 54,76,923 \text{ mm} = 5,47,692.3 \text{ cm} = 54,769.23 \text{ deci.m} = 5,476.923 \text{ m}$$

$$= 547.6923 \text{ deca.m} = 54.76923 \text{ h.m} = 5.4768213 \text{ km}$$

Poll-2

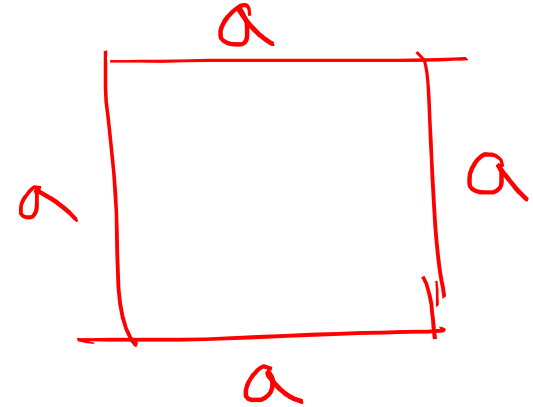
What is the perimeter of a square?

A) 4*one side

B) 4*one diagonal

C) 3*one side

D) 2(length + breadth)



$$a + a + a + a = 4a$$

Chapter-3

3.3 The units of measuring length

Metric System	British System
10 millimetres (mm) = 1 centimetre (cm)	12 inches = 1 foot
10 centimetres (cm) = 1 decimetre (decim)	3 feet = 1 yard
10 decimetres (decim) = 1 metre (m)	1760 yards = 1 mile
10 metres (m) = 1 decametre (deca m)	6080 feet = 1 nautical mile
10 decametres (deca m) = 1 hectometre (hm)	220 yards = 1 furlong
10 hectometres (h.m) = 1 kilometre (km)	8 furlongs = 1 mile

Unit of measurement of length : metre

Handwritten notes in red ink:

- 150 inches = 12.5 feet
- 12 inches = 1 foot
- 150 feet = 12.5 yards
- 12.5 feet = 1.04 yards
- 1760 yards = 1 mile
- 6080 feet = 1 nautical mile
- 220 yards = 1 furlong
- 8 furlongs = 1 mile
- 4.1667 yards = 12.5 feet



Chapter-3

3.4 Relation between British and Metric System

→ <u>1 inch = 2.54 cm (approximate)</u>	→ <u>1 metre = 39.37 inches (approximate)</u>
→ <u>1 yard = 0.9144 cm (approximate)</u>	<u>1 km = 0.62 miles</u>
→ <u>1 mile = 1.61 km (approximate)</u>	

The relation between the British and the Metric System can not be determined exactly. That is why, this relation is expressed approximately with a few decimal places. The ruler is used to measure short lengths and tapes are used for measuring larger lengths. Usually the length of a tape is about 30 metres or 100 feet.

Chapter-3



Example 1. A runner ran 24 rounds in a circular track of a length of 400 metres.
How much distance did he run?

Solution : 1 round is 400 metres.

∴ The distance of 24 rounds will be (400×24) metres or 9600 metres or 9 kilometres 600 metres.

$$[\because 1000 \text{ m} = 1 \text{ km}]$$

Therefore, the runner ran 9 kilometres 600 metres.

$$\begin{array}{r} 9600 \\ \hline 1000 \end{array} = 9.6$$

9 km 600 m



Chapter-3

3.5 Measurement of Weights

Objects around us have weights. Their weights are measured by using different units in different countries.

Metric Units of Measurement of Weights

10 milligrams (mg)	= 1 centigram (cgm)
10 centigrams (cgm)	= 1 decigram (deci gm)
10 decigrams (deci gm)	= <u>1 gram (gm)</u>
10 grams (gm)	= 1 decagram (deca gm)
10 decagrams (deca gm)	= 1 hectogram (hgm)
10 hectograms (hgm)	= <u>1 kilogram (kg)</u>

Unit of weight : gm	1 kilogram or 1 kg = 1000 grams
---------------------	---------------------------------

There are two more units used for measurement in metric system. The units quintal and metric ton are used in order to measure large quantity of goods.

100 kilograms	= 1 quintal
1000 kilograms	= 1 metric ton ✓

Chapter-3

✓ **Example 2.** How much rice each of them will get if 1 metric ton rice is distributed among 64 labours?

Solution : 1 metric ton = 1000 kg ✓

64 labours get 1000 kg rice

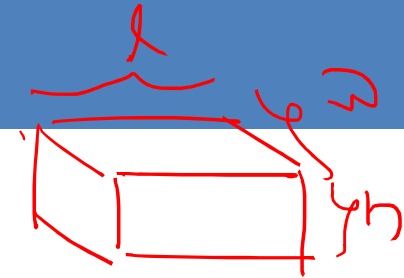
$$\therefore 1 \text{ ,, ,, ,, } \frac{1000}{64} \text{ kg rice}$$

$$= \underline{15 \text{ kg } 625 \text{ gm rice}}$$

\therefore Each labour will get 15 kg 625 gm rice.

Chapter-3

$$V = l \times b \times h$$




3.6 Measurement of Volume of Liquids

The space occupied by any liquid is its volume. A solid body has length, breadth and height. But no liquid material has definite length, breadth and height. Liquid takes the shape of the container it is put in. That is why, liquid is measured by a pot of definite volume. Usually, we use litre pots. These are conically or cylindrically shaped mug made of aluminum or iron sheet, having capacities $\frac{1}{4}$, $\frac{1}{2}$, 1, 2, 3, 4 etc. litres. Again, vertical pots made of transparent glass with 25, 50, 100, 200, 300, 500, 1000 millilitre marks are also used. Usually, those pots are used to measure milk, oil etc.

At present for the convenience of buyers and sellers edible oils are sold in bottles. In such cases, also, bottles of 1, 2, 5 and 8 literes are widely used. Different types of soft drinks are sold in 250, 500, 1000, 2000 millilitre bottles.

Chapter-3

Metric Units for measurement of Volume of Liquids



10 millilitres (ml)	= 1 centilitre (cl)
10 centilitres	= 1 decilitre (dl)
10 decilitres	= <u>1 litre (l)</u>
10 litres	= 1 decalitre (decal)
10 decalitres	= 1 hectolitre (hl)
10 hectolitres	= 1 kilolitre (kl)

Chapter-3

$$\underline{1000 \text{ cm}^3 = 1 \text{ L}}$$

$$\begin{aligned} 1 \text{ m}^3 &= 1 \text{ m} \times 1 \text{ m} \times 1 \text{ m} \\ &= 100 \text{ cm} \times 100 \text{ cm} \times 100 \text{ cm} \\ 1 \text{ m}^3 &= 1000000 \text{ cm}^3 = 1000 \text{ L} \end{aligned}$$

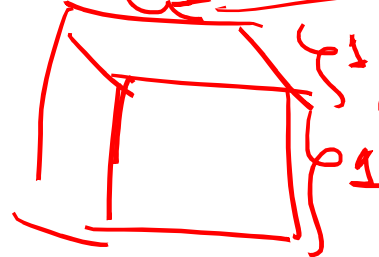
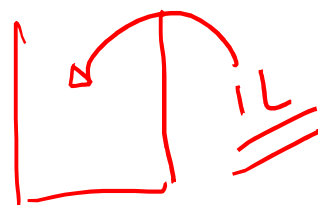
✓ The unit of measuring volume of liquid : litre

Remarks : The weight of 1 cubic centimetre of pure water at 4° Celsius is 1 gram. Cubic centimetre is abbreviated as cc in English.

Weight of 1 litre of pure water is 1 kilogram

$$1 \text{ L} = \frac{1000000 \text{ cm}^3}{1000} \rightarrow 1000 \text{ cm}^3$$

$$\underline{1000 \text{ L}}$$



$$\underline{1 \text{ m}^3 = 1000 \text{ L}}$$

Chapter-3

Example 3. The length of a tank is 3 metres, the breadth is 2 metres and the height is 4 metres. How many litres and kilograms of pure water will it contain?

Solution : The length of the tank = 3 metres, breadth = 2 metre and height = 4 metres

∴ The volume of the tank = $(3 \times 2 \times 4)$ cubic metres = 24 cubic meters $/m^3$

$$3m \times 2m \times 4m$$

$$300cm \times 200cm \times 400cm$$

$$24000000cm^3$$

$$= 24000000 \text{ cubic cm}$$

$$= 24000 \text{ litres} \quad [1000 \text{ cubic cm} = 1 \text{ litre}]$$

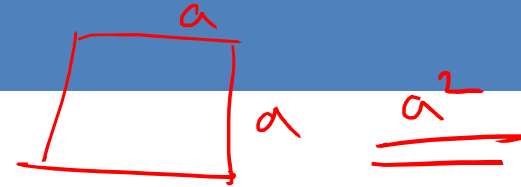
The weight of 1 litre pure water is 1 kilogram

$$1000cm^3 = 1L$$

∴ The weight of 24000 litres of pure water is 24000 kilogram.

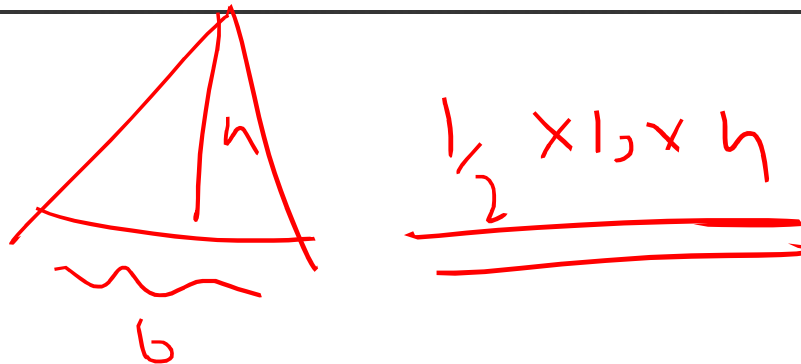
Therefore, the tank contains 24000 litres of water and its weight is 24000 kilograms.

Chapter-3



3.7 Measurement of Area

- ✓ Measurement of area of a rectangle = length × breadth
- ✓ Measurement of area of a square = (side)²
- ✓ Measurement of area of a triangle = $\frac{1}{2} \times \text{base} \times \text{height}$



Chapter-3

Unit of measure of area : square metre

m²

Metric Units in Measuring Area

100 square centimetres (sq. cm) = 1 square decimetre (sq. deci m)

100 square decimetres (sq. deci m) = 1 square metre (sq. m)

100 square metres (sq. m) = 1 are (sq. decametre)

100 are (sq. decametre) = 1 hector (or 1 square hecto metre)

100 hectores (or 1 square hecto metre) = 1 square kilometre

Chapter-3

160 —→ 1 Kutra

$\frac{1}{16} \times \frac{100}{16} = 6.25 \text{ Kutra}$

100 Chatak = 7 Bigha

Metric units

144 square inches = 1 sq. feet

9 sq. feet = 1 sq. yard

4840 sq. yards = 1 acre

100 decimals = 1 acre

Local Units

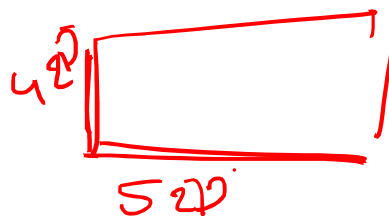
1 sq. am = 1 Ganda

20 Ganda = 1 Chatak

16 Chatak = 1 Katha

20 Katha = 1 Bigha

$\frac{20K}{1} = \frac{1}{1}$
 $\frac{1}{1} = \frac{1}{20}$
 $\frac{1}{20} = 0.05$



$\frac{0.3125}{20} = 0.015625$ Bigha



Chapter-3

Relation between Metric and British System in Measuring Area

1 sq. centimetre = 0.16 sq. inches (approx.)

1 sq. metre = 10.76 sq. feet (approx.)

1 hector = 2.47 acres (approx.)

1 sq. inch = 6.45 sq. cm (approx.)

1 sq. feet = 929 sq. centimetres (approx.)

1 sq. yard = 0.84 sq. metres (approx.)

1 sq. mile = 640 acres

Chapter-3

Relation between Metric, British and National Units in Measuring Area

1 sq. arm	=	324 sq. inches
1 sq. yard or 4 ganda	=	9 sq. feet = 0.836 sq. metres (approx.)
1 Katha	=	720 sq. feet = 80 sq. yard = 66.89 sq. metres (approx.)
1 Bigha	=	1600 sq. yards = 1337.8 sq. metres (approx.)
1 Acre	=	3 Bigha 8 chatak = 4046.86 sq. metres (approx.)
1 decimal	=	435.6 sq. feet = 1000 sq. kari (100 kari = 66 feet)
1 sq. mile	=	1936 Bigha
1 sq. metre	=	4.78 ganda (approx.) = 0.239 chatak (approx.)
1 are	=	23.9 chatak (approx.)

Chapter-3

✓ **Example 4.** 1 inch = 2.54 centimetres and 1 acre = 4840 sq. yards. How many square metres are there in 1 acre ?

Solution : 1 inch = 2.54 centimetres

$$36 \text{ inches or 1 yard} = 2.54 \times 36 \text{ centimetres}$$

$$= 91.44 \text{ centimetres}$$

$$1 \text{ yard} = \frac{91.44}{100} \text{ metres} = 0.9144 \text{ metres}$$

$$\therefore 1 \text{ yard} \times 1 \text{ yard} = 0.9144 \text{ metres} \times 0.9144 \text{ metres}$$

$$\text{or, 1 sq. yard} = 0.83612736 \text{ sq. metres}$$

$$\therefore 4840 \text{ sq. yard} = 0.83612736 \times 4840 \text{ sq. metres}$$

$$= 4046.85642240 \quad , , \quad , ,$$

$$= 4046.86 \text{ sq. metres (app.)}$$

$$\therefore 1 \text{ acre} = 4046.86 \text{ sq. metres (app.)}$$

$$1 \text{ c} = 7 \text{ sq. m}$$

$$1 \text{ yard} = 36 \text{ inches}$$

$$m \times m \rightarrow m^2$$

Chapter-3

Example 5/ The area of Jahangirnagar University is 700 acres. Express it in hectars in the nearest integer.

Solution : 2.47 acres = 1 hector

$$1 \text{ ,,} = \frac{1}{2.47} \text{ ,,}$$

$$700 \text{ ,,} = \frac{1 \times 700 \times 100}{247} \text{ hectars} = 283.4 \text{ hectars}$$

Therefore, required area is 283 hectars (app.)

283

Chapter-3

Example 6. The length of a rectangle is 40 metres and the breadth is 30 metres 20 cm. What is the area of the rectangle? → *Py - 4 m 20 cm*

Solution : Length of the rectangle = 40 metres = (40×100) cm = 4000 cm

and breadth = 30 metres 30 cm

$$= (30 \times 100) \text{ cm} + 30 \text{ cm}$$

$$= \underline{3030 \text{ cm}}$$

$$\therefore \text{Required area} = (4000 \times 3030) \text{ sq. cm} = \underline{12120000 \text{ sq. cm}}$$

$$= 1212 \text{ metres}^2 = 12 \text{ ares } 12 \text{ sq. metres}$$

Therefore, the area of the rectangle is 12 ares 12 sq. metres.

l x b

sq m
m²

Chapter-3

3.8 Volume

Volume is the cubic measurement of solid

Volume of rectangular solid = length \times breadth \times height

Volume of a solid is determined by expressing length, breadth and height of the solid in the same units. The volume of a solid body of 1 cm length, 1 cm breadth and 1 cm height is 1 cubic centimetre.

Metric Units of Measuring Volume

1000 cubic centimetres (c.cm) = 1 cubic decimetre (c.dm.) = 1 litre

1000 cubic deci metres = 1 cubic metre (c.m)

1 cubic metre = 1 stayer

10 stayer = 1 deca stayer

1 cubic cm. (cc) = 1 millilitre

1 cubic inch = 16.39 millilitres(app.)

Chapter-3

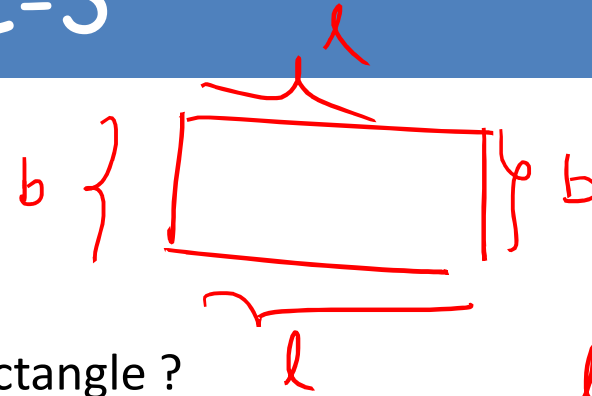
Relation between Metric and British Systems of Volume

1 Stayer = 35.3 cubic feet (app.)

1 decastayer = 13.08 cubic yards (app.)

✓ 1 cubic feet = 28.67 litres (app.)

POLL-3



What is the perimeter of a rectangle ?

A) length * breadth

C) length + breadth

B) $2(\text{length} + \text{breadth})$

D) $\frac{1}{2}(\text{length} + \text{breadth})$

$$l + l + b + b$$

$$2l + 2b$$

$$= 2(l + b)$$

Chapter-3

Example 7. The length of a box is 2 metres, the breadth is 1 metre 50 cm and the height is 1 metre. What is the volume of the box?

Solution : length = 2 metres = 200 cm

breadth = 1 metre 50 cm = 150 cm

and height = 1 metre = 100 cm

$$\therefore \text{Volume of the box} = \text{length} \times \text{breadth} \times \text{height}$$
$$= (200 \times 150 \times 100) \text{ cubic centimetres}$$
$$= 3000000 \text{ cubic cm}$$
$$= 3 \text{ cubic metres}$$
$$[1 \text{ m}^3 = 1000000 \text{ cm}^3]$$

Alternative method : length = 2 metres, breadth = 1 metre 50 cm = $1\frac{1}{2}$ metres and height = 1 metre

\therefore Volume of the box = length \times breadth \times height

$$= \left(2 \times \frac{3}{2} \times 1 \right) \text{ cubic metres}$$
$$= 3 \text{ cubic metres}$$

\therefore Required volume is 3 cubic metres.

Chapter-3

Example 9. The length of a house is 3 times the breadth. To cover the house by carpet an amount of Tk. 1102.50 is spent at the rate of Tk. 7.50 per sq. metre of carpet. Find the length and the breadth of the house.

Solution : Tk. 7.50 is spent for 1 sq. metre

$$\therefore \text{Tk. 1} \quad ,, \quad ,, \quad \frac{1}{7.50} \text{ sq. metres}$$

$$\therefore \text{Tk. 1102.50} \quad ,, \quad ,, \quad \frac{1 \times 1102.50}{7.50} \text{ sq. metres}$$

$$= 147 \text{ sq. meter}$$

$$147 \text{ m}^2$$

i.e., the area of the house is 147 sq. metres.

Let, the breadth = x metres

\therefore the length = $3x$ metres

\therefore Area = (length \times breadth) sq. units

$$= (3x \times x) \text{ sq. units} = 3x^2 \text{ sq. units}$$

According to the condition

$$3x^2 = 147$$

$$\text{or, } x^2 = \frac{147}{3}$$

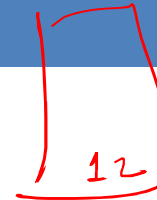
$$\text{or, } x^2 = 49$$

$$\therefore x = \sqrt{49} = 7$$

Therefore, breadth = 7 metres

and length = (3×7) metres or 21 metres.

POLL-4



The length of a book is 25 cm and breadth is 18 cm and the book has 200 pages .
The thickness of each page of the book is 0.1 mm . What is the volume of the book ?

A) 4.5

C) 450

paper

B) 45

D) 4500

$$100 \times 0.1 \text{ mm}$$

$$= 10 \text{ mm}$$

$$= 1 \text{ cm}$$

$$\underline{\underline{100 \rightarrow}}$$



$$V = l \times b \times h$$

$$= 25 \text{ cm} \times 18 \text{ cm} \times 1 \text{ cm} = 450 \text{ cm}^3$$

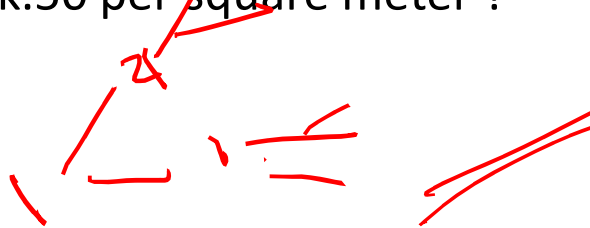
Creative question

The length of a rectangular is 48 m and breadth is 32m and 80cm .

A) How is the area of a rectangular ?

B) Inside ,there is a road of breadth 3 meter . Find the area of the road .

C) If the perimeter of the rectangular is equal to a square , how much money will be spent to imbed grass on that square at Tk.50 per square meter ?



লেগে থাকো সৎভাবে,
স্বপ্ন জয় তোমারই হবে

উদ্ভাস-উন্মেষ শিক্ষা পরিবার

