INDIAN SCHOOL AL WADI AL KABIR

FIRST REHEARSAL EXAMINATION(2023-24)

Sub: MATHEMATICS- BASIC(241)

Class: X　　　　Max Marks: 80

Date:05/12/2023　　　　Time: 3 hours

Section A consists of 20 questions of 1 mark each.

Q.1.	**(D)** 3, 420	**Q.2.**	**(C)** 10
Q.3.	**(B)** $x^2 - x - 12$	**Q.4.**	**(C)** no real roots
Q.5.	**(D)** 7.5 cm	**Q.6.**	**(A)** 12 units
Q.7.	**(D)**-9	**Q.8.**	**(B)** 15
Q.9.	**(A)** 60°	**Q.10**	**(C)** 60°
Q.11	**(D)**$2\sqrt{3}cm$	**Q.12**	**(B)** Step 1
Q.13	**(B)** 16 : 9	**Q.14**	**(A)**$360\ cm^2$
Q.15	**(B)** 1/2	**Q.16**	**(A)**100°
Q.17	**(B)** $\frac{22}{46}$	**Q.18**	**(C)**q
Q.19	(a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).	**Q.20**	(a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).

SECTION B

Q.21	Tangent is perpendicular to radius at point of contact. So, ∠ABO = ∠ACO = 90°	½ m
	In a quadrilateral, the sum of the angles is 360°. ∠BAC + ∠BOC + ∠ABO + ∠ACO = 360°	½ m
	∴ ∠BAC + ∠BOC = 180° ∠BOC = 180° − 40° ∠BOC = 140°	½ m
	$\angle BOC + X + X = 180$ 2x=40 , x=20, $\angle OBC = 20$	½ m

Q.22	2x – y =3, -----(I) 4 x – y = 5 4X -5 =Y Sub in (I) 2X –(4X-5) =3 2X-4X+5=3 -2X=3-5 X=1 Sub in (I) 2-Y=3 Y=-1	½ m ½ m ½ m ½ m
Q.23	$\angle BED = \angle ACB = 90^0$ $\because \angle B + \angle C = 180^0$ ∴ BD || AC $\angle EBD = \angle CAB$ (*Alternate angles*) Therefore, by AA similarity theorem, we get Δ BED ~ Δ ACB $\Rightarrow \frac{BE}{AC} = \frac{DE}{BC}$ $\Rightarrow \frac{BE}{DE} = \frac{AC}{BC}$	½ m ½ m ½ m ½ m
	OR In ΔABC DE||AC Line drawn parallel to one side of triangle, insects the other two sides. It divides the other side in same ratio. $\frac{BE}{EC} = \frac{BD}{DA}$ ___(i) In ΔAEB DF||AE Line drawn parallel to one side of triangle, intersects the other sides. It divides the other sides in same ratio. $\frac{BF}{FE} = \frac{BD}{DA}$ ___(ii) From (i) & (ii) $\frac{BE}{EC} = \frac{BF}{FE}$ ∴ Hence proved.	1 m ½ m ½ m

Q.24	$\Rightarrow \tan\theta = \frac{3}{4}$ $\sin\theta = \frac{3}{\sqrt{3^2+4^2}} = \frac{3}{5}$ $\cos\theta = \frac{4}{\sqrt{3^2+4^2}} = \frac{4}{5}$ $(\frac{4\sin\theta - \cos\theta + 1}{4\sin\theta + \cos\theta - 1}) = \frac{4(\frac{3}{5}) - (\frac{4}{5}) + 1}{4(\frac{3}{5}) + (\frac{4}{5}) - 1}$ $= \frac{12-4+5}{12+4-5} = \frac{13}{11}$	½ m 1 m ½ m
Q.25	Here, $\theta = 30^o$ l = arc = 8.8 cm $l = \frac{\theta}{360^o} \times 2\pi r$ $8.8 = \frac{30}{360} \times 2 \frac{22}{7} \times r$ $r = \frac{8.8 \times 6 \times 7}{22} = 16.8$ cm	½ m ½ m 1 m
	OR $Area = \frac{3}{4} * \pi r^2$ $= \frac{3}{4} * 3.14 * 60 * 60$ $= 8478 cm^2$	½ m 1 m ½ m
	Section C consists of 6 questions of 3 marks each	
Q.26	Let us assume that $5 + 6\sqrt{7}$ is rational Let $5 + 6\sqrt{7} = \frac{p}{q}; q \neq 0$ and p, q are integers $\Rightarrow \sqrt{7} = \frac{p-5q}{6q}$ p and q are integers, $\therefore p - 5q$ is an integer $\frac{p-5q}{6q}$ is a rational number $\Rightarrow \sqrt{7}$ is a rational number which is a contradiction. So, our assumption that $5 + 6\sqrt{7}$ is a rational number is wrong Hence $5 + 6\sqrt{7}$ is an irrational number.	½ m 1 m 1 m ½ m
Q.27	$4x^2+4x+1$ $\alpha + \beta = -\frac{b}{a} = -\frac{4}{4} = -1, \ \alpha\beta = \frac{c}{a} = 1/4$ $2\alpha + 2\beta = 2(\alpha + \beta) = 2(-1) = -2$ $2\alpha \times 2\beta = 4\alpha\beta = 4(1/4) = 1$ x^2+2x+1.	1 m ½ m +½ m 1 m

Q.28	Let the fixed charge be x and additional charge be y per day both in Rs. For Latika, number of days = 6 = 2 + 4 Therefore, charge $x + 4y = 22$ $\Rightarrow x = 22 - 4y$ ....(1) For Anand, number of days = 4 = 2 + 2 Therefore, charge = $x + 2y = 16$ $\Rightarrow x = 16 - 2y$ ....(2) Comparing (1) and (2), we have $22 - 4y = 16 - 2y$ $\Rightarrow y = 3$ Substituting this value of y in equation (1), we have $x = 22 - 4 \times 3 = 10$ So, fixed charge = Rs. 10 and additional charge = Rs. 3 per day.	½ m ½ m 1 m ½ m ½ m
	(OR) $99x + 101y = 499 - - - (1)$ $101x + 99y = 501 - - - (2)$ Adding (1) and (2) $200x + 200y = 1000$ $\therefore\ x + y = 5 - - - (3)$ Subtracting (1) from (2) $2x - 2y = 2$ $\therefore\ x - y = 1 - - - (4)$ Adding (3) and (4) $2x = 6\ \therefore \boxed{x = 3}$ Putting $x = 3$ in equation (4) $3 - y = 1\quad \boxed{\therefore\ y = 2}$ $\therefore\ y = 2, x = 3$	1 m 1 m ½ m ½ m
Q.29	$\sin 30^\circ = \frac{1}{2}$ and $\sec 30^\circ = \frac{2}{\sqrt{3}}$ $\cos 45^\circ = \frac{1}{\sqrt{2}}$ and $\tan 45^\circ = 1$ $\cos 60^\circ = \frac{1}{2}$	1 m

$$\frac{2\left(\frac{1}{2}\right)^2+3\left(\frac{2}{\sqrt{3}}\right)^2-2(1)^2}{\left(\frac{1}{2}\right)^2+\left(\frac{1}{\sqrt{2}}\right)^2} = \frac{2\left(\frac{1}{4}\right)+3\left(\frac{4}{3}\right)-2}{\frac{1}{4}+\frac{1}{2}} = \frac{10}{3}$$

½ m

½ m

½ m

½ m

OR

$$\frac{\tan\theta}{1-\cot\theta}+\frac{\cot\theta}{1-\tan\theta}-\sec\theta\operatorname{cosec}\theta = .$$

$$\frac{\tan^2\theta}{\tan\theta-1}-\frac{\cot\theta}{\tan\theta-1}-\sec\theta\operatorname{cosec}\theta$$

½ m

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

½ m

$$\frac{\sin^3\theta-\cos^3\theta}{\sin\theta\cos\theta(\sin\theta-\cos\theta)}-\frac{1}{\sin\theta\cos\theta}$$

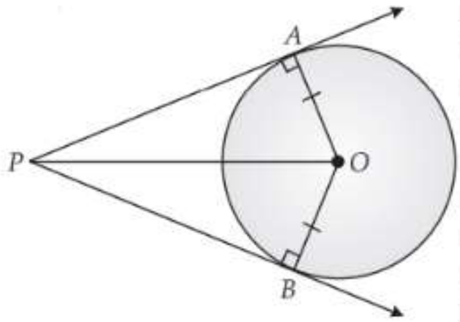
1 m

$$\frac{1-2\sin\theta\cos\theta+3\sin\theta\cos\theta}{\sin\theta\cos\theta}-\frac{1}{\sin\theta\cos\theta}$$

$$\Longrightarrow 1$$

1 m

Q.30



To prove : $AP = BP$

Construction Join OP, AO and BO.

Proof : ΔOAP and ΔOBP

$OA = OB$ (Radius of circle)

$OP = OP$ (Common side)

$\angle OAP = \angle OBP = 90°$ (Radius ⊥ to the tangent)

$\therefore$ $\Delta OAP \cong \Delta OBP$ (RHS congruency rule)

$\therefore$ $AP = BP$ (cpct)

Hence proved.

Fig: ½ m

½ m

1 m

½ m

½ m

Q.31

	1	2	3	4	5	6
1	(1, 1)	(1, 2)	(1, 3)	(1, 4)	(1, 5)	(1, 6)
2	(2, 1)	(2, 2)	(2, 3)	(2, 4)	(2, 5)	(2, 6)
3	(3, 1)	(3, 2)	(3, 3)	(3, 4)	(3, 5)	(3, 6)
4	(4, 1)	(4, 2)	(4, 3)	(4, 4)	(4, 5)	(4, 6)
5	(5, 1)	(5, 2)	(5, 3)	(5, 4)	(5, 5)	(5, 6)
6	(6, 1)	(6, 2)	(6, 3)	(6, 4)	(6, 5)	(6, 6)

1 m

1 m

option 1:probability=5/36 option 2: probability=2/36

½ m

Chance of winning is more in option 1.

½ m

	SECTION D	
Q.32	For upstream, Speed = (18 – x) km/hr Distance = 24 km Time = t_1 Therefore, $t_1 = \frac{24}{18-x}$ For downstream, Speed = (18 + x) km/hr Distance = 24 km Time = t_2 Therefore,	½ m ½ m 1 m
	$t_1 = t_2 + 1$ $\frac{24}{18-x} = \frac{24}{18+x} + 1$ $\Rightarrow \frac{1}{18-x} - \frac{1}{18+x} = \frac{1}{24}$ $\Rightarrow \frac{(18+x)-(18-x)}{(18-x)(18+x)} = \frac{1}{24}$ $\Rightarrow 48x = (18-x)(18+x)$ $\Rightarrow 48x = 324 + 18x - 18x - x^2$ $\Rightarrow x^2 + 48x - 324 = 0$ $\Rightarrow x^2 + 54x - 6x - 324 = 0$ $\Rightarrow x(x+54) - 6(x+54) = 0$ $\Rightarrow (x+54)(x-6) = 0$ $\Rightarrow x = -54$ or $x = 6$ $\Rightarrow x \neq -54$ $\therefore x = 6$ Thus the speed of stream is 6 km/hr Hence the correct answer is 6 km/hr.	½ m ½ m 1 ½ m ½ m
	OR $\frac{1}{(x-2)} + \frac{2}{(x-1)} = \frac{6}{x}$ $= \frac{x-1+2x-4}{(x-2)(x-1)} = \frac{6}{x}$ $= x(3x-5) = 6(x-2)(x-1)$ $= 3x^2 - 5x = 6(x^2 - x - 2x + 2)$ $= 3x^2 - 5x = 6x^2 - 18x + 12$ $= 13x - 3x^2 - 12 = 0$ $= 3x^2 - 13x + 12 = 0$ $= 3x^2 - 4x - 9x + 12 = 0$ $= x(3x-4) - 3(3x-4) = 0$ $(3x-4)(x-3)$ so, $x=3$ or $x = \frac{4}{3}$	1 m ½ m ½ m 1 m 1 ½ m ½ m

Q.33	In ΔAEP and ΔCDP ∠AEP = ∠CDP = 90º [∵ CE ⊥ AB and AD ⊥ BC; altitudes] ∠APE = ∠CPD (Vertically opposite angles) ⇒ ΔAEP ~ ΔCPD (AA criterion) In ΔABD and ΔCBE ∠ADB = ∠CEB = 90º ∠ABD = ∠CBE (Common angle) ⇒ ΔABD ~ ΔCBE (AA criterion) In ΔAEP and ΔADB ∠AEP = ∠ADB = 90º ∠PAE = ∠BAD (Common angle) ⇒ ΔAEP ~ ΔADB (AA criterion)	Given, To prove figure Reasons 2 m Each proving 1m
Q.34	Total height of the tent above the ground = 27 m Height of the cylinderical part, $h_1 = 6$ m Height of the conical part, $h_2 = 21$ m Diameter = 56 m Radius = 28 m Curved surface area of the cylinder, $CSA_1 = 2\pi r h_1 = 2\pi \times 28 \times 6 = 336\pi$ Curved surface area of the cylinder, CSA_2 will be $\pi r l = \pi r\sqrt{h^2 + r^2} = \pi \times 28 \times \sqrt{21^2 + 28^2} = 28\pi\sqrt{441 + 784} = 28\pi \times 35 = 980\pi$ Total curved surface area = CSA of cylinder + CSA of cone $= CSA_1 + CSA_2$ $= 336\pi + 980\pi = 1316\pi = 4136 \text{ m}^2$ Thus, the area of the canvas used in making the tent is 4136 m^2.	½ m 1 ½ m 1 ½ m ½ m 1 m
	OR Let r cm be the radius and h cm the height of the cylinder. Then, $r = \frac{7}{2}\text{cm}; h = (19 - 2 \times \frac{7}{2})\text{ cm} = 12\text{cm}$ Also radius of hemisphere = $\frac{7}{2}\text{cm} = r\text{cm}$ Now, volume of the solid = volume of the cylinder + volume of two hemisphere $\{\pi r^2 h + 2(\frac{2}{3}\pi r^3)\}\text{ cm}^3 = \pi r^2 (h + \frac{4r}{3})\text{ cm}^3$ $= \left\{\frac{22}{7} \times (\frac{7}{2})^2 \times (12 + \frac{4}{3} \times \frac{7}{2})\right\}\text{cm}^3 = \frac{22}{7} \times \frac{7}{2} \times \frac{7}{2} \times \frac{50}{3}\text{cm}^3 = 641.66\text{cm}^3$	½ m ½ m 2 m

Surface area of the solid

=curved surface are of cylinder + surface area of two hemisphere

$= (2\pi rh + 2 \times 2\pi r^2)\ cm^2$

$= 2\pi r\,(h + 2r)\ cm^2$

$= 2 \times \frac{22}{7} \times \frac{7}{2}(12 + 2 \times \frac{22}{7} \times \frac{7}{2})\ cm^2$

$= (2 \times \frac{22}{7} \times \frac{7}{2} \times 19)\ cm^2 = 418 cm^2$

½ m

1½ m

Q.35

Life time (in hours)	Number of bulbs (fi)	xi	di=xi-a a=65	ui=di/h	fiui	Mean= $a+\frac{\Sigma fiui}{\Sigma fi}$ =65 +15/40 =65+0.375 =65.375
40-50	4	45	-20	-2	-8	
50-60	6	55	-10	-1	-6	
60-70	13	65	0	0	0	
70-80	10	75	10	1	10	
80-90	2	85	20	2	4	
90-100	5	95	30	3	15	
Total	40				15	

Table : 3 m
Calculations :2 m

Q.36

i) second term = 6200 d=200 (------------------1 m)
ii)

Takes a = 6000, d = 200 and n = 25 to find the amount as 6000 + (25 – 1)200 = Rs 10800.

-- (1 m)
(iii) {(A)

S_{50} =50/2 [2(4000) + (50 – 1)(400)]

Solves the above expression to find the total amount as Rs 6,90,000.

½ m

1½ m

Or

iii) Frames equation as follows:

6000 + (n – 1)200 = 4000 + (n – 1)400

Solves the above equation to find the value of n as 11. — 1 m

Writes that, since they both earn the same amount for the 11th painting, as Bhima's increment is more, Bhima gets more money than Manan for the 12th painting. — 1 m

Q.37

i) A(-2,2) B(-1, 2) ___________________________(1 m)

ii) A

B(1,2), F(-2,9)

$BF^2 = (-2-1)^2 + (9-2)^2$ — ½ m

$= (-3)^2 + (7)^2$

$= 9 + 49$

$= 58$ — ½ m

So, $BF = \sqrt{58}$ units

OR ii)B)

A(-2,2), F(-2,9), G(-4,7), H(-4,4)

Clearly GH = 7-4=3units

AF = 9-2=7 units

So, height of the trapezium AFGH = 2 units — ½ m

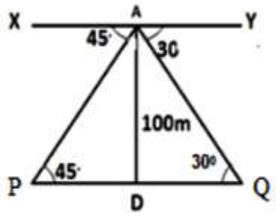
So, area of AFGH $= \frac{1}{2}(AF + GH) \times height$

$= \frac{1}{2}(7+3) \times 2$

= 10 sq. units — 1 ½ m

iii) Z (-4,2) ratio ---(1 m)

Q.38



(I) XY ‖ PQ and AP is transversal.

∠APD = ∠PAX (alternative interior angles) — 1 m

∠APD = 30°

(II) ∠YAQ = 30°

∠AQD = 30° — ½ m

Because XY || PQ and AQ is a transversal

so alternate interior angles are equal — ½ m

∠YAQ=∠AQD

	(III) In Δ ADP $\tan 45^{\circ} = \frac{100}{PD}$ $1 = \frac{100}{PD}$ PD=100 m Boat P is 100 m from the light house **OR** In ΔADQ $\tan 30^{0} = \frac{100}{DQ}$ $\frac{1}{\sqrt{3}} = \frac{100}{DQ}$ $DQ = 100\sqrt{3}$ m Boat Q is 100√3 m from the light house.	1 m 1 m 1 m 1 m