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Holiday homework

Physical quantities and measurement

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

Ans: Measurement is the process of finding an unknown physical quantity by using a standard quantity. The value obtained on measuring a quantity is called its magnitude. The magnitude of a quantity is expressed as numbers in its unit.

2. State two smaller units of volume. How are they related to the S.I unit ?

Ans:

A smaller unit of volume is cubic centimetre and cubic decimetre. One cubic centimetre is the volume of a cube of each side 1 centimetre

$1 cm^3 = 1cm \times 1cm \times 1cm$

Relationship between m^3 and cm^3

$1m^3 = 1m \times 1m \times 1m$

$1 m^3 = 100 cm \times 100 cm \times 100 cm$

$\therefore 1m^3 = 10^6 cm^3$

Relationship between m^3 and dm^3 we know that

$1m = 10dm$

$1m^3 = 1m \times 1m \times 1m$

$= 1m^3 = 10dm \times 10dm \times 10dm$

$= 1m^3 = 10^3\ dm^3$

3. State the S.I unit and C.G.S units of density. How they are related?

Ans:

The S.I unit of mass is kilogram (symbol kg) and of volume is cubic metre (symbol m^3). Therefore S.I unit of density is $\frac{kg}{m^3}$

The C.G.S unit of mass is gram (Symbol g) and of volume is cubic metre (Symbol cm^3). Therefore the C.G.S unit of density is $\frac{g}{cm^3}$

4. A cubical tank of side 1m is filled with 800 kg of a liquid. Find (i) the volume of tank (ii) the density of liquid in $kg\,m^{-3}$

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~~Given: Side of tank (a) = 1m weight of a liquid (m) = 800 kg~~

~~(i) The volume of tank~~

~~(ii) The density of liquid in kgm^{-3}~~

Ans: Since tank is cubical, so its volume is

$v = a^3$

$v = l^3 = 1 \times 1 \times 1 = 1m^3$

= Now the density of liquid is

$d = \frac{m}{v} = \frac{800}{1} = 800\ kg/m^3$

So the volume of tank will be $1m^3$ and the density of liquid is $800\ kgm^{-3}$

5. The mass of a dead object is 115g. when it is immersed into a measuring cylinder the water level rises from 20 ml mark to 30 ml mark. Find the volume of the dead object and the density of the dead in kgm^{-3}.

Ans: $M = 115g$

= $v_1 = 20\ ml$, $v_2 = 30\ ml$

Density of dead object $d = \frac{M}{V}$

= $\frac{115}{10 cm^3}$ g

= $11.5 g cm^{-3}$

Since $1 g cm^{-3} = 1000 kg^{-3}$

= $11.5 \times 1000 = 11500 kgm^{-3}$

Motion

8. How does a rotatory motion differ from the circular motion?

Ans: In rotatory motion the axis of rotation passes from a point in the body itself whereas in circular motion the axis of revolution passes through a point outside the body. The motion of earth around the sun is the circular motion whereas the motion of earth about its own axis is the rotational motion.

In the circular and rotatory motion the distance of a point of the body from a fixed point always remain same whereas it is not the same in curvilinear motion.

90 A boy walks a distance 30m in 1min and another 30 m in 1"5 min. Describe the type of motion of the boy and find his average speed ms^{-1}.

Ans: As the speed does not remain constant throughout the journey in the motion is non-uniform.
Total distance travelled in going and coming back,
$D = 30m + 30m = 60m$
Total time taken in going and coming back
$t = 1min + 1.5 min = 2.5 min$
$= 2.5 \times 60s = 150sec$

Average speed = $\frac{\text{Total distance travelled}}{\text{Total time of travel}}$

$= \frac{60}{150s} = 0.4ms^{-1}$

100 A car travels with speed 30 kmh^{-1} for 30 min and then with speed 40 $km\ h^{-1}$ for one hour find the total distance travelled by the car the total time to travel, and the average speed of car.

Ans-8 Speed of car for first 30 min = 30 kmh^{-1}

Speed of car for next 1 hour = 40 kmh^{-1}

(a) Total distance traversed by the car

1st case, Speed = $\frac{\text{Distance}}{\text{Time}}$

$\Rightarrow$ Distance = Speed x time

= 30 min = 0.5 hours

= Distance = 30 x 0.5

= 15 km

2nd case Speed = $\frac{\text{Distance}}{\text{Time}}$

= Distance = Speed x Time

= Distance = 40 kmh^{-1} x 1 hr

= 40 km

So, now we will add (1) and (2)

= Total distance = 15 km + 40 km = 55 km

Total time to travel = 0.5 hr + 1.0 hrs = 1.5 hr

Average Speed = $\frac{\text{Total distance traversed}}{\text{Total time taken}}$

4) Differentiate between periodic and non-periodic

Periodic motion	non-periodic motion
A motion repeating itself at regular intervals is regarded as periodic motion. Ex- movement of earth	* A motion that repeats itself is considered as non-periodic but not at regular periods of time. Ex- vehicles

8) Define the term weight and state its S.I unit

Ans: The weight of a body is the force with earth attracts the body ie the weight of a body is not constant, but is changes from place to place. It is represented by the symbol W. The S.I unit of weight is newton (N).

= $\frac{5.5\ km}{1.5\ hr}$

= $36.67\ km\,h^{-1}$

Energy

11. State two factors on which the potential energy of a body at a certain height above the ground depends.

Ans: The potential energy of a body in the raised position depends upon the following factors are :

a) The mass of the body : Greater the mass of the body, greater is the potential energy of the body.

b) Its height above the ground : Higher the height of the body greater is its potential.

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12. Can a body possess energy even when it is not in motion? Explain your answer with an example.

Ans

Yes, a body possess energy even when it is not in motion; consider a body raised to a certain height say. It is a velocity is zero. Kinetic energy will be zero but the body will have.

P.E. = mgh

So, a body may possess energy through it is not in motion.

13. A hydroelectric power station converts the kinetic energy of flowing or falling water into electrical energy that can be used in homes and business. The water rushes past the turbine shifting its blades and causing it to spin, converting some of the water's kinetic energy into mechanical energy.

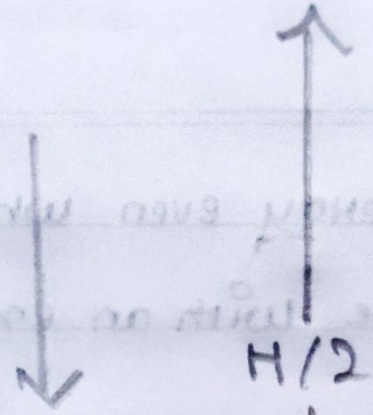
14. ~~This sheet~~ What do you mean by conservation of mechanical energy? State the condition when does it hold.

1)

$P \cdot E = E$

$K \cdot E = 0$

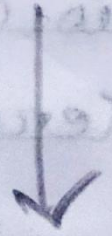
A



$P \cdot E = E/2$

$K \cdot E = E/2$

B



$P \cdot E = 0$

$K \cdot E = E$

C

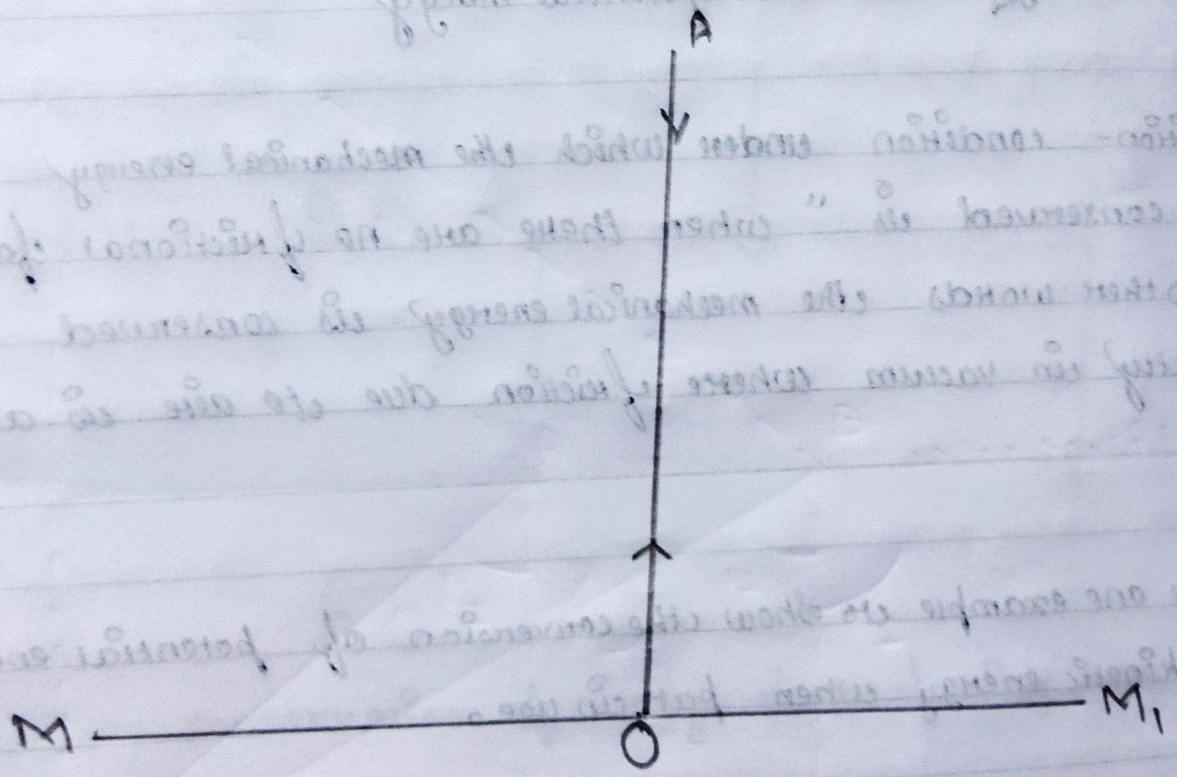
Ans:- This means "The total mechanical energy (P.E + K.E) of an isolated system at any instant is equal to the sum of kinetic energy and the potential energy

condition- condition under which the mechanical energy is conserved is " when there are no frictional forces" in other words the mechanical energy is conserved strictly in vacuum where friction due to air is absent.

186 Give one example to show the conversion of potential energy to kinetic energy when put in use.

Ans:- The example is an apple changing on a tree has the potential energy due to its head raised position. When the apples falls from the tree. The falling apple has a kinetic energy. So the potential energy stored in apple in its raised position changes into kinetic energy when the apple is falling.

(18) Draw a diagram to show the reflection of a light ray incident normally on a plane mirror.



18
Ans
*
*
*
*
19
Ans

Light energy

18. State 4 characteristics of the image formed by a plane mirror.

Ans: The 4 characteristics of the image formed by a plane mirror are.

* The image is upright or erect
* The image is virtual
* The image is of same size as the object
* The image is laterally inverted.

19. What is irregular reflection? Give an example.

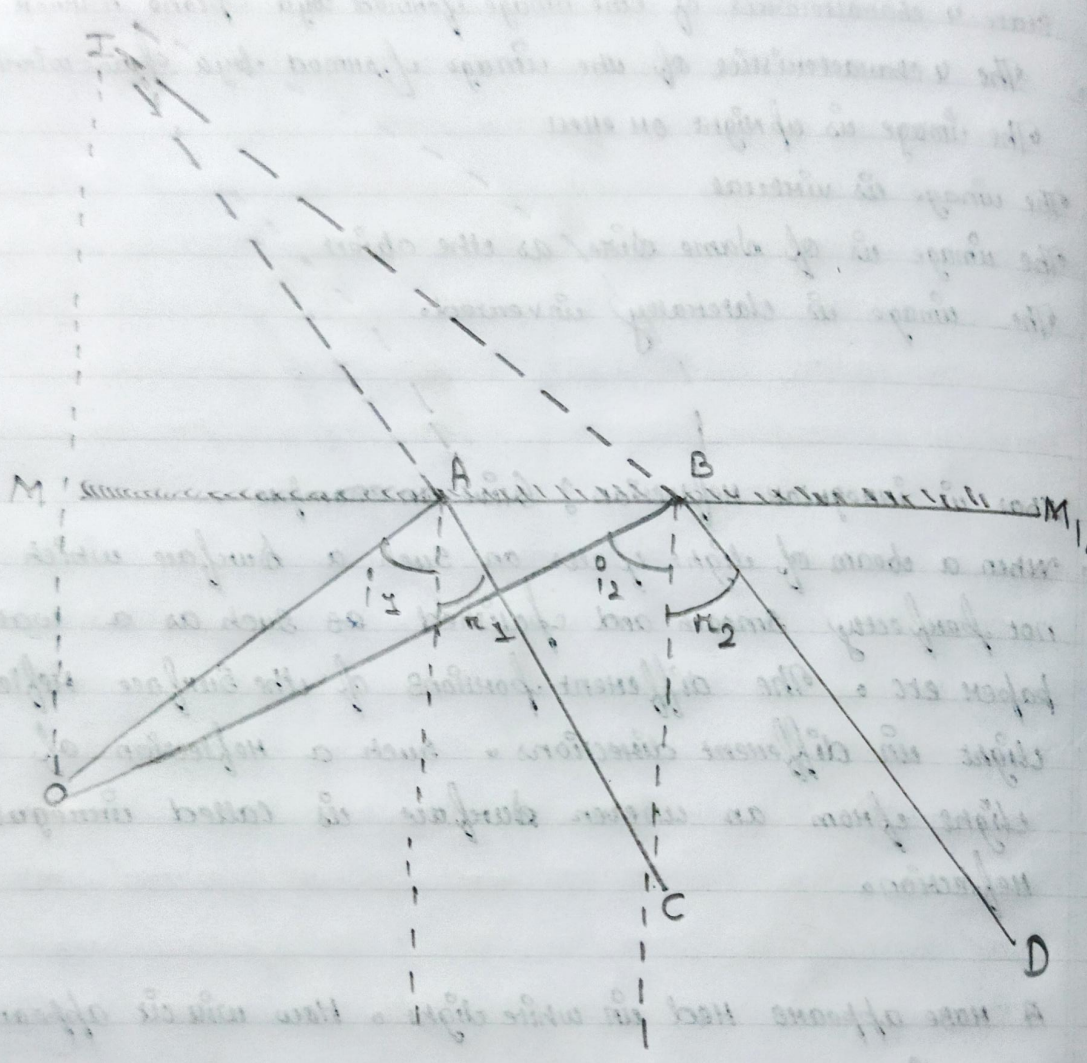
Ans: When a beam of light falls on such a surface which is not perfectly smooth and polished as such as a wall, wood paper etc. The different portions of the surface reflect light in different directions. Such a reflection of light from an uneven surface is called irregular reflection.

20. A rose appears red in white light. How will it appears in

(i) green light

(ii) red light

Give a reason for your answers for each.



O = object

M - M1 = Plane mirror

OA = Incident ray

AEC = Reflected ray

I = virtual image of object O

∠i = Angle of incidence

∠r1 = Angle of reflection

(i) If a red rose is seen in green light it appears black. The reason is that the rose absorbs the green light falling on it and reflect none.

If a ~~rose~~ red rose is seen in red light it appears bright red. This is because the rose reflects the red light falling on it and absorb noone of it.