Specimen Answers of Question Paper. 3

Standard 10th Mathematics Part I

Time : 2 Hours **Marks 40**

Q. 1 (A)

(1) Q = $\left\{\frac{p}{q} | p, q \in I, q \neq 0\right\}$

(2) $|8| + |-3| = 8 + 3 = 11$

(3) When $x = -1$,

$x^4 - x^3 + 5 = (-1)^4 - (-1)^3 + 5$

$= 1 - (-1) + 5$

$= 1 + 1 + 5 \quad = 7$

(4) $x^2 = 16 \times 9$

$\therefore x = 4 \times 3 = 12$

(5) $x + y = 12$,

$\therefore$ when $x = 5$,

$5 + y = 12 \qquad \therefore y = 12 - 5 = 7$

(6) From first of April to 31st of March.

(B)

(1) Mean = $\frac{1+3+2+2+4+1+2+2+1}{9} = \frac{18}{9} = 2$

Acending order is 1, 1, 1, 2, 2, 2, 2, 3, 4

The number at middle place is 2. $\therefore$ Median = 2

The number repeated maximum number of times is 2.

$\therefore$ the mode is 2.

(2) (i) $a : b = 7 : 2$

$\therefore b : a = 2 : 7$ .... invertendo

(ii) $\frac{a}{b} = \frac{7}{2} \qquad \therefore \frac{a+b}{b} = \frac{7+2}{2} = \frac{9}{2}$ .... componendo

(3)

$$\begin{array}{rl} & 3x + y = 14 \text{ ....(1)} \\ + & x - y = 2 \text{ ....(2)} \\ \hline \therefore & 4x \quad = 16 \text{ .... adding (1) and (2)} \end{array}$$

$\therefore\ x = 4$

substituting $x = 4$ in equation (2)

$4 - y = 2$

$\therefore\ -y = 2 - 4 = -2$

$\therefore\ y = 2$

Q. 2 (A)

(1) (B) $\frac{3}{2}, 2$ (2) (C) $\frac{n(n+1)}{2}$

(3) (A) Market value > Face value (4) (D) 2

(B)

(1) S = {HH, HT, TH, TT}, $n(S) = 4$

If event A is getting a head on both coins.

A = {HH}, $n(A) = 1$

$P(A) = \frac{n(A)}{n(S)} = \frac{1}{4}$

(2)

Class	Class Mark (x_i)	Frequency f_i	$x_i f_i$
0-20	10	6	60
20-40	30	4	120
40-60	50	5	250
60-80	70	7	490
80-100	90	3	270
		25	1190

$\text{Mean} = \frac{\sum x_i f_i}{\sum f_i}$

$= \frac{1190}{25}$

$= 47.6$

(3) $\alpha = 4$ and $\beta = -12$

$\therefore\ \alpha + \beta = 4 + (-12) = -8$

$\alpha\beta = 4 \times (-12) = -48$

$x^2 - (\alpha + \beta)x + \alpha\beta = 0$

$x^2 - (-8)x + (-48) = 0$

$x^2 + 8x - 48 = 0$

Q. 3 (A)

(1) $n(S) = 20 + 40 + 15 + 25 = \boxed{100}$

$n(C) = \boxed{15}$

$P(C) = \frac{n(C)}{n(P)} = \boxed{\frac{15}{100}} = \boxed{\frac{3}{20}}$

(2) $S_n = \frac{n}{2}[\boxed{2a} + (n - 1) d]$

$\therefore S_{30} = \frac{30}{2}[20 + (30 - 1) \times \boxed{5}]$

$= 15[20 + \boxed{145}]$

$= 15 \times 165$

$= \boxed{2475}$

(3)

x	$\boxed{1}$	-1
y	1	$\boxed{-5}$
(x, y)	$\boxed{(1, 1)}$	$\boxed{(-1, -5)}$

(B)

(1) F. V. = Rs. 100, M. V. = Rs. 150, Dividend = 12%

Let rate of return = x %

If Rs. 150 are invested, the returns are Rs. 12

$\therefore \frac{12}{150} = \frac{x}{100}$

$x = \frac{12 \times 100}{150} = 8$

$\therefore$ The rate of return is 8 %.

(2) The A. P. is 3, 8, 13, 18, ...

Let the n^{th} term of the A. P. be 148.

$a = 3$, $d = 5$ and $t_n = 148$

$t_n = a + (n - 1) d$

$148 = 3 + (n - 1)\,5$

$\quad = 3 + 5n - 5$

$\therefore\ 5n = 148 + 2 = 150$

$\therefore\ n = 30$

$\therefore$ 30^{th} term is 148.

(3) $x + y = 7$

$2x - 3y = 9$

$\therefore\ a_1 = 1,\ b_1 = 1,\ c_1 = 7$ and $a_2 = 2,\ b_2 = -3,\ c_2 = 9$

Now, $D = \begin{vmatrix} a_1 & b_1 \\ a_2 & b_2 \end{vmatrix} = \begin{vmatrix} 1 & 1 \\ 2 & -3 \end{vmatrix} = -3 - 2 = -5$

$Dx = \begin{vmatrix} c_1 & b_1 \\ c_2 & b_2 \end{vmatrix} = \begin{vmatrix} 7 & 1 \\ 9 & -3 \end{vmatrix} = -21 - 9 = -30$

$Dy = \begin{vmatrix} a_1 & c_1 \\ a_2 & c_2 \end{vmatrix} = \begin{vmatrix} 1 & 7 \\ 2 & 9 \end{vmatrix} = 9 - 14 = -5$

$\therefore\ x = \frac{Dx}{D} = \frac{-30}{-5} = 6$ and $y = \frac{Dy}{D} = \frac{-5}{-5} = 1$

Q. 4

(1) α and β are the roots of $x^2 - 4x - 6 = 0$

$\therefore\ a = 1,\ b = -4,\ c = -6$

$\alpha + \beta = \frac{-b}{a} = \frac{-(-4)}{1} = \frac{4}{1} = 4$

$\alpha\beta = \frac{c}{a} = \frac{-6}{1} = -6$

$\alpha^2 + \beta^2 = (\alpha + \beta)^2 - 2\alpha\beta$

$\quad = (4)^2 - 2(-6)$

$\quad = 16 + 12$

$\quad = 28$

$\alpha^3 + \beta^3 = (\alpha + \beta)^3 - 3\alpha\beta(\alpha + \beta)$

$\quad = (4)^3 - 3(-6)(4)$

$\quad = 64 + 72$

$\quad = 136$

(2) $t_n = a + (n - 1)d$

$\therefore\ t_3 = a + (3 - 1)d = a + 2d$

$t_7 = a + (7 - 1)d = a + 6d$

$\therefore\ t_3 + t_7 = (a + 2d) + (a + 6d) = 2a + 8d$

$\therefore\ 2a + 8d = 6$

$\therefore\ a + 4d = 3$ ....(I)

$t_3 \times t_7 = (a + 2d)\ (a + 6d)$

$= (a + 4d - 2d)\ (a + 4d + 2d)$

$= (3 - 2d)\ (3 + 2d)$ .... from (I)

$\therefore\ (3 - 2d)\ (3 + 2d) = 8$

$\therefore\ 9 - 4d^2 = 8$

$\therefore\ 4d^2 = 1 \qquad d^2 = \frac{1}{4} \qquad d = \frac{1}{2}$ or $d = -\frac{1}{2}$

Now, if $d = \frac{1}{2}$	If $d = -\frac{1}{2}$
$a + 4 \times \frac{1}{2} = 3$ .... from (I)	$a + 4 \times \left(-\frac{1}{2}\right) = 3$ .... from (I)
$a = 1$	$a = 5$

$\therefore$ the first term of the A. P. is 1 and the common difference is $\frac{1}{2}$.
or, the first term of the A. P. is 5 and the common difference is $-\frac{1}{2}$.

(3) The total number of students, N = 500.

For mathematics, $\theta = 126$

No. of students showing
inclination toward Maths $= \frac{\theta}{360} \times N = \frac{126}{360} \times 500 = 175$

Similarly,

No. of students showing
inclination towards Social science $= \frac{54}{360} \times 500 = 75$

No. of students showing
inclination towards Science $= \frac{72}{360} \times 500 = 100$

No. of students showing
inclination towards languages $= \frac{108}{360} \times 500 = 150$

Now, $150 - 100 = 50$

$\therefore$ 50 more students show inclination towards languages than towards science

(4) Suppose, the units place digit of the two digit number is y and the tens place digit is x.

$\therefore$ the number is $10x + y$

$\therefore$ the number obtained by reversing the digits is $10y + x$

$\therefore$ from the given conditions,

$(10x + y) + (10y + x) = 121$

$\therefore$ $11x + 11y = 121$ $\therefore$ $x + y = 11$ .... (I)

Also, $x = y + 7$ $\therefore$ $x - y = 7$ ....(II)

$\therefore$ Adding (I) and (II), $2x = 18$ $x = 9$

$\therefore$ from (I) $a + y = 11$ $y = 2$

$\therefore$ the two digit number is 29.

Q. 5

(1) The distance between Akola and Bhusawal is 168 km.

Suppose, average speed of passenger train is x km/hr.

$\therefore$ the average speed of express train is $(x + 14)$ km/hr.

$\therefore$ the time required for passenger train = $\frac{168}{x}$ hours

and the time required for express train = $\frac{168}{x+14}$ hours

$\therefore$ from the given condition,

$$\frac{168}{x} - \frac{168}{x+14} = 1$$

$$\therefore \frac{168x+168\times14-168x}{x(x+14)} = 1$$

$\therefore$ $x^2 + 14x = 168 \times 14$

$\therefore$ $x^2 + 14x - 2352 = 0$

$\therefore$ $x^2 + 56x - 42x - 2352 = 0$

$\therefore$ $x(x + 56) - 42(x + 56) = 0$

$\therefore$ $x(x + 56)(x - 42) = 0$

$\therefore$ $x + 56 = 0$ or $x - 42 = 0$

$\therefore$ $x = -56$ or $x = 42$

But speed is not negative

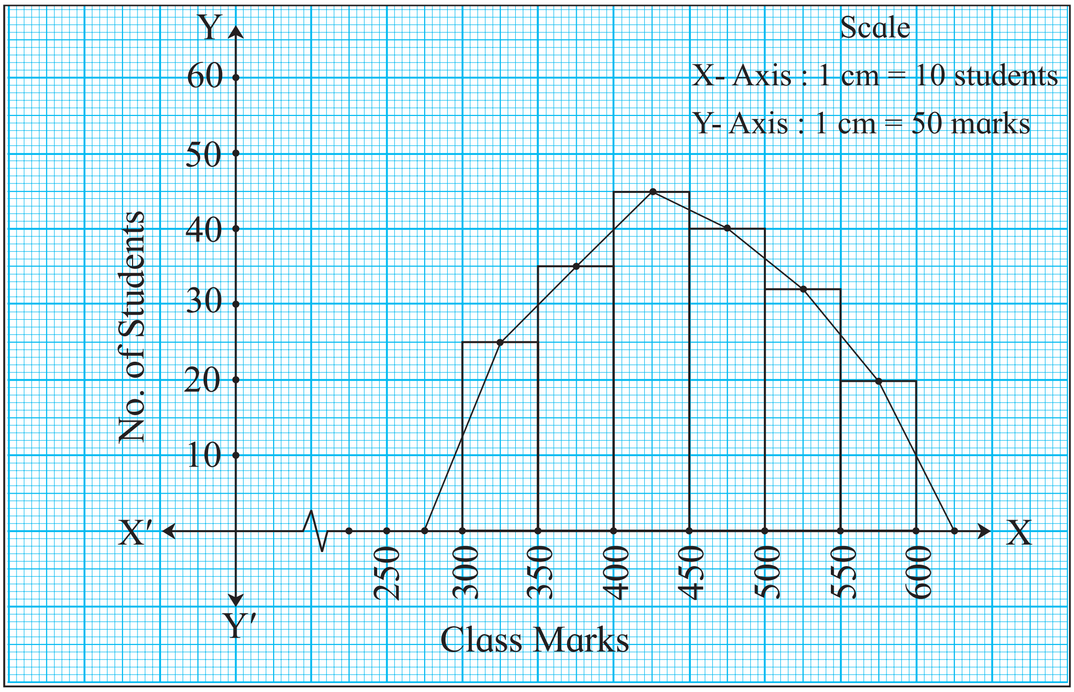
$x = 42$

$\therefore$ average speed of passenger train = 42 km/hr

and average speed of express train = (42 + 14) = 56 km/hr.

(2)

Class Mark	Classes of Marks	No. of students (Frequency)	Co-ordinates
325	300 - 350	25	(325, 25)
375	350 - 400	35	(375, 35)
425	400 - 450	45	(425, 45)
475	450 - 500	40	(475, 40)
525	500 - 550	32	(525, 32)
575	550 - 600	20	(575, 20)



Q. 6

(1) Let the number of blue balls be B, of red balls R and of white balls W.

As per given information, B < R < W.

Colour of ball →	B	R	W	
No. of balls ↓	1	38	11	Not as per information.
	2	26	22	Not as per information.
	3	14	33	**Possible as per information.**
	4	2	44	Not as per information.

there are 3 blue, 14 red and 33 white balls in the bag.

Let the event that the ball is red be A.

$n(A) = 14$ and $n(S) = 50$

probability of a ball drawn is red $= \frac{n(A)}{n(S)}$

$= \frac{14}{50}$

$= \frac{7}{25}$

(2) (i) The sale of dealer A $= \frac{100}{5} \times 5000 = 1{,}00{,}000$ rupees

(ii) The purchase of dealer B $= \frac{100}{5} \times 4000 = 80{,}000$ rupees

(iii) $\therefore$ Balance of CGST paid by A $= \frac{1000}{2}$ = Rs. 500

and SGST = Rs. 500

Mathematics Part II STD 10th

Question Paper No. 3 Answersheet

Q. 1 (A)

(1) $d(A, B) = 4 - (-8) = 4 + 8 = 12$

(2) $\angle RHG = \angle DHP$ ....(Opposite angles)

$= 85^\circ$

$\angle HGS = \angle DHP$ .... (Corresponding angles)

$= 85^\circ$

(3) $\angle ACD = \angle B + \angle A$ .... (theorem of remote interior angle)

$= 40 + 70$

$= 110^\circ$

(4) WY = 2 OY = 2×5 = 10 cm (Diagonals of parallelogram bisect each other)

(5) Point A(−3, 2) is in second quadrant and point B(12, 0) is on X− axis.

(6) Curved surface area of sphere $= 4\pi r^2$

$= 4 \times 3.14 \times 1^2 \quad (\because r = 1 \text{ cm})$

$= 4 \times 3.14 \times 1$

$= 4 \times 3.14$

$= 12.56$ sq. cm

Q . 1 (B)

(1) 2.sin30 + 3.tan45

$= 2 \times \frac{1}{2} + 3 \times 1$

$= 1 + 3$

$= 4$

(2) $MB = \frac{1}{2} \times AB = \frac{1}{2} \times 12 = 6$ cm (perpendicular drawn from the centre of the circle to the chord bisects the chord)

$OB^2 = OM^2 + MB^2$ ....(Pythagoras thearem)

$= 8^2 + 6^2$

$= 64 + 36 = 100$

$\therefore OB = 10$ cm

(3) In Δ PQR 12 cm > 10 cm > 8 cm

$\therefore$ QR > PQ > PR

$\therefore$ $\angle P > \angle R > \angle Q$

The biggest angle is $\angle P$ and the smallest angle is $\angle Q$.

Q 2 (A) (1) A (2) C (3) A (4) B

Q. 2 (B)

(1) Δ ABC ~ Δ DEF

$$\frac{A(\Delta ABC)}{A(\Delta DEF)} = \frac{AB^2}{DE^2}$$

$$\frac{1}{2} = \frac{4^2}{DE^2}$$

$$\frac{1}{2} = \frac{16}{DE^2}$$

$\therefore DE^2 = 16 \times 2$ $\quad\therefore DE = 4\sqrt{2}$

(2) Chords EN and FS intersect each other externally.

$$\therefore \angle NMS = \frac{1}{2} \times [m(\text{arc NS}) - m(\text{arc EF})]$$

$$= \frac{1}{2} \times (125 - 37)$$

$$= \frac{1}{2} \times 88$$

$$= 44^0$$

(3) P(0, 6) $\quad$ Q(12, 20)

$\downarrow$ $\quad$ $\downarrow$

(x_1, y_1) $\quad$ (x_2, y_2)

Let co-ordinates of midpoint be (x, y)

By formula for midpoint.,

$$x = \frac{x_1 + x_2}{2}$$

$$= \frac{0+12}{2}$$

$$= \frac{12}{2} = 6$$

$$y = \frac{y_1 + y_2}{2}$$

$$y = \frac{6+20}{2}$$

$$= \frac{26}{2}$$

$$= 13$$

$\therefore$ PQ co-ordinates of midpoint of segment PQ are(6, 13)

Q. 3 (A)

(1) AB = BC

$\angle BAC = \angle BCA = \boxed{45^\circ}$

$AB = BC = \boxed{\frac{1}{\sqrt{2}}} \times AC$

$= \boxed{\frac{1}{\sqrt{2}}} \times \sqrt{8} = \frac{1}{\sqrt{2}} \times \sqrt{4 \times 2}$

$= \boxed{\frac{1}{\sqrt{2}}} \times 2\sqrt{2}$

$= 2$

(2) Proof : $\angle EFG = \angle FGH$ .... $\boxed{\text{Alternate angles}}$ (I)

$\angle EFG = \boxed{\frac{1}{2}\ [m(\text{arc EG})]}$ ....(Inscribed angle theorem) (II)

$\angle FGH = \boxed{\frac{1}{2}\ [m(\text{arc FH})]}$ .... (Inscribed angle theorem) (III)

$\therefore m(\text{arc EG}) = \boxed{m(\text{arc FH})}$ .... [(I), (II), (III)]

$\therefore$ chord EG $\cong$ chord FH..... (corresponding chords of congruent arcs)

(3) Area of square ABCD = side^2

$= 7^2$

$= 49\ \text{cm}^2$

Sector D–AXC $= \frac{\theta}{360} \times \pi r^2$

$= \frac{90}{360} \times \frac{22}{7} \times 7^2$

$= \frac{1}{4} \times \frac{22}{7} \times 7 \times 7$

$= \frac{154}{4}$

$= 38.5\ \text{cm}^2$

$\therefore$ Area of shaded portion = 49 − 38.5

$= 10.5\ \text{cm}^2$

Q 3 (B)

(1) $NQ^2 = MQ \times QP$ .... (Theorem of Geometric mean)

$= 9 \times 4$

$= 36$

$\therefore NQ = 6$

(2) $\sec\theta + \tan\theta = \dfrac{1}{\cos\theta} + \dfrac{\sin\theta}{\cos\theta}$

$= \dfrac{1+\sin\theta}{\cos\theta}$

$= \dfrac{(1+\sin\theta)(1-\sin\theta)}{\cos\theta(1-\sin\theta)}$

$= \dfrac{1^2-\sin^2\theta}{\cos\theta(1-\sin\theta)}$

$= \dfrac{\cos^2\theta}{\cos\theta(1-\sin\theta)}$

$\therefore \sec\theta + \tan\theta = \dfrac{\cos\theta}{1-\sin\theta}$

(3) $r_1 = 5$ cm, $r_2 = 2$ cm, $h = 9$ cm

Area of frustum$= \dfrac{1}{3}\pi h\,(r_1^{\,2} + r_2^{\,2} + r_1 \times r_2)$

$= \dfrac{1}{3} \times 3.14 \times 9\,(5^2 + 2^2 + 5 \times 2)$

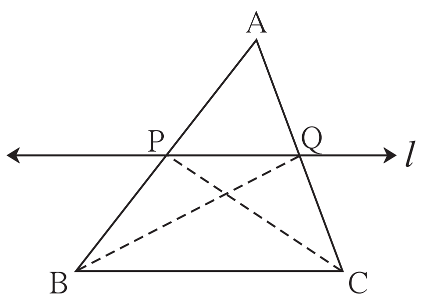
$= 3.14 \times 3(25 + 4 + 10)$

$= 3.14 \times 3 \times 39$

$= 367.38$ cm^2

Q 4

(1)



Given :In ΔABC line $l \parallel$ Side BC line l intersects side AB and side AC in P and Q respectively.

To prove : $\dfrac{AP}{PB} = \dfrac{AQ}{QC}$

Construction : Draw seg PC and seg QB.

Proof : $\frac{A(\Delta APQ)}{A(\Delta PQB)} = \frac{AP}{PB}$ ...... (I) (Areas are in proportion to the bases)

$\frac{A(\Delta APQ)}{A(\Delta PQB)} = \frac{AQ}{QC}$ .... (II) (Areas are in proportion to the bases)

Δ PQB and Δ PQC have the same base PQ and PQ || BC,

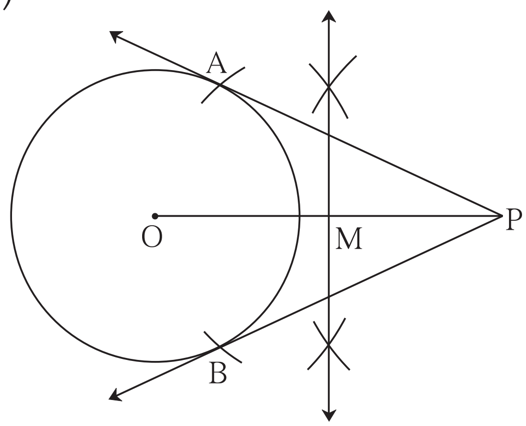
their height is also same.

$\therefore$ A(Δ PQB) = A(Δ PQC) ..... (III)

$\therefore$ $\frac{A(\Delta APQ)}{A(\Delta PQB)} = \frac{A(\Delta APQ)}{A(\Delta PQC)}$ .... from ((I), (II) and (III)

$\therefore$ $\frac{AP}{PB} = \frac{AQ}{QC}$ .... from (I) , (II)

(2)



(3) slope of the line = $\frac{y_2 - y_1}{x_2 - x_1}$

P(2, 4), Q(3, 6)

slope of the line PQ = $\frac{6-4}{3-2} = \frac{2}{1} = 2$

R (3, 1), S (5, k)

slope of the line RS = $\frac{k-1}{5-3} = \frac{k-1}{2}$

But line PQ || line RS

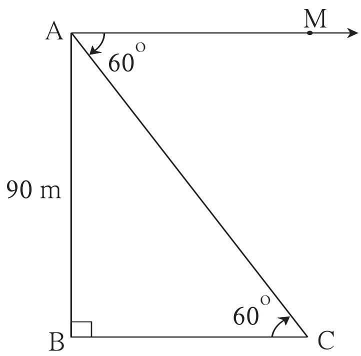
$\therefore$ slope of line PQ = slope of line RS

$\therefore$ $2 = \frac{k-1}{2}$

$\therefore$ $4 = k - 1$

$\therefore$ $4 + 1 = k$

$\therefore$ $k = 5$



Let AB be the light house.

The boat is at C and observer is at A.

$\angle$ MAC is the angle of depression.

$\angle MAC = \angle ACB = 60^\circ$ .....(Alternate angle)

AB = 90 m.

From the figure, $\tan 60^\circ = \frac{AB}{BC}$

$$\sqrt{3} = \frac{90}{BC}$$

$$BC = \frac{90}{\sqrt{3}} = \frac{90 \times \sqrt{3}}{\sqrt{3} \times \sqrt{3}} = \frac{90\sqrt{3}}{3} = 30\sqrt{3}$$

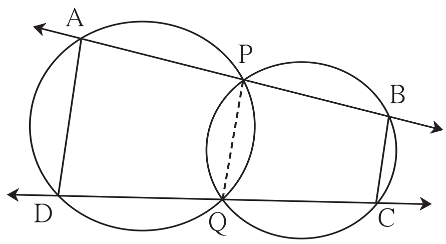
$\therefore$ BC = 30 × 1.73

$\therefore$ BC = 51.90

$\therefore$ The boat is at a distance of 51.90m from the light house.

Q. 5

(1)



Draw Seg PQ.

APQD is a cyclic qudrilateral.

$\angle ADQ + \angle APQ = 180^\circ$ .... (1)

PBCQ is a cyclic qudrilateral.

$\therefore \angle BCQ + \angle BPQ = 180^\circ$ ...... (2)

$\therefore \angle ADQ + \angle APQ + \angle BCQ + \angle BPQ = 180^\circ + 180^\circ$.... [from (1),(2)]

$\therefore \angle ADQ + \angle BCQ + \angle APQ + \angle BPQ = 180^\circ + 180^\circ$ ...... (3)

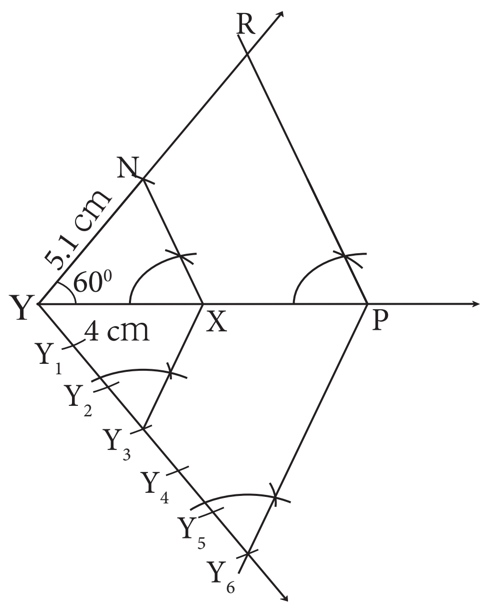
But $\angle APQ + \angle BPQ = 180^\circ$ .... (4) (angles in linear pair)

$\therefore \angle ADQ + \angle BCQ + 180^\circ = 180^\circ + 180^\circ$ .... [from (3) , (4)]

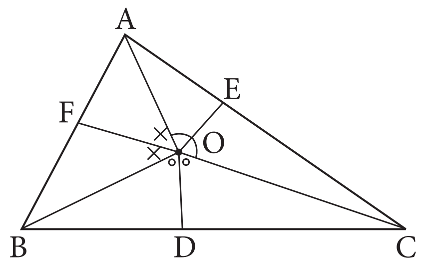
$\therefore \angle ADQ + \angle BCQ = 180^\circ$

$\therefore \angle ADC + \angle BCD = 180^\circ$

(2)



Q. 6



(1) In Δ AOB, OF is bisector of $\angle$ AOB

$\therefore \frac{OA}{OB} = \frac{AF}{BF}$ .... (1) (by angle bisector theoerm)

In Δ BOC, OD is bisector of angle $\angle$ BOC .

$\therefore \frac{OB}{OC} = \frac{BD}{CD}$ .... (2)(by angle bisector theoerm)

In Δ AOC , OE is bisector of angle$\angle$ AOC.

$\therefore \frac{OC}{OA} = \frac{CE}{AE}$ .... (3)(by angle bisector theoerm)

$\therefore \frac{OA}{OB} \times \frac{OB}{OC} \times \frac{OC}{OA} = \frac{AF}{BF} \times \frac{BD}{CD} \times \frac{CE}{AE}$ from (1), (2) and (3)

$\therefore \frac{OA \times OC \times OB}{OB \times OA \times OC} = \frac{AF \times CE \times BD}{BF \times AE \times CD}$

$\therefore \quad 1 = \frac{AF \times CE \times BD}{BF \times AE \times CD}$

$\therefore$ BF $\times$ AE $\times$ CD = AF $\times$ CE $\times$ BD

(2) Volume of hemisphere $= \frac{2}{3} \pi R^3$

volume of cone $= \frac{1}{3} \pi r^2 \times h$

By the given condition ;

2 × volume of cone = volume of hemisphere

$\therefore 2 \times \frac{1}{3} \pi r^2 h = \frac{2}{3} \pi R^3$

$\therefore r^2 h = R^3$

$\therefore$ if $r = h = R$ ....then both sides will be equal.

$\therefore$ if radius of base of the cone is R and its height is R, which is equal to radius of the bowl, then a cone satisfying the given condition can be made.

Activity Sheet 3: Model Answer

Std: 10^{th} | Science and Technology: Part I | Marks: 40

Que. 1 A) 5 marks

i. $s = \frac{1}{2}gt^2$. 1

ii. Li/Na/K/Rb/Cs/Fr (any one) 1

iii. Decrease in temperature 1

iv. H_2O 1

v. Bulb A 1

B) 5गुण

i. a) $F_1 = F_2$ 1

ii. b) Angle of deviation decreases but after certain value of incident angle, deviation angle increases. 1

iii. a) single 1

iv. d) double displacement 1

v. c) Sunita Williams 1

Que. 2 (any five) 10 marks

1. i. Elements in period 3: $_{14}S,\ _{15}P$ 1

ii. electronic configuration $_{14}S$: $2, 8, 4$ $\frac{1}{2}$

$_{15}P$: $2, 8, 5$ $\frac{1}{2}$

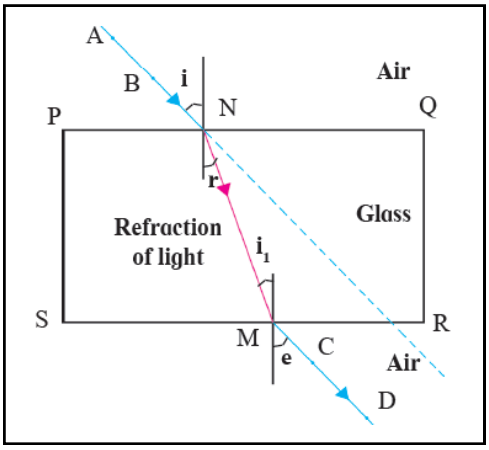
2. $v = 1.5 \times 10^8 m/s,\ c = 3 \times 10^8 m/s$, n= ?

$n = \frac{c}{v}$ $\frac{1}{2}$

$n = \frac{3\times 10^8}{1.5\times 10^8}$ $\frac{1}{2}$

$n = 2$ $\frac{1}{2}$

absolute refractive index of the medium is 2. $\frac{1}{2}$

3. 

in figure. PQ || SR

NM is a refracted ray. $\therefore\ r = i_1$

By the laws of refraction,

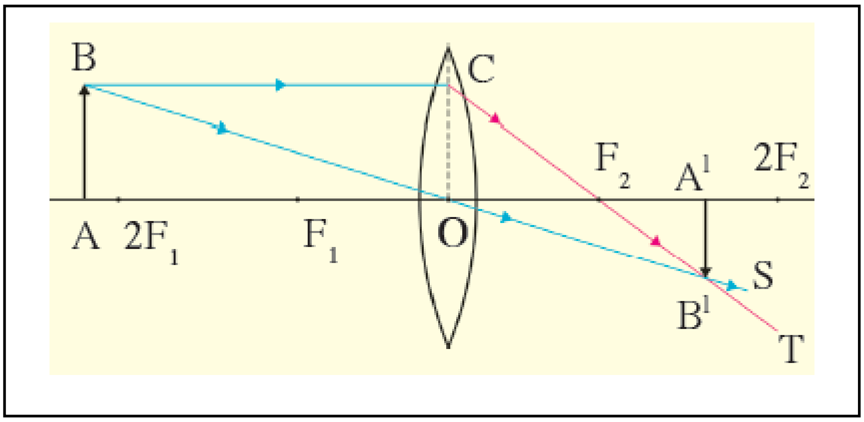
$_{g}n_{a} = \frac{\sin i}{\sin r}$; $_{a}n_{g} = \frac{\sin i_1}{\sin e}$ $\frac{1}{2}$

$\therefore\quad _{g}n_{a} = \frac{1}{_{a}n_{g}}$ $\frac{1}{2}$

$\therefore\quad \frac{\sin i}{\sin r} = \frac{\sin e}{\sin i_1}$ ....but $r = i_1$ $\frac{1}{2}$

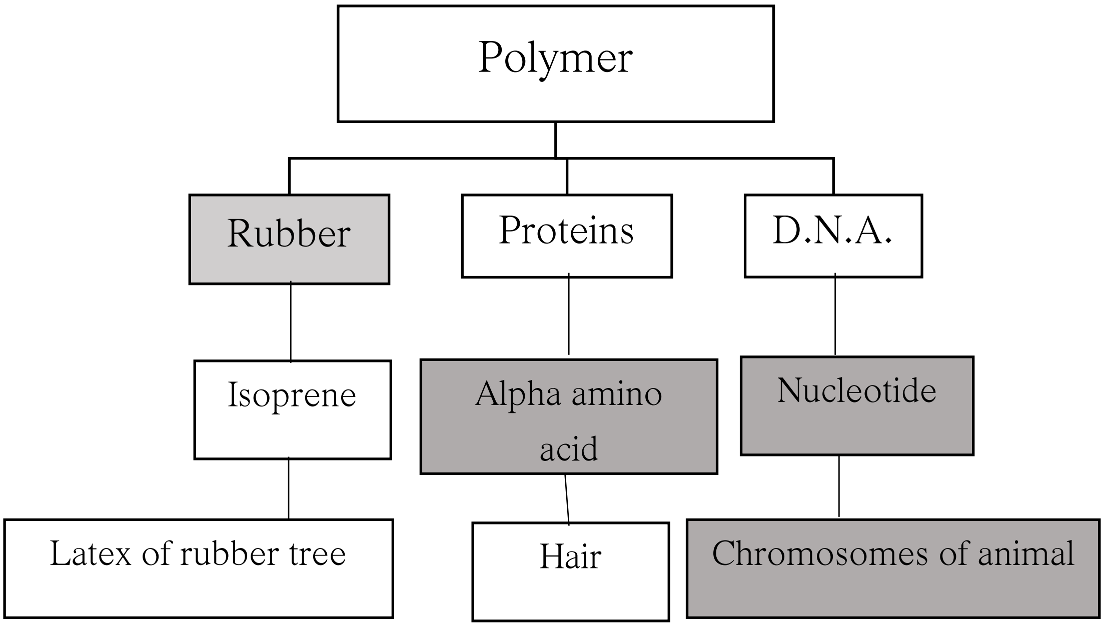
$\therefore\quad \sin i = \sin e$

$\therefore\quad i = e$ $\frac{1}{2}$

4. 

scientifically and technically correct diagram 2

5. $\frac{1}{2}$ mark for each 2



6. i. orbit of geostationary satellite is parallel to the equator. $\frac{1}{2}$

ii. the time of revolution for the earth around itself and that for geostationary satellite to revolve around the earth being the same 1

iii. these satellites are stationery with reference to the earth they can observer a specific portion of the earth continuously. $\frac{1}{2}$

iv. therefore, geostationary satellite not useful for studies of polar regions.

7. a) low earth orbits $\frac{1}{2}$

height above the earth's surface: 180 km to 2000 km $\frac{1}{2}$

b) Medium earth orbits $\frac{1}{2}$

height above the earth's surface: 2000 km to 35780 km $\frac{1}{2}$

c) high earth orbits $\frac{1}{2}$

height from the earth's surface > 35780 km $\frac{1}{2}$

Que. 3 (any five) 15 marks

1. radius of planet 'A' = R_A, radius of planet 'B' = R_B

Mass of planet 'A' = M_A, mass of planet 'B' = M_B= ?

From given...

$R_A = \frac{R_B}{2}$; $g_B = \frac{1}{2}\ g_A$ $\frac{1}{2}$

$g = \frac{GM}{R^2}$; $\therefore\ g_A = \frac{GM_A}{R_A^2}$; $\therefore\ g_B = \frac{GM_B}{R_B^2}$ $\frac{1}{2}$

$\frac{GM_B}{R_B^2} = \frac{1}{2}\left(\frac{GM_A}{R_A^2}\right)$ ... $\frac{1}{2}$

$\frac{M_B}{R_B^2} = \frac{1}{2}\left(\frac{GM_A}{\left(R_B/_2\right)^2}\right)$ ... $\frac{1}{2}$

$\frac{M_B}{R_B^2} = \frac{1}{2}\left(4\frac{GM_A}{(R_B)^2}\right)$ $\frac{1}{2}$

$M_B = 2\ M_A$ $\frac{1}{2}$

2. a) Li 1

b) first group 1

c) while going down a group atomic radius goes on increasing. As a result, atomic size increases. 1

3. a) carbon dioxide 1

b) lime water turns milky. 1

c) $CaCO_{3\,(s)} \xrightarrow{\Delta} CaO_{(s)} + CO_2 \uparrow$ 1

4. i. This is exothermic process. 1

ii. if we poured conc. sulphuric acid speedily in a water. Water gets evaporated instantaneously and very large amount of heat is liberated which may cause an accident. 1

iii. to avoid this, and only small amount of heat is liberated at a time it added slowly to water with constant stirring 1

5. i. butane 1

ii. propanoic acid 1

iii. butan-2-one 1

6. during heating ice the change in temperature with time is shown in the graph

Seg AB: Seg AB represents conversion of ice in to water at constant temperature. During melting of ice at 0^0C, ice absorb heat energy and this continues till all the ice converts into water. 1

Seg BC: once all ice is transformed into water, temperature of water starts rising it increases up to 100^0C. Seg BC represents rise in temperature of water from 0^0C to 100^0C. 1

Seg CD: even though the heat energy is supplied to the water after 100^0C its temperature does not rise. The heat energy absorbed by water is used to break the bonds between molecules of the liquid to convert it into gaseous state. 1

7. a) Myopia or Nearsightedness 1

b) Possible reasons of defect

i. The curvature of the cornea and the eye lens increases. The muscles near the lens cannot relax so that the converging power of the lens remains large. $\frac{1}{2}$

ii. The eyeball elongates so that the distance between the lens and the retina increases. $\frac{1}{2}$

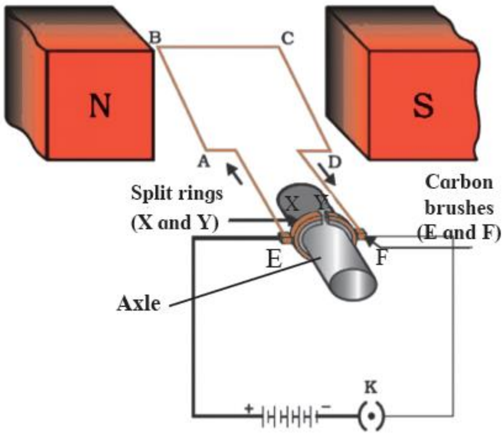
c) correction of defect: this defect can be corrected using spectacles with concave lens. This lens diverges the incident rays and these diverged rays can be converged by the lens in the eye to form image on the retina. 1

Que. 4 (any One) 5 marks

1. a. Fleming's left hand rule 1

b. Electric motor 1

c. 1



d. pleted, the current flows through the coil in the direction A-B-C-D. $\frac{1}{2}$

ii. The coil is in the magnetic field therefor according to Fleming's left hand rule force exerted on the AB branch is in downward direction and on the CD branch it is in upward direction. $\frac{1}{2}$

iii. After half rotation current in the coil start flowing through D-C-B-A direction. $\frac{1}{2}$

iv. therefore, on DC branch force is in downward direction and BA branch it is in upward direction so its complete remaining half rotation. $\frac{1}{2}$

In this way after every half rotation the direction of the current in the coil changes and coil continue to rotate.

2. a. corrosion: **Corrosion** is a process where the water or the moisture on the surface of the metal oxidizes with the atmospheric oxygen. 1

b. Methods of prevention (any two each carry 1/2 mark) 1

1. Galvanizing 2. Anodization 3. Tinning

4. Electroplating 5. Alloying

c. Anodization 1

d. In this process cupper, aluminum are coated with a thin layer of their oxides by means of electrolysis. For this copper or aluminum article is us as anode. It obstructs the contact of the aluminum or copper with oxygen and water. 2