



Address:
JAMBU PERSHAD & SONS
6275/22 Nicholson Road,
Ambala Cantt, Haryana,
INDIA
Pin: 133001

Email:
sales@japson.com
japsonambala@yahoo.com

Website:
www.japson.com
Phone:
+91-171-4006897

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

Refraction Through a Glass Slab

Lateral Displacement of a Light Ray

- The emergent ray is always parallel but laterally displaced from the incident ray.
- The lateral displacement increases as the angle of incidence increases.
- The lateral displacement also increases.

Refractive Index of a Glass Slab

To find the refractive index of a glass slab, mark a point E on the refracted ray, in such a way that EA = AE. Draw perpendiculars, AF and EG, to the normal. The refractive index of the glass will be equal to the ratio of AF to EG.

Refractive index of glass = n_{21}

Refractive index of glass is also given by the formula:

$$\text{Refractive index } (n) = \frac{\text{Speed of light in air}}{\text{Speed of light in glass}}$$

In the case of viewing ponds:

$$\text{Refractive index } (n) = \frac{\text{Real depth}}{\text{Apparent depth}}$$

Refraction of Light Through Different Mediums

Snell's Law (Snell's Law): The ratio of the sine of the angle of incidence to the sine of the angle of refraction is a constant which depends on the media.

Mathematically: $n_1 \sin i = n_2 \sin r$

Total Internal Reflection

When light passes from an optically denser medium to a rarer medium, beyond critical angle, it undergoes total internal reflection instead of refraction. At critical angle (C), the angle of refraction is 90°.

Looming and Mirage are two natural phenomena showing total internal reflection.

Eye and its Defects

TRANSVERSE SECTION OF EYEBALL

Presbyopia

- Due to hardening of eye lens with age.
- Eye lens gradually loses its ability to increase its refractive index.

CAUSES

- Hardening of eye lens.
- Decreasing flexibility of eye lens.

CORRECTION

- Use of convex lens spectacles.

Cataract

- Clouding of eye lens.
- Cataract makes it harder to see.

CAUSES

- Long-term exposure to ultraviolet light.
- Advanced age.

CORRECTION

- Cataract surgery.

Myopia

- Excess curvature of eye lens.
- Excess length of eye.
- Excess curvature of cornea.

CAUSES

- Excess curvature of eye lens.
- Excess length of eye.
- Excess curvature of cornea.

CORRECTION

- Use of concave lens spectacles.

Hypermetropia

- Short curvature of eye lens.
- Short length of eye.
- Short curvature of cornea.

CAUSES

- Short curvature of eye lens.
- Short length of eye.
- Short curvature of cornea.

CORRECTION

- Use of convex lens spectacles.

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 = Effort Arm / 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 = Number of Ropes That Support The Movable Pulley.

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 another object in place.

Mechanical Advantage = Length of Either Slope / Thickness of Blunt End

Inclined Plane

The inclined plane is a flat surface on which an object or material is at different heights. This flat surface allows the work to be done with a force.

Mechanical Advantage = Length of Slope / Height of Inclined Plane

Screw

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

Mechanical Advantage = Circumference of the Screw / Pitch of the Screw

Wheel & Axle

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

Mechanical Advantage = Radius of Wheel / Radius of Axle

Refraction of Light Through Lenses

Lens: A part of a transparent medium bounded by two spherical surfaces.

Refraction: bending of ray straight when it passes from one transparent medium to a other transparent medium.

SCHEME DEFINITIONS:

- Principal Axis:** The line joining the centres of the two spheres of which the lens is made is called its 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 where all parallel rays to the principal axis converge after refraction through the lens. For concave lens, it is a point on the principal axis where all parallel rays to the principal axis appear to diverge after refraction through the lens.
- Focal Length:** The distance between the optical centre and the focus is known as the focal length.

LENSES & SERIES OF IMAGES:

CONVEX LENS:

- Object at infinity:** The rays parallel to the principal axis converge at the focus after refraction through the lens.
- Object at 2F:** The image is formed between F and 2F. The image is inverted, real, and of the same size as the object.
- Object between F and 2F:** The image is formed beyond 2F. The image is inverted, real, and larger than the object.
- Object at F:** The image is not formed as the rays are parallel after refraction.
- Object between F and optical centre:** The image is formed on the same side of the lens as the object. The image is virtual, erect, and larger than the object.

CONCAVE LENS:

- Object at infinity:** The rays parallel to the principal axis diverge after refraction through the lens. The rays appear to come from the focus on the same side of the lens as the object.
- Object at 2F:** The image is formed between F and 2F. The image is virtual, erect, and smaller than the object.
- Object between F and 2F:** The image is formed between F and 2F. The image is virtual, erect, and smaller than the object.
- Object at F:** The image is not formed as the rays are parallel after refraction.
- Object between F and optical centre:** The image is formed on the same side of the lens as the object. The image is virtual, erect, and larger than the object.

E. Charts, Metric Weight & Measures

Metric Weights & Measures

Metric system is a decimalized system of measurement. It is the official system of measurement now and is known as The International System of Units (abbreviated as SI).

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	d	10 ⁻¹
hecto	h	10 ²	centi	ct	10 ⁻²
kilo	k	10 ³	milli	mt	10 ⁻³
mega	M	10 ⁶	micro	μ	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

Length	Weight (Mass)
1 millimetre = 0.001 metre	1 milligram = 0.000001 kilogram
1 centimetre = 0.01 metre	1 centigram = 0.0001 kilogram
1 decimetre = 0.1 metre	1 decigram = 0.001 kilogram
1 metre = 100 centimetre	1 decagram = 0.01 kilogram
1 kilometre = 1000 metre	1 hectogram = 0.1 kilogram
1 hectometre = 100 metres	1 kilogram = 1000 gram
1 kilometre = 1000 metres	

Time

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

Area

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

Volume and Capacity (Liquid and Dry)

1 cubic centimetre = 0.000001 cubic metre
1 cubic decimetre = 0.001 cubic metre
1 cubic metre = 1000 litres
1 litre = 1000 cubic centimetre
1 millilitre = 0.001 litre
1 decilitre = 0.1 litre
1 centilitre = 0.01 litre
1 microlitre = 0.000001 litre
1 nanolitre = 0.000000001 litre

F. Charts, Optical Instruments

OPTICAL INSTRUMENTS

SLIDE PROJECTOR

BINOCULARS

TELESCOPE

COMPOUND MICROSCOPE

MAGNIFYING GLASS

CAMERA

PERISCOPE

G. Charts, Lever

LEVER

A lever is a simple machine. Three main components of a lever are

- Fulcrum:** A point on which the lever rests or around which the lever can rotate.
- Load or Resistance:** It is the object to be moved or the object on which force is applied.
- Effort:** It is the force which is applied on lever or on load to move it.

Lever Of The First Class

In lever of the first kind the fulcrum lies between the effort and the load.

Examples: Crowbar, A screwdriver to pry open the lid of a can, A pair of scissors, Pliers.

Lever Of The Second Class

In lever of the second kind the fulcrum lies between the load and the effort.

Examples: Wheelbarrow, Bottle opener, Nut-cracker.

Lever Of The Third Class

In lever of the third class the effort comes between the load and the fulcrum.

Examples: Fishing rod, Forearm, Forearm, Spoon, Forearm, Forearm, Forearm.

H. Charts, Pascal's law

Pascal's Law

Pascal's law, established by French mathematician Blaise Pascal, states that pressure exerted anywhere in a confined incompressible fluid is transmitted equally in all directions throughout the fluid such that the pressure ratio remains the same.

$$\Delta P = \rho g(\Delta h)$$

Where

- ΔP is the hydrostatic pressure (in pascal).
- ρ is the fluid density (in kg/m^3).
- g is acceleration due to gravity (in m/s^2).
- Δh is the height of fluid above the point of

APPLICATIONS

Used in Artesian Wells, Water Towers, and Dams

Hydraulic Press

Used for Amplifying the Force of the Driver's Foot in the Braking System

I. Charts, Measurements

Measurements

Comparing unknown quantities with some known fixed quantities of same kind are measurements. Measurement is expressed in two parts.

Weight of a Sack of Wheat is 98 kg

Parts of Body Used For Measurements

Crude ways of measurements always give incorrect results.

Standard System of Units of Measurements

Standard ways of measurements always give exact results.

System	Length	Mass (Weight)	Time
IPS	feet	pound	second
CGS	centimetre	gram	second
MKS	metre	kilogram	second
SI	metre	kilogram	second

Measuring Length

Measuring Mass

Measuring Small Thickness

Measuring Time & Temperature

Measuring Irregular Surface Area

Measuring Volume of Irregular Objects

J. Charts, Sound

Sound

Sound is a vibration transmitted through solid, liquid or gas medium. It is a mechanical energy which produces a sensation of hearing. Ears are the receiver of sound. Sound is measured in decibels.

Generation of sound waves

Propagation of sound waves

Ears perceive sound

Measurement of different sounds on a decibel scale (dB)

Characteristics of Sound

Sonic Boom

Ultrasound & Echo

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

Particles of a medium oscillate in the direction of propagation of the wave.

Examples of Wave Motion

- Ripples on the surface of water
- Sunlight propagating in sky
- Sound
- Propagating seismic waves

CHANGES AROUND US

<h3>SLOW CHANGE</h3> <p>Changes which take place slowly over a long period.</p> <ol style="list-style-type: none"> 1) Growth and change producing other and 2) Tree transplantation, 3) Formation of clouds, 4) Folding of rocks of mountains. 		<h3>FAST CHANGE</h3> <p>Changes which take place rapidly.</p> <ol style="list-style-type: none"> 1) Bursting of the balloon. 2) Coming to rest by a person quickly. 3) Heating water to photographic film. 4) Blowing of tyre. 	
<h3>REVERSIBLE CHANGE</h3> <p>Processes in which a substance changes from one state and then again changes to the same substance maintaining the condition.</p> <ol style="list-style-type: none"> 1) Melting of ice. 2) Iron and sulphur on heating. 3) Melting of candle. 4) Freezing of water. 		<h3>IRREVERSIBLE CHANGE</h3> <p>Processes in which substances undergo changes to a new substance which cannot be recovered back to original form.</p> <ol style="list-style-type: none"> 1) Milk changes to curd. 2) Iron changes to rust. 3) Ripening of fruit. 4) Burning of book. 	
<h3>PERIODIC CHANGE</h3> <p>Changes which occur after fixed intervals of time.</p> <ol style="list-style-type: none"> 1) Moon seen at regular intervals. 2) High and low tides of the sea. 3) Phases of moon. 4) Season of India's year. 		<h3>NON-PERIODIC CHANGE</h3> <p>Changes which do not occur after regular intervals.</p> <ol style="list-style-type: none"> 1) Birth. 2) Death. 3) Gradual decay. 	
<h3>DESIRABLE CHANGE</h3> <p>There are certain changes that are desirable in our life.</p> <ol style="list-style-type: none"> 1) Growth of children. 2) Learning of languages. 3) Growth of plants and trees. 		<h3>UNDESIRABLE CHANGE</h3> <p>There are certain changes that do not occur in our life.</p> <ol style="list-style-type: none"> 1) Spoiling of food. 2) Extension of life. 3) Spread of disease. 4) Pollution caused by industries. 	
<h3>PHYSICAL CHANGE</h3> <p>Changes which do not alter the chemical composition of substances except the appearance.</p> <ol style="list-style-type: none"> 1) Melting of ice. 2) Ripening of the mango. 3) Making a piece of cloth as a handkerchief. 4) Chopping off the apple. 		<h3>CHEMICAL CHANGE</h3> <p>A reaction in which new substances with entirely different properties from the original substances are formed.</p> <ol style="list-style-type: none"> 1) Iron changes to rust. 2) Cooking food. 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 screen, when white light splits into seven colours, is called a spectrum.

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

ABNORMAL DISPERSION: 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 that further bends away from the base. If any incident ray and emergent ray are extended, they meet at a point. The angle between the incident ray and the normal at the point of incidence is called the angle of incidence. The angle between the emergent ray and the normal at the point of emergence is called the angle of emergence.

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

$\angle i = \angle e = \angle p = \angle d$

$\angle i$ = 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 them 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 divide 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 β subtended at the eye by the final image to the angle α 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

Principle of Archimedes

Body immersed in a fluid is buoyed up by a force equal to the weight of the displaced fluid. This force enables the object to float or at least seem lighter.

Floating Log
Log floats because its density is less than water. It weighs less and hence floats.

Sinking Rock
The rock sinks because its density is greater than water.

EXAMPLES OF ARCHIMEDES PRINCIPLE

Floating Ship
The ship floats because the average density of ship is less than that of water.

Balloons Rise High
Hot air balloons rise because the balloon's density is less than density of surrounding air.

Reflection of light

Laws of Reflection

- The incident ray, the reflected ray and the normal ray, all lie in the same plane.
- The angle of incidence is equal to the angle of reflection.
- The reflected ray and the incident ray are on the opposite sides of the normal ray.

Image Formation by Plane Mirrors

- Image produced is upright.
- Image is virtual.
- Size of image & object is same.
- Distance of the image and the object from the mirror is same.
- Image is laterally inverted.

Image Formation by Spherical Mirrors

Concave Mirror

- Image is highly diminished, inverted and real.
- Image is real in size, inverted and real.
- Image is enlarged, erect and virtual.

Convex Mirror

- Image is highly diminished, erect and virtual.
- Image is real in size, erect and virtual.

Q. Charts, Microscope

MICROSCOPE

In a Compound Microscope, two lenses are used for larger magnification, one compounding the effect of the other. The objective lens forms a real, inverted and magnified image of the object. This serves as the object for the second lens, the eyepiece, which produces the final image, which is enlarged and virtual.

Compound Microscope

Electron Microscope

RAY DIAGRAM FOR COMPOUND MICROSCOPE

$u > f_1$
 $v > f_2$
 $u < f_2$
 $v > f_2$

A = Object size
 A' = Size of final image
 A'' = Size of final image
 C = Tube length
 d = 25 cm
 E = Object distance
 E' = Image distance

Magnification produced by a compound microscope

$$M = \frac{A'}{A} = \frac{v}{u} \times \frac{v'}{u'}$$

where, u and u' are final lengths of object & each component respectively.

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.



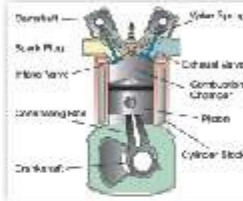
Motion of Pendulum



Motion of Strings of Guitar



Motion of Taut Membrane of Tabla



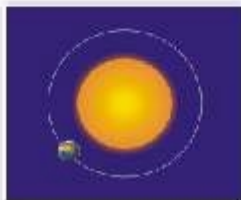
Motion of Piston in Engine

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

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