

IIT - JEE / NEET

11th & 12th

Maths/Bio/Commerce

9th & 10th (Maths/Science)

6th to 8th (Main Subject)

FACILITIES

Monthly Test

Limited Seats

Minimum Fees

Library Facility

Regular Classes

Parking For Vehicles

Study Material Provided

Air Cooled Class Room



WCA

**WINGS
COMPETENT
ACADEMY**

Fly up High

**ENROLL
NOW**

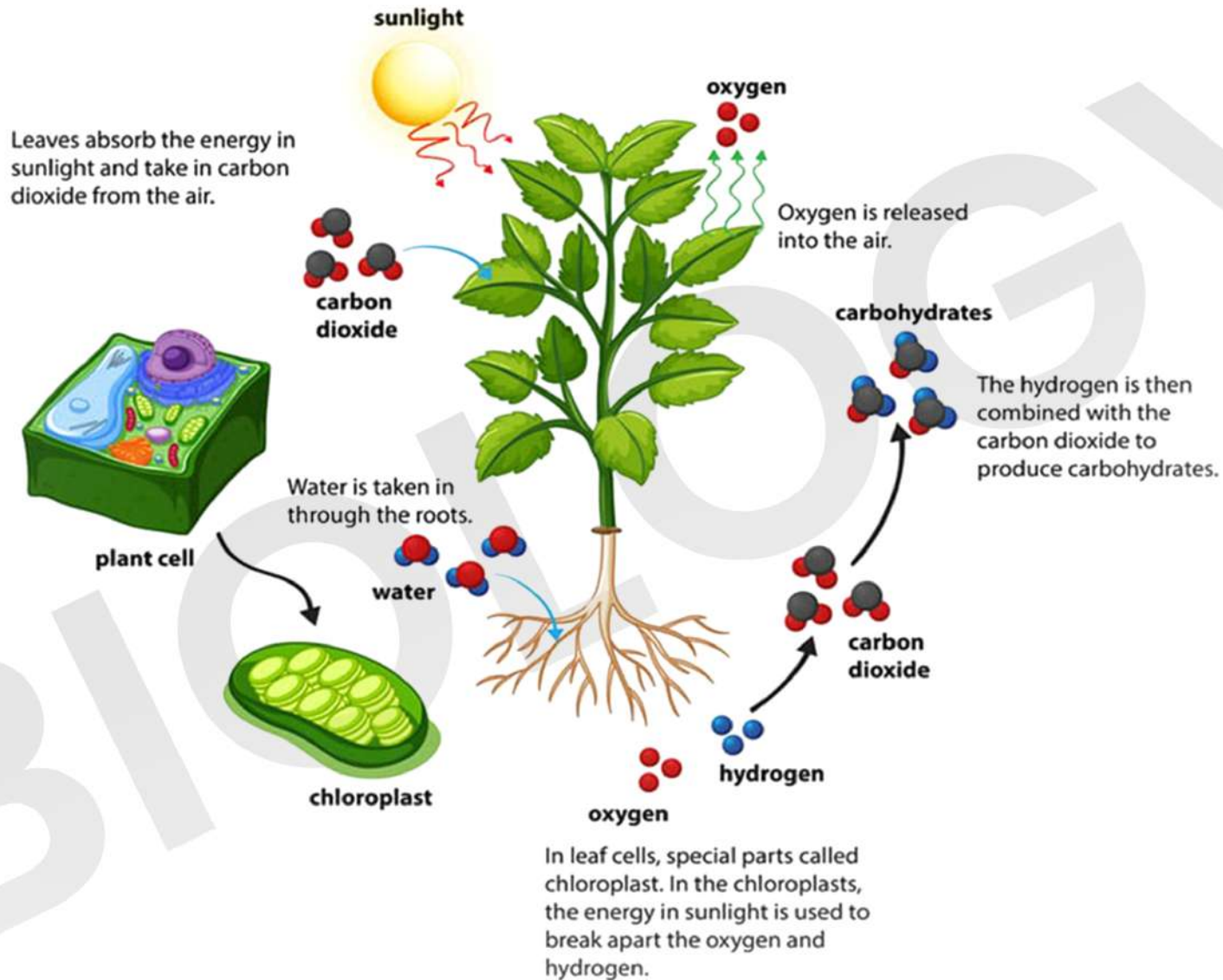
**Admission
Open**

Shivaji Nagar, Near Malsay Talab, Professor Colony Road, Raipur

8817618678



Process of Photosynthesis





Periodic Table of the Elements

1 1A 1A																	18 VIII A 8A						
1 H Hydrogen 1.008																	2 He Helium 4.003						
3 Li Lithium 6.941	4 Be Beryllium 9.012																	5 B Boron 10.811	6 C Carbon 12.011	7 N Nitrogen 14.007	8 O Oxygen 15.999	9 F Fluorine 18.998	10 Ne Neon 20.180
11 Na Sodium 22.990	12 Mg Magnesium 24.305	3 IIIB 3B	4 IVB 4B	5 VB 5B	6 VIB 6B	7 VIIB 7B	8 VIII 8	9 VIII 8	10 VIII 8	11 IB 1B	12 IIB 2B	13 Al Aluminum 26.982	14 Si Silicon 28.086	15 P Phosphorus 30.974	16 S Sulfur 32.066	17 Cl Chlorine 35.453	18 Ar Argon 39.948						
19 K Potassium 39.098	20 Ca Calcium 40.078	21 Sc Scandium 44.956	22 Ti Titanium 47.867	23 V Vanadium 50.942	24 Cr Chromium 51.996	25 Mn Manganese 54.938	26 Fe Iron 55.845	27 Co Cobalt 58.933	28 Ni Nickel 58.693	29 Cu Copper 63.546	30 Zn Zinc 65.38	31 Ga Gallium 69.723	32 Ge Germanium 72.631	33 As Arsenic 74.922	34 Se Selenium 78.972	35 Br Bromine 79.904	36 Kr Krypton 83.798						
37 Rb Rubidium 85.468	38 Sr Strontium 87.62	39 Y Yttrium 88.906	40 Zr Zirconium 91.224	41 Nb Niobium 92.906	42 Mo Molybdenum 95.95	43 Tc Technetium 98.907	44 Ru Ruthenium 101.07	45 Rh Rhodium 102.906	46 Pd Palladium 106.42	47 Ag Silver 107.868	48 Cd Cadmium 112.411	49 In Indium 114.818	50 Sn Tin 118.711	51 Sb Antimony 121.760	52 Te Tellurium 127.6	53 I Iodine 126.904	54 Xe Xenon 131.294						
55 Cs Cesium 132.905	56 Ba Barium 137.328	57-71	72 Hf Hafnium 178.49	73 Ta Tantalum 180.948	74 W Tungsten 183.84	75 Re Rhenium 186.207	76 Os Osmium 190.23	77 Ir Iridium 192.217	78 Pt Platinum 195.085	79 Au Gold 196.967	80 Hg Mercury 200.592	81 Tl Thallium 204.383	82 Pb Lead 207.2	83 Bi Bismuth 208.980	84 Po Polonium [208.982]	85 At Astatine 209.987	86 Rn Radon 222.018						
87 Fr Francium 223.020	88 Ra Radium 226.025	89-103	104 Rf Rutherfordium [261]	105 Db Dubnium [262]	106 Sg Seaborgium [266]	107 Bh Bohrium [264]	108 Hs Hassium [269]	109 Mt Meitnerium [278]	110 Ds Darmstadtium [281]	111 Rg Roentgenium [280]	112 Cn Copernicium [285]	113 Nh Nihonium [286]	114 Fl Flerovium [289]	115 Mc Moscovium [289]	116 Lv Livermorium [293]	117 Ts Tennessine [294]	118 Og Oganesson [294]						

Atomic Number
Symbol
Name
Atomic Mass

Lanthanide Series	57 La Lanthanum 138.905	58 Ce Cerium 140.116	59 Pr Praseodymium 140.908	60 Nd Neodymium 144.242	61 Pm Promethium 144.913	62 Sm Samarium 150.36	63 Eu Europium 151.964	64 Gd Gadolinium 157.25	65 Tb Terbium 158.925	66 Dy Dysprosium 162.500	67 Ho Holmium 164.930	68 Er Erbium 167.259	69 Tm Thulium 168.934	70 Yb Ytterbium 173.055	71 Lu Lutetium 174.967
Actinide Series	89 Ac Actinium 227.028	90 Th Thorium 232.038	91 Pa Protactinium 231.036	92 U Uranium 238.029	93 Np Neptunium 237.048	94 Pu Plutonium 244.064	95 Am Americium 243.061	96 Cm Curium 247.070	97 Bk Berkelium 247.070	98 Cf Californium 251.080	99 Es Einsteinium [254]	100 Fm Fermium 257.095	101 Md Mendelevium 258.1	102 No Nobelium 259.101	103 Lr Lawrencium [262]



1. $(a + b)^2 = a^2 + 2ab + b^2$; $a^2 + b^2 = (a + b)^2 - 2ab$
2. $(a - b)^2 = a^2 - 2ab + b^2$; $a^2 + b^2 = (a - b)^2 + 2ab$
3. $(a + b + c)^2 = a^2 + b^2 + c^2 + 2(ab + bc + ca)$
4. $(a + b)^3 = a^3 + b^3 + 3ab(a + b)$; $a^3 + b^3 = (a + b)^3 - 3ab(a + b)$
5. $(a - b)^3 = a^3 - b^3 - 3ab(a - b)$; $a^3 - b^3 = (a - b)^3 + 3ab(a - b)$
6. $a^2 - b^2 = (a + b)(a - b)$
7. $a^3 - b^3 = (a - b)(a^2 + ab + b^2)$
8. $a^3 + b^3 = (a + b)(a^2 - ab + b^2)$
9. $a^n - b^n = (a - b)(a^{n-1} + a^{n-2}b + a^{n-3}b^2 + \dots + b^{n-1})$
10. $a^n = a.a.a \dots n \text{ times}$
11. $a^m.a^n = a^{m+n}$
12. $\frac{a^m}{a^n} = a^{m-n}$ if $m > n$
 $= 1$ if $m = n$
 $= \frac{1}{a^{n-m}}$ if $m < n$; $a \in R, a \neq 0$
13. $(a^m)^n = a^{mn} = (a^n)^m$
14. $(ab)^n = a^n.b^n$
15. $\left(\frac{a}{b}\right)^n = \frac{a^n}{b^n}$
16. $a^0 = 1$ where $a \in R, a \neq 0$
17. $a^{-n} = \frac{1}{a^n}, a^n = \frac{1}{a^{-n}}$
18. $a^{p/q} = \sqrt[q]{a^p}$
19. If $a^m = a^n$ and $a \neq \pm 1, a \neq 0$ then $m = n$
20. If $a^n = b^n$ where $n \neq 0$, then $a = \pm b$
21. If \sqrt{x}, \sqrt{y} are quadratic surds and if $a + \sqrt{x} = \sqrt{y}$, then $a = 0$ and $x = y$
22. If \sqrt{x}, \sqrt{y} are quadratic surds and if $a + \sqrt{x} = b + \sqrt{y}$ then $a = b$ and $x = y$
23. If a, m, n are positive real numbers and $a \neq 1$, then $\log_a mn = \log_a m + \log_a n$
24. If a, m, n are positive real numbers, $a \neq 1$, then $\log_a \left(\frac{m}{n}\right) = \log_a m - \log_a n$
25. If a and m are positive real numbers, $a \neq 1$ then $\log_a m^n = n \log_a m$
26. If a, b and k are positive real numbers, $b \neq 1, k \neq 1$, then $\log_b a = \frac{\log_k a}{\log_k b}$

27. $\log_b a = \frac{1}{\log_a b}$ where a, b are positive real numbers, $a \neq 1, b \neq 1$
28. if a, m, n are positive real numbers, $a \neq 1$ and if $\log_a m = \log_a n$, then $m = n$
29. if $a + ib = 0$ where $i = \sqrt{-1}$, then $a = b = 0$
30. if $a + ib = x + iy$, where $i = \sqrt{-1}$, then $a = x$ and $b = y$
31. The roots of the quadratic equation $ax^2 + bx + c = 0$; $a \neq 0$ are $\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

The solution set of the equation is $\left\{ \frac{-b + \sqrt{\Delta}}{2a}, \frac{-b - \sqrt{\Delta}}{2a} \right\}$

where $\Delta = \text{discriminant} = b^2 - 4ac$

32. The roots are real and distinct if $\Delta > 0$.
33. The roots are real and coincident if $\Delta = 0$.
34. The roots are non-real if $\Delta < 0$.
35. If α and β are the roots of the equation $ax^2 + bx + c = 0, a \neq 0$ then
 - i) $\alpha + \beta = \frac{-b}{a} = -\frac{\text{coeff. of } x}{\text{coeff. of } x^2}$
 - ii) $\alpha \cdot \beta = \frac{c}{a} = \frac{\text{constant term}}{\text{coeff. of } x^2}$
36. The quadratic equation whose roots are α and β is $(x - \alpha)(x - \beta) = 0$
 i.e. $x^2 - (\alpha + \beta)x + \alpha\beta = 0$
 i.e. $x^2 - Sx + P = 0$ where $S = \text{Sum of the roots}$ and $P = \text{Product of the roots}$.
37. For an arithmetic progression (A.P.) whose first term is (a) and the common difference is (d).
 - i) n^{th} term = $t_n = a + (n - 1)d$
 - ii) The sum of the first (n) terms = $S_n = \frac{n}{2}(a + l) = \frac{n}{2}\{2a + (n - 1)d\}$
 where $l = \text{last term} = a + (n - 1)d$.



Magnetic fields

force on a current	$F = BIl$
force on a moving charge	$F = BQv$
magnetic flux	$\Phi = BA$
magnetic flux linkage	$N\Phi = BAN \cos \theta$
magnitude of induced emf	$\varepsilon = N \frac{\Delta\Phi}{\Delta t}$
	$N\Phi = BAN \cos \theta$
emf induced in a rotating coil	$\varepsilon = BAN\omega \sin \omega t$
alternating current	$I_{\text{rms}} = \frac{I_0}{\sqrt{2}} \quad V_{\text{rms}} = \frac{V_0}{\sqrt{2}}$
transformer equations	$\frac{N_s}{N_p} = \frac{V_s}{V_p}$
	efficiency = $\frac{I_s V_s}{I_p V_p}$

Nuclear physics

inverse square law for γ radiation	$I = \frac{k}{x^2}$
radioactive decay	$\frac{\Delta N}{\Delta t} = -\lambda N, N = N_0 e^{-\lambda t}$
activity	$A = \lambda N$
half-life	$T_{1/2} = \frac{\ln 2}{\lambda}$
nuclear radius	$R = R_0 A^{1/3}$
energy-mass equation	$E = mc^2$

OPTIONS

Astrophysics

1 astronomical unit	$= 1.50 \times 10^{11} \text{ m}$
1 light year	$= 9.46 \times 10^{15} \text{ m}$
1 parsec	$= 2.06 \times 10^5 \text{ AU} = 3.08 \times 10^{16} \text{ m} = 3.26 \text{ ly}$
Hubble constant, H	$= 65 \text{ km s}^{-1} \text{ Mpc}^{-1}$
$M = \frac{\text{angle subtended by image at eye}}{\text{angle subtended by object at unaided eye}}$	
telescope in normal adjustment	$M = \frac{f_o}{f_e}$
Rayleigh criterion	$\theta \approx \frac{\lambda}{D}$
magnitude equation	$m - M = 5 \log \frac{d}{10}$

Wien's law	$\lambda_{\text{max}} T = 2.9 \times 10^{-3} \text{ m K}$
Stefan's law	$P = \sigma AT^4$
Schwarzschild radius	$R_s \approx \frac{2GM}{c^2}$
Doppler shift for $v \ll c$	$\frac{\Delta f}{f} = -\frac{\Delta \lambda}{\lambda} = \frac{v}{c}$
red shift	$z = \frac{v}{c}$
Hubble's law	$v = Hd$

Medical physics

lens equations	$\frac{1}{f} = \frac{1}{u} + \frac{1}{v}$
	$m = \frac{v}{u}$
	$\frac{1}{f} = \frac{1}{u} + \frac{1}{v}$
threshold of hearing	$I_0 = 1.0 \times 10^{-12} \text{ W m}^{-2}$
intensity level	intensity level = $10 \log \frac{I}{I_0}$
absorption	$I = I_0 e^{-\mu x}$
	$\mu_m = \frac{\mu}{\rho}$
ultrasound imaging	$Z = \rho c$
	$\frac{I_r}{I_i} = \left(\frac{Z_2 - Z_1}{Z_2 + Z_1} \right)^2$
half-lives	$\frac{1}{T_E} = \frac{1}{T_B} + \frac{1}{T_P}$

Electricity

current and pd	$I = \frac{\Delta Q}{\Delta t} \quad V = \frac{W}{Q} \quad R = \frac{V}{I}$
resistivity	$\rho = \frac{RA}{L}$
resistors in series	$R_T = R_1 + R_2 + R_3 + \dots$
resistors in parallel	$\frac{1}{R_T} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} + \dots$
power	$P = VI = I^2 R = \frac{V^2}{R}$
emf	$\varepsilon = \frac{E}{Q} \quad \varepsilon = I(R + r)$

Circular motion

magnitude of angular speed	$\omega = \frac{v}{r}$
	$\omega = 2\pi f$
centripetal acceleration	$a = \frac{v^2}{r} = \omega^2 r$
centripetal force	$F = \frac{mv^2}{r} = m\omega^2 r$

Simple harmonic motion

acceleration	$a = -\omega^2 x$
displacement	$x = A \cos(\omega t)$
speed	$v = \pm \omega \sqrt{A^2 - x^2}$
maximum speed	$v_{\text{max}} = \omega A$
maximum acceleration	$a_{\text{max}} = \omega^2 A$
for a mass-spring system	$T = 2\pi \sqrt{\frac{m}{k}}$
for a simple pendulum	$T = 2\pi \sqrt{\frac{l}{g}}$

Thermal physics

energy to change temperature	$Q = mc\Delta\theta$
energy to change state	$Q = ml$
gas law	$pV = nRT$ $pV = NkT$
kinetic theory model	$pV = \frac{1}{3} Nm (c_{\text{rms}})^2$
kinetic energy of gas molecule	$\frac{1}{2} m (c_{\text{rms}})^2 = \frac{3}{2} kT = \frac{3RT}{2N_A}$

Gravitational fields

force between two masses	$F = \frac{Gm_1 m_2}{r^2}$
gravitational field strength	$g = \frac{F}{m}$
magnitude of gravitational field strength in a radial field	$g = \frac{GM}{r^2}$
work done	$\Delta W = m\Delta V$
gravitational potential	$V = -\frac{GM}{r}$ $g = -\frac{\Delta V}{\Delta r}$

Electric fields and capacitors

force between two point charges	$F = \frac{1}{4\pi\epsilon_0} \frac{Q_1 Q_2}{r^2}$
force on a charge	$F = EQ$
field strength for a uniform field	$E = \frac{V}{d}$
work done	$\Delta W = Q\Delta V$
field strength for a radial field	$E = \frac{1}{4\pi\epsilon_0} \frac{Q}{r^2}$
electric potential	$V = \frac{1}{4\pi\epsilon_0} \frac{Q}{r}$
field strength	$E = \frac{\Delta V}{\Delta r}$
capacitance	$C = \frac{Q}{V}$ $C = \frac{A\epsilon_0\epsilon_r}{d}$
capacitor energy stored	$E = \frac{1}{2} QV = \frac{1}{2} CV^2 = \frac{1}{2} \frac{Q^2}{C}$
capacitor charging	$Q = Q_0(1 - e^{-t/RC})$
decay of charge	$Q = Q_0 e^{-t/RC}$
time constant	RC