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# Physics (I) Charts, School Education

## Product Image



## Description

**Standard Size:** 58x90cms

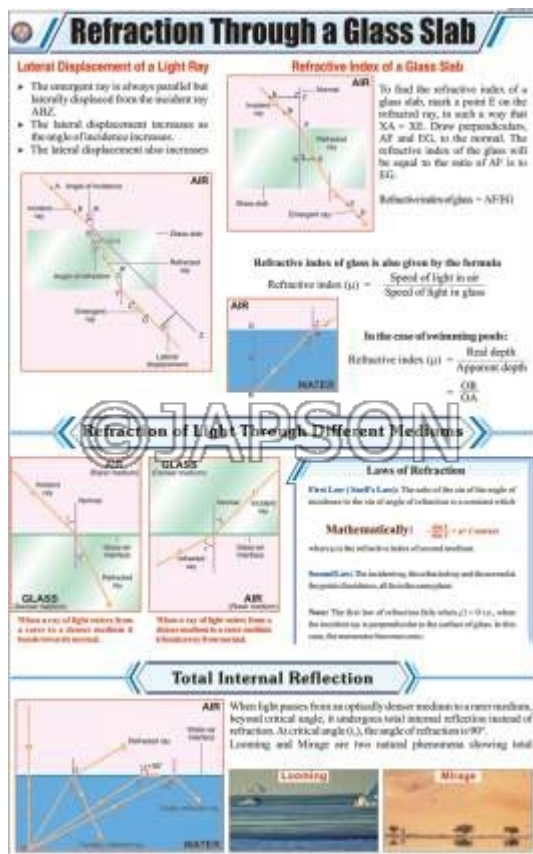
**Language:** English

Laminated Paper Charts with Plastic Rollers. These Charts have technically accurate and

detailed description in vivid colours.

**Note:** Based on minimum order quantity conditions, Charts can be customized to your requirements in terms of CONTENT, LANGUAGE, SIZE, etc. Please write back to us for discussion.

## A. Charts, Refraction Through a Glass Slab



## B. Charts, Eye and Its Defects



## C. Charts, Simple Machine

## D. Charts, Refraction of Light Through Lenses

## Simple Machine

**Simple machine** is a device that changes the amount, distance, or direction of the force needed to do work in order to gain a **Mechanical Advantage**.

### Lever

A lever is a simple machine that is used to push, pull, or lift things called loads from a fixed point called the fulcrum.

**Mechanical Advantage** =  $\frac{\text{Effort Arm}}{\text{Resistance Arm}}$

### Pulley

Pulley is used to change the direction of an applied force or to gain a mechanical advantage. Fixed pulley system does not create a mechanical advantage.

**Mechanical Advantage of a Movable Pulley** =  $\frac{\text{Number of Ropes That Support The Moving Pulley}}{1}$

### Wedge

A wedge is a triangular shaped tool. It can be used to separate two objects or portions of an object, lift an object, or hold an object in place.

**Mechanical Advantage** =  $\frac{\text{Length of Slope}}{\text{Thickness of Blunt End}}$

### Inclined Plane

The inclined plane is a flat surface on which an object is pushed or pulled. This type of plane allows the heavy work to be done with a force.

**Mechanical Advantage** =  $\frac{\text{Length of Slope}}{\text{Height of Inclined Plane}}$

### Screw

A screw is a shaft with thread formed on its surface. A screw can convert a rotational force (torque) to a linear force and vice versa.

**Mechanical Advantage** =  $\frac{\text{Circumference of the Screw}}{\text{Pitch of the Screw}}$

### Wheel & Axle

A wheel and axle is a modified lever of the first class in which larger wheel (or outside) rotates around the smaller wheel (axle).

**Mechanical Advantage** =  $\frac{\text{Radius of Wheel}}{\text{Radius of Axle}}$

## Refraction of Light Through Lenses

**Lens** is a transparent medium bounded by two spherical surfaces.

**Refraction** : bending of light rays when it passes from one transparent medium to a other transparent medium.

**SCHEME DEFINITIONS**

- Optical axis** : The line joining the centres of the two spheres of which the lens is made is called the Principal axis.
- Optical Centre** : Optical Centre is that point on the principal axis which allows a ray of light to pass through without getting deviated.
- Principal focus** : For convex lens, it is a point on the principal axis towards which all the rays parallel to the principal axis converge after refraction through the lens. For concave lens, it is a point on the principal axis from which all the rays parallel to the principal axis appear to diverge after refraction through the lens.
- Focal length** : The distance between the optical centre and the focal point is called the focal length.

**LENSES & SERIES OF PRISMS**

**CONVEX LENS**

**CONCAVE LENS**

**IMAGE FORMED BY A LENS**

- Objects are imaged differently by a lens, we know the path of the rays, defining their nature, on the object after they are refracted by the lens. We use any two of the following rays for the purpose.
  - Ray parallel to the principal axis: The ray travels through the optical centre of a convex lens or it appears to pass from the focus after refraction.
  - Ray passing through the optical centre: A ray travelling through the optical centre of a lens emerges without any deviation.
  - Ray passing through the focus: This type of ray will emerge parallel to the principal axis after refraction.

**Image formed by a convex lens varies in size, class and position depending on the distance of the object from the lens.**

### IMAGE FORMATION BY CONVEX LENS

**Object Beyond 2F** : The image is formed between F and 2F. The image is real, inverted and smaller than the object.

**Object at 2F** : The image is real, inverted and of the same size as the object. It is formed at 2F on the other side of the lens.

**Object Between F and 2F** : The image is real, inverted and larger than the object. It is formed beyond 2F on the other side of the lens.

**Object at F** : Refracted rays are parallel after refraction. Hence the virtual image is formed at infinity.

**Object Between F and O** : The image is virtual, erect and larger than the object. It is formed on the same side of the lens.

### IMAGE FORMATION BY CONCAVE LENS

**Object anywhere between Optical Centre and Infinity** : The image is virtual, erect and diminished. It is formed between F and O on the same side of the lens.

**Object at Infinity** : The image is virtual, erect and highly diminished. It is formed at F on the same side of the lens.

## E. Charts, Metric Weight & Measures

## F. Charts, Optical Instruments

## Metric Weights & Measures

Metric system is a decimalized system of measurement. It is the official system of measurement used in most countries.

**SI Base Units**

Unit	Symbol	Quantity
metre	m	length
kilogram	kg	mass
second	s	time
ampere	A	electric current
Kelvin	K	temperature
candela	cd	luminous intensity
mole	mol	amount of substance

**Standard Prefixes For the Units of Measure**

Prefix	Symbol	Multiples	Prefix	Symbol	Sub-multiples
deca	da	$10^1$	deci	dc	$10^{-1}$
hecto	h	$10^2$	centi	cm	$10^{-2}$
kilo	k	$10^3$	milli	m	$10^{-3}$
mega	M	$10^6$	micro	$\mu$	$10^{-6}$
giga	G	$10^9$	nano	n	$10^{-9}$
tera	T	$10^{12}$	pico	p	$10^{-12}$
petta	P	$10^{15}$	femto	f	$10^{-15}$
exa	E	$10^{18}$	atto	a	$10^{-18}$
zetta	Z	$10^{21}$	zepto	z	$10^{-21}$
yotta	Y	$10^{24}$	yocto	y	$10^{-24}$

**Multiples and Submultiples of Units**

Unit	Symbol	Quantity
metre	m	length
kilogram	kg	mass
second	s	time
ampere	A	electric current
Kelvin	K	temperature
candela	cd	luminous intensity
mole	mol	amount of substance

**Length**

1 millimetre	= 0.001 metre
1 centimetre	= 0.01 metre
1 decimetre	= 0.1 metre
1 metre	= 1 metre
1 decimetre	= 0.1 metre
1 centimetre	= 0.01 metre
1 millimetre	= 0.001 metre

**Weight (Mass)**

1 milligram	= 0.000001 kilogram
1 centigram	= 0.00001 kilogram
1 decigram	= 0.0001 kilogram
1 gram	= 0.001 kilogram
1 dekagram	= 0.01 kilogram
1 hectogram	= 0.1 kilogram
1 kilogram	= 1 kilogram

**Time**

1 second	= 1 second
1 minute	= 60 seconds
1 hour	= 60 minutes
1 day	= 24 hours
1 year	= 365 days
1 decade	= 10 years
1 century	= 100 years
1 millennium	= 1000 years

**Area**

1 square centimetre	= 0.0001 square metre
1 square decimetre	= 0.01 square metre
1 square metre	= 1 square metre
1 are	= 100 square metres
1 hectare	= 10,000 square metres
1 square kilometre	= 1,000,000 square metres

**Volume and Capacity (Liquid and Dry)**

1 cubic centimetre	= 0.000001 cubic metre
1 cubic decimetre	= 0.001 cubic metre
1 cubic metre	= 1 cubic metre
1 litre	= 1 cubic decimetre
1 decilitre	= 0.1 litre
1 centilitre	= 0.01 litre
1 millilitre	= 0.001 litre

## OPTICAL INSTRUMENTS

**SLIDE PROJECTOR**

**BINOCULARS**

**TELESCOPE**

**COMPOUND MICROSCOPE**

**MAGNIFYING GLASS**

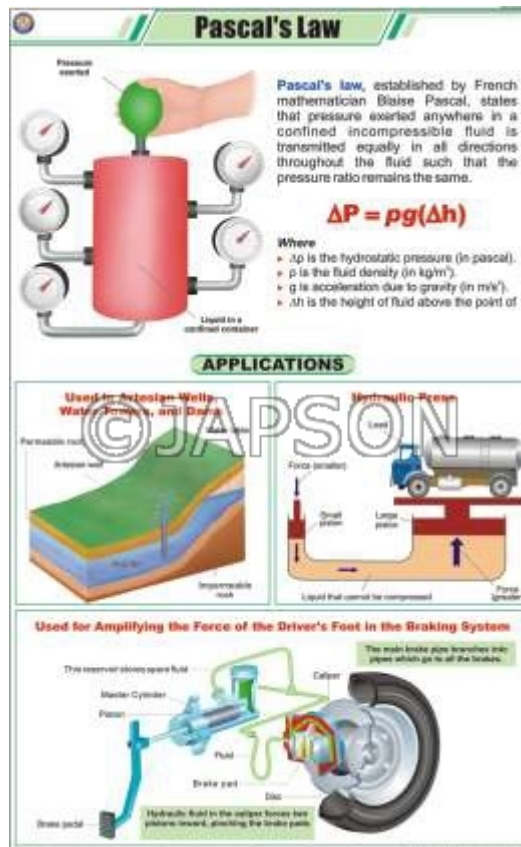
**CAMERA**

**PERISCOPE**

## G. Charts, Lever



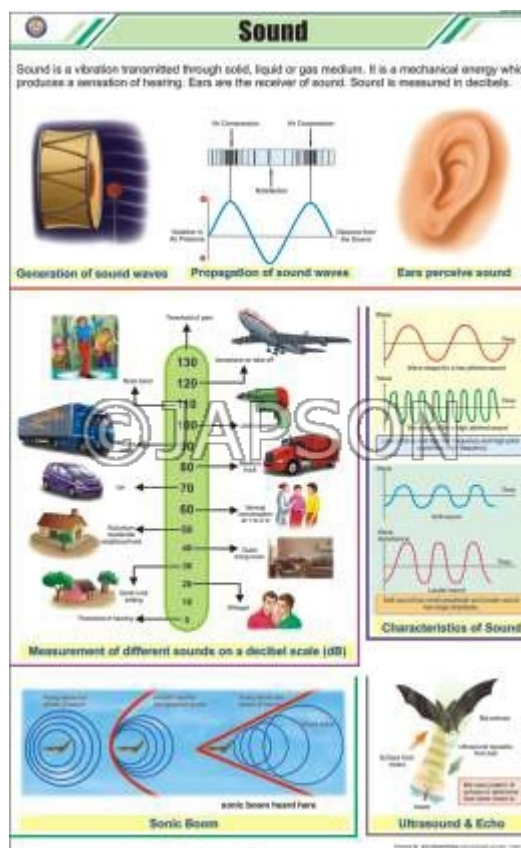
## H. Charts, Pascal's law



## I. Charts, Measurements



## J. Charts, Sound



## K. Charts, Wave Motion

## L. Charts, Changes Around Us

## Wave Motion

Transference of energy in a medium or through a vacuum due to the oscillation caused by a disturbance is called wave motion.

### Transverse Wave

Particles of a medium oscillate at right angle to the direction of propagation of a wave.

Electromagnetic waves are non-mechanical transverse waves.

### Longitudinal Wave

All longitudinal waves are mechanical waves.

### Examples of Wave Motion

- Ripples on the surface of water
- Sunlight propagating in sky
- Sound
- Propagating seismic waves
- Seismic waves are longitudinal
- Acoustic waves are transverse

## CHANGES AROUND US

<b>SLOW CHANGE</b> Changes which take place slowly over a long period. (1) Growth and change surrounding culture and practices. (2) Tectonic movement. (3) The evolution of life. (4) Folding of rocks of orogenesis.		<b>FAST CHANGE</b> Changes which take place rapidly. (1) Bursting of the bomb. (2) Fanning of cyclone into gale. (3) Blasting of a dam.	
<b>REVERSIBLE CHANGE</b> Processes in which a substance changes from one state to another and then again changes to the same substance reversing the conditions. (1) Melting of ice. (2) Freezing and melting of water. (3) Folding and unfolding of a cloth.		<b>IRREVERSIBLE CHANGE</b> Processes in which a substance changes to a new substance which cannot be converted back to original form. (1) Milk changes to curd. (2) Iron changes to rust. (3) Ripening of fruit. (4) Burning of wood.	
<b>PERIODIC CHANGE</b> Changes which occur after fixed intervals of time. (1) Moon seen at regular intervals. (2) High and low tide of the sea. (3) Phases of the moon. (4) Season of the year.		<b>NON-PERIODIC CHANGE</b> Changes which do not occur after regular intervals of time. (1) Earthquake. (2) Flood. (3) Drought.	
<b>DESIRABLE CHANGE</b> There are certain changes that are desirable. (1) Growth of a plant. (2) Maturity of a person. (3) Growth of a child.		<b>UNDESIRABLE CHANGE</b> There are certain changes that are not desirable. (1) Spreading of a disease. (2) Pollution of the environment. (3) Global warming.	
<b>PHYSICAL CHANGE</b> Changes which do not alter the chemical properties of a substance are called physical changes. (1) Melting of ice. (2) Boiling of water. (3) Dissolving of sugar in water. (4) Chopping of a log.		<b>CHEMICAL CHANGE</b> A reaction in which a substance with certain different properties from the original substance is formed. (1) Rusting of iron. (2) Burning of wood. (3) Burning of paper. (4) Burning of sugar.	

M.Charts, Refraction Through Prisms N. Charts, Telescope

## Refraction Through Prisms

### Dispersion of White Light Through a Prism

**DISPERSION:** The phenomenon due to which white light splits into seven colours (i.e. violet, indigo, blue, green, yellow, orange and red (VIBGYOR), when passed through an equilateral prism, is called dispersion.

**SPECTRUM:** The band of seven colours obtained on a screen, when white light splits into seven colours, is called a spectrum.

**NORMAL DISPERSION:** Dispersion through a prism: follows the order given by VIBGYOR, it is said to be normal dispersion.

**ABNORMAL DISPERSION:** If dispersion through a prism fails to follow the order given by VIBGYOR, it is said to be anomalous dispersion.

### Refraction of Light Through an Equilateral Prism

An incident ray approaches the prism from the side of the base. On passing through the prism it bends towards the base. The light ray, which comes out of the prism is called the emergent ray or the emergent ray. It further bends away from the base. If the incident ray and emergent ray are extended, they intersect at a point. The angle between the incident ray and the emergent ray is called the angle of deviation.

Angle of Incidence = Angle of Emergence = Angle of Prism = Angle of Deviation.

Where  $\angle i$  = angle of incidence  
 $\angle e$  = angle of emergence  
 $\angle p$  = angle of prism  
 $\angle d$  = angle of deviation

### Re-Combination of Spectrum Colours

The seven coloured rays of the spectrum can be recombined to give back white light. A triangular glass prism is placed on its base. Alongside it, in the reverse direction on its vertex, another glass prism of the same material and same refractive index is placed, so that its refracting surface is in the opposite direction. When a beam of white light passes through the first glass prism, it is dispersed into seven coloured rays. The second prism receives these and recombines them to form the original white beam of light. This phenomenon was discovered by Newton.

### Rainbow

A rainbow is produced by the dispersion of sunlight by tiny raindrops which act as many small prisms in the air. When the sun shines on the raindrops, during or after a shower, they disperse light by refraction and deviate its component colours by internal reflection to the eye of the observer.

## TELESCOPE

The Telescope is used to provide angular magnification of distant objects. It has an objective lens and an eyepiece lens. The objective has a large focal length and a much larger aperture than the eyepiece. Light from a distant object enters the objective and a real image is formed at its second focal point. The eyepiece magnifies this image producing a final inverted image.

### A Refracting Telescope

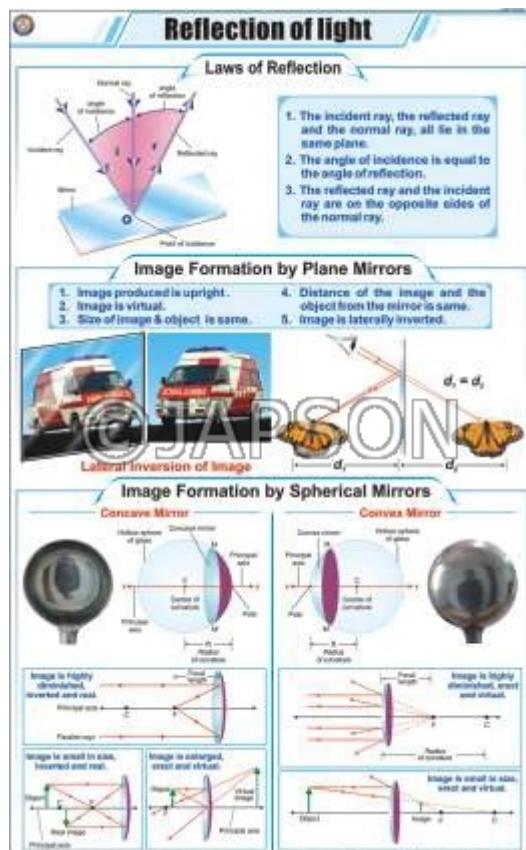
Telescope can be categorized as astronomical and terrestrial. Refracting telescope can be used both for terrestrial and astronomical observations. The magnifying power  $m$  is the ratio of the angle  $\beta$  subtended at the eye by the final image to the angle  $\alpha$  which the object subtends at the lens or the eye. Hence

$$m = \frac{\beta}{\alpha} = \frac{f_o}{f_e}$$

Length of the telescope tube is  $f_o - f_e$

### A Reflecting Telescope (Cassegrain)

O. Charts, Principle of Archimedes P. Charts, Reflection of Light



## Q. Charts, Microscope



## R. Charts, Motion



# MOTION

An object is said to be in motion with respect to certain other objects if its position continuously changes with respect to these objects.

## LINEAR MOTION

All parts of a body move with the same speed in a straight or curved line.

### Rectilinear Motion

Body changes its position in a straight line with respect to time.



Motion of Child Along Slide



Motion of Athlete Running on Track



Motion of Ball Hit by Player



Motion of Writing Fountain Pen

### Curvilinear Motion

Body Changes its position with respect to time on a curved path.

## ROTATIONAL MOTION

Distance of the moving object remain constant from a fixed point which lies on its axis.



Motion of Potter's Wheel



Motion of Spinning Top



Motion of Merry Go Round



Motion of Wheels of Bicycle

## OSCILLATORY MOTION

To and fro movement along the same path is known as oscillatory motion or simply oscillation.



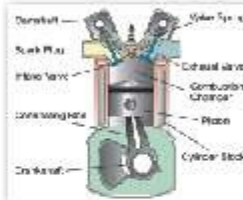
Motion of Pendulum



Motion of Strings of Guitar



Motion of Taut Membrane of Tabla



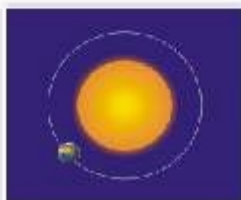
Motion of Piston in Engine

## PERIODIC MOTION

Motion which repeats itself after regular interval of time is known as periodic motion.



Motion of Moon Around Earth



Motion of Earth Around Sun



Motion of Hands in Watch



Motion of Lungs During Breathing

## Disclaimer

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product at the time of order as product development is a continuous process and minor modifications may be made to design based on latest availability, process and design.