Physical Quantities and measurement

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Ques. Question

Q1 Difine mass

Ans Matter is defined as anything which occupies space and has mass.

Q2 What is ~~unit~~ SI unit of mass.

Ans The SI unit of mass is Kilogram.

Q3 Difine time

Ans Time can be considered to be ~~be~~ the fourth dimension of reality used to describe events in three dimensional space

Q4 Difine one second.

Ans The second is the SI unit of ~~India~~ time.

Question

Q1 Difine temperature.

The temperature is the measure of degree of hotness or coldness of an object.

Q2. What is that SI Unit of temperature.

Ans. The SI unit of temperature is kelvin.

Q3. What are diffrent scale of temperature.

Ans

	Scale of temperature	Ice Point	Steam Point	Number of degree in between the Ice point & steam point
1.	Kelvin	273K	373K	100
2.	Celsius	0°c	100°c	100
3.	Fahrenheit	32°F	212°F	180

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Question.

Q.1 What do you mean by mean solare day.

Ans ~~The interval between two instances or~~ A solare day is the time taken by the earth to complete one rotation about its own axis.

Q2. The unit of time in MSK and GGS system is second.

Q3. How can you measure short time interval ? Explain

Ans The stopwatch is used to measure short time intervals

Physical quantites and measurments

Q What do you mean by ice point and steam point? ~~and steam point~~

Ans Ice point refers to the freezing point of water equal to 0°c (32°F) at which pure water and ice are in equilibrium.
Steam point refers to boiling point of pure water 100 degree celsius at which water and vapour are in equilibrium

One degree on celsius scale is equal to 1.8 F degree on Fahrenheit scale.

Q Differentiate between laboratory thermometer and clinical thermometer

Ans Clinical thermometer

Laboratory thermometer

Used to measur human body temperature

It has ~~knt~~ Kink, which prevents immediate backflow of mercury

Used to measure temperature in the laboratory

It does not have a ~~knic~~ kink

Q1. What is measurement? How is a measurement expressed?

Ans Measurement is a comparison of an unknown quantity with a known fixed quanity of the same kind.
The value obtained on measuring a quantity is called it magnitude.
The magnitude of a quanity is expressed as numbers in its unit.

Q2 State two characteristics of a unit.

Ans Two characteristics of a unit are

1. It should be of ~~con~~ convenient size
2. It must be university accepted ie its value must remain same at all places and at all times.

Q3. Name four basic measurements ~~in~~ in our daily life.

In our daily life we measure the

following four basic physical quantities

1. Length
2. Mass
3. Time
4. Temperature

Q4 What are the SI units of.

1. Mass
2. Length
3. Time and
4. Temperature. Write their name and symbols.

SI unit are as follows

Quantity	SI unit	Symbol of SI unit
(i) length	metre	m
(ii) Mass	Kilogram	Kg
(iii) Time	second	s.
(iv) Temperature	Kelvin	K

Q5. Define ~~one matter~~ metre the SI unit of length. State its one multiple and one sub multiple

One metre is defined as the distance travelled by light in air in $\frac{1}{299,792,458}$ of a second

Multiple of metre = Kilometre

Submultiple of metre = Centimeter

Q6. Convert the following quantities as indicated

a) 12 inch = ft
b) 1 ft = cm
c) 20 cm = m
d) 4·2 Km = cm
e) 0·2 Km = m
f) 0·2 cm = mm
g) 1 yard = m

a) 12 inch 1 ft
b) 1 ft = 30.48 cm
c) 100 cm 1 m

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

$\therefore 20\text{ cm} = \frac{1}{100} \times 20\text{ m} = 0{\cdot}2\text{ m}$

$\therefore 20\text{ cm} = 0{\cdot}2\text{ m}$

d) $1m = 100cm$

$\therefore 4.2m = 100 \times 4.2cm$

$= 100 \times \frac{42}{10} cm = 420cm$

$\therefore 4.2m = 420cm$

e) $1Km = 1000m$

$\therefore 0.2Km = 1000 \times 0.2m$

$= 1000 \times \frac{2}{10} m = 200m$

$\therefore 0.2Km = 200m$

f) $1cm = 10mm$

$\therefore 0.2cm = 10 \times 0.2mm$

$= 10 \times \frac{2}{10} mm = 2mm$

$\therefore 0.2cm = 2mm$

g) $1 yard = 0.91m$

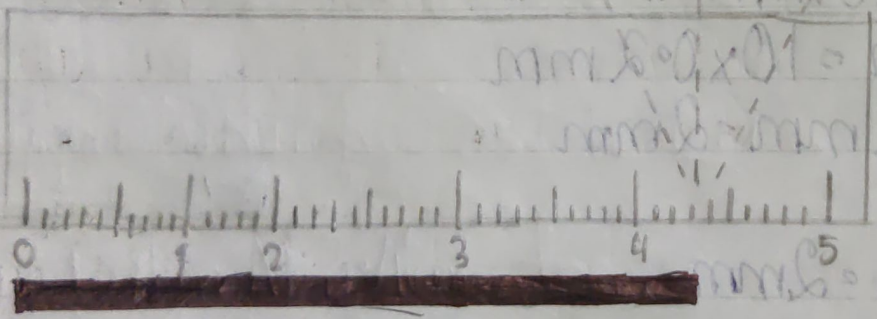
Q7. a) Describe in steps how would you measure the length of a pencil using a meter rule. Draw a diagram if necessary.

Ans To measure the length of a pencil using a meter rule place meter rule with its making close to the object. Let PQ be a pencil. The end P of the pencil coincides with the zero mark on the ruler. The end Q of the pencil is read by keeping the end at the position B vertically above the end Q. So the length pencil is 4.3 cm

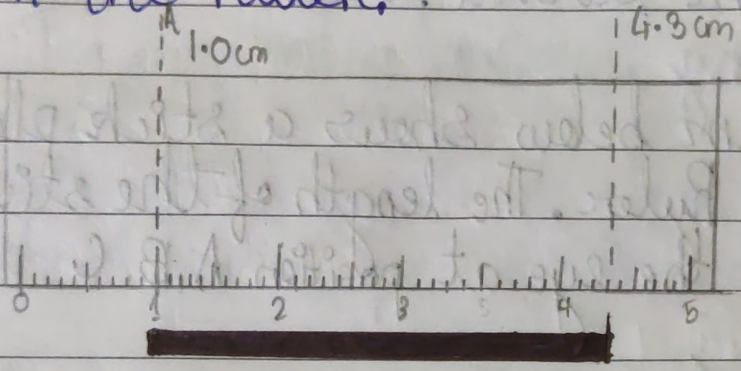
(4.2)cm Wrong Position.

Correct Position (4.3) cm

Wrong Position (4.4 cm)



b) The ends of the ruler get damaged with use and its zero mark may not be visible. To measure the length of an object with such a ruler. the object is placed close to a specific marking on the ruler and position of both ends of the object are read on the ruler.

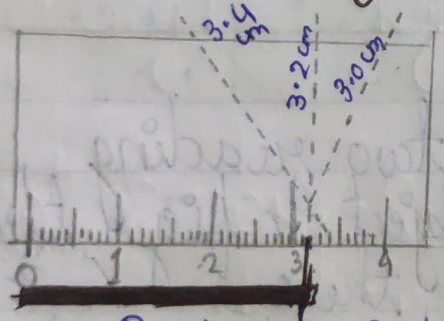


The difference of the two reading gives the length of the object. In fig the reading on ruler at the end X is 1.0 cm and at the end Y is 4.3. So the length of the rod xy is 4.3 - 1.0 = 3.3 cm.

Q8 Name the device which you will use to measure the perimeter of your playground. Describe in steps how you will use it.

Ans We will use a measuring tape to measure the perimeter of our playground. To measure the length of playground the tape is spread along the length of the curved area.

Q9. The diagram below shows a stick placed along a metre Ruler. The length of the stick is measured keeping the eye at position A, B, C



a) Position A: 3·4 cm
Position B: 3·2 cm
Position C: 3·00 cm
No they are not same.

b) B is the correct position of the eye.
Correct length of the stick PQ = 3.2 cm

Q10: Define Mass. State its (1) S.I
(2) C.G.S
(3) F.P.S units.
How are they related?

Ans The mass of a body is quantity of matter contained in it. The S.I unit of mass is kilogram. It short form, In short form, it written as kg

* In C.G.S system the unit of mass is gram (symbol g)
* In F.P.S system the unit of mass is pound (symbol lb)

Q11 Convert the following quantities as indicated

a) 2500 Kg = metritone

b) 150 Kg = quental

c) 10 Ib = Kg

d) 250 g = Kg

e) 0.01 kg = g

f) 5 mg = Kg

a) 2500 Kg = 2.5 metric tonne.

1000 Kg = 1 metric tonne

1 Kg = $\frac{1}{100}$ metric tonne

$\therefore$ 2500 Kg = $\frac{1}{1000}$ x 2500 metri tonne

$\therefore$ 2500 Kg = 2.5 metri tonne

b) 150 Kg = 1.5 quintal

100 Kg = 1 quintal

1 Kg = $\frac{1}{100}$ quintal

150 = $\frac{1}{100}$ × 150 quintal

= 1.5 ~~quia~~ quintal

∴ 150 Kg = 1.5 quintal

c) 10 lb = 4.5359 Kg

1 lb = 453.59 g

= 453.59 × $\frac{1}{1000}$ Kg [1 Kg = 1000 g]

= 0.45359 Kg

∴ 10 lb = 0.45359 × 10 Kg

= 4.5359 Kg

∴ 10 lb = 4.5359 Kg

d) $2500g = 2.5Kg$

$1000g = 1Kg$

$1g = \frac{1}{1000} Kg$

$\therefore 2500g = \frac{1}{1000} \times 2500Kg = 2.5Kg$

$\therefore 2500g = 2.5Kg$

e) $0.01Kg = 10g$

$1Kg = 1,000g$

$\therefore 0.01Kg = 1000 \times 0.01g$

$= 1000 \times \frac{1}{100} g = 10g$

$\therefore 0.01Kg = 10g$

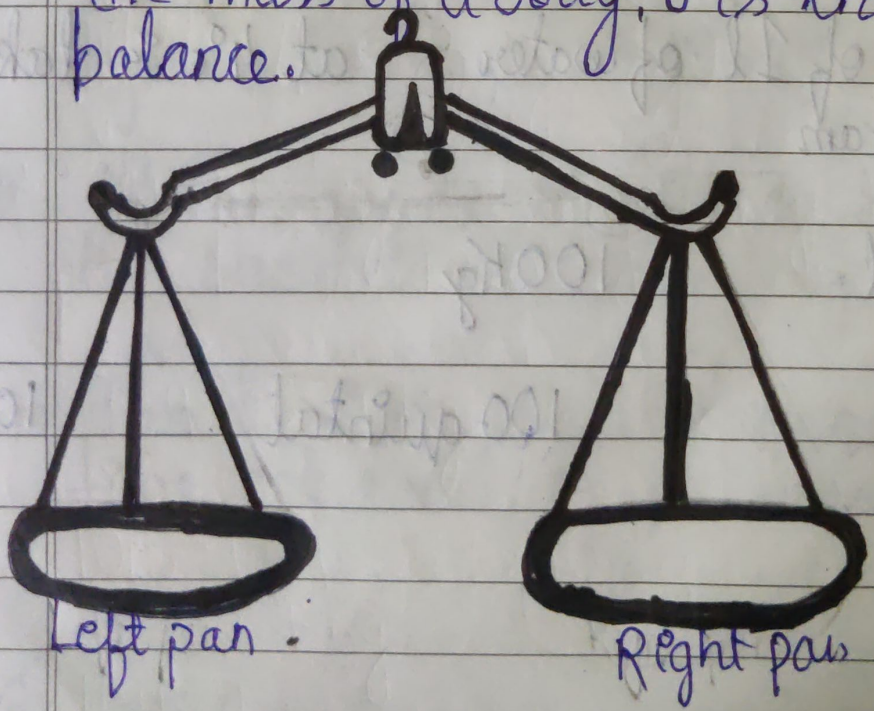
f) $5mg = 5 \times 10^{-6}$ Kg

$5mg = \frac{5}{1000}$ g or 5×10^{-3} g

$\frac{5}{1000}$ g or 5×10^{-3} g $= \frac{5}{1000 \times 1000}$ or 5×10^{-6} Kg

Q12. Name the instrument which is commonly used to measure the mass of a body. State how it used?

Ans Instruments commonly used to measure the mass of a body. is the beam balance.



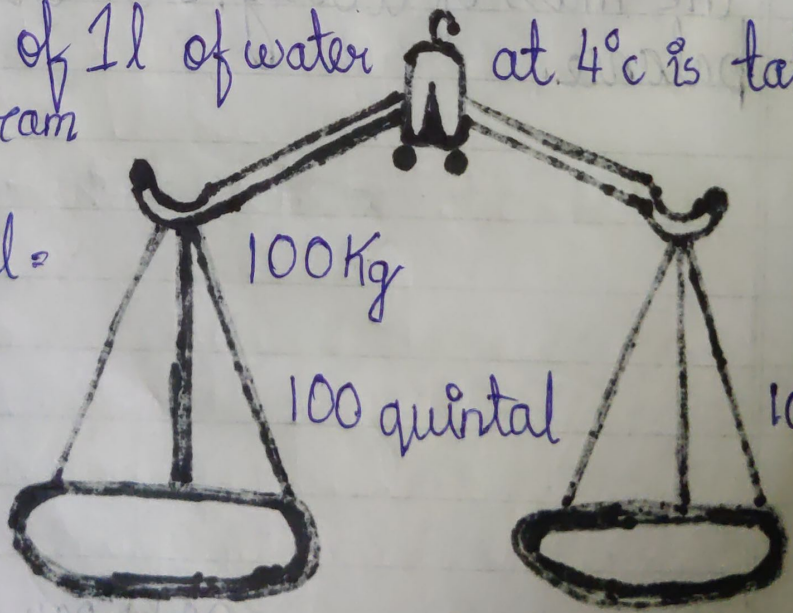
When we hold up the balance we observe that when there is nothing on either pan, the beam is horizontal. The body whose mass is to be measured is placed on the left pan. The standard weigh are put on right pan. They are so adjusted that the beam is again horizontal on holding the balance up. The total of standard weights give the mass of the given body.

Q13 Define one kilogram, the SI unit of mass. How is it realeted to (i) quintal (ii) metric tome and (iii) gram.

Ans The mass of 1l of water at 4°c is taken as 1 Kilogram

1 ~~quin~~ quintal = 100 Kg

1 metric ton = 100 quintal = 1000 Kg



Q14 Name and define the SI unit of time. How is it related to (i) minute (ii) hour (iii) day and ~~eight~~ (iv) year?

Ans The SI unit of time is second
In short form we write it as S
One ~~short~~ second ~~it~~ is the time interval between the two consecutive tricks that you hear from pendulum wall clock

1 min = 60s
1h = 60 min = 3600s
1 day = 24h = 86400s
1 year = 365 days = 3.15×10^7s.

Q15 Name two devices used to measure the short time interval of an event

Ans Two devices used to measure the time interval of an event are

1. Stop Watch
2. Stop Clock

Q16 Express in second

1. 3 min 15 second and
2. 5h 2min 5sec

Ans (1.) 3 min = 15 second
1 min = 60 second
3 min 15 second = 60 × 3 + 15
= 180 + 15
= 195 seconds

(2.) 1 min = 60 sec
2 min = 2 × 600 = 120 sec
1 hour 3600 second
5h 3600 × 5 = 18000 sec
5h 2m and 5 sec
= 18000 + 120 + 5 = 18125 sec

Q17 What does the temperature measure

Ans Temperature measure the degree of coldness and hotness of a body.

Q18 Name the

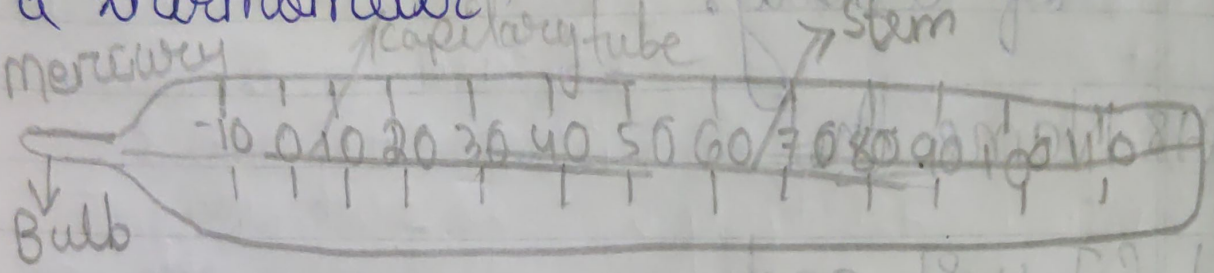
1. SI unit and
2. One common unit of temperature. Write their symbols also.

Ans The SI unit of temperature is kelvin (symbol k)

common unit of temperature is degree centigrade (symbol °C)

Q19 Name the instrument used for measuring of the temperature of a person. Draw its labelled neat diagram

Ans The temperature is measured with a thermometer



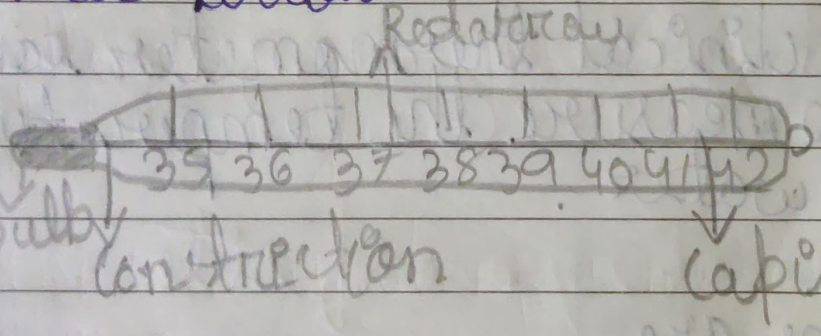
Q20 Write the temperature of (i) melting ice (ii) boiling water

Ans The temperature of

1. melting ice = 0°c
2. boiling water = 100°c

Q21 What is a clinical thermometer? State it special feature. Draw a labelled neat diagram of a clinical thermometer showing the range of temperature ~~for measuring the~~ marked on it.

Ans Doctors use a special thermometer called the clinical thermometer for measuring the temperature of the patient's body. This thermometer has the markings from 35°c to 42°c. It has a slight bend or kink in the stem just above the bulb. This kink is called the constriction. This constriction prevents the mercury from falling back all by itself. The temperature of a healthy person is 37°c. This temperature is marked by a red arrow.



Clinical thermometer

Q 22 Normal temperature of a human body is ~~35~~ 37°c or 98.6°F

~~To measure~~ To measure the temperature of a patient body, its bulb is keep either below the tongue or under the arm's pit of the patient for about a min. ~~Then~~ Then the thermometer is taken out and it reading is noted. When the temperature of paitent's body is above 37°c he is said to suffer with fever

Q 23 No a clinical thermometer cannot be used to measure the temperature of boiling water.

The reasons are

1. It has very small range
2. It can break on cooling and on excess heating

Q24 The Total surface occupied by an object is called its area or surface area

Q25 The SI unit of area is square meter or meter? which is short form is written as m^2

Q26. (i) Square yard : One square yard is the area of a square of each side 0.836 metre

1 square yard = 1 yard × 1 yard
= 0.9144 m × 0.9144 m
= 0.836 m^2 (or 0.84 m^2 nearly)

(ii) One hectare is the area of a square of each side 100 m. Thus

1 hectare = 100 m × 100 m = 10,000 m^2
(or 10^4 m^2)

(iii) Km^2: One square kilometer is the area of a square of each side 1 kilometer. Thus

$$1\,Km^2 = 1\,Km^2 = \left(\frac{1}{100}m\right) \times \left(\frac{1}{100}m\right) = \frac{1}{10000}m^2$$

$$= 10^{-4}m^2$$

(v) $mm^2 = 1\,mm^2 = 10^{-6}m^2$

Q27 The area of a square can be calculated by using the following formular

~~area~~ Area of square of side

$$S \times S$$

$$= l \times l = L^2$$

The area of a leaf is obtained by using a graph paper. A graph paper has small square's of each sides 1 mm. The area of each big square is 1 cm^2. Procedure: Place the leaf on graph ~~papp~~ paper. Draw its outline on the paper and remove it. ~~now~~ Now count the number of complete squares. ~~To~~ To this add the number of incomplete square which are half or more than half. Ignore the square which are

less than half. Thus approximate area = (No of complete squares + no of half or more than half of incomplete squares) x area of one square.