SOLUTION BOOKLET
10th moving 11th

MAGNET TALENT SEARCH EXAM
(FOR CLASS: VII, VIII, IX, X, & XI STUDYING STD'S)
SUNDAY, 01 OCTOBER 2023

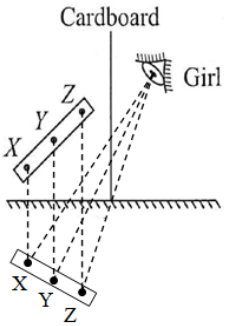
SECTION – A

EASY LEVEL

PHYSICS

Sol.1 **[B]** Image of man Y formed at 14 m behind the plane mirror, so image of man Y will be at a distance of 16m from man X.

Sol.2 **[C]** As when the cardboard is removed vertically the image of Z will be seen first and image of X will be seen last.



Sol.3 **[C]** Diamond to glass, glass to water & water to air. As we know T.I.R. takes place when light rays goes from optically denser to optically rarer medium.

Sol.4 **[A]** Image formed by a plane mirror is virtual, erect, laterally inverted and at same distance from mirror and of same size as that of object.

Sol.5 **[D]** Image is formed by a large number of rays coming from object. So if any part of lens is covered some rays will be blocked which decreases the intensity of light. hence brightness of image dreases.

Sol.6 **[B]**

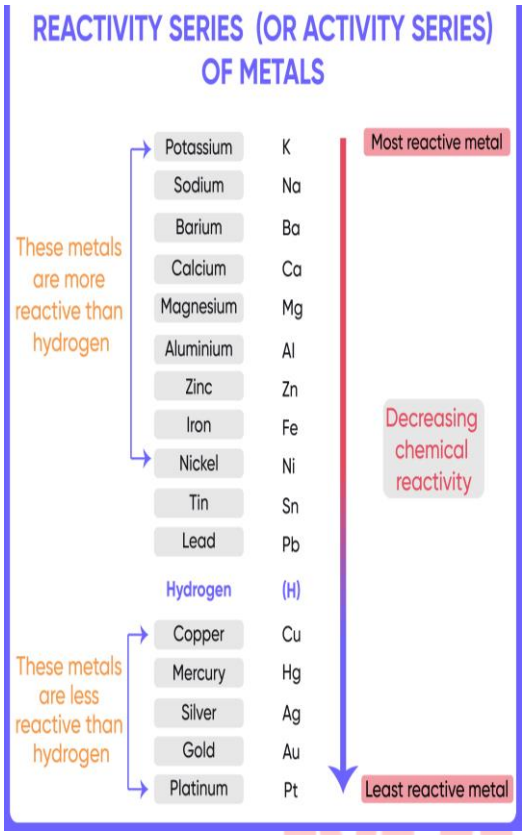
CHEMISTRY

Sol.7 **[B]** A double displacement reaction is a type of reaction where part of one reactant is replaced by part of another reactant.
Double displacement reaction take the form:
AB + CD → AD + CB

Sol.8 [D] Metal is that which complete its octet by loose electrons
Non-Metal is that which complete its octet by gain electrons
X have completed octet
Y complete its octet by gain.
Z complete its octet by loose.

Sol.9 **[B]** Because zinc is more reactive than copper so zinc replace copper and zinc gets oxidized and act as reducing agent.

Sol.10 [B]



Sol.11 [C] Redox reaction is that type of reaction in which both oxidation and reduction occur. Third reaction is neutralisation reaction.

Sol.12 [A] Acid + Metal $\longrightarrow$ Salt + Hydrogen.

BIOLOGY

Sol.13 [D]

Sol.14 [C]

Sol.15 [B]

Sol.16 [B]

Sol.17 [D]

Sol.18 [B]

Sol.19 [B]

Sol.20 [A]

Sol.21 [D]

Sol.22 [D]

Sol.23 [B]

Sol.24 [B]

MATHS

Sol.25 [A] Because ΔOAP is right angle triangle

Sol.26 [C] $\Delta ADE \sim \Delta ACB$ (by AAA rule)

so $\frac{DE}{BC} = \frac{AE}{AB}$.

Sol.27 [C] 57 = 19 x 3
$95 = 19 \times 5$

Sol.28 [C] Given: ΔABC similar to ΔDEF

$$\therefore \frac{AB}{BC} = \frac{DE}{EF}$$

$$\therefore \frac{9}{6} = \frac{x}{12}$$

DE = x = 18cm

Sol.29 [C] diagonals of a parallelogram bisect each other.

Sol.30 [B]

Sol.31 [C] If $\alpha + \beta = 90^o$ and $\alpha = 2\beta$ then $\beta = 30^o$ and $\alpha = 60^o$

Sol.32 [B] Given: $\sec\theta + \tan\theta = \sqrt{3}$ .....(1)

We know $\sec^2\theta - \tan^2\theta = 1$

$(\sec\theta - \tan\theta)(\sec\theta + \tan\theta) = 1$

$$\sec\theta - \tan\theta = \frac{1}{\sqrt{3}}$$ .....(2)

When we add (1) and (2)

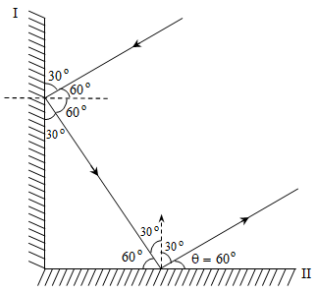
We get $\sec\theta = \frac{2}{\sqrt{3}}$

So $\theta = 30^o$

MODERATE LEVEL

PHYSICS

Sol.33 [C]



Sol.34 [A] $\frac{1}{z} = \frac{1}{y} + \frac{1}{x}$ using mirror formula

$$\frac{1}{z} = \frac{x+y}{xy} \Rightarrow \quad z = \frac{xy}{x+y}$$

taking reciprocal

Sol.35 [D] $\lambda = 589$ nm speed of light in air $C = 3\times10^8 m/s$, Air $n_1 = 1$

speed of light in water $(v_2) = \frac{c}{n_2} = \frac{3\times10^8}{1.33} = \frac{300}{133}\times10^8$

$$v_2 = 2.256\times10^8 m/s$$

Sol.36 [A] Water $n_2 = 1.33$ Frequency = $\frac{\text{speed}}{\text{wave length}} \Rightarrow f = \frac{3\times10^8}{589\times10^{-9}} = \frac{3}{589}\times10^{17}$

$$f = 0.00509\times10^{17}$$

$$f \approx 5.1\times10^{14} Hz$$

As we know that when a ray of light goes from one medium to another medium of different optical density then its speed & wave length changes but frequency remains same, as frequency of light is the property of source of light.

Using $f = \frac{\nu}{\lambda} \Rightarrow$

$$\lambda_2 = \frac{\nu_2}{f} = \frac{2.256\times10^8}{5.1\times10^{14}} = \frac{2256}{51}\times\frac{10^9}{10^{17}} \Rightarrow \frac{2256}{51}\times10^{-8}$$

$$\lambda_2 = 44.235\times10^{-8} \Rightarrow \lambda_2 \approx 442.4 \text{ nm}$$

Sol.37 [A]

Sol.38 [B] Object distance (u) = $-\infty$, Image distance (ν) = -1.5m
using lens formula

$$\frac{1}{f} = \frac{1}{\nu} - \frac{1}{u} \Rightarrow f = -1.5M, \text{ use} P = \frac{1}{f} = P = \frac{1}{-1.5} \Rightarrow \quad P = -0.66D$$

CHEMISTRY

Sol.39 [C] (i) Oxydising agent (ii) Oxidation (iii) Reduction (iv) Reducing agent
Here the oxidation of Cu in CuO is +2. It is reduced to Cu having oxidation state of zero. So, CuO is an oxidising agent. The process iii is a reduction step.
The H2 having zero oxidation is oxidized to H2O where the oxidation state of H+ is +1. So, the process ii is oxidation step. (iv) show reduction on CuO so it is reducing agent.

Sol.40 [C] In the given reaction, there is addition of oxygen to iron metal and it is oxidised. Also, there is removal of hydrogen from the water and thus, water is reduced. And H_2O shows oxidation on iron so it act as oxidising agent.

Sol.41 [C] Concept: When heat is released (Exothermic process) surrounding gets warm means temperature rises. When heat is absorbed (Endothermic process) surrounding gets cold means temperature falls.

Sol.42 [C] Bulb will glow because NaOH is a strong base and furnishes ions for conduction. Because electricity conduct by ions and NaOH dissociate into ions.

Sol.43 [B] Because metal have positive charge and electron deficient so it gain electron from cathode.

Sol.44 [C]

BIOLOGY

Sol.45 [C]

Sol.46 [B]

Sol.47 [A]

Sol.48 [A]

Sol.49 [C]

Sol.50 [C]

Sol.51 [B]

Sol.52 [C]

Sol.53 [D]

Sol.54 [C]

Sol.55 [B]

Sol.56 [C]

MATHS

Sol.57 [A]

$\Delta ALO \sim \Delta DMO$ (AAA rule)

Hence, $\frac{AO}{OD} = \frac{AL}{DM}$ (Corresponding sides)…(I)

Area of triangle $= \frac{1}{2}$ base $\times$ height

$$\frac{Ar(\Delta ABC)}{Ar(\Delta DBC)} = \frac{\frac{1}{2}BC \times AL}{\frac{1}{2}BC \times DM}$$

$$\frac{Ar(\Delta ABC)}{Ar(\Delta DBC)} = \frac{AL}{DM}$$

$$\frac{Ar(\Delta ABC)}{Ar(\Delta DBC)} = \frac{AO}{OD} \text{ (from I)}$$

Sol.58 [B] Let the number be 'N'.
Now N, when divided by 24, 32 & 42 leaves remainder 5.
In other words, (N-5) will be completely divisible by 24, 32 and 42 and the least as well.
So, (N-5) has to be the LCM of 24, 32 & 42.
LCM (24, 32, 42) = 672 = (N-5)
So, N = 677

Sol.59 [A] we know $a < 0$ when graph is downward of a quadratic equation,
and sign of a & c are opposite when one root is positive and other is negative.

Sol.60 [C]

$$s_n - 2s_{n-1} + s_{n-2} = (s_n - s_{n-1}) - (s_{n-1} - s_{n-2})$$

$$= a_n - a_{n-1} \quad [\because (s_n - s_{n-1}) = a_n]$$

$$= [a + (n-1)d] - [a + (n-2)d]$$

$$= a + nd - d - a - nd + 2d$$

$$= d$$

Sol.61 [C] Two dice are rolled simultaneously, then Total outcomes =6×6 =36

Total cases prime number on both the dice =(2,2),(2,3),(2,5),(3,2),(3,3),(3,5),(5,2),(5,3),(5,5)=9

Therefore,

Probability P(E)= (Favourable outcomes)/(Total outcomes)

=9/36

=1/4

Sol.62 [B] Let A, B, C are three men and P,Q are 2 women Total sample space of selecting two person is (A, B) (A, C), (A, P), (A, Q), (B, C), (B, P), (B, Q), (C, P), (C, Q), (P, Q)

Sol.63 [B] we know when graph of quadratic polynomial is below x Axis then a < 0 and c < 0

Sol.64 [D] Let P be a point on AB such that, PC is at right angles to the Line Joining the centers of the circles. Note that, PC is a common tangent to both circles.

This is because tangent is perpendicular to radius at point of contact for any circle.

let $\angle PAC = \alpha$ and $\angle PBC = \beta$.

PA = PC [lengths of the tangents from an external point C]

In a triangle CAP, $\angle PAC = \angle ACP = \alpha$

similarly PB = CP and $\angle PCB = \angle CBP = \beta$

now in the triangle ACB,

$\angle CAB + \angle CBA + \angle ACB = 180^o$ [sum of the interior angles in a triangle]

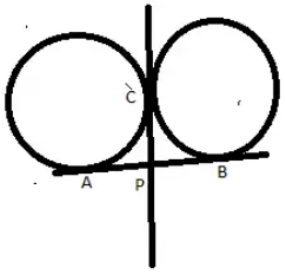
$\alpha + \beta + (\alpha + \beta) = 180^o$ (Since $\angle ACB = \angle ACP + \angle PCB = \alpha + \beta$.

$2\alpha + 2\beta = 180^o$

$\alpha + \beta = 90^o$

$\therefore \angle ACB = \alpha + \beta = 90^o$

the answer will be option D



Sol.65 **[D]** Object distance (u) = -25 cm, Image distance (v) = -40cm

using lens formula

$\frac{1}{f} = \frac{1}{v} - \frac{1}{u} \Rightarrow f = 2/3m$ use $P = \frac{1}{f} \Rightarrow P = \frac{1}{2/3} = \frac{3}{2} \Rightarrow P = +1.5D$

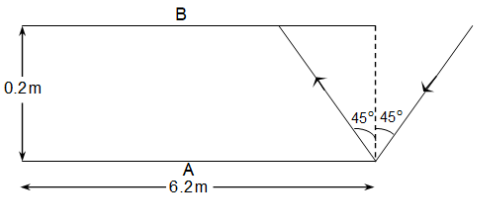
Sol.66 **[C]** Critical angle for glass-liquid pair $\longrightarrow$ $n_1 SinC = n_2 \sin 90^o \Rightarrow \frac{3}{2} SinC = n(1) \Rightarrow SinC = \frac{2n}{3}$

For T.I.R. on face AC, $i \geq C$ we have $i = 60^o$

So $\sin 60^o \geq SinC$

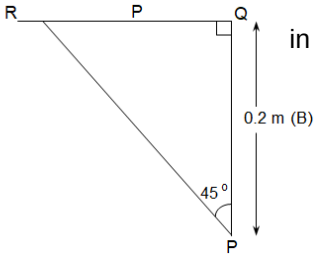
$\frac{\sqrt{3}}{2} \geq \frac{2n}{3} \Rightarrow n \leq \frac{3\sqrt{3}}{4}$

Sol.67 **[D]**



no. of reflections $n = \frac{6.2m}{0.2m}$

$n = \frac{62}{2} = 31$



in right angle ΔPQR

$\tan 45^o = \frac{P}{B} = \frac{P}{0.2}$

$P = 0.2 \tan 45^o$

$P = 0.2 (1)$

$P = 0.2$ m

Sol.68 **[D]** $pH = \log \frac{1}{[H^+]}$ when value of $[H^+]$ increase pH value decrease.

Sol.69 **[A]** Because acid react with metal and metal carbonate fast as comparison base, so HCl shows rapid evolution of gas as comparison NaOH.

Sol.70 **[C]** Cathode is that electrode which connect with negative terminal of battery.
Anode is that electrode which connect with positive terminal of battery.
Cation is that ion which have positive charge and move towards cathode
Anion is that ion which have negative charge and move towards anode.

BIOLOGY

Sol.71 **[A]**

Sol.72 **[B]**

Sol.73 **[B]**

Sol.74 **[A]**

Sol.75 **[C]**

Sol.76 **[B]**

DIFFICULT LEVEL

Sol.77 [C]

$1^2 - 2^2 + 3^2 - 4^2 + 5^2 - 6^2 + \ldots + (2n-1)^2 - (2n)^2$

We have, $a^2 - b^2 = (a - b)(a + b)$

$1^2 - 2^2 + 3^2 - 4^2 + 5^2 - 6^2 + \ldots + (2n-1)^2 - (2n)^2$

$= (1-2)(1+2) + (3-4)(3+4) + \ldots (2n-1-2n)(2n-1+2n)$

$= (-1)(1+2) + (-1)(3+4) + \ldots (-1)(2n-1+2n)$

$= -1[1 + 2 + 3 + 4 + \ldots 2n - 1 + 2n]$

$= -1[\frac{2n(2n+1)}{2}]$ $\quad [\because 1 + 2 + 3 \ldots\ldots x = \sum x = \frac{x(x+1)}{2}]$

$= -n(2n + 1)$

Hence, sum of the series $= -n(2n + 1)$

Sol.78 [B]

Assuming the cyclist speed without the wind = a and the wind speed = b

Then $\frac{1km}{a+b} = 3 \Rightarrow a+b = \frac{1}{3}$

$\frac{1km}{a-b} = 4 \Rightarrow a-b = \frac{1}{4}$

Adding both the equations, we get $2a = \frac{1}{3} + \frac{1}{4}$

$\Rightarrow a = \frac{7}{24}$

Time taken to cover 1 km $= \frac{1\,km}{a} = \frac{1\ km}{\frac{7}{24}} = \frac{24}{7} = 3\frac{3}{7}$

Sol.79 [B]

$\Rightarrow 2x^2 + kx - 5 = 0$

$\alpha + \beta = -\frac{k}{2}, \alpha\beta = -\frac{5}{2}$

$\rightarrow x^2 - 3x - 4 = 0$

$\Rightarrow x^2 - 3x - 4 = 0$

$\Rightarrow x^2 - 4x + x - 4 = 0$

$\Rightarrow x(x-4) + 1(x-4) = 0$

$\therefore \alpha = -1, \beta = 4$

If common root is -1,

$$\therefore \beta = \frac{5}{2}$$

$$\therefore k = -3$$

If common root is 4

$$\beta = -\frac{5}{8}$$

$$\therefore k = -\frac{27}{4}$$

Sol.80 [D]

$$\text{Given } x = \sec\theta - \tan\theta = \frac{1-\sin\theta}{\cos\theta}$$

$$y = \text{cosec}\,\theta + \cot\theta = \frac{1+\cos\theta}{\sin\theta}$$

$$xy + 1 = \left(\frac{1-\sin\theta}{\cos\theta}\right)\left(\frac{1+\cos\theta}{\sin\theta}\right) + 1 = \frac{1-\sin\theta+\cos\theta}{\sin\theta\cos\theta}$$

$$= \frac{(\sin^2\theta+\cos^2\theta)}{\sin\theta\cos\theta} - \frac{(\sin\theta-\cos\theta)}{\sin\theta\cos\theta}$$

$$= (\tan\theta + \cot\theta) - (\sec\theta - \text{cosec}\,\theta)$$

$$= (\text{cosec}\,\theta + \cot\theta) - (\sec\theta - \tan\theta) = y - x$$

$$\therefore\ xy + 1 = y - x$$

SECTION – B

MENTAL ABILITY

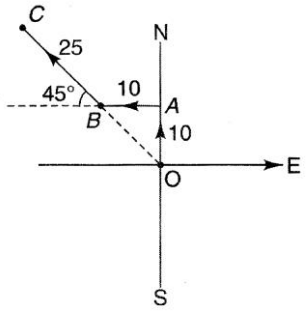
Sol.81 [A]

Sol.82 [A]

Sol.83 [B] Each letter of the word MYSTIFY is moved one step forward to obtain the corresponding letter of the code.

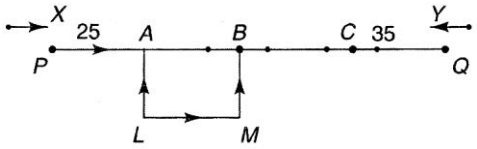
Sol.84 [D] From 2nd and 3rd statements, we can find the code for 'home'. To find the code for 'they', we need the code for 'go' which can not be determined from the data. Thus data is inadequate to find the code for 'they'.

Sol.85 [B] Rohit originally is facing but he turns to his left from O. Here onwards his travel plans are shown in the diagram. He is finally at C which is North-west with respect to his starting point O.



Sol.86 [A] The route Bus X is P→A→L→M→B.
Clearly PB = 50 kms
Bus Y travels along the route Q→C.

The distance between the two buses X and Y is BC = 120 – (50 + 35) = 35 kms.



Sol.87 **[C]** Sohan's son's uncle means Sohan's brother. So, the old man's son is Sohan's brother, i.e. the old man is the father of Sohan. The answer is (C).

Sol.88 **[D]** Studying the statements carefully, was find that B is the brother of A and A's son is the brother of D, so D is the daughter of A. Since C and D are sisters, so C is also the daughter of A. Thus B is the uncle of C.

Sol.89 **[B]**

Sol.90 **(A OR D)**

Sol.91 **[D]**

Sol.92 **[B]** As 1990 was not a leap year, it would have one odd day. Thus, the same date in the following year would fall on Tuesday.

Sol.93 **[B]** Number of odd days in 1600 years = 0
Number of odd days in 300 years = 1
Number of leap years in 46 years = 11
Number of odd days in 46 years = 35
$11\times 2+35\times 1=22+35=57=1$
Number of odd days in year 1980 up to 15th August = 31+28+31+30+31+30+31+15=227 = 1
Total number of odd days = 1+1+3=5
Therefore, the day on 15th August, 1947 was Friday.

Sol.94 **[B]** In this figure these are 21 columns containing 2 cubes each, 4 columns containing 1 cube each,
So, $(21\times 2)+(4\times 1)=46$

Sol.95 **[D]** If first figure cube is rotated anticlockwise then it will look like third figure, so opposite to number 2, it is number 5.

Sol.96 **[C]** From figures-1 and 2 only we can see that opposite to face with number 6 is number 1.

Sol (97-100):

	Place of Stay	Subject
P	PG	English
Q	Home	Statistics / History
R	Home	Philosophy
S	Hostel	Physics
T	PG	Maths
U	Hostel	Statistics / History

Sol.97 **[D]**

Sol.98 **[A]**

Sol.99 **[B]**

Sol.100 **[C]**