SpellIndia
INDIA's No. 1
SPELLING BEE
Preparatory Study Material Provider
www.phonicsestore.com

ICSE ACADEMY
www.spellbeeacademy.com

Pati's

Formula List

PREPARE

for

ICSE

Class 10

Physics

How to Prepare for ICSE Class 10 exams : Free Resources

Please click on subject to proceed further.

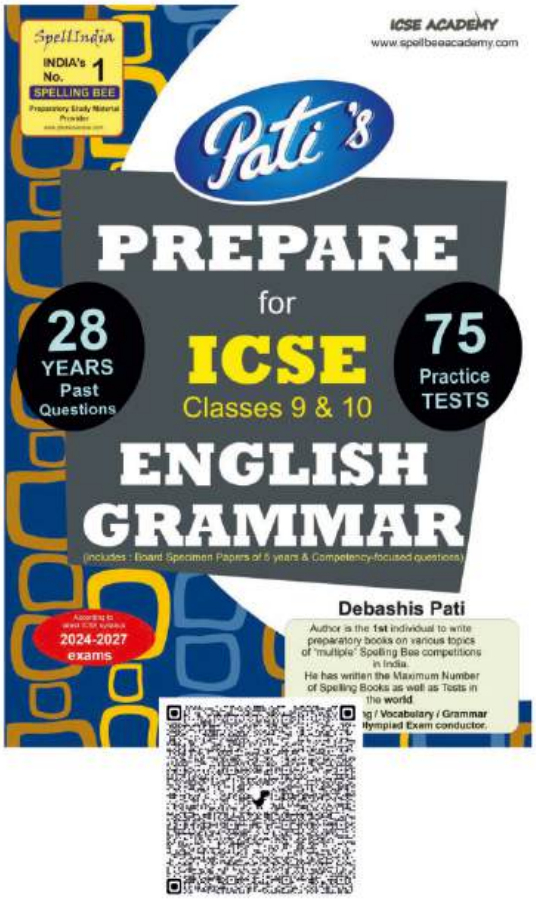
We will keep adding resources here till "March 2026".

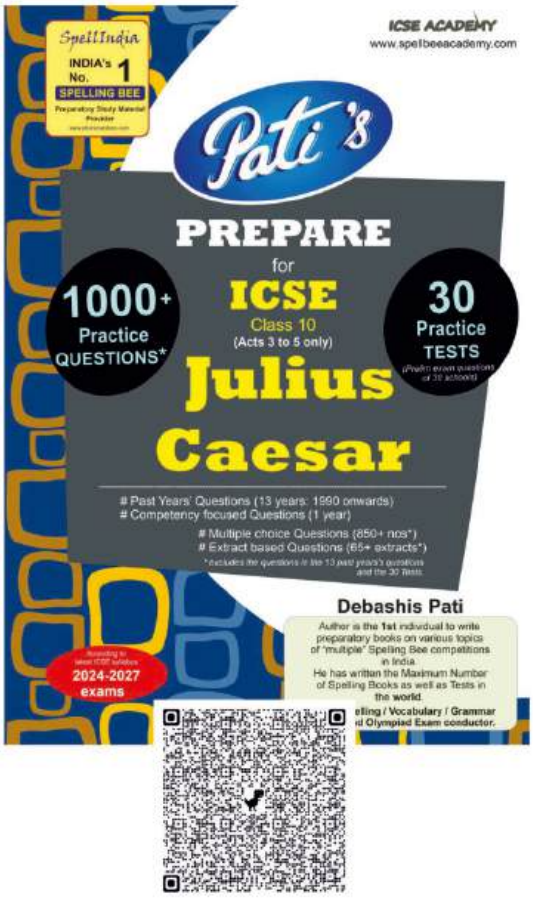
So, save this link, keep visiting and stay updated.

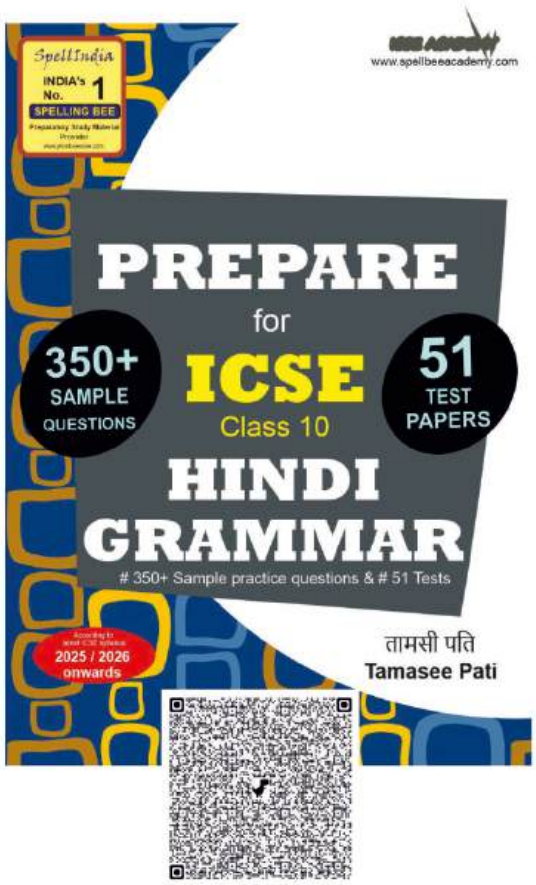
(Resources include : Syllabus, Past Year Papers, Specimen Papers, Competency based Questions, Books pdf downloadable, 350+ Term Papers / Prelim Papers of various schools - across subjects, etc.)

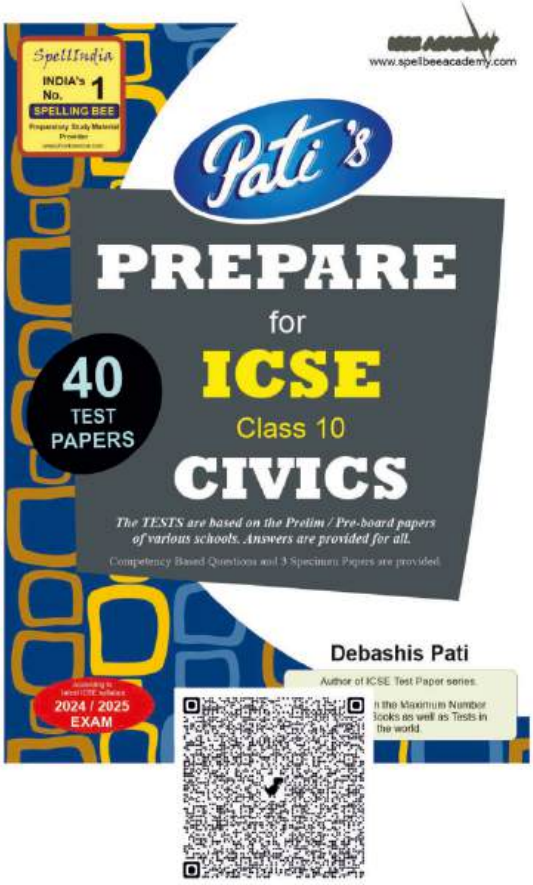
01 English Literature	02 English Language	03 Geography	04 History & Civics
05 Physics	06 Chemistry	07 Mathematics	08 Biology
09 Computer Applications	10 Physical Education	11 Hindi	12 Commercial Studies
13 Economics	14 Technical Drawing	15 Environmental Science	16 Home Science
17 Gujarati	18 Marathi	19 French	

SCAN QR code to buy the book at amazon NOW.



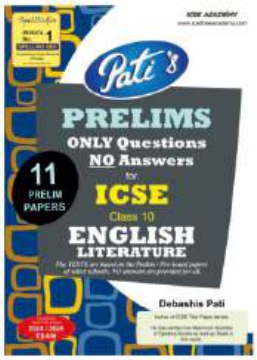


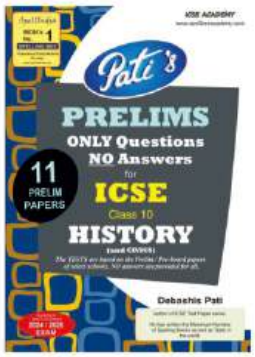


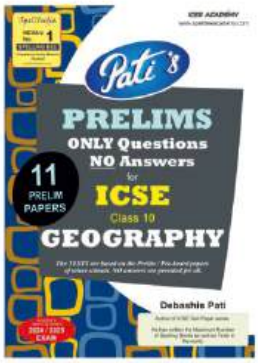


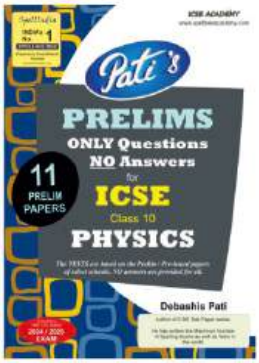
Pati's ICSE ACADEMY

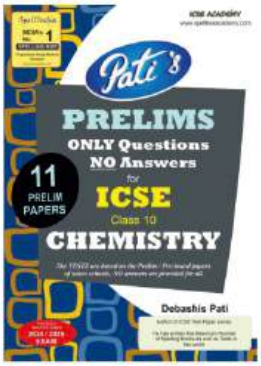
Scan QR code for Free Access to
500+ Prelim Papers across 20 subjects

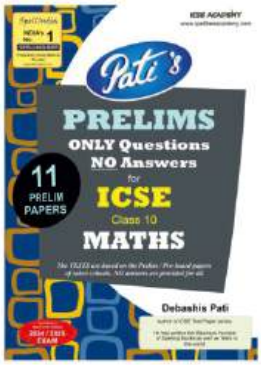


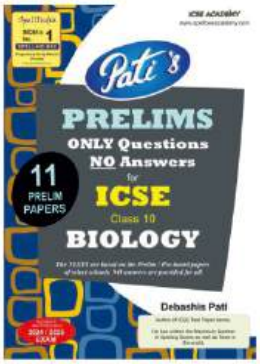












ICSE ACADEMY

Prepare for ICSE CLASS 10
Physics
Free Resources

SCAN QR CODE Now

★ **Important units :**

	Physical Quantity	SI	CGS	Scalar/ Vector
1.	Mass	kg	g	Scalar
2.	Length	m	cm	Scalar
3.	Time	s	s	Scalar
4.	Velocity	$m \cdot s^{-1}$	$cm \cdot s^{-1}$	Vector
5.	Displacement	m	cm	Vector
6.	Acceleration or Acceleration due to gravity	$m \cdot s^{-2}$	$cm \cdot s^{-2}$	Vector
7.	Momentum	$kg \cdot m \cdot s^{-1}$	$g \cdot cm \cdot s^{-1}$	Vector
8.	Force or weight	N	$dyne$	Vector
9.	Work, Energy	J	erg	Scalar
10	Power	W	$erg \cdot s^{-1}$	Scalar
11.	Pressure	Pa $(N \cdot m^2)$	$dyne \cdot cm^2$	Scalar
12.	Current (I)	A	–	Scalar
13.	Potential difference or Voltage (V)	V	–	Scalar
14.	Resistance (R)	Ω	–	Scalar

Chp. 01 : MOMENT OF FORCE or TURNING EFFECT OF THE FORCE or TORQUE

1) $\tau = F \times \perp d$

2) $Moment\ of\ couple\ =\ Either\ force\ \times\ Perpendicular\ distance\ between\ line\ of\ action\ of\ two\ forces$
Moment of couple $= F \times d$

3) Principle of moments (equilibrium) :

(a) $\sum clockwise\ moments = \sum anticlockwise\ moments$

(b) $\sum all\ moments = 0$

Units :

1) $1\ kgf\ =\ 9.8\ N\ \approx 10N$

Chp. 02 : WORK ENERGY POWER

1) $W = \vec{F} \cdot \vec{S}$

2) $W = F \cdot S \cos\theta$

3)

θ	0^o	30^o	45^o	60^o	90^o	180^o
$\cos\theta$	1	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	0	-1

4) $Power = \frac{Work\ done}{Time} = \frac{W}{t}$

5) $Power = \vec{F} \cdot \vec{v}$

6) Potential Energy $= E_P = U = mgh$
$[E_P : Elastic\ potential\ energy \quad \& \quad U : Gravitational\ potential\ energy\ ]$

7) Kinetic Energy $= E_K = \frac{1}{2}mv^2$

8) $W = F \cdot S \cos\theta = mgh = \frac{1}{2}mv^2$

9) $Momentum = mass \times velocity$
$p = mv$

10) Relationship between kinetic energy (K) and momentum (p) :
$K = \frac{p^2}{2m}$ (Or) $p = \sqrt{2mK}$

11) Work - Energy Theorem :
$Work\ done = Increase\ in\ kinetic\ energy$
$W = \frac{1}{2}mv^2 - \frac{1}{2}mu^2$

12) Law of Conservation of Mechanical Energy : $K + U = constant$

Units :

1) $1\,joule = 10^7\,erg$

2) $1\,kilowatt\ hour\ (kWh) = 3.6 \times 10^6\,J$

3) 1 calorie = 4.18 J ≈ 4.2 J
1 kilocalorie = 4180 J
1 J = 0.24 calorie

4) $1\,eV = 1.6 \times 10^{-19} J$

5) $1\,watt = 10^7\,erg\,s^{-1}$

6) $1\,horsepower = 746\,watt$

7) **Relation between units of force :**
(a) $1\,N = 10^5\,dyne$
(b) $1\,gf = 980\,dyne$
(c) $1\,kgf = 9.8\,N$

8) **Three kinematic equations of motion :**
(a) $v = u + at$
(b) $s = ut + \frac{1}{2}at^2$
(c) $v^2 - u^2 = 2as$

9) **Bigger units :**
(a) $Kilo\ unit = 10^3\ unit$
(b) $Mega\ unit = 10^6\ unit$
(c) $Giga\ unit = 10^9\ unit$

10)

	Symbol	Mass	Charge	Location
Electrons	${}^{0}_{-1}e$	$9.1 \times 10^{-31}\,kg$	$-1.6 \times 10^{-19} C$	Orbiting around the nucleus in fixed orbits
Protons	${}^{1}_{+1}P$	$1.6749 \times 10^{-27}\,kg$	$+1.6 \times 10^{-19} C$	In the nucleus at the centre
Neutrons	${}^{1}_{0}n$	$1.6726 \times 10^{-27}\,kg$	zero	In the nucleus at the centre

Chp. 03 : Machines

1) $MA = \frac{L}{E}$

2) $VR = \frac{d_E}{d_L}$

3) Efficiency $\eta = \frac{Work\ output}{Work\ input} = \frac{W_o}{W_i} = \frac{MA}{VR} = \frac{MA}{VR} \times 100\%$

4) i) If $L > E$; $\Rightarrow$ $MA > 1$; force multiplier

ii) If $L = E$; $\Rightarrow MA = 1$; change in direction of force

iii) If $L < E$; $\Rightarrow MA < 1$; speed multiplier

5) In such type of combination where one fixed pulley is placed with 'n' number of movable pulleys,
$MA = 2^n$,
$VR = 2^n$ ..... [where n = number of moveable pulleys = number of strings]

6) **Block and Tackle System of Pulleys :**

Total number of pulleys	Number of pulleys in block	Number of pulleys in tackle	Mechanical Advantage	Velocity Ratio	Number of strands supporting load
3	2	1	3	3	3
4	2	2	4	4	4
5	3	2	5	5	5

1) c = speed of light in air or vacuum = $3 \times 10^8\ ms^{-1}$

speed of light in water = $2.25 \times 10^8\ ms^{-1}$

speed of light in glass = $2 \times 10^8\ ms^{-1}$

speed of light in diamond = $1.24 \times 10^8\ ms^{-1}$

2) **Snell's law :** $\frac{\sin i}{\sin r} = {}_1\mu_2\ (or)\ {}_1\eta_2$

3) **(a)** $\mu_{glass} = \frac{Speed\ of\ light\ in\ vacuum\ or\ air\ (c)}{Speed\ of\ light\ in\ glass\ (v)} = \frac{3 \times 10^8}{2 \times 10^8} = 1.5$

The refractive index of glass is 1.5 means that the light travels in air 1.5 times faster than in air.

(b) $\mu_{water} = \frac{Speed\ of\ light\ in\ vacuum\ or\ air\ (c)}{Speed\ of\ light\ in\ water\ (v)} = \frac{3 \times 10^8}{2.25 \times 10^8} = 1.33$

The refractive index of water is 1.33 means that the light travels in air 1.33 times faster than in air.

(c) $\mu_{diamond} = \frac{Speed\ of\ light\ in\ vacuum\ or\ air\ (c)}{Speed\ of\ light\ in\ diamond\ (v)} = \frac{3 \times 10^8}{1.24 \times 10^8} = 2.42$

The refractive index of diamond is 2.42 means that the light travels in air 2.42 times faster than in air.

(d) $\mu_{air} = 1$

4) ${}_1\mu_2 = \frac{1}{{}_2\mu_1}$

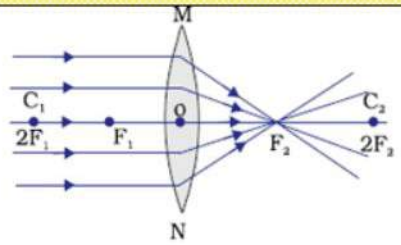
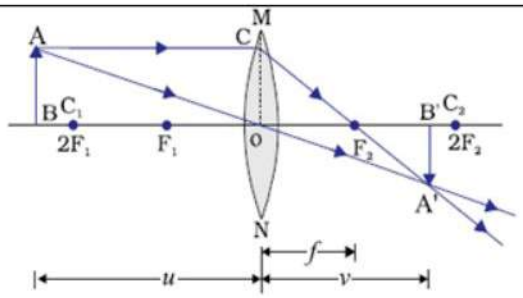
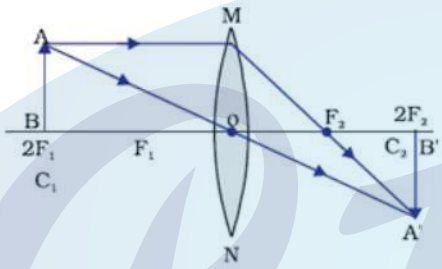
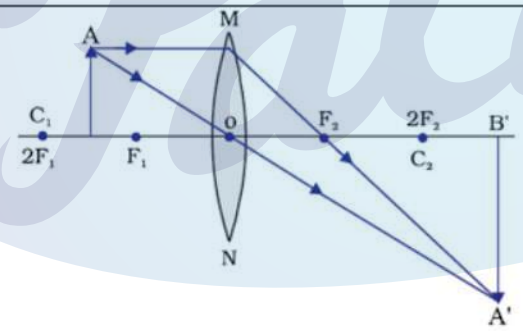
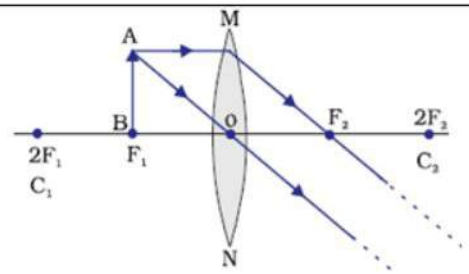
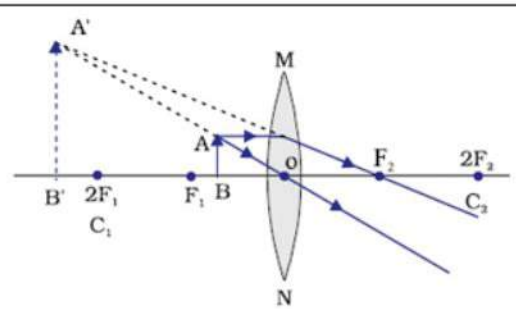
5) $i_1 + i_2 = A + \delta$

6) $\delta_{min} = 2\,i_1 - A$

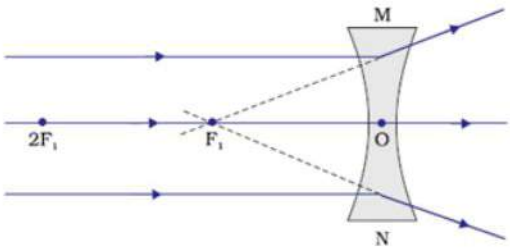
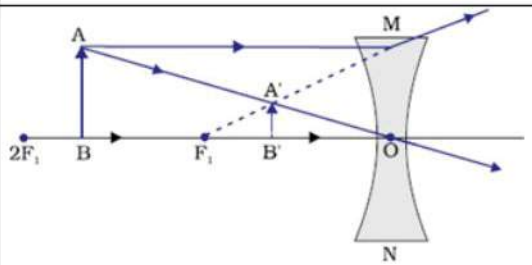
7) ${}_a\mu_m = \frac{Real\ depth}{Apparent\ depth}$

8) $Shift = Real\ depth\ (1 - \frac{1}{\mu})$

1) Images by convex lens :

Position of the object	Ray Diagram	Characteristics & Position of image	Application
Infinity		(a) Real , (b) Inverted & (c) Highly diminished	Burning glass & Camera lens
Beyond $2F_1$		(a) Real , (b) Inverted & (c) Diminished	In camera lens, when the object, not very far, is to be photographed
At $2F_1$		(a) Real , (b) Inverted & (c) same sized	In a *terrestrial telescope* for erecting the inverted ~~image~~ formed by an objective lens
Between F_1 and $2F_1$		(a) Real , (b) Inverted & (c) Magnified	In cinema and slide projectors
At focus $2F_1$		(a) Real , (b) Inverted & (c) Highly magnified	In collimator of a spectrometer
Between F_1 and optical center O		(a) Virtual , (b) Erect or upright & (c) Magnified	Magnifying glass or simple microscope (reading glass)

2) Images by convex lens :

Position of the object	Ray Diagram	Characteristics & position of image	Application
Infinity		(a) Virtual , (b) Erect & (c) Highly diminished	Galilean telescope
Between infinity and optical center O of the lens		(a) Virtual (b) Erect & (c) Diminished	In spectacles for the short-sighted persons

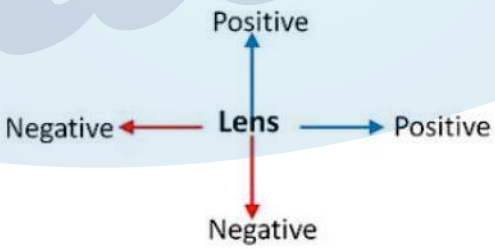
3) $m = \frac{Height\ of\ image\ (I)}{Height\ of\ object\ (O)} = \frac{v}{u}$

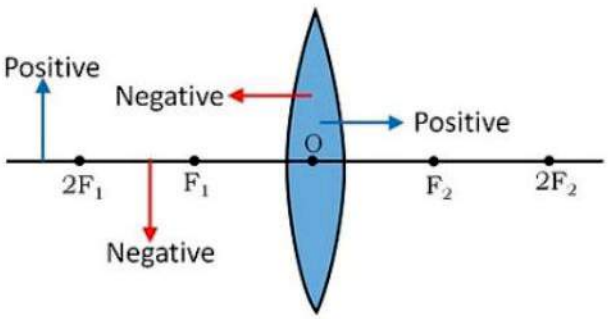
4) $Power\ of\ lens\ (in\ diopter) = \frac{1}{focal\ length\ (in\ metre)}$

5) Sign convention :

Lens	u	v	f	p
Convex	$-ve$	$-ve/+ve$	$+ve$	$+ve$
Concave	$-ve$	$-ve$	$-ve$	$-ve$

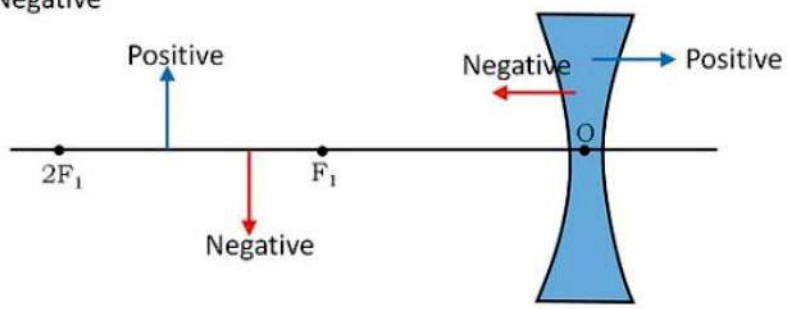
Sign convention for Lens





Convex Lens

Focal length of convex lens is always ***Positive***



Concave Lens

Focal length of concave lens is always ***Negative***

Chp 06 : Spectrum

1. Violet light has higher frequency and shorter wavelength than red light.
2. $V_{voilet} < V_{red}$
3. $\mu_{voilet} > \mu_{red}$
4. $f_{voilet} > f_{red}$
5. $\lambda_{voilet} < \lambda_{red}$
6. **Comparison between frequencies and wavelengths of different colours of visible light:**

Colour	Frequency range in 10^{14} Hz	Wavelength range in $\dot{A}$
Violet	7.50 to 6.73	4000 to 4460
Indigo	6.73 to 6.47	4460 to 4440
Blue	6.47 to 6.01	4440 to 5000
Green	6.01 to 5.19	5000 to 5780
Yellow	5.19 to 5.07	5780 to 5920
Orange	5.07 to 4.84	5920 to 6200
Red	4.84 to 3.75	6200 to 8000

7.

	Ultraviolet radiations	*Visible radiations*	*Infrared radiations*
Range of wavelength	100 Å to 4000 Å	4000 Å to 8000Å	8000 Å to 10^7 Å

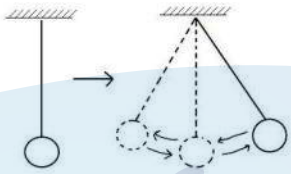
Chp 07 : Sound

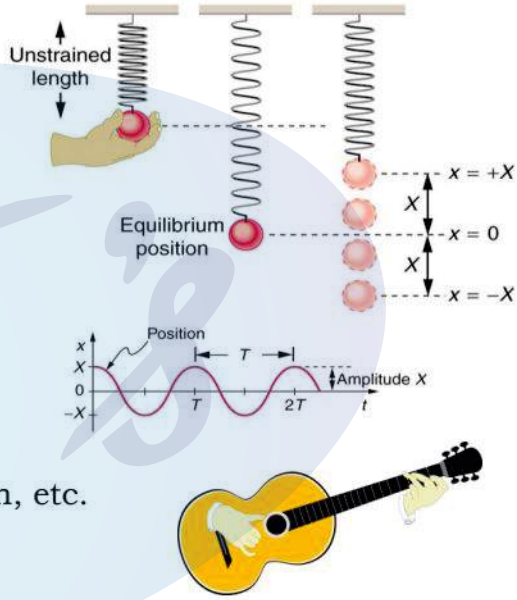
1. In case of echo : $d = \frac{V \times t}{2}$

2. In case of no echo : $d = V \times t$

3. Oscillations of simple pendulum :

$T = 2\pi\sqrt{\frac{l}{g}}$ and $f = \frac{1}{T} = \frac{1}{2\pi}\sqrt{\frac{g}{l}}$





4. Oscillations of a load suspended by a spring :

$T = 2\pi\sqrt{\frac{m}{K}}$ .... [where K is force constant] and

$f = \frac{1}{T} = \frac{1}{2\pi}\sqrt{\frac{K}{m}}$

5. When the string in the instruments like sitar, guitar, violin, etc. is once plucked : $f = \frac{1}{2l}\sqrt{\frac{T}{\pi r^2 \rho}}$

6. A *tuning fork* is the instrument used to produce sound of a certain *fixed (single) frequency.*

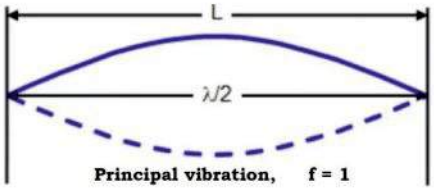
7. Vibrating air columns : When an air column in a flute or organ pipe is made to vibrate, it vibrates with its natural frequency which is inversely proportional to the length of air column ($f \propto \frac{1}{l}$).

In an organ pipe open at both the ends $f_1 : f_2 : f_3 : \cdots . = 1 : 2 : 3 : \cdots$

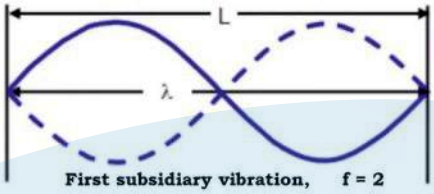
In an organ pipe with one end closed $f_1 : f_2 : f_3 : \cdots . = 1 : 3 : 5 : \cdots$

In an organ pipe with one end closed $f_1 : f_2 : f_3 : \cdots . = 1 : 3 : 5 : \cdots$

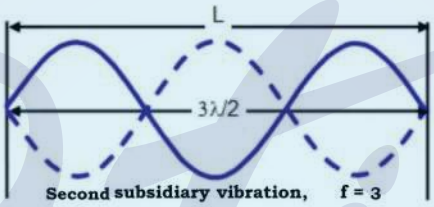
8. Vibrating strings : A stretched string tied at two ends (nodes), if the string is plucked :
in the middle the length : String vibrates in one loop
at the one-fourth the length : String vibrates in two loops
at the one-sixth the length : String vibrates in three loops



Principal vibration, f = 1



First subsidiary vibration, f = 2



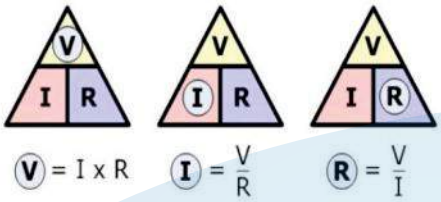
Second subsidiary vibration, f = 3

$$f_1 : f_2 : f_3 = 1 : 2 : 3$$

$$\lambda_1 : \lambda_2 : \lambda_3 = 2l : l : \frac{2l}{3} = 6 : 3 : 2$$

Chp 09 : Current electricity

1. $I = \frac{Q}{t} = \frac{n \cdot e}{t}$
2. $Q = n \cdot e$
3. $V = \frac{W}{Q}$
4. Ohm's Law :



5. $R_S = R_1 + R_2 + R_3 + \cdots + R_n$
6. $\frac{1}{R_P} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} + \cdots + \frac{1}{R_n}$
7. $R = \rho \cdot \frac{l}{A}$
8. $\rho = \frac{R \cdot A}{l}$
9. $\sigma = \frac{1}{\rho} = \frac{l}{R \cdot A}$
10. $\rho_{metals} < \rho_{semiconductors} < \rho_{insulators}$
11. $\varepsilon = V + v$
12. $\varepsilon = V + v = IR + Ir = I(R + r)$
13. $r = \left(\frac{\varepsilon}{V} - 1\right) R$
14. $Electrical\ energy = W = QV = VIt = I^2Rt = \frac{V^2 t}{R}$
15. $Electrical\ power = \frac{W}{t} = \frac{QV}{t} = VI = I^2R = \frac{V^2}{R}$

16. $H \propto I^2Rt$

17. SI unit of power : watt
MKS : $kg\ m^2\ s^{-3}$
CGS : $erg\ s^{-1}$

➢ Power is a scalar quantity.

Relation between SI and CGS system :
$1\ watt\ =\ 10^7\ erg\ s^{-1}$

Unit used in mechanical engineering : Horse power
1 horsepower = 746 watt

Chp 10 : Household Circuits

1. Colour coding of wires :

Wire	Colour in old convention	Colour in new convention
Live	Red	Brown
Neutral	Black	Light blue
Earth	Green	Green or yellow

2.

	Three Pin Plug	Socket
Top	E	E
Left	L	N
Right	N	L

Chp 11 : Electromagnetism

1. Unit of magnetic field :

$F = KBIl$
$\therefore F = BIl$ .....[when $K = 1$]
$\therefore B = \frac{F}{Il}$

Hence, SI unit of magnetic field is -

$NA^{-1}m^{-1}$ (or) tesla (or) $\frac{weber}{meter^2}$

Chp 11 : Calorimetry

- $1\ cal = 4.186\ J \approx 4.2\ J$
- $1\ K\ cal = 1000\ cal = 4200\ J$
- $1\ J = 0.24\ cal$

1) $\Delta T\ K = \Delta T\ ^0C$

2) $Q = m\ c\ \Delta t$

3) Principle of calorimetry : Heat lost by hot body = Heat gained by cold body

$$m_1\ c_1\ \Delta(initial\ temp. - final\ temp.) = m_2\ c_2\ \Delta(final\ temp. - initial\ temp.)$$

$$m_1\ c_1\ (t_1 - t_3) = m_2\ c_2\ (t_3 - t_2)$$

4) $Heat\ lost\ by\ hot\ solid = Heat\ gained\ by\ water + Heat\ gained\ by\ vessel$

5) $C' = \frac{\Delta Q}{\Delta T}$

6) $c = \frac{\Delta Q}{m\ \Delta T}$

7) $C' = m\ c$

8) When water falls from a height : $mgh = mc\Delta T$

9) Energy supplied by electric heater $= Pt = mc\Delta T$

10)

	Pressure ↑	**Impurities ↑**
Melting Point	Increase (wax & lead)/ Decrease (ice & bismuth)	Decrease
Boiling Point	Increase	Increase

11) $Q = m\ L$

12) Unit of specific latent heat :

$$L = \frac{Q\ (J)}{m\ (kg)}$$

Thus, SI unit of specific latent heat is $J\ kg^{-1}$.

- Other units are : $cal\ g^{-1}$ and $kilo - cal\ kg^{-1}$.
- $1\ cal\ g^{-1} = 4.2\ J\ g^{-1}$

  $1\ cal\ g^{-1} = 4200\ J\ kg^{-1}$

  $1\ k\ cal\ kg^{-1} = 1\ cal\ g^{-1}$

Chp 12 : Radioactivity

1)

	Symbol	Mass	Charge	Location
Electrons	${}^{0}_{-1}e$	$9.1 \times 10^{-31}\ kg$	$-1.6 \times 10^{-19} C$	Orbiting around the nucleus in fixed orbits
Protons	${}^{1}_{+1}P$	$1.6749 \times 10^{-27}\ kg$	$+1.6 \times 10^{-19} C$	In the nucleus at the centre
Neutrons	${}^{1}_{0}n$	$1.6726 \times 10^{-27}\ kg$	zero	In the nucleus at the centre

2) (i) Atomic Number (Z) : Atomic number is the number of protons or number of electrons. $\therefore Z = e = p$

(ii) Atomic mass number (A) : Atomic mass number is the sum of number of protons and neutrons (nucleons).

$\therefore A = p + n$

$\therefore A = Z + n$

$\therefore n = A - Z$

NOTE : Atomic mass number is slightly less than the actual mass of the atom, due to presence of electrons.

3) $\underset{parent\ nucleus}{{}^{A}_{Z}X} \xrightarrow{\alpha - decay} \underset{daughter\ nucleus}{{}^{A-4}_{Z-2}Y} + \underset{\alpha - particle}{{}^{4}_{2}He}$

4) $\underset{parent\ nucleus}{{}^{A}_{Z}X} \xrightarrow{\beta - decay} \underset{daughter\ nucleus}{{}^{A}_{Z+1}Y} + \underset{\beta - particle}{{}^{0}_{-1}e}$

5) $\underset{parent\ nucleus}{{}^{A}_{Z}X} \xrightarrow{\gamma - decay} \underset{daughter\ nucleus}{{}^{A}_{Z}X} + \underset{\gamma - particle}{\gamma}$

Pati's

ICSE Academy

Prepare for ICSE CLASS 10
Free Resources

SCAN QR CODE Now

History/Civics

Geography

Maths

Physics

Chemistry

Biology

Hindi

Physical Education

Computer Applications

Pati's

ICSE Academy

Prepare for ICSE CLASS 10
Free Resources

SCAN QR CODE Now

Economics

Commercial Studies

French

Robotics & AI

Home Science

EVS

Marathi

Gujarati

Odiya

Pati's ICSE ACADEMY

Scan QR code for Free Access to
500+ Prelim Papers across 20 subjects