ACADEMIC SESSION 2021-22

SMART SKILLS

CLASS VIII

PHYSICS

KEY FEATURES

This edition is enriched with activities that will be demonstrated/done by the students and will provide exposure to a variety of questions that include multiple choice questions, application based questions, very short answer type questions, short answer type questions, figure based questions, etc. to check the child's grasp of the concept.

- The **H.O.T.S.** (High Order Thinking Skills) questions will help in developing a child's logical and analytical thinking and will greatly enhance the development of independent thinking skills.

- The assignments will enable the child to express the taught concepts clearly in the desired format.

- The Recapitulation assignments and Question banks will enable students to be better prepared to appear for the examinations by giving them an idea about the format of the paper and to optimise their speed of writing.

- The **FACTOPAEDIA** contains amazing scientific facts. This will help in creating awareness among the students about the world of science.

- Last but not the least – This Smart Skills has been prepared to help the children develop a scientific aptitude by-

    ✓ Reinforcing concepts
    ✓ Inspiring them to learn by doing.
    ✓ Strengthening expression in the desired scientific language.
    ✓ Developing independent thinking.
    ✓ Understanding the reasoning of day to day phenomena.

INDEX

SYLLABUS

	TERM I
APRIL – MAY	**CHAPTER 16 - LIGHT** What makes things visible, Reflection of light from a plane mirror, Ray diagrams to show regular and diffused reflection, Ray diagram to show the formation of an image by a Plane mirror, Characteristics of the image formed by a plane mirror, Multiple images formation with plane mirrors ,Laws of reflection, Structure of the Human eye and the function of its parts, Persistence of vision, Eye care. Braille system for the visually challenged.Refraction.
JULY	**CHAPTER 13 SOUND** Production of Sound, Different categories of Musical instruments and their vibrating parts, Sound needs a medium for propagation, Characteristics of Sound wave, characteristics of Sound, Numericals related to calculation of time period and frequency, Audible and inaudible Sounds, Preliminary idea about the Human ear- Parts and functions, Differences between Noise and Music, Sources and effects of Noise pollution.
AUGUST	**CHAPTER 15 SOME NATURAL PHENOMENA** Lightning, Thunderstorm, Earthquakes.
	TERM II
SEPTEMBER & OCTOBER	**CHAPTER 17 STARS AND THE SOLAR SYSTEM** Celestial objects- Stars, Planets, Meteors, meteorites, comets, asteroids. Moon- Description of its surface, Phases of the moon A few constellations and their shapes. Planets of the Solar system and a brief information about them. Artificial satellites - their applications.
NOVEMBER & DECEMBER	**CHAPTER 11 FORCE AND PRESSURE** Scientific meaning and definition of Force, Effects of force, Types of Forces, Definition of Pressure, Formula and units of pressure , Numericals based on Pressure, Pressure exerted by liquids and gases, Atmospheric Pressure and its effects.
JANUARY & FEBRUARY	**CHAPTER 12 FRICTION** Scientific meaning and Definition of friction, Cause of friction, Factors affecting Friction, Types of friction, Friction a necessary evil- its advantages and disadvantages, Ways of increasing and reducing friction, Fluid friction.

S No	LEARNING OUTCOMES
	FORCE AND PRESSURE
1.	**The students will be able to differentiate and classify materials, objects, phenomena and processes, based on properties or characteristics and understand the concept of force and pressure**
2.	**The students will be able to plan and conduct investigations or experiments to arrive at and verify the facts, principles, phenomena or to seek answers to queries on their own and understand the scientific principles involved**
3.	**The student will be able to relate processes and phenomena with causes and effects and explain scientifically**
4.	**The student will be able to calculate force / pressure / area using the data given**
5.	**The students will be able to apply scientific concepts in daily life and solving problems**

CHAPTER 11

FORCE AND PRESSURE

Assignment 11.1

1. **Force** is a physical quantity that changes or tends to change the state of rest or uniform motion of an object, speed and direction of an object and shape or size of an object.

2. Its SI unit is Newton (N).

3. **Contact force** - It is the force which acts on a body only when the objects are in physical _____ with each other.

   Eg. Muscular force, Frictional force.

4. **Muscular Force –** The force exerted by the _____ of a human or animal body is called muscular force.

   Eg : A cart pulled by a horse, a woman carrying a bucket of water

5. **Frictional force –** The force acting between two _____ in contact which opposes the motion of one body over the other.

   Eg : A rolling ball on the ground comes to rest, rubbing the hands warm them up during winters

6. **Non contact force –** The force that can act without any actual _____ between the two objects i.e. acts from a distance is called a noncontact force (action –at –a distance force).

   Eg. Gravitational force, Electrostatic force, Magnetic force.

7. **Gravitational force –** The force of attraction between any two objects in the universe is called Gravitational force. The Gravitational force exists everywhere in the universe.

   Eg. The force of attraction between the earth and the moon.

8. **Electrostatic force –** The force of attraction or repulsion between charged objects or between a charged and uncharged objects is called electrostatic force.

   Eg. The force of repulsion between like charges, the force by which the rubbed comb _____ bits of paper.

9. **Magnetic force –** The force exerted by a _____ on another magnet or magnetic materials is called magnetic force.

   Eg. north pole of magnet repelling the north pole of another magnet, safety pins attracted towards a magnet

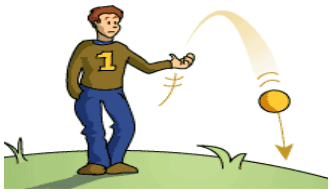
10. **Resultant force –** It is the single force that produces the same effect on a body as done by all forces acting on it collectively.
    - ➢ When two forces act along the same line and same direction on a body then the resultant force is the _____ of the two forces acting on it.
    - ➢ When two forces act along the same line and opposite direction on a body then the resultant force is the _____ of the two forces acting on it.
11. **Balanced forces** - When the resultant of all the forces acting on a body is _____, then the forces are said to be balanced forces. Balanced forces do not produce any change in the state of rest or uniform motion of a body. It can change the shape or size of an object.
12. **Unbalanced forces**- When the resultant of all the forces acting on a body is not _____, then the forces are said to be unbalanced forces.

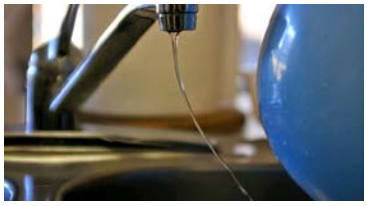
    Unbalanced forces produce change in the state of rest or uniform motion, change in direction and speed of a moving body.

Assignment 11.2

Name the forces exerted, as seen in the given pictures. Also state whether they are contact or noncontact forces?

SITUATION	TYPE OF FORCE	CONTACT/NON CONTACT

Fill in the blank columns after observing the given pictures.

SITUATION	Agent exerting the force	Object on which it acts	effect of the force
			
			
			
			
			

Assignment 11.3

ACTIVITY [TO BE DEMONSTRATED IN LAB]

Aim: **To demonstrate the various types of forces.**

Materials Required: Bar magnet, iron filings,safety pins, iron nails, straws, newspaper, tap water, plastic scale, bits of paper, balloon, sand paper, toy car, spring balance, ball, rubber band, block of wood/metal ball/book, etc.

Theory:

Procedure:

1. Rub a plastic scale with a newspaper and bring near the bits of paper.
2. Rub a straw with a newspaper and try to stick the straw on the wall.
3. Rub two straws with the newspaper and bring them near each other.
4. Rub two balloons with wool and bring the balloons near each other.
5. Take one of the balloon rubbed and try to stick on the wall.
6. Take two bar magnets and bring their like poles towards each other.
7. Take two bar magnets and bring their unlike poles towards each other.
8. Bring some magnetic materials/ iron filings/ iron nails/ safety pins near a magnet.
9. Lift a book/ block of wood/ metal ball OR push a table.
10. Roll a ball on the surface of the table/ on sand paper/ piece of cloth/ sand, etc.
11. Release a ball from a height or throw the ball upwards.

Observation:

1. The plastic scale _____.
2. The straw _____.
3. The straws _____.
4. The balloons _____.
5. The balloon _____.
6. The magnets _____ .
7. The magnets _____
8. The objects _____ .
9. We use _____ to lift or push.

10. The ball _____ .

11. The ball _____.

Conclusion:

1. The forces exerted in 1, 2, 3, 4 and 5 are _____.
2. The force exerted in 6, 7, and 8 are _____.
3. The force exerted in 9 is _____.
4. The force exerted on the ball in 10 is _____.
5. The force exerted on the ball in 11 is _____.

Hence, _____ **and** _____ **are contact forces.**

_____, _____ **and** _____ **are Non**

contact forces.

Assignment 11.4

1. **Give one word for the following**:-

a. A force acting on a body from a distance -

b. A force which needs physical contact to act -

c. SI unit of force -

d. A push or pull acting on a body -

e. A force of attraction acting on all bodies because of every other body -

2. Match the following:-

Column A	Column B
a. A man blowing a balloon	i. Force can make a stationary object move
b. A woman pushing a table	ii. Force can stop a moving object
c. A cricketer catching a ball	iii. Force can change the shape of the object
d. A girl pulling the leash of a running dog	iv. Force can change the direction of a moving object
e. A driver turning the steering wheel of a car	v. Force can make an object move slower

3. **Fill up the columns B and C with appropriate answers:-**

SNo.	**Column A** (Situation)	**Column B** (Contact/Non-Contact)	**Column C** (Type of Force)
1.	Bat hitting a ball		
2.	Between earth and moon		
3.	Man rowing aboat		
4.	Water in river flowing downward		
5.	Between a magnet and a nail		
6.	Between comb(rubbed with hair) and bits of paper		
7.	Between tyres of moving vehicle and the road		

4. **Identify the type of force acting in each of the following cases:-**

a. Water in rivers flow downwards

b. A coin slips and falls from your hand

c. A straw rubbed with paper attracts another straw

d. Magnetic compass deflects when kept under the wire of a simple circuit.

e. A magnet attracts an iron nail

f. A ball rolling on ground comes to rest

g. The boat stops as one stops rowing

h. A scooter comes to rest as its engine is switched off

i. Animals carry out their physical activities

j. A woman lifting a bucket of water

5. **Fill in the blanks:-**

a. The SI unit of force is _____.

b. Static electric charges exert _____ force whereas magnets exert _____ force.

c. An object slows down when force is applied in the _____ direction.

Assignment 11.5

1. In a tug of war, two teams A and B exert forces of 65 N and 50 N respectively. What is the net force acting on the rope?

2. Two friends Tom and Sam are applying a force of 2 N and 4 N on a box in the same direction. What will be the total force applied by them?

3. In a tug of war, side A applies 10 N force and side B applies 8 N force. Which side will the rope move?

4. In a tug of war, two teams A and B exert forces of 65N, 23N, 85 N and 45N, 16N, 78N respectively. What is the net force acting on the rope?

5. Two friends Pragya and Mary are applying forces of 22.8 , 33.5 ,22.5 and 14 N on a box in the same direction. What will be the net force applied by them?

Assignment 11.6

1. Define force.

2. When does force come into play?

3. In a game of tug of war, the two teams pull equally hard. So, the rope does not move in either direction. When is this possible?

4. What are the three main effects of force?

5. Define the two contact forces with one example of each.

6. Define the three non-contact forces with one example of each.

7. Why is the force of friction called the contact force?

8. Why can you not lift a bucket of water without holding it?

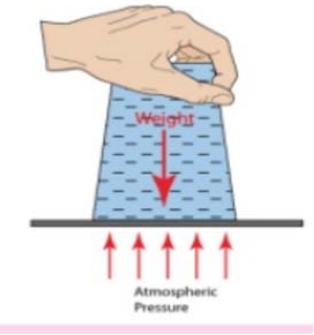
Assignment 11.7 [ACTIVITY]

Aim: To prove that air exerts pressure

Materials Required : Glass, Water, cardboard

Theory:

Diagram:



Procedure:

1. Take a glass and fill it with water upto the brim
2. Press the cardboard on the filled glass.
3. Turn the glass upside down.

Observation:

_____

_____

_____

Conclusion:

_____

_____

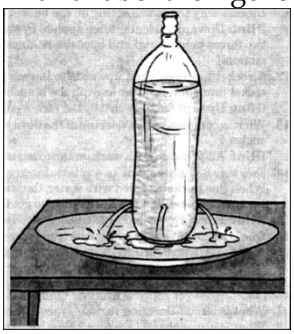
Assignment 11.8 [ACTIVITY]

Aim: To show that liquids exert equal pressure in all directions at the same level.

Materials Required: Mineral water bottle, water, compass/needle

Theory:

Diagram: Draw and label the figure



Procedure:

1. Take a bottle and pierce 3-4 holes at the same level.
2. Fill it up with water

Observation:

_____

_____

_____

Conclusion:

_____

_____

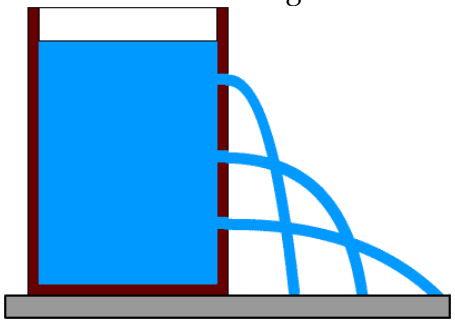
Assignment 11.9 [ACTIVITY]

Aim: To show that pressure exerted by liquids increases with depth.

Materials Required: Mineral water bottle, compass/needle, water

Theory:

Diagram: Draw and label the diagram.



Procedure:

1. Take a bottle and pierce 3 holes at different heights but along the same vertical line.
2. Fill it up with water and keep on a plane surface.
3. Measure the distance between the bottle and the different points where the water is falling on the surface from the holes.

Observation:

_____

_____

_____

Conclusion:

_____

_____

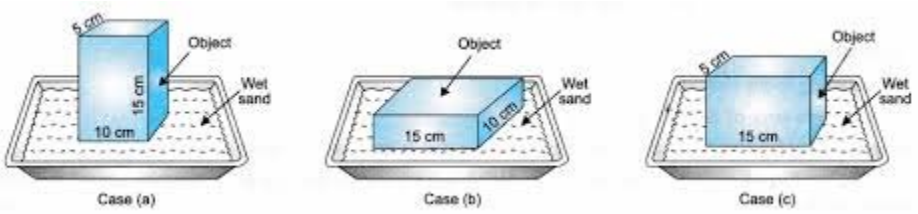
Assignment 11.10 [ACTIVITY]

Aim – To study the effect of force on a surface and hence find the relationship between force, pressure and area.

Materials Required – A deep tray, refined flour, glass rod, 4-5 glass slabs

Theory -

Diagram –



Procedure –

1. Fill the tray with refined flour and stir it with a glass rod to leave the flour loose.
2. Keep one slab with its three different faces on the flour one by one and record your observation.
3. Now keep the slab with its maximum dimension in contact with the flour.
4. Arrange the rest of the slabs one on top of the other on the first slab and record your observation.

Observation –

1. When the slab is kept with its maximum dimension on the flour, _____

   _____.

2. When the slab is kept with its minimum dimension on the flour, _____

   _____.

3. When the slab is kept with its maximum dimension on the flour and rest of the

   slabs are kept on it, _____.

Conclusion –

1. When the area of contact between the slab and flour is more, the pressure

2. When this area of contact decreases, the pressure

3. The force acting on the flour due to the slabs together

4. Pressure -

Assignment 11.12

Multiple choice questions:-

1. The pull or push acting on a body is called
   (a) force
   (b) pressure
   (c) thrust
   (d) friction

2. Pressure that balances blood and fluid pressure in our body is
    (a) water pressure
    (b) atmospheric pressure
    (c) blood pressure
    (d) Both (b) and (c)

3. Pressure exerted by water in a bucket increases with
    (a) increase in the diameter of bucket
    (b) decrease in diameter of bucket
    (c) volume of the bucket
    (d) depth of water in bucket

4. Force applied per unit area of a surface is called
    (a) force of friction
    (b) force of muscles
    (c) pressure
    (d) thrust

5. A force applies on a rolling ball on the ground can cause
    (a) an increase in the speed of the ball
    (b) a decrease in the speed of the ball
    (c) change in direction of the ball
    (d) all of these

6. Which of the following will exert more pressure if pushed with same force?
    (a) geometry box
    (b) sharpener
    (c) end of a new pencil
    (d) pointed end of nail

7. Which of the following is not an example of contact force?
    (a) ball rolling on gorund
    (b) horse pulling a cart
    (c) ball falling on earth
    (d) man pushing a load
8. The SI unit of force is
    (a) dyne
    (b) newton
    (c) gram
    (d) kilogram

9. Which of the following forces is only attractive?
    (a) electrostatic
    (b) magnetic
    (c) gravitational
    (d) all of these

10. Gravitational force acts
    (a) only between sun and the planets
    (b) only between sun and earth

(c) only between earth and moon
(d) between all objects in this universe

Assignment 11.13

1. Fill in the blanks:-

a. _____ is force per unit area.

b. _____ and _____ are together called fluids.

c. Liquids exert _____ in all directions.

2. Complete the following paragraph to find out how a vacuum cleaner works:-

A vacuum cleaner works by removing some of the air inside its collecting bag. This reduces the _____ inside it. So the air pressure outside is _____ than the air pressure inside it. The air pressure _____ the vacuum cleaner pushes air into it, taking dust and bits of dirt along with it.

3. The properties of a liquid in an open vessel are :-

a. Pressure of the liquid _____ with increase in its density.

b. The liquid exerts pressure on the _____ as well as _____ of the container.

c. The pressure of the liquid ___ _____ _____ _____ is same in all directions.

d. The pressure of the liquid _____ with an _____ in its depth.

4. Define pressure and write the mathematical expression for it.

5. What are the SI unit of pressure?

6. What is the relation between Pascal and N/m^2?

7. Where is the liquid pressure greater – 10m below the surface of sea or 20m below

8. Two objects of masses M and 2M are lying on an equal area. Determine the ratio of pressure exerted by them on the ground.

9. How would pressure change if

a. Area is doubled keeping force constant.
b. Force is doubled keeping area constant.

10. Calculate the pressure exerted by a force of 200 N on an area of 20 m^2.

11. Calculate the area on which a force of 1000 N exerts a pressure of 25 Pa.

12. Calculate the pressure exerted on an area 5 m^2 by a force of 25 N.

13. A pressure of 50 N/m^2 acts on an area of 5 m^2. Calculate the force exerted.

14. Calculate the thrust on an area of 6 sq cm if a pressure of 45 Pa is exerted?

15. Calculate the pressure exerted on an area 2.5 m^2 by a force of 150 N.

Assignment 11.14

Give reasons for the following:-

1. Astronauts have to wear special pressurized suits.

2. Deep sea divers have to wear specially designed suits.

3. A balloon bursts if too much of air is blown into it.

4. War tanks move on caterpillar tracks which cover wheels.

5. One end of the drawing pin is wide while the other end is sharp.

6. People living in plains suffer from nose bleeding as they go to high altitudes.

7. The fine slices of tomato can be cut only by a sharp knife.

Practice questions

Explain scientifically

a. We are not crushed under the weight of the air above us.

b. A balloon bursts as it goes high in the air.

c. Shoulder bags are provided with wide straps.

d. Tools meant for cutting and piercing have sharp edges.

e. The pillars of bridges and flyovers have a broad base.

f. The foundation of high rise buildings is wide.

g. A sealed packet of chips gets inflated , when carried to high altitudes.

h. Porters place a round piece of cloth on their heads.

FUN ACTIVITY

Find out 12 words from the grid given on 'Force and Pressure'

[Note: You can go straight, back, up, down or diagonally]

R	A	L	U	C	S	U	M	Q	W	T	Y	U	I

A	A	S	D	I	F	G	H	J	K	L	P	O	O
E	L	E	C	T	R	O	S	T	A	T	I	C	E
B	H	I	R	E	T	U	O	M	P	G	K	L	J
T	G	F	F	N	F	S	A	Z	X	R	C	V	B
H	E	O	U	G	E	N	S	D	F	A	G	H	N
R	H	E	T	A	O	U	E	I	H	V	A	D	S
U	L	N	M	M	F	R	I	C	T	I	O	N	R
S	B	O	E	H	U	P	M	S	D	T	X	C	E
T	U	T	G	S	J	O	B	N	Z	A	J	B	T
K	E	W	S	F	K	L	V	C	X	T	U	Y	E
R	B	E	S	D	F	A	R	T	Y	I	R	T	M
W	R	N	P	A	O	Q	R	F	U	O	E	F	O
P	Q	U	I	O	R	A	T	N	I	N	D	O	R
W	E	R	T	Y	C	D	S	U	O	H	J	K	A
B	L	A	I	S	E	P	A	S	C	A	L	I	B

S No	LEARNING OUTCOMES
	FRICTION
1.	**The students is able to differentiate and classify materials, objects, phenomena and processes, based on properties or characteristics and understand the concept of friction due to solids, liquids and gases**
2.	**The students is able to plan and conduct investigations or experiments to arrive at and verify the facts, principles, phenomena or to seek answers to queries on their own and understand the scientific principles involved**

3.	**The student is able to relate processes and phenomena with causes and effects and explain scientifically**
4.	**The students is able to analyse and interpret situations where friction is present or absent and if friction is helpful or troublesome**
5.	**applies scientific concepts in daily life and solving problems**

Chapter – 12

FRICTION

ASSIGNMENT 12 .1

1. Friction is defined as a contact force that opposes the _____ of one surface over the _____. It always acts _____ to the direction of the motion of the body.

2. Friction arises because of --

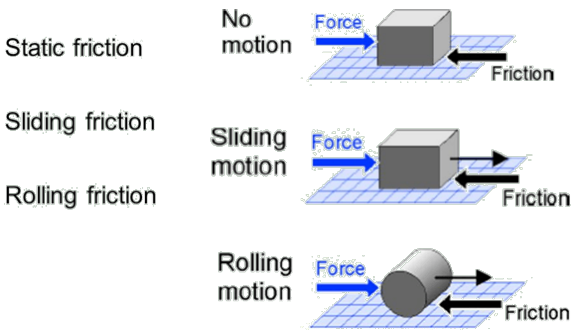
➢ The interlocking of the surfaces- Friction is due to the _____ of the surfaces. The grooves and ridges of the two surfaces get interlocked with each other and oppose motion.

3. Friction depends on

➢ Nature of the surfaces in contact: Rough surfaces have _____ friction than the smooth ones.

➢ Weight of an object: On a horizontal surface, the force of friction is _____ proportional to the weight of the body which moves.

4. There are different types of friction-



- **Static friction**- is the friction that exists between a stationary body and the surface on which it rests. The static friction is experienced, when we try to move the body at rest and the body does not move. The force required to overcome friction at the instant an object starts moving from rest is a measure of static friction.
- **Sliding Friction** is defined as the force of friction between the two surfaces in contact when one of them is _____ on the other . the force required to keep the object moving with the same speed is a measure of sliding friction.
- **Rolling friction** is defined as the force of friction between two surfaces in contact when one of them is _____ over the other. eg. _____

5. **Fluid friction or drag** is the friction exerted by fluids ie. _____ and _____.

   The fluid friction depends on

   - ➢ Nature of the fluid
   - ➢ Shape of the object
   - ➢ Speed of the object with respect to the fluid.

6. Friction can be decreased in the following ways –

- ➢ By _____ the surfaces
- ➢ By applying Grease or _____ on the surfaces
- ➢ By using wheels , _____ or roller bearings

➢ By streamlining the body of the object.

7. **Friction can be increased by -**

➢ Making the surfaces _____.

➢ Increasing the mass of the moving object.

8. **Friction is <u>necessary</u> for the following reasons-**

---

9. **Friction is an <u>evil</u> since ---**

- It generates _____
- It leads to energy wastage and minimisation of efficiency in machines.
- Friction causes wear and _____ of machinery parts ,tyres, shoe soles etc.

10. Sliding friction is smaller than static friction because when an object starts sliding on a surface, the contact points on its surface, do not get enough time to lock into the contact points on the other surface.. So, the sliding friction is slightly smaller than the static .

11. **Streamlining** is a change in the shape of an object moving through a ----------

to enable it to move easily with ---------- friction.

- Birds and fishes have evolved to have special shapes since----------

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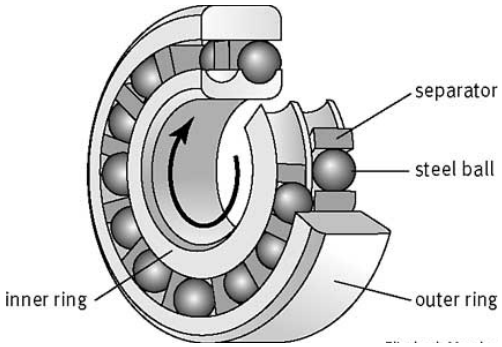
12. **BALL BEARINGS**

Ball bearings contain a set of balls between two metallic rings where the ----------ring rotates easily while the ----------ring is static. It can be used to support a rotating shaft that is fixed to the inner ring of a ball bearing.

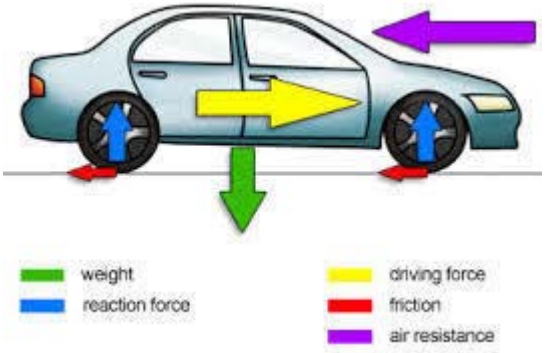
The shaft and **inner ring rotate** together while the **outer ring** remains stationary.

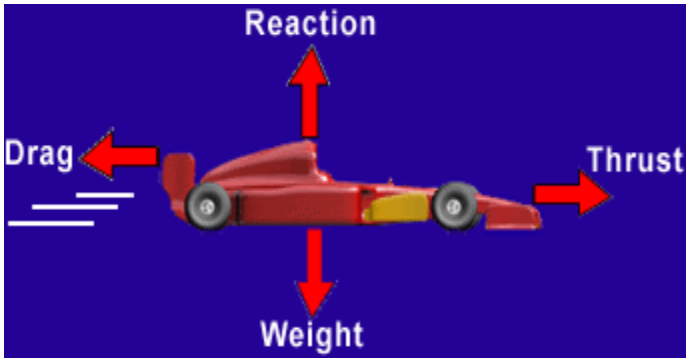


Bicycles, DVD players, water pumps, washing machines and fans are just a few of many day to day products that we use that use **ball bearings**.

FUN ACTIVITY

1. Make a straight track on ground for a battery operated toy car. Coat the track one by one with different materials like sand, paper, cardboard, stones, mud, etc. and move the car from one end of the track to another. In each case, measure the distance travelled by the toy car and the time taken to cover that distance.





Observation table

Track material	Distance travelled	Time taken	Distance travelled/ time
Cardboard			
Paper			
Sand			
Stones/ mud			

Conclusion :

ACTIVITY 1

Aim – To determine the factors affecting friction.

Materials required – a block of wood with a hook, a spring balance, a sheet of glass/

cellophane sheet, a large sheet of coarse sandpaper, weights, two round pencils, and a

large table.

Theory –

Method

1. Pull the block of wood gently across the tabletop with the spring balance.

2. Note down the reading on the spring balance ----------. This tells you the force needed to pull the block.

3. Place the sheet of glass or cellophane on the table and pull the block of wood over it.

Note down the reading. ----------

4. Now place the sandpaper on the table, with the rough side up and pull the wooden

block over it. Note down the reading on the spring balance. ----------

5. Finally, place the wooden block over the two round pencils and pull it with the spring

balance. Again note the reading. ----------

6. Repeat the whole activity, with some weights over the wooden block on each type of

surface. And note down the readings. ----------

Observation table

Type of surface	**Force in Newtons required to move the wooden block**
Sandpaper	
Glass/ cellophane sheet	
Tabletop	
Using pencils as rollers	
Adding weights on the block	

Conclusion - (i) Friction depends on:

a. _____

b._____

ASSIGNMENT 12.1

1. Which of the following is not used to reduce friction?
   (a) ball bearing
   (b) lubricant
   (c) air cushion
   (d) saw dust

2. The cause of friction between two surfaces in contact is
   (a) size of the object
   (b) area of the surface of object
   (c) roughness of surfaces in contact
   (d) shape of the object

3. When two surfaces are rubbed against each other,
   (a) heat is produced
   (b) wear and tear takes place
   (c) surfaces become smooth
   (d) nothing happens

4. On decreasing the weight of an object, friction
   (a) decreases
   (b) increases
   (c) remains unaltered
   (d) vanishes

5. Streamlining reduces
   (a) static friction
   (b) sliding friction
   (c) rolling friction
   (d) fluid friction

6. Which of the following is not true about friction?
   (a) It wears down an eraser
   (b) It helps us to walk
   (c) It helps a ship to sail through water
   (d) It heats up our palms when rubbed.

7. The hinges of a creaking door are oiled to
   (a) to keep them clean
   (b) to keep them rust free
   (c) to maintain their shine
   (d) to reduce noise and wear and tear

8. The easiest way to shift a heavy carton from one place to another is
   (a) tie it with rope and pull
   (b) ask more labourers to push it
   (c) Put it on trolley
   (d) Split it up into parts

9. A car skids on a wet road because
   (a) water increases the friction between road and tyres
   (b) water decreases the friction between road and tyres
   (c) it is not possible to apply brakes on wet road
   (d) brakes are ineffective on wet road

10. It is not possible to open a bottle's lid with oily hands because due to friction
   (a) surface becomes sticky
   (b) surface becomes rough
   (c) surface becomes smooth and slippery
   (d) none of these

ASSIGNMENT 12.2

(A) Circle the odd one out and justify scientifically:-

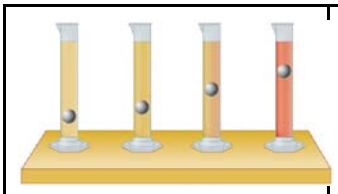
1. oil, grease, sand, graphite, powder

2. sole of shoe, tyre of car, surface of road, oily hands

3. ball bearing, trolley, bags with rollers, wooden box, toy car

(B) Name the forms of friction exerted, as seen in the given figures.

	Sliding friction		
			
			

(C) State whether presence of friction is "helpful" or "troublesome" in the following actions:-

(D) Name the two surfaces between which friction plays the role in the following cases:-

a. A boy can walk on the concrete road

b. One can write with pen on a paper

c. A man can turn the door knob to open the door

d. A boy slips on stepping on a banana peel.

e. A student writes, using a chalk, on a board

f. A man turns the lid to open a bottle.

g. The screw remains gripped to the wall.

(E) Fill in the blanks with an appropriate lubricant used in each of the following cases :-

h. Asha removes her bangles easily by applying _____ on her hands.

i. Rashi puts some _____ on the carrom board.

j. Piyush applied _____ on the chains of his bicycle to prevent wear and tear.

k. _____ in our mouth helps us to swallow food.

(F) Fill in the blanks with words 'increase' or 'decrease':-

a. The treaded tyres of trucks _____ the friction between the tyres and the ground.

b. Fine powder is sprinkled on carom board to _____ the friction.

c. Kabaddi players rub their hands with soil to _____ friction for better grip.

d. Gymnasts apply a coarse substance in the hands to _____ the friction for better grip.

e. A motor mechanic uses grease between moving parts of machines to _____ the friction.

f. The use of lubricants _____ friction.

ASSIGNMENT 12.3

1. In which direction is frictional force applied?

2. Which is easier – to move a box from rest or to move it when it is already in motion? Justify your answer.

3. What are the effects of friction?

4. Mention two ways each of (a) increasing friction (b) decreasing friction.

5. What could be an option if it is not advisable to use oil or similar substances as lubricant?

6. Wear and tear due to friction depends on two factors. What are they?

7. What are the factors on which fluid friction depend?

8. Mention three situations where friction is undesirable.

9. On what principle do ball bearings work?

10. Two men tried to push a heavy box and could succeed. Finally, wheels were fitted to the box and now one man could move it. Justify.

Assignment 12.4

Give reasons for the following :-

l. Aircrafts and ships have pointed fronts.

m. Grooves are made in the tyres of vehicles.

n. The shafts of rotating machines are mounted on ball bearings.

o. A piece of chalk gets smaller on repeated use.

p. It is easier to stir a glass of water as compared to a glass of honey.

q. It is difficult to put a loaded cart in motion than to maintain its motion.

r. Wheels of automobiles are made circular.

s. A large sized brake on a bicycle is as effective as a small brake provided material of brakes remain same.

t. The handles of a motorcycle are covered with a rubber sheet with spikes.

Practice questions:-

Explain the following with scientific reason:-

a. It is convenient to pull luggage fitted with rollers.

b. Ball bearings are used between hubs and axles of ceiling fans.

c. The shape of an aeroplane resembles that of a bird.

d. It is difficult to tie a knot in a silk thread.

e. The moving parts of machines are oiled from time to time.

Assignment 12.5

Fill up the grid with the help of the clues given :-

ACROSS

1. Another name for fluid friction (4)
2. A necessary evil (8)
3. _____ friction is the least (7)
4. _____ friction is the most (6)
5. Force required to keep the object moving with same speed measures ____ friction (7)

DOWN

6. Used to reduce friction between two surfaces (9)
7. Gymnasts apply coarse substance on hands to _____ friction for better grip. (8)
8. Sprinkling powder on carom board _____ friction (7)
9. Design used to reduce fluid friction (12)
10. _____ converts sliding friction into rolling friction (4,7)

1.													9.
				3,8									
10.													
					5.	6.							
		7.											
	2.												
					4.								

S No	LEARNING OUTCOMES
	SOUND
1.	**The students is able to differentiate and classify materials, objects, phenomena and processes, based on properties or characteristics and understand the concept of SOUND**
2.	**The students is able to plan and conduct investigations or experiments to arrive at and verify the facts, principles, phenomena or to seek answers to queries on their own and understand the scientific principles involved in production of sound, its travelling and hearing**
3.	**The student is able to measure physical quantities using appropriate apparatus, instruments and devices like using a simple pendulum to explain the scientific terms related to sound**
4.	**The student is able to take initiative to know about musical instruments and the phenomena which produces different quality of sound**
5.	**The student is able to apply scientific concepts and physical quantities learnt in various situations where sound is heard and explain / reason.**

Chapter - 13

SOUND

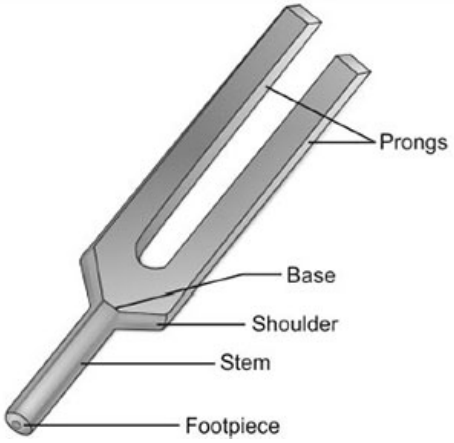
ACTIVITY 1

Aim : Sound is produced by a vibrating body

Materials required : Beaker, water, tuning fork, rubber pad

Theory: The rapid to and fro motion of an object is called vibration. Vibrations produce sound.

Diagram : [Draw the figures and label.]



Procedure:

1. Strike the tuning fork on the rubber pad and bring it close to your ear.
2. Strike it again on the rubber pad and touch the surface of water kept in the beaker with one of its prongs.

Observation :

1. When the tuning fork is brought close to the ear, _____
2. When the prong of the tuning fork is allowed to touch the surface of water, _____.

Conclusion : _____.

- Rapid to and fro or back and forth motion of an object is called **vibration**.

Chapter - 13

SOUND

ACTIVITY 2

[LET US DO]
Aim: To find out the vibrating parts of different musical instruments

Visit the music room of our school

Observation

S No	Name of the instrument	Part which produces sound
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		

Conclusion: _____

_____

_____

_____

_____

Chapter - 13

SOUND

ACTIVITY 3

Aim : Sound needs a material medium to propagate

Materials Required : Metal glass with narrow mouth / plastic container, straw, tape,, two mobiles

Theory:

Diagram:

Procedure :

Procedure 1: [If glass and two mobiles are used]

1. A ringing mobile is kept inside the glass and is heard.

2. Air inside the glass is sucked out with the ringing mobile still inside and heard.

Procedure 2: [If a plastic container, straw and two mobiles are used]

1. A plastic container is taken with a lid.
2. A hole is made on the lid and the straw is inserted into the hole and fixed with tape.
3. The container is closed using the lid.
4. Mobile A is kept inside the container and a call is made to it by mobile B and observed.
5. Now let mobile A keep ringing and air is sucked out using the straw and is observed.

Observation :

Procedure 1: [If glass and two mobiles are used]

1. The sound of the ringing mobile is _____ when it is kept inside the glass.

2. When air is sucked out slowly from the glass, _____

   _____.

Procedure 2: Is a plastic container, straw and two mobiles are used]

1. After step 4, the ringing of the mobile is _____.

2. After step 5, the ringing of the mobile _____.

Conclusion : _____.

Note : If the air is sucked out completely, vacuum will be created inside the glass and the sound of the ringing mobile will not be heard at all as sound does not travel through vacuum.

Identify the musical instruments shown in the pictures and state the vibrating part of the instrument.

	Name of instrument	**Vibrating part**
1.		
		---------- ----------
2.		---------- ----------
3.		---------- ----------
4.		---------- ----------

5.  ---------- ----------

6.  ---------- ----------

7.  ---------- ----------

8.  ---------- ----------

9. 

10. ---------- ----------

---------- ----------

11.

Chapter – 13

SOUND

Assignment 13.1

1. How is sound produced by humans?

In humans, sound is produced by the organ called _____ or larynx. It is located at the upper end of the _____. Inside the voice box, _____ vocal cords are stretched across such that it leaves a narrow slit between them for the passage of air. When the lungs force air through the slit, the vocal cords _____ producing sound.

_____ of sound produced depends on whether the vocal cords are tight or loose. Muscles attached to the vocal cords can make them tight or loose. The sound is further modulated by the air chamber of mouth and nose.

2. Some points to remember:-

- Sound travels _____ in gases, faster in liquids and _____ in solids.
- Sound _____ travel through vacuum.
- Speed of sound in _____ is 340 m/s approximately. It changes with atmospheric conditions like temperature, atmospheric pressure, humidity, etc.
- Speed of light in air/vacuum = 3×10^8 m/s

Characteristics of sound

1. **Loudness –** It depends on the _____ of vibrations. Large amplitudes produce loud sounds whereas small amplitudes produce soft sound.

2. **Pitch –** Pitch of a note depends upon the _____ of the sound. A high pitch sound has high frequency and vice versa.

   High pitch » high frequency » sharp, shrill voice. Eg. Women 's voice
   Low pitch » low frequency » heavy, hoarse, blunt voice. Eg. Men's voice

Musical Instruments

They are classified into three types depending on the kind of vibrations produced.

1. **Stringed instruments –** Vibrations in the _____ produce sound. The frequency of vibration is changed by changing the thickness, tightness and length of the wires. Eg – Guitar, *sitar*, violin, *sarod*, *veena*, etc.

2. **Wind instruments –** Vibrations in _____ produce sound. The frequency of vibration is changed by changing the length of vibrating air columns. Eg – Flute, mouthorgan, clarinet, *shehnai*, etc.

3. **Percussion instruments –** Vibrations of the _____ produces sound. The frequency of vibration can be increased by stretching the membrane more. The loudness can be increased by striking the membrane harder. Eg – Tabla, drum, mridangam, etc.

Music – 1. Regular vibrations produce musical sound

2. Soothing, pleasant, refreshing

Noise – 1. Irregular vibrations produce noise

2. Irritating, unpleasant, tiring

H.O.T.S.

When can music become noise?

Chapter – 13

SOUND

Assignment 13.2

Multiple choice questions:-

1. Sound travels fastest in
   (a) air
   (b) water
   (c) vacuum
   (d) solids

2. Decibel is the unit to measure
   (a) pitch
   (b) frequency
   (c) loudness
   (d) quality

3. The SI unit of frequency is
   (a) second $^{-1}$
   (b) hertz
   (c) mega hertz
   (d) decibel

4. Which of the following frequency of sound is inaudible?
   (a) 50 Hz
   (b) 500 Hz
   (c) 5000 Hz
   (d) 50000 Hz

5. The minimum distance between the source of sound and reflecting surface to produce an echo is
   (a) 22.6 m
   (b) 11.3 m
   (c) 10 m
   (d) 17 m

6. Sound having frequency less than 20 Hz are called
   (a) ultrasonic
   (b) supersonics
   (c) infrasonic
   (d) SONAR

7. In sitar, sound is produced by
   (a) beating
   (b) blowing
   (c) rubbing
   (d) plucking

8. A stretched rubber band vibrates 500 times in 5 seconds. Its frequency is
   (a) 10 Hz
   (b) 100 Hz
   (c) 1000 Hz
   (d) 500 Hz

9. The rapid to and fro motion of an object is called
   (a) periodic motion
   (b) oscillation
   (c) vibration
   (d) both (a) and (c)

10. Curtains, cushions, rugs, etc are _____ of sound
   (a) poor absorbers and good reflectors
   (b) good absorbers and poor reflectors
   (c) only good reflectors
   (d) only good absorbers

Complete the following table:-

S No	Source	Louder	Shriller
1.	Drum or guitar		
2.	Roar of lion or tweeting of bird		
3.	Voice of female or male		
4.	Crying baby or shouting man		

Chapter – 13

SOUND

Assignment 13.3

1. Fill in the blanks:-

   a. A rapid back and forth movement of a body about a mean position is called _____.

   b. The pitch is determined by the _____ of the vibrating body.

   c. Sound cannot travel through _____.

   d. Sound travels _____ than light.

   e. Vibrations of frequency less than 20 Hz are called _____.

   f. The number of vibrations completed in 1 second is called _____.

   g. The unpleasant and irritating sounds are called _____.

   h. The shrillness of sound depends upon _____.

2. Classify the sound produced by the following into high pitched and low pitched:-

a. man	b. child	c. bird
d. frog	e. woman	f. whistle
g.thunder	h. mosquito	i. drum
j. flute	k. jet plane	

3. State whether the following statements are true or false. If false, write down the correct statement.

   a. The audible range of frequency is 20-20,000 Hz.

   b. The louder the sound, the lesser is the amplitude of a vibrating body.

   c. A medium is not necessary for the propagation of sound.

   d. Time in which the vibrating particle completes one vibration is called the time period.

   e. Loudness and duration of a sound determines the amount of noise pollution.

4. Unscramble these letters to make a word (Clue given for each).

a. AHPR (An ancient stringed instrument) -

b. ABTS (These animals use sound waves to navigate) -

c. EIONS (A very harsh sound) -

d. ACIOLNRSUT (Sound of a very high frequency) -

e. CEOH (A reflected sound wave) -

f. IDLEUBA (A sound that we can hear) -

g. TUFLE (A wind instrument) -

h. NAILSCOTIOL (To and fro motion of a body) -

i. CMSUI (Sound that have a soothing effect) -

j. RAYXLN (Another term for voice box) -

5. Classify the following into stringed, percussion and wind instrument:

a. Flute	b. *Tabla*	c. Whistle
d. Clarinet	e. *Shehnai*	f. *Dafli*
g. Congo	h. *veena*	i. Guitar
j. Violin	k. *sitar*	l. *Sarod*

Chapter – 13

SOUND

Assignment 13.4

1. Name the state of matter in which sound travels

a. the fastest b. the slowest

2. Name the instrument used in the laboratory to produce sound of fixed frequency.
3. What is the role of ear drum in hearing?
4. What is the unit in which loudness of sound is measured?
5. In space, astronauts use radios to talk to each other. Why?
6. On the basis of production of sound, what is the difference between birds which chirp and bees that buzz?
7. Circle the odd one out and justify your answer:-
    a. amplitude, frequency, time period, Hertz
    b. Violin, bursting cracker, electric drill, honking vehicle
    c. bats, dogs, human beings, deers, monkeys
8. How is the voice of a 5 year old child different from the voice of a 25 year old man?

Characteristics of vibration / oscillation

Amplitude : The maximum displacement from the mean position is called the amplitude. Its SI unit is metre (m).

Time – period (T) : Time taken to complete one oscillation / vibration is called the time period. Its SI unit is **second (s).**

Frequency (*f*) : Number of oscillations in 1 second is known as frequency. Its SI unit is **Hertz (Hz).**

Relationship between f and T

$$f = 1 / T$$

Chapter – 13

SOUND

Assignment 13.5

1. If the frequency of a vibrating particle is 5 Hz, how many vibrations it makes in 1 second?
2. If an object completes 5 vibrations in 1 s, what is its time period?
3. An object completes 800 vibrations in 20 s. Calculate its frequency.

4. Calculate the time period of a vibrating particle whose frequency is 20 Hz.

5. What is the frequency of a vibration, if the time taken by 650 vibrations is 13 s?

6. Find the frequency of vibration if its time period is 0.04 s.

7. What is the frequency of an object which oscillates 25 times in one second?

8. Calculate the time period of a pendulum whose frequency of oscillation is 2 Hz.

9. Calculate the frequency of a pendulum whose time period is 3s

ACTIVITY

[LET US DO]

Prepare a poster on 'ways to reduce noise pollution' and write a slogan on 'creating awareness about harmful effects of noise pollution' on an A-4 sheet and paste it in your notebook.

H.O.T.S

Extreme loud sounds can make one deaf. Explain why?

The wires of a guitar are of different thickness. Why?

Chapter – 13

SOUND

Assignment 13.6

1. Complete the following table:-

S No	Musical instrument	Vibrating part producing sound	Type of instrument
1	Veena		
2	Tabla		
3	Flute		

4	Ektara		
5	Sarod		
6	Guitar		
7	Violin		
8	Jaltarang		
9	Sitar		
10	Drum		
11	Whistle		

2. State whether the following produce sound of 'high pitch' or 'low pitch':- Drum, baby, man, woman, bird, lion, whistle

3. Suggest 5 measures which can minimize noise pollution in a residential area.

4. What are the harms caused by noise pollution?

5. How can a musical sound be different from a noise?

6. What is the audible frequency for human ear?

7. How is loudness of a sound related to amplitude?

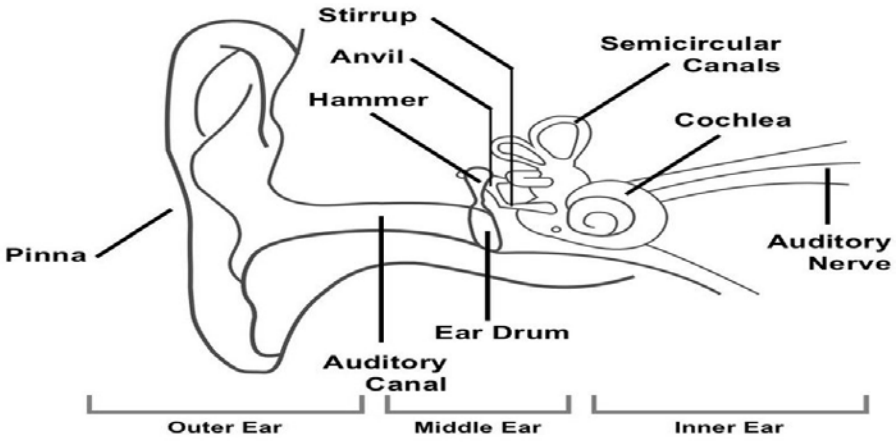
8. How do astronauts communicate in space?

Chapter – 13

SOUND

Assignment 13.7

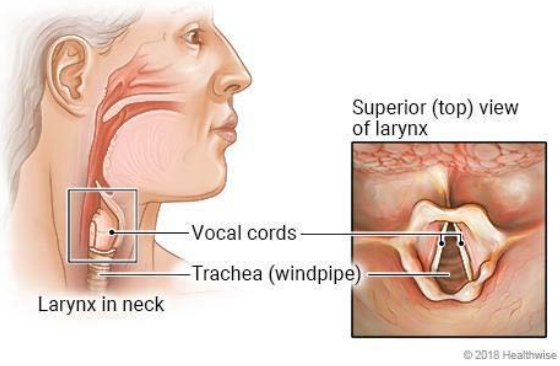
1. Label the figure of human ear:-



2. How do we hear sound through our ears?

The _____ part of the ear channels vibrations down to a thin membrane called _____ which is stretched very tightly. The eardrum then begins to _____ and the vibrations are passed on to _____ tiny bones (the hammer, the anvil and the stirrup) in the _____ ear. From here, the vibrations are passed on to the _____ ear. The inner ear consists of a 34 cm long coiled tube called the _____. It is filled with fluid and contains cells with hairs. These hair cells are very _____ to vibrations. The vibrations are transmitted by the _____ nerve to the brain to register _____.

3. Explain how is sound produced by human beings?



Chapter – 15

SOME NATURAL PHENOMENA

[The topics will be done by assignment method]

1. Lightning is caused by the accumulation of _____ in the clouds.
2. The process of transferring of charge from a charged object to the earth is called _____.
3. It is not safe to be in contact with telephone cords, electrical wires and metal pipes during lightning. Why?
4. _____ _____ is a device used to protect building from the effect of lightning.
5. An _____ is a sudden shaking of trembling of the earth which lasts for a very short time.
6. Earthquakes can cause floods, _____ and _____.
7. The tremors are caused by the disturbance deep down inside the uppermost layer of the earth called _____.
8. The power of an earthquake is expressed in terms of a magnitude on a scale called the _____ _____.
9. The seismic waves are recorded by an instrument called the _____.
10. _____ charges repel and _____ charges attract each other.
11. An _____ is a device to detect whether a body is charged or not.
12. The boundaries of earth's plates where earthquake tends to occur are called _____ zones.

ACTIVITY [LET US DO]
[To be done and pasted in the notebook]

On a Political map of World, locate the places where major earthquakes have occurred on past 10 years. In the key, name the places, date of occurrence, and its strength (in Richter scale).

Fun Activity … Making an electroscope

Aim--To make an electroscope using aluminium foil.

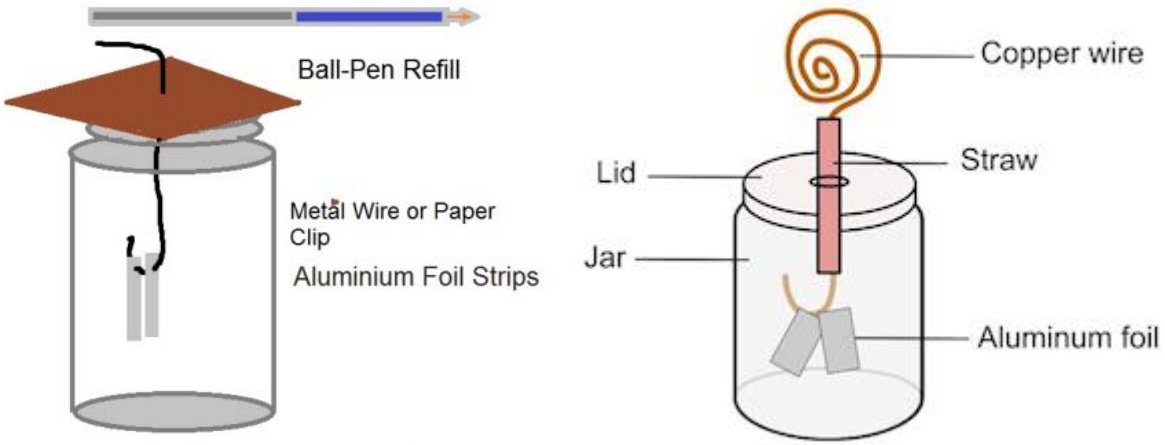
Material Required--A glass bottle or jar, piece of cardboard, pair of scissors, paper clip, tape, metal wire, ebonite rod, silk cloth.

Theory--

An electroscope is a device used to detect the presence of charge and the nature of charge on a body.

Like charges repel each other while unlike charges attract each other.

Diagram:



Procedure:

· Take a glass bottle with a wide mouth.

· Cover it with a piece of cardboard. Pierce a hole in the cardboard and pass a metal wire through it. (You may use the bottle cap in place of the cardboard)

· Turn one end of the wire to make a U.

· Cut two strips of aluminium foil about 3 cm by 1cm each.

· Hang them at the bent end of the metal wire.

· Fix the metal wire to the cardboard with a tape.

· Now take some aluminum foil and crumple it to form a small ball.

· Put the end of the wire with foil leaves inside the box and fix the cardboard on the mouth of the bottle.

· Now fix the crumpled foil ball on the end of the metal wire outside which works as a collector.

· Rub an ebonite rod with a silk cloth and touch to the foil ball and observe the aluminium leaves carefully.

Observation:

Conclusion:

Try making an electroscope in different ways by seeing some videos:

https://youtu.be/2PmWlPjV6n0

https://youtu.be/3qyeQO1guKk

SOME NATURAL PHENOMENA [LET US DO]

Search for 10 natural disasters [You can go up, down, sideways, backwards, diagonally]

A	V	O	L	C	A	N	O	B	S	D	F	G	H	J	K	L	P	O	I

F	U	Y	T	R	E	W	Q	A	Z	X	C	V	B	N	H	M	N	B	V
L	Q	W	E	R	T	Y	U	I	C	L	O	U	D	B	U	R	S	T	O
O	M	N	V	B	C	X	X	S	Y	D	F	G	H	J	R	K	L	I	L
O	C	L	O	U	D	B	U	R	C	S	T	A	Z	E	R	Q	W	S	C
D	A	D	G	J	K	L	O	P	L	Q	W	E	R	T	I	Y	H	B	A
M	N	B	V	M	O	O	N	A	O	P	E	G	G	O	C	A	S	S	N
E	A	R	T	H	Q	U	A	K	N	B	R	I	D	G	A	I	J	N	L
E	K	A	U	Q	H	T	R	A	E	E	R	T	Y	U	N	H	J	K	A
Z	X	C	V	B	N	M	S	P	O	O	N	F	E	D	E	L	I	O	N
J	A	D	O	O	U	M	B	R	E	L	L	A	S	R	S	O	U	P	D
A	M	S	T	E	R	D	R	A	M	G	O	D	I	N	K	I	T	E	S
L	U	C	K	Y	M	S	E	O	A	S	D	F	F	G	H	J	K	K	L
A	B	C	D	Y	U	O	I	R	T	E	T	S	D	F	G	H	J	J	I
B	S	D	F	G	H	J	K	L	M	S	Q	W	E	E	R	T	Y	M	D
C	A	T	U	I	P	U	L	T	E	Q	W	E	C	V	B	N	A	J	E
D	A	E	I	O	U	A	E	R	I	O	U	A	B	C	R	N	O	O	A
T	Y	P	H	O	O	N	O	O	R	J	A	H	A	N	U	K	A	S	Z
E	S	T	O	P	O	F	V	E	R	S	I	D	A	S	T	B	I	N	Y
F	G	H	I	J	K	L	M	N	O	P	Q	R	T	S	T	U	V	W	X

S No	LEARNING OUTCOMES
	LIGHT

1.	**The students are able to differentiate and classify materials, objects, phenomena and processes, based on properties or characteristics and understand the concept of LIGHT**
2.	**The students are able to apply scientific concepts in daily life and solving problems which relates with real life**
3.	**The students are able to handle various optical devices and laboratory apparatus properly; observe the images of objects and analyse**
4.	**The student is able to take initiative to know about scientific discoveries and inventions based on optics like microscope / telescope etc.**
5.	**The student is able to communicate the findings and conclusions effectively**

CHAPTER 16

LIGHT

Light is a form of energy. It enables us to see the beautiful world around us.

- The white light of the sun visible to us is a mixture of _____ colours . (VIBGYOR).
- The spectrum of the sun consists of the ultraviolet radiation, the visible white light and the _____ radiation.
- The bouncing back of light in the same medium when it falls on a surface is called _____.
- The laws of reflection are
    - The incident ray, the reflected ray and the normal at the point of incidence, all lie in the same _____.
    - Angle of incidence is equal to angle of _____
- When an object is placed between two mirrors at 90^o to each other, the number of images seen through the mirror is _____.
- Periscope is based on the principle of _____of light.
- Diffused reflection occurs when light is reflected from a _____ surface.
- We get an infinite number of images if two plane mirrors are placed _____ to each other.

- In a _____ , beautiful patterns by coloured glass pieces can be seen.

- If the angle between the incident ray and the reflected ray is 60 degree, then the angle of incidence is _____.
- The image formed by a plane mirror is :
  - ➢ erect
  - ➢ of the _____ size as the object
  - ➢ _____ (cannot be taken on a screen)
  - ➢ laterally inverted ie. the left hand side of the object appears to be _____ hand side of the image and vice versa.
  - ➢ as far behind the mirror as the object is in front.

ACTIVITY 1

[LET US DO]

Aim: To verify the laws of reflection

Materials Required:, Plane mirror, wooden board, sheet of white paper, laser torch / 4 alpins, pencil, protractor

Theory:The two laws of reflection are:-

1. The angle of incidence is always equal to the angle of reflection
2. The incident ray, the normal at the point of incidence and the reflected ray, all lie in the same plane.

Diagram:

Observation Table:

1.

S No	Angle of incidence, i	Angle of reflection, r

2. The incident ray, the normal and the reflected ray meet at _____

Conclusion:

CHAPTER 16

LIGHT

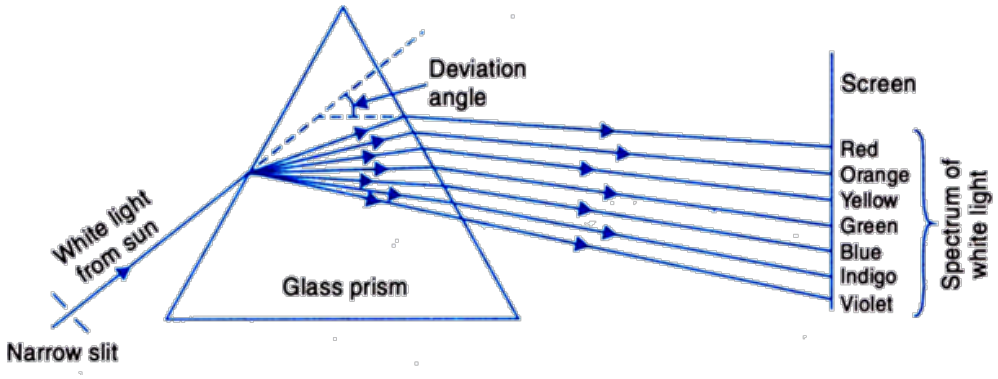
ACTIVITY 2

Aim: To show dispersion of light

Materials Required: Prism, white light/ sunlight, screen

Theory: The phenomenon of splitting of white light into its constituent colours is known as dispersion.

Diagram:



Procedure:

1. One of the non-parallel faces of the prism is focused towards sunlight at an angle and is held at the position.

2. Observe the screen

Observation:

Conclusion: Sunlight splits into _____.

CHAPTER 16

LIGHT

ACTIVITY 3

Aim : To view multiple images by multiple reflection by using plane mirrors.

Materials Required: 2 plane mirrors, 1 pencil or sketch pen, a white sheet of paper, wooden board

Theory:

Diagram:

Procedure:

1. Place the paper on the wooden board.
2. Draw a horizontal line on it and mark its centre as O
3. From O, draw a perpendicular to the horizontal line.
4. Place a pencil on the vertical line.
5. Place 2 plane mirrors on both sides of the pencil with the edges of mirrors touching O at different angles.
6. Each time the mirrors are placed at an angle, count the number of images formed.

7. Repeat this for 3-4 times.
8. Now place the mirrors parallel to each other and count the number of images formed.

Observation:

S No	Angle between the mirrors	Number of images

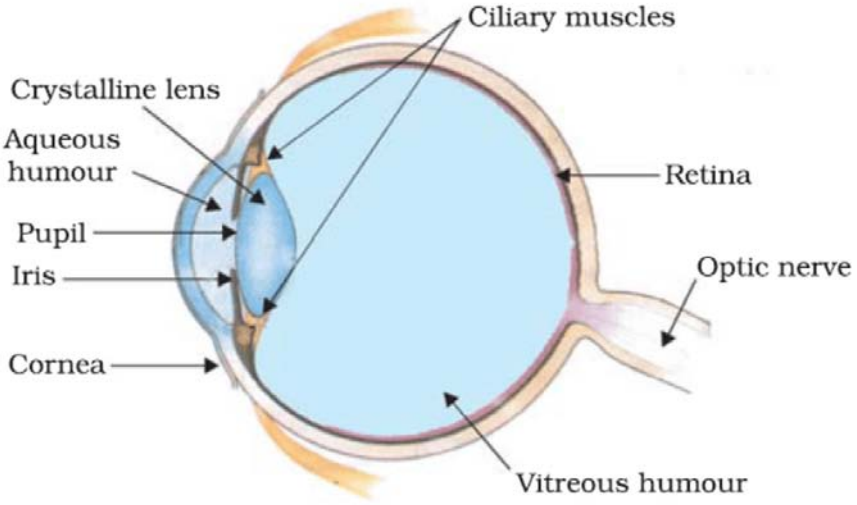
Conclusion: _____

_____

Chapter – 16

LIGHT

Assignment 16.1



1. Complete the following table-

Part of the human eye.	**Description and Functions**
	It is the front transparent membrane of the eye. It permits light into the eye and causes maximum refraction of the light rays.

Cornea	
Iris	
Pupil	
Eye lens	
Ciliary muscles	
Retina	
Optic nerves	
Blind spot	

2. Fill in the blanks :-

a. The _____ nerve carries the impression on the retina to the brain.

b. The image formed by a plane mirror is _____ inverted.

c. Cataract is the condition that affects the _____ of the eye.

d. We get _____ images with two plane mirrors placed parallel to each other.

e. The normal makes an angle of _____ with the surface of the plane mirror.

f. The light sensitive cells on the retina are called _____.

g. The colour of the eye is due to _____.

h. The impression of an image persists for _____ of a second.

3. Give one word for the following:-

a. A kind of reflection in which reflected rays travel parallel to one another.

b. A reflection taking place from the walls of a room.

c. Phenomenon of splitting of white light by a plane mirror immersed in water at an angle of 45^0 .

d. A special script designed for reading for visually challenged people.

e. This part of eye acts as window to the world.

f. Light sensitive screen at the back of eye where image is formed.

g. Its function is to carry optical messages to the brain.

h. Its function is to alter the focal length of the crystalline lens.

i. It determines the colour of the eye.

Chapter – 16

LIGHT

Assignment 16.5

1. What is cataract? How is it treated?

---

2. Mention 3 important measures to ensure proper eye care.

---

3. Why is the blind spot so called?

---

4. If a ray strikes at an angle of **42** degrees with a reflecting surface, what will be the angle of reflection. Draw a figure to show the same.

5. If the angle between the incident and reflected ray is **75** degrees, determine the angle of reflection. Draw a figure to show the same.

6. Define Dispersion.

---

7. Define Persistence of vision.

Chapter – 16

LIGHT

Assignment 16.2

1. Draw a diagram to show

   a. dispersion of white light

   b. dispersed light reunites to form white light

2. Will a red light passing through a prism result in spectrum? Why?

3. A man is standing at a distance of 6m in front of a plane mirror. He starts walking towards the mirror at the speed of 2 m/s. After 2 s, what will be the distance between the man and his image?

4. A rainbow appears before and after rainfall. Explain.

5. Describe an activity to verify the laws of reflection of light.

6. Draw a neat labelled diagram of 'Human Eye'.

7. When do we perceive an object to be moving and why?

8. Deficiency of which vitamin causes maximum eye troubles?

9. Why is blind spot so called?

10. What is the most comfortable distance at which one can read with normal eye?

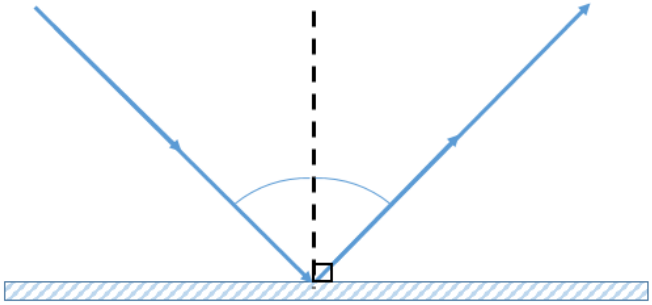
11. What is a Kaleidoscope? Write its principle.

CHAPTER 16

LIGHT

Assignment 16.3

1. A ray of light AB strikes a plane mirror MM′ at B and is reflected along BC. A normal OB is drawn. Label the diagram and complete the sentences given below:-



a. The ray AB which strikes MM′ at B is called_____.

b. The bounced ray BC from B is called _____.

c. The line BD which is perpendicular to MM′ is called the _____.

d. The angle between AB, _____ and BD, _____ is called the _____ (L i).

e. The angle between BD, _____ and BC, _____ is called the _____ (L r).

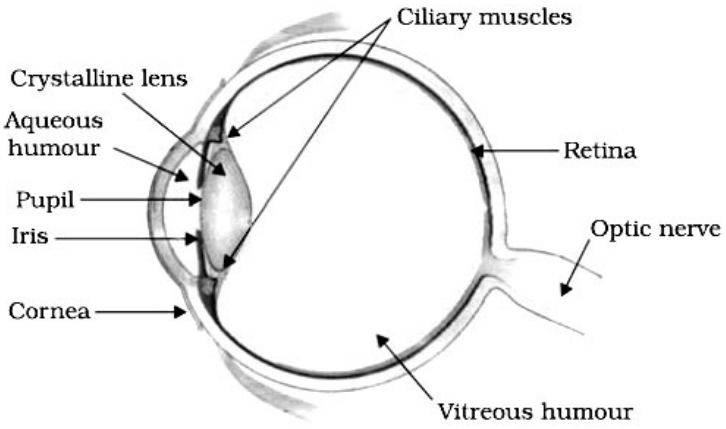
2. Complete the following ray diagram to show the image formed by a plane mirror of a point object and write down the characteristics of the image formed:-

Characteristics of the image formed:-

i.
ii.
iii.
iv.
v.

3. What is a Kaleidoscope? Write its principle.

4. Name the parts of human eye and complete the following [Eye diagram is for reference]:-



_____ → _____ → _____ ↓

light enters → muscles control pupil → opening through which light enters eye

light gets finely focussed
↓

Decodes message ← carries sensation to brain ← inverted image is formed on it

CHAPTER 16

LIGHT

Assignment 16.4

Tick the correct option:-

1. Light changes direction as it falls on a plane mirror because of
   (a) reflection from plane mirror (b) refraction
   (c) dispersion (d) both (a) and (b)
2. A handy mnemonic for remembering the order of colours produced by a prism is
   (a) ROYGVIB (b) GYORVIB
   (c) VIBGYOR (d) VIBGYRO

3. The normal makes an angle of ___ with the reflecting surface.
   (a) 45^0 (b) 0^0
   (c) 90^0 (d) 60^0

4. The number of images formed is maximum when the two plane mirrors are kept
   (a) side by side (b) parallel
   (c) at 90^0 (d) either (b) or (c)

5. The splitting of white light into its constituent colours is called
   (a) refraction (b) dispersion
   (c) deviation (d) displacement

6. The iris present in human eye
(a) controls the thickness of the lens
(b) is controlled by the ciliary muscles
(c) controls the amount of light entering the eye
(d) controls the lens of eye

7. In multiple reflection from two plane mirrors, the number of images formed
   (a) increases as the angle between the mirrors is increased
   (b) decreases as the angle between the mirrors is increased
   (c) is zero when the angle between the mirrors is zero
   (d) is infinite when the angle between the mirrors is zero

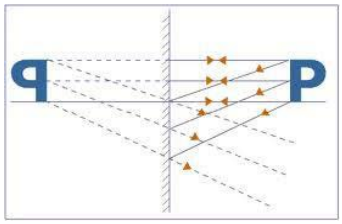
CHAPTER 16

LIGHT

Assignment 16.5

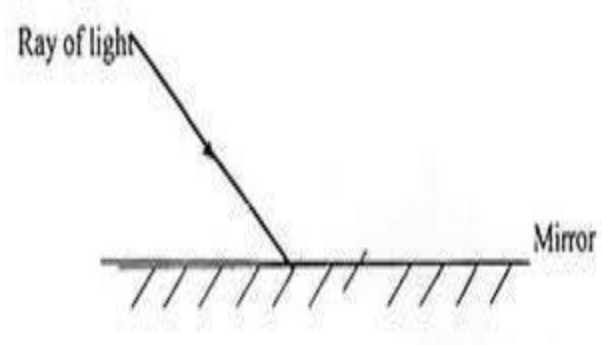
1. Which characteristic of image formed by plane mirror is shown in each of the following figures:-

(a) _____

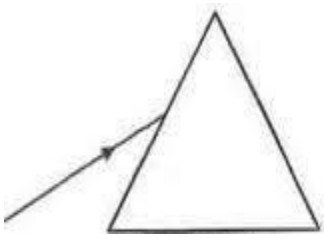


(b) _____

2. Complete the following figure, label it and write the key on its right:-

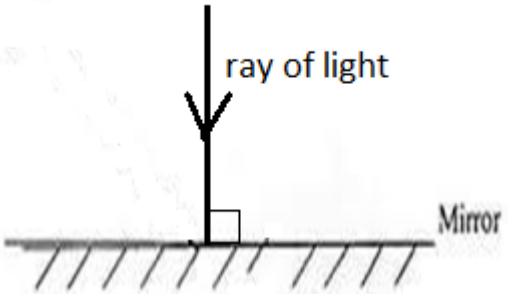


(a)

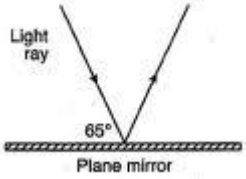


(b)

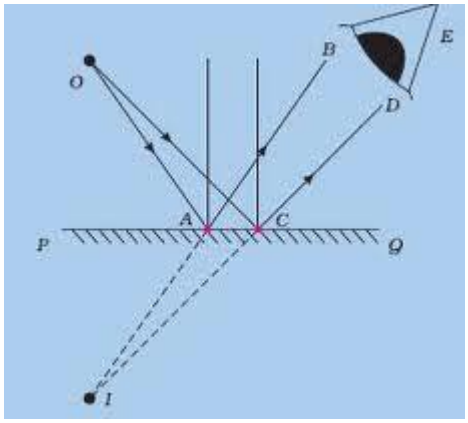
(c)



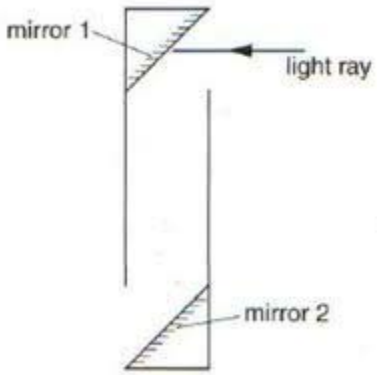
3. In the given figure, calculate the angle of reflection.



4. What does the ray diagram represent? Write its key.



5. Draw the reflected ray from mirror 2 and complete the diagram.
This alignment of plane mirrors is used in which device?

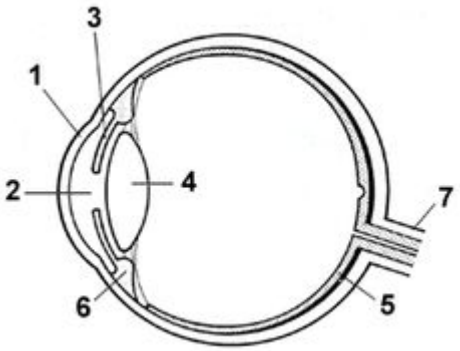


CHAPTER 16

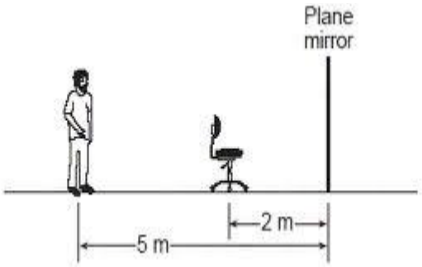
LIGHT

Assignment 16.6

1. Label the diagram of human eye:-



2. Answer the following questions:-



(a) What is the distance between man and chair?

(b) What is the distance between the chair and its image?

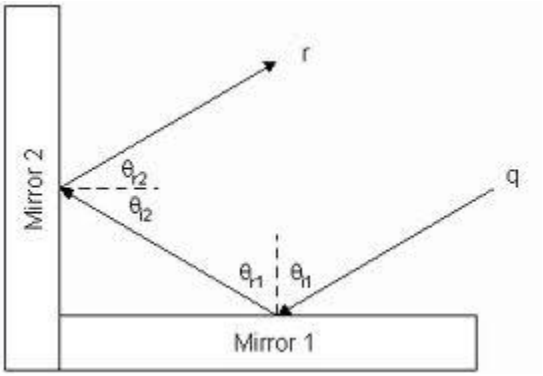
(c) What is the distance between the man and his image?

(d) What is the distance between the image of chair and the mirror?

(e) What is the distance between the image of man and the mirror?

(f) What is the distance between the image of man and image of chair?

3. If the angle of incidence in mirror 1 is 70^0, find the angle of reflection in mirror 2.



H.O.T.S.

Oil spilled from a vehicle on a wet road after rainfall appears coloured. Why?

Most of the light reflected from objects around us is due to diffused reflection. What would happen if all objects around us are plane, smooth and highly polished?

We know that angle of incidence is equal to angle of reflection for a plane mirror. Is this true for curved polished surfaces?

Louis Braille - As a small child, he was blinded in an accident; as a boy he developed a mastery over that blindness; and as a young man – still a student at school – he created a revolutionary form of communication that transcended blindness and transformed the lives of millions.

After two centuries, the braille system remains an invaluable tool of learning and communication for the blind, and it has been adapted for languages worldwide.

The 200th anniversary of Braille's birth in 2009 was widely celebrated throughout the world by exhibitions and symposiums about his life and achievements. Belgium and Italy struck 2-euro coins, India struck a 2 rupee coin, and the USA struck a one dollar coin to mark the event.

CHAPTER 16
LIGHT

INTRODUCTION TO THE CONCEPT OF REFRACTION

Assignment

- When light passes from one medium to another it changes its path, this phenomenon is called refraction
- Refraction occurs because the speed of light changes in different media.

CHAPTER 16
LIGHT
REFRACTION

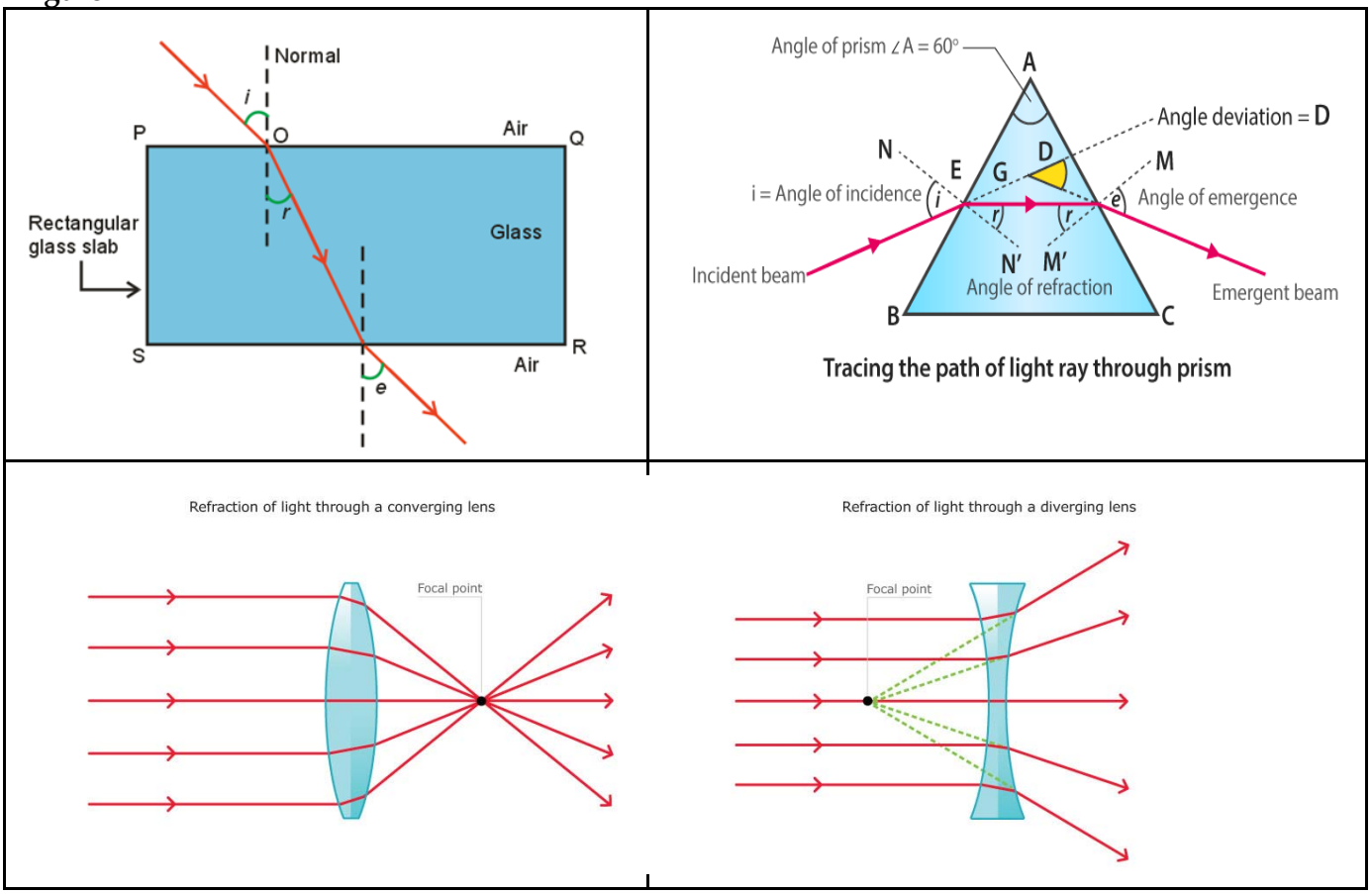
ACTIVITY

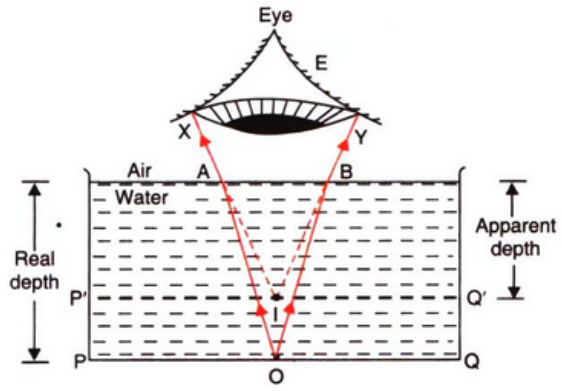
Aim : To study refraction through different optical devices.

Materials Required: **Theory:** A rectangular glass slab, triangular glass prism, convex lens, concave lens, a laser light , smoke box, beaker, water, coin,

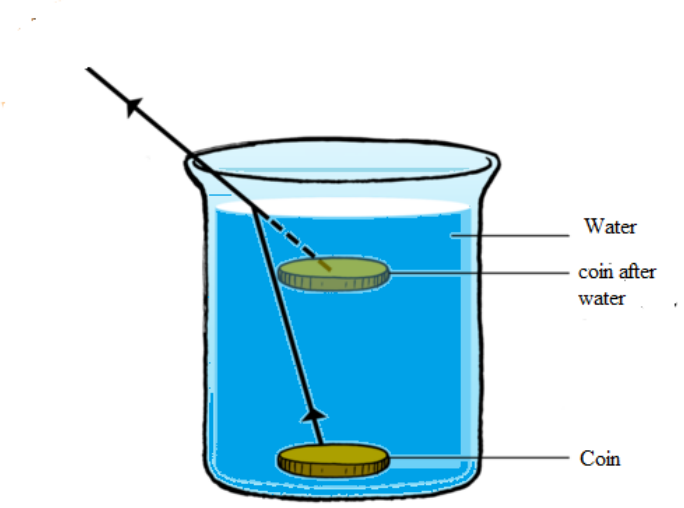
Theory: A spherical lens is a transparent refracting object whose either one or both refracting surfaces are spherical.

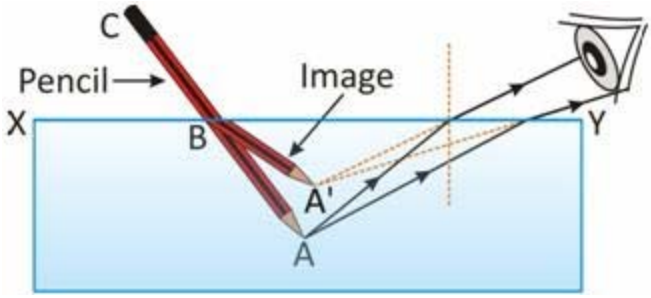
Figure





(b) Refraction of light





Procedure:

1. In a smoke box, smoke is filled, glass slab is fitted and ray of light is incident through the slab and the path of light is observed.
2. In the smoke box, the slab is replaced by a prism and the path of light through the prism is observed.
3. In the smoke box, the prism is replaced by a convex lens and two parallel rays of light are incident on the lens. The path of ray of light is observed.
4. In the smoke box, the convex lens is replaced by concave lens and the two parallel rays of light are incident on the lens. The path of the ray of light is observed.
5. A coin is placed in a steel tumbler and is observed using an eye. Then the level of eye is lowered till the coin vanishes from sight. Then keeping the eye fixed at that position, water is poured slowly in the tumbler and is observed.
6. A pencil or stick is placed in an empty beaker and observed. Then, water is poured in the beaker and observed from top and sides.

Observation:

1. The _____.
2. The _____ .
3. The _____ .

4. The _____ .

5. The _____ .

6. The _____ .

Conclusion:

1. When a ray of light strikes a transparent medium, it _____ .

2. When the ray of light passes through a rectangular glass slab, it _____inside the slab and when emerges out the slab becomes _____ to the incident ray.

3. When the ray of light passes through the prism, it _____ inside the prism and again _____ when it emerges out of the prism.

4. When parallel beam of light strikes a convex lens, they _____ and meet at a point.

5. When parallel beam of light strikes a concave lens, they _____ away from each other.

6. Objects inside water appear to be raised or at an apparent position when viewed from air because of _____ .

Enlighten yourself about the following facts.

Louis Braille - As a small child, he was blinded in an accident; as a boy he developed a mastery over that blindness; and as a young man – still a student at school – he created a revolutionary form of communication that transcended blindness and transformed the lives of millions.

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The Differences Between the Human Eye & a Camera Lens

The human eye and a camera lens have a few things in common, most notably that they both use a converging lens to receive and project images. But human eyes and camera lenses have many things that set them apart from each other.

Retina Provides Color

- The image an eye perceives is projected from the cornea to the retina, which absorbs the image and projects it to the brain. A camera projects an image on to film where it is captured

and saved as a black and white image. The retina contains millions of cones that provide the image with color.

Stereoscopic View

- The biggest difference between eyes and a camera lens is that two eyes give us stereoscopic vision. This allows our eyes to project a more detailed image to the brain than a single camera lens and provide depth of field, something a single camera lens can't do.

Light Sensitivity

- A camera lens projects an image onto film that has chemicals with a uniform sensitivity to light. The eye project images on to the retina that has rods with varying capacities to absorb light.

Light Adjustment

- The human eye controls how much light it receives by reducing and enlarging the size of the pupil. A camera lens has to be adjusted to receive the proper amount of light.

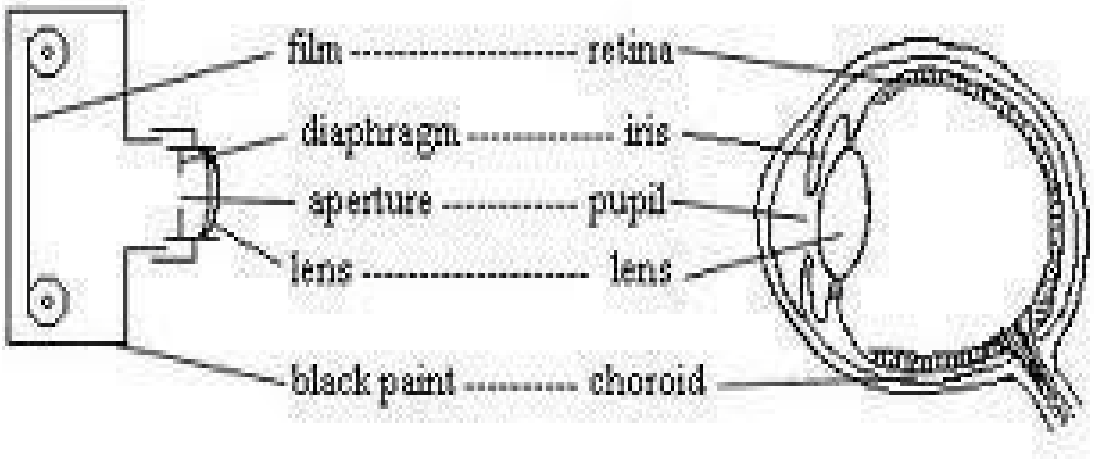
Cameras Have no Blind Spot

- The human eye has a "blind spot" located where the optic nerve leaves your eye and connects to the brain. At that connection point, the eye can't see anything. A camera lens doesn't have a connecting point like this and has no blind spot.

Similarities Between the Eye and the Camera

First of all, both of them have an opening at the centre for light to enter; aperture for the camera and a pupil for the eye. The camera has a diaphragm to control the size of the aperture(to control the amount of light entering camera/eye) while the eye has iris muscles to control the size of the pupil. Cornea is the main part of the eye(included are lens, aqueous and vitreous humor) that functions to refract light as a glass biconvex does in the camera. Photosensitive chemicals on film(camera) and photoreceptors in the cornea(eye) are the objects of light action to form image. The last similarity is that they both absorb excessive light to prevent multiple images formation using a dark internal surface in the camera and a pigmented, dark choroid in the eye.

Structural comparison between human eye and a camera



S No	LEARNING OUTCOMES
	STARS AND SOLAR SYSTEM
1.	**The students is able to plan and conduct investigations or experiments to arrive at and verify the facts, principles, phenomena or to seek answers to queries on their own and understand the scientific principles.**
2.	**The student is able to explain processes and phenomena like phases of moon.**
3.	**The student is able to analyse and interpret from various data, figures and observations about astronomical objects.**
4.	**The student is able to apply scientific concept and apply learning to hypothetical situations and describe various things observed in the sky.**

Chapter – 17

STARS AND THE SOLAR SYSTEM

Assignment 17.1

1. Rewrite the following statements correctly:-

   a. Halley's comet is seen after every 76 centuries.

   _____

   b. Helium gas constitutes most of the sun and other stars.

   _____

   c. The unburnt part of meteor, which reaches the earth, is called meteoroid.

   _____

   d. Asteroids are present between orbits of Saturn and Jupiter.

   _____

   e. Earth is the fourth planet from the sun.

   _____

2. Match the following:- [Match the following:- Pick up the correctly matched word from column B and write them in the second column.

Column A		Column B
Stars		Hunter
Constellation		Long tail
Orion		Spins sideways
Comets		Pole star
Uranus		Galaxy
Milky way		Jupiter

Polaris		Ursa major
Giant planet		Twinkle

3. Answer in one word:-

   a. Name the comet which is expected to be seen in 2062 from earth.

   b. Name the nearest planet from the sun

   c. Name the star which does not appear to move from earth.

   d. Name the constellation which resembles a distorted W or M.

   e. Name the planet having the special feature- the great red spot.

   f. Which planet is also called the red planet?

   g. Name the planet with only one moon.

   h. Name the two planets that rotate from east to west.

   i. Name the planet that is hidden most of the time in the glare of the sun.

   j. Name the constellation that helps in locating the brightest star, Sirius.

   k. Name the heavenly body which revolves around a planet.

   l. What are meteors commonly known as?

   m. Can we hear on moon? Why?

4. What are the characteristic features of inner planets?

5. What are the characteristic features of outer planets?

6. How will you identify a comet in the night sky?

7. Name one constellation each seen in summers and winters.

THINK ONCE !!!

How did the stars help the sailors to navigate during ancient times when we had not developed devices to know directions?

Chapter – 17

STARS AND THE SOLAR SYSTEM

Assignment 17.2

1. What are celestial bodies? Name any three celestial bodies.
2. Name a star which appears stationary from the earth.
3. Why is Venus the brightest planet?
4. Distinguish between star and shooting star.
5. Why do comets have a long bright tail?
6. Why does the sun appear to move from east to west?
7. How can we locate pole star in the night sky?
8. Circle the odd one out and justify your answer:-
    a. Ursa Major, Cassiopeia, Pole star, Orion, Scorpio
    b. Stars, moon, planets, comets, clouds
9. Name the planets which can be seen with naked eye.
10. Draw the constellation 'Orion' and write a short note on it.
11. 'The brightest star Sirius is 8.7 light years from the earth'. What does this statement mean?
12. What are the characteristic features of earth which makes life possible on earth?
13. What are the practical applications of artificial satellites?
14. Name some satellites which have been launched by India.
15. Which is the latest satellite launched by India?

CHAPTER 17

STARS AND THE SOLAR SYSTEM

Assignment 17.3

QUIZ

1. Name the brightest object in the night sky.
2. Give one word for the celestial object revolving around the sun,
3. In which direction does the earth rotate?
4. What is the total number of planets in the solar system?
5. Which is the nearest star from us?
6. What is the main source of heat and light for all planets?
7. What happens to the period of revolution of the planets as the distance of the planet increases from the sun?
8. Name the only natural satellite of the earth.
9. Name the planet nearest to the sun.
10. Which planet appears yellowish in colour?
11. Which is the planet whose density is less than that of water?
12. Which planets are also called outer planets?
13. Name the four planets which are called inner planets.
14. Which planet appears to roll on its sides.
15. Name the only planet where life is known to exist.
16. What is the common feature between Uranus and Venus?
17. Name the planet which can be seen only with large telescopes?
18. Which planet is often called the morning or evening star?

19. Which planet is also called the Red Planet?
20. Which is the brightest planet in the night sky?
21. The earth appears to be of _____ colour from space.
22. Which is the smallest planet of the solar system?
23. Which is the largest planet of the solar system?
24. Which planet can float on water?
25. Which planet has two moons?
26. Which planet is mostly hidden in the glare of the sun?
27. Which planet shows phases just like that of moon?
28. Which planet is often seen near the horizon just before sunrise or after sunset?

Answers :

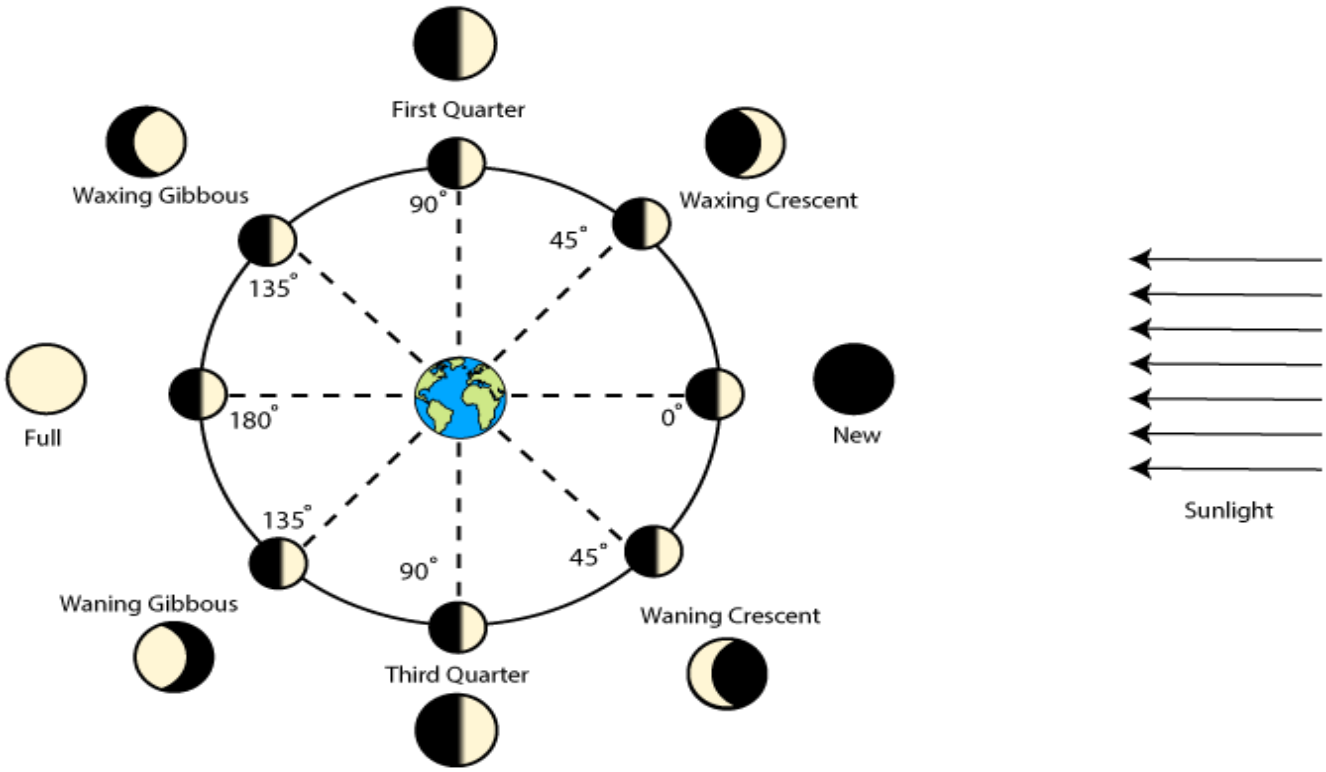
1. 15.
2. 16.
3. 17.
4. 18.
5. 19.
6. 20.
7. 21.
8. 22.
9. 23.
10. 24.
11. 25.
12. 26.
13. 27.
14. 28.

Chapter 17

STARS AND SOLAR SYSTEM

Assignment 17.5

Observe the phases of moon and fill in the blanks with appropriate words:-



The various shapes of the bright part of the moon as seen during a month is called the _____ of moon. The time period between one full moon and the next full moon is slightly longer than 29 days.

The moon is not self luminous. It is visible to us since it _____ the light of the sun. Only that part of the moon from which sunlight is reflected towards us is visible to us.

Since the moon revolves around the _____ and the earth revolves around the ___ the relative positions of the sun, moon and earth keep changing. The moon completes one _____ around the earth (29.5 days).

As the moon revolves around the earth, we are able to see only the part of the moon which is _____ by the sun and is towards us.

When the rays of the sun fall directly on the moon and the moon is seen as a full disc of light, it is called _____.

As the moon revolves around the earth, the illuminated part of the moon that faces the earth keep reducing gradually from _____ to half moon to _____ moon until the part of the moon facing the earth becomes completely dark and is called _____. This phase where there is a gradual _____ in size of the visible part of the moon is called the _____ phase or Krishna Paksha.

Once again, after new moon, the size of the illuminated part of the moon visible from the earth increases from _____ to Half Moon to _____ moon and finally the Full Moon. This phase where there is a gradual _____in the size of the visible part of the moon as seen from the earth is called the _____ Phase or Shukla Paksha.

QUESTION BANK [I]

1. **Fill in the blanks :-**

a. Sound requires a _____ to travel.

b. A force can _____ a moving body or change the _____ of motion.

c. Pitch of a sound depends on _____ of vibration.

d. Electric charges exert _____ force and magnets exert _____ force.

e. Sounds above 20,000 Hz are called _____.

f. Grooves on tyres _____ friction between tyre and road.

g. _____ is the time taken to complete one vibration.

h. Lubricants _____ friction between the rubbing surfaces.

i. Three forces that can act from a distance are _____, _____ and _____.

j. Force per unit area is called _____.

k. If the same force is made to act on a larger area, the pressure _____.

l. Pressure in a liquid _____ as the depth increases.

2. Rewrite the following statements correctly:-

a. The pull of the earth is an example of a contact force.

b. The lighting of a matchstick is due to muscular force.

c. The conveyer belts are made rough to decrease friction.

d. Special suits worn by deep sea divers protect them from severe cold.

e. The louder the sound, the lesser is the amplitude of a vibrating body.

3. Answer the following in briefly:-

(a) A cricketer uses his bat to deflect a ball straight towards the boundary. What effect of force is illustrated in this case?
(b) How does oiling help in reducing friction?
(c) Why are ball bearings used in bicycles?
(d) Which are the states of matter in which sound travels the fastest and the slowest?
(e) What changes can a force produce to the motion of an object?
(f) A man first stands and then lies down on a sandy beach. In which case, will he sink deeper and why?
(g) How does density of a liquid effect pressure?
(h) State the laws of reflection.
(i) Give an example to prove that 'light travels faster than sound'?
(j) What is the function of ciliary muscles?

4. Answer the following in 30-40 words:-

(a) What is noise pollution? How can it be reduced?
(b) How is it possible to drink a liquid by a straw?
(c) Nature has given broad feet to elephants. Why?
(d) Give two differences between real and virtual image.
(e) How are meteors different from meteorites?
(f) How can the brightest star, Sirius be located in the night sky?
(g) Give three differences between planets and stars.

5. Describe an activity to show that ' air exerts pressure'.

6. Describe an activity to show that a body producing sound is in a state of vibration.

7. Rewrite the following statements correctly:-

a. Kaleidoscopes are used by barbers to show the back of the head.

b. Poor vision is caused due to the deficiency of vitamin C.

c. A ray of light which bounces off from the reflecting surface is the incident ray.

d. The constellations are one of the celestial objects.

8. Draw the constellations Ursa major, Orion and Cassiopeia.

9. Mention five uses of artificial satellites.

10. Draw a neat labeled diagram of 'Human Eye'.

QUESTION BANK [II]

1. Name the forces exerted, as seen in the given pictures. Also state whether they are contact or noncontact forces?

(i)  (ii) 

2. Observe the pictures and answer in columns **-**Agent exerting the force, Object on which it acts, effect of the force.

SITUATION	**Agent exerting the force**	**Object on which it acts**	**effect of the force**

3. Write in activity format, an activity to show that Pressure in a liquid increases with depth?
4. List down three possible effects of force exerted on an object?
5. Calculate the force by a pile of books that exert a pressure of 225 Pa on a surface of area 25sqm?
6. Explain giving scientific reasons.-

(a) A balloon bursts as it goes high in the air.

(b) The pillars of bridges and flyovers have a broad base.

(c) A fruit can be cut into thin slices using a sharp knife.

(d) Porters place a round piece of cloth on their heads.

(e) The foundation of a high rise building is wide.

(f) Tools meant for cutting and piercing have sharp edges.

(g) People living in plains suffer from nose bleeding as they go to high altitudes.

(h) It is easy to convenient to pull luggage fitted with rollers.

(i) Ball bearings are used between hubs and axles of ceiling fans.

(j) The shape of an aeroplane resembles that of a bird.

(k) It is difficult to tie a knot in a silk thread.

(l) The moving parts of machines are oiled from time to time.

(m) Grooves are made in the tyres of vehicles.

7. Fill up the blanks after rewriting the sentences.

a. Three forces that can act from a distance are _____, _____ and _____.
b. Force per unit area is called _____.
c. If the same force is made to act on a larger area, the pressure _____.
d. Pressure in a liquid _____ as the depth increases.

8. How can the brightest star, Sirius be located in the night sky?

9. Give three differences between planets and stars.

10. Why does Uranus appear to roll on its sides?

12. Draw neat diagrams to show -

(i) Summer constellation

(ii) Winter constellation

(iii) Phases of the moon

QUESTION BANK [III]

1. Write the given sentences and fill in the blanks, underlining the answer word.

a. An optical device used by sailors, that works on the principle of light reflection from two plane mirrors placed parallel to one another is a----------while that which works using three parallel mirrors inclined at 60 degrees to one another is a ----------.

b. Shrillness of a sound is determined by the ---------- of a sound wave while loudness is determined by the ----------of a sound wave.

c. If the angle between the incident ray and the surface of a plane mirror is 35 degrees, the angle of incidence is ---------- and the angle between incident ray and the reflected ray is ----------

d. Musical notes produced by a guitar is caused by vibrating ---------- while that produced by a tabla is caused by a vibrating ----------.

2. Answer in brief :-

(A) On throwing a pebble into a pond, ripples are observed with water molecules vibrating at the rate of 18000 times per minute.

i. Determine the frequency and time period of the wave?

ii. Will this sound be audible to man?

(B) How is sound produced by human beings?

(C) Rahul stays in a noisy locality and suffers from the ill effects of noise pollution. His friend Reena took the initiative to implement a few measures to control noise pollution in the area.

i. Suggest three common sources of noise pollution in a residential locality?

ii. What value is reflected in Reena's action?

FACTOPAEDIA IN PHYSICS

- Although tyres of all vehicles are grooved, the tyres of racing cars are smooth to reduce friction so that they can go faster. These tyres are called slicks.

- Sustained exposure for 8 hours or more at 90-95 dB can result in hearing loss.

- The word 'noise' is derived from a latin word 'noxia' which means 'I do harm'.

- Audible range of some animals

Animal	**Audible Range**
Dogs	as high as 40,000 hz
Cats	100 – 60,000 Hz
Elephants	1 – 20,000 Hz
Grasshopper	upto 50,000 Hz

Mice	1000 – 1,00,000 Hz
Dolphin	upto 1,00,000 Hz
Moth	1000 – 2,40,000 Hz

- Loudness of sound produced by different objects / activities

Object/activity	loudness in dB
Silence	0
Breathing	10
Ticking clock/murmuring	30
City traffic	60-90
Subway train	95
Car horn	110
DJ/Rock n roll music	120
Jet engine / Gunblast	140

- **Strength of earthquake and its effect**

Richter scale reading	Nature of earthquake
0-3.5	May not be felt, can be recorded
3.5-5.4	Often felt, but rarely causes damage
5.5 – 6.0	Slight damage to well constructed buildings
6.1-6.9	Can be destructive in areas upto 10km across
7-7.9	Major earthquake, causes serious damage over larger areas
8 and above	Severe, serious damage across several 100 km

- Whales in the ocean "sing" to each other. The sound of their song can travel a distance of 800 km.

- The earliest seismograph was invented in China, in AD 136, by a man named Choko.
- We cannot dive more than 120 m (approx) in water. Water pressure below this level is enough to crush the human body.
- Dogs can hear sound at a higher frequency than humans, allowing them to hear noises that we cannot.
- A flash of lightning could power a light bulb for a month.
- The blue whale can produce sounds up to 188 decibels. This is the loudest sound produced by a living animal and has been detected as far away as 530 miles.
- The first coast to coast telephone line was established in 1914.
- The largest meteorite crater in the world is in Winslow, Arizona. It is 4150 feet across and 150 feet deep.
- The human eye blinks an average of 4,200,000 times a year.
- The highest temperature produced in a laboratory was 920,000,000 F (511,000,000) at the Tokamak Fusion Test Reactor in Princeton, NJ, USA.
- The hottest planet in the solar system is Venus, with an estimated surface temperature of 864 F (462 C).

- The cosmos contains approximately 50,000,000,000 galaxies.
- There are between 10^{11} and 10^{12} stars in a normal galaxy.
- The microwave was invented after a researcher walked by a radar tube and a chocolate bar melted in his pocket.
- A car travelling at a speed of 80 km/h uses half its fuel to overcome wind resistance.
- There is enough fuel in a full tank of Jumbo Jet to drive an average car four times around the world.
- It takes 70% less energy to produce a ton of paper from recycled paper than from trees.
- Cats have over one hundred vocal sounds, while dogs have only about ten.
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