Marking Scheme Class X Session 2023-24 MATHEMATICS STANDARD (Code No.041)

TIME: 3 hours MAX.MARKS: 80

	SECTION A	
	Section A consists of 20 questions of 1 mark each.	
1.	(b) xy ²	1
2.	(b) 1 zero and the zero is '3'	1
3.	(b) $\frac{a1}{a2} = \frac{b1}{b2} \neq \frac{c1}{c2}$	1
		1
4.	(c) 2 distinct real roots	1
5.	(c) 7	1
6.	(a) 1:2	1
7.	(d) infinitely many	1
8.	(b) $\frac{ac}{b+c}$	1
9.	(b) 100°	1
10.	(d) 11 cm	1
11.	$\sqrt{b^2-a^2}$	1
	$(c) \frac{\sqrt{b}}{b}$	
12.	(d) cos A	1
13.	(a) 60°	1
14.	(a) 2 units	1
15.	(a) 10m	1
16.	$4-\pi$	1
	(b) 4 22	
17.	(h) 22	1
	(b) $\frac{1}{46}$	
18.	(d) 150	1
19.	(a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of	1
20.	assertion (A) (c) Assertion (A) is true but reason (R) is false.	1
20.	SECTION B	1
	Section B consists of 5 questions of 2 marks each.	
21.	Let us assume, to the contrary, that $\sqrt{2}$ is rational.	
21.	~	1/2
	So, we can find integers a and b such that $\sqrt{2} = \frac{a}{b}$ where a and b are coprime.	, 2
	So, b $\sqrt{2} = a$.	
	Squaring both sides,	
	we get $2b^2 = a^2$.	1/2
	Therefore, 2 divides a ² and so 2 divides a.	
	So, we can write $a = 2c$ for some integer c .	
	Substituting for a, we get $2b^2 = 4c^2$, that is, $b^2 = 2c^2$.	1/2
	This means that 2 divides b ² , and so 2 divides b	
	Therefore, a and b have at least 2 as a common factor.	
	But this contradicts the fact that a and b have no common factors other than 1.	1/2
	This contradiction has arisen because of our incorrect assumption that $\sqrt{2}$ is rational.	
	So, we conclude that $\sqrt{2}$ is irrational.	

AB = DC = $\frac{1}{2}$ Point P divides AB in the ratio 2:3 $AP = \frac{2}{5}a$, $BP = \frac{2}{5}a$ point Q divides DC in the ratio 4:1. $DQ = \frac{4}{5}a$, $CQ = \frac{1}{5}a$ $APO = ACQO [AA similarity]$ $\frac{AP}{CQ} = \frac{PO}{PO} = \frac{AO}{CO}$ $\frac{AO}{CO} = \frac{\frac{2}{5}a}{\frac{1}{5}a} = \frac{2}{1} \Rightarrow OC = \frac{1}{2}OA$ 23. PA = PB; CA = CE; DE = DB [Tangents to a circle] Perimeter of $\Delta PCD = PC + CD + PD$ $= PC + CC + ED + PD$ $= PC + CC + ED + PD$ $= PC + CA + BD + PD$ $= PA + PB$ Perimeter of $\Delta PCD = PA + PA = 2PA = 2(10) = 20$ cm 24. $v \tan(A + B) = \sqrt{3} vA + B = 60^{\circ} (1)$ $v \tan(A - B) = \frac{1}{\sqrt{3}} vA - B = 30^{\circ} (2)$ $Adding (1) & & (2), we get 2B = 30^{\circ} \Rightarrow B = 45^{\circ} Also (1) - (2), we get 2B = 30^{\circ} \Rightarrow B = 45^{\circ} [or] 2 \cos cc^2 30 + x \sin^2 60 - \frac{3}{4} \tan^2 30 = 10 \Rightarrow 2(2)^2 + x \left(\frac{\sqrt{3}}{2}\right)^2 - \frac{3}{4} \left(\frac{1}{\sqrt{3}}\right)^2 = 10 \Rightarrow 3c + x (3) - 1 = 40 \Rightarrow 3$	22.	ABCD is a parallelogram.	1/2
$AP = \frac{2}{3} \text{ a}, BP = \frac{3}{5} \text{ a}$ $point Q divides DC in the ratio 4:1.$ $DQ = \frac{4}{5} \text{ a}, CQ = \frac{1}{5} \text{ a}$ $APO = \Delta CQO [AA similarity]$ $\frac{AP}{CQ} = \frac{PO}{PO} = \frac{AO}{CO}$ $\frac{2}{1} = \frac{3}{3} = \frac{2}{1} \implies OC = \frac{1}{2} \text{ OA}$ $23.$ $PA = PB; CA = CE; DE = DB [Tangents to a circle]$ $Perimeter of \Delta PCD = PC + CD + PD$ $= PC + CA + BD + PD$ $= PC + CA + BD + PD$ $= PC + CA + BD + PD$ $= PA + PB$ $Perimeter of \Delta PCD = PA + PA = 2PA = 2(10) = 20$ cm $24. \because \tan(A + B) = \sqrt{3} \therefore A + B = 60^{\circ} \qquad \dots (2)$ $Adding (1) & (2), we get 2B = 30^{\circ} \implies A = 45^{\circ}$ $Also (1) - (2), we get 2B = 30^{\circ} \implies B = 45^{\circ}$ $ OC $ $2 \cos cc^{2}30 + x \sin^{2}60 - \frac{3}{4} \tan^{2}30 = 10$ $\Rightarrow 2(2)^{2} + x \left(\frac{\sqrt{3}}{2}\right)^{2} - \frac{3}{4} \left(\frac{1}{\sqrt{3}}\right)^{2} = 10$ $\Rightarrow 2(4) + x \left(\frac{3}{4}\right) - \frac{3}{4} \left(\frac{1}{3}\right) = 10$ $\Rightarrow 32 + x (3) - 1 = 40$ $\Rightarrow 3x = 9 \implies x = 3$ $\Rightarrow 3x = 9 \implies x = 3$ $\Rightarrow 3x = 3 \implies x = 3$ $\Rightarrow 3x $. ()	/2
point 0 divides DC in the ratio 4:1. $DQ = \frac{4}{5} \text{ a}, CQ = \frac{1}{5} \text{ a}$ $\Delta APO \sim \Delta CQO [AA similarity]$ $\frac{A^P}{cQ} = \frac{PO}{QO} = \frac{AO}{cO}$ $\frac{AO}{CQ} = \frac{\frac{5}{5} \text{ a}}{\frac{1}{5} \text{ a}} = \frac{2}{1} \Rightarrow \text{OC} = \frac{1}{2} \text{ OA}$ 23. $PA = PB; CA = CE; DE = DB [Tangents to a circle]$ Perimeter of $\Delta PCD = PC + CD + PD$ $= PC + CE + ED + PD$ $= PC + CE + ED + PD$ $= PA + PB$ Perimeter of $\Delta PCD = PA + PA = 2PA = 2(10) = 20$ cm 24. $\because \tan(A + B) = \frac{1}{\sqrt{3}} \therefore A - B = 30^{\circ} (2)$ $Adding (1) & (2), we get 2B = 30^{\circ} \Rightarrow B = 45^{\circ} Also (1) - (2), we get 2B = 30^{\circ} \Rightarrow B = 45^{\circ} [or] 2 cosec230 + x sin260 - \frac{3}{4} tan230 = 10 \Rightarrow 2(2)^2 + x \left(\frac{\sqrt{3}}{2}\right)^2 - \frac{3}{4} \left(\frac{1}{\sqrt{3}}\right)^2 = 10 \Rightarrow 32 + x (3) - 1 = 40 \Rightarrow 32 + x (3) - 1 = 40 \Rightarrow 32 + 9 \Rightarrow x = 3 25. Total area removed = \frac{A}{300} m^2 + \frac{A}{360} m^2 + \frac{A}{360} m^2 = \frac{A^P}{300} m^2} = \frac{A^P}{300} m^2 = \frac{A^P}{300} m^2} $			
$DQ = \frac{4}{5} a, CQ = \frac{1}{5} a$ $\Delta APO \sim \Delta CQO [AA similarity]$ $\frac{AP}{CQ} = \frac{PO}{QO} = \frac{AO}{CO}$ $\frac{AO}{CO} = \frac{2}{5} \frac{a}{5} = \frac{2}{1} \implies OC = \frac{1}{2} OA$ $23.$ $PA = PB; CA = CE; DE = DB [Tangents to a circle]$ $Perimeter of \Delta PCD = PC + CD + PD = PC + CE + ED + PD = PC + CE + ED + PD = PA + PB Perimeter of \Delta PCD = PA + PA = 2PA = 2(10) = 20 CM 24. \therefore \tan(A + B) = \sqrt{3} \therefore A + B = 60^{\circ} \qquad \dots (1) \therefore \tan(A - B) = \frac{1}{\sqrt{3}} \therefore A - B = 30^{\circ} \qquad \dots (2) Adding (1) & (2), we get 2A = 90^{\circ} \implies A = 45^{\circ} Also (1) - (2), we get 2B = 30^{\circ} \implies B = 45^{\circ} [Or] 2 \cos c^{2}30 + x \sin^{2}60 - \frac{3}{4} \tan^{2}30 = 10 \Rightarrow 2(2)^{2} + x \left(\frac{\sqrt{3}}{2}\right)^{2} - \frac{3}{4} \left(\frac{1}{\sqrt{3}}\right)^{2} = 10 \Rightarrow 2(4) + x \left(\frac{3}{4}\right) - \frac{3}{4} \left(\frac{1}{3}\right) = 10 \Rightarrow 32 + x (3) - 1 = 40 \Rightarrow 33 + x (3) - 1 = 40 \Rightarrow 34 + x (3) - 1 = 40 \Rightarrow 36 + x (3) - 1 = 40 \Rightarrow 36 + x (3) - 1 = 40 \Rightarrow 36 + x (3) - 1 = 40 \Rightarrow 36 + x (3) - 1 = 40 \Rightarrow 36 + x (3) - 1 = 40 \Rightarrow 36 + x (3) - 1 = 40$		$AP = \frac{2}{5}a$, $BP = \frac{3}{5}a$	
$\frac{\Delta \text{ APO}}{QQ} \sim \Delta \text{ CQO} [\text{AA similarity}]$ $\frac{\Delta P}{QQ} = \frac{PO}{QO} = \frac{\Delta O}{AO}$ $\frac{\Delta O}{QO} = \frac{2}{1} \frac{3}{a} = \frac{2}{1} \implies \text{OC} = \frac{1}{2} \text{ OA}$ 23. PA = PB; CA = CE; DE = DB [Tangents to a circle] Perimeter of $\Delta PCD = PC + CD + PD$ $= PC + CE + ED + PD$ $= PC + CA + BD + PD$ $= PC + CA + BD + PD$ $= PA + PB$ Perimeter of $\Delta PCD = PA + PA = 2PA = 2(10) = 20$ cm 24. $\because \tan(A + B) = \sqrt{3} \implies A - B = 30^{\circ} \implies (2) \implies (2$			1/2
$\frac{AP}{CQ} = \frac{PO}{QO} = \frac{AO}{CO}$ $\frac{AO}{SO} = \frac{\frac{7}{5}a}{\frac{1}{5}a} = \frac{2}{1} \Rightarrow OC = \frac{1}{2}OA$ 23. $PA = PB; CA = CE; DE = DB [Tangents to a circle]$ $Perimeter of \Delta PCD = PC + CD + PD$ $= PC + CE + ED + PD$ $= PC + CA + BD + PD$ $= PA + PB$ $Perimeter of \Delta PCD = PA + PA = 2PA = 2(10) = 20$ CM 24. $\because \tan(A + B) = \sqrt{3} \therefore A + B = 60^{\circ} \dots (1)$ $\because \tan(A - B) = \frac{1}{\sqrt{3}} \therefore A - B = 30^{\circ} \dots (2)$ $Adding (1) & (2), we get 2A = 90^{\circ} \Rightarrow A = 45^{\circ}$ $Also (1) - (2), we get 2B = 30^{\circ} \Rightarrow B = 45^{\circ}$ $[or]$ $2 \cos cc^{2}30 + x \sin^{2}60 - \frac{3}{4} \tan^{2}30 = 10$ $\Rightarrow 2(2)^{2} + x \left(\frac{\sqrt{3}}{2}\right)^{2} - \frac{3}{4} \left(\frac{1}{\sqrt{3}}\right)^{2} = 10$ $\Rightarrow 32 + x (3) - \frac{1}{4} = 10$ $\Rightarrow 32 + x (3) - \frac{1}{4} = 10$ $\Rightarrow 32 + x (3) - \frac{1}{4} = 10$ $\Rightarrow 32 + y = 3 = 3$ 25. $Total area removed = \frac{\angle A}{A} \cos \pi r^{2} + \frac{\angle B}{AB} \cos \pi r^{2} + \frac{\angle C}{360} \sin r^{2}$ $= \frac{AA + \angle AB + \angle C}{360} \sin r^{2}$ $= \frac{180}{360} \sin^{2} r^{2}$ $= \frac{180}{360} x^{2} \frac{1}{7} X (14)^{2}$ $= 308 \text{ cm}^{2}$ [or] The side of a square = Diameter of the semi-circle of diameter 'a') The horizontal/vertical extent of the white region = 14 - 3 - 3 = 8 \text{ cm} $\frac{1}{2}$		$DQ = \frac{4}{5}a$, $CQ = \frac{1}{5}a$	
$\frac{RO}{RO} = \frac{S}{RO} = \frac{S}{RO}$ $\frac{AO}{RO} = \frac{S}{\frac{1}{5}} = \frac{2}{1} \Rightarrow OC = \frac{1}{2}OA$ $\frac{AO}{RO} = \frac{S}{\frac{1}{5}} = \frac{2}{1} \Rightarrow OC = \frac{1}{2}OA$ $\frac{AO}{RO} = \frac{S}{\frac{1}{5}} = \frac{2}{1} \Rightarrow OC = \frac{1}{2}OA$ $\frac{AO}{RO} = \frac{S}{\frac{1}{5}} = \frac{2}{1} \Rightarrow OC = \frac{1}{2}OA$ $\frac{AO}{RO} = \frac{S}{\frac{1}{5}} = \frac{2}{1} \Rightarrow OC = \frac{1}{2}OA$ $\frac{AO}{RO} = \frac{S}{\frac{1}{5}} = \frac{2}{1} \Rightarrow OC = \frac{1}{2}OA$ $\frac{AO}{RO} = \frac{S}{\frac{1}{5}} = \frac{2}{1} \Rightarrow OC = \frac{1}{2}OA$ $\frac{AO}{RO} = \frac{S}{\frac{1}{5}} = \frac{2}{1} \Rightarrow OC = \frac{1}{2}OA$ $\frac{AO}{RO} = \frac{S}{\frac{1}{5}} = \frac{1}{1} \Rightarrow OC = \frac{1}{2}OA$ $\frac{AO}{RO} = \frac{S}{\frac{1}{5}} = \frac{1}{1} \Rightarrow OC = \frac{1}{2}OA$ $\frac{AO}{RO} = \frac{S}{\frac{1}{5}} = \frac{1}{1} \Rightarrow OC = \frac{1}{2}OA$ $\frac{AO}{RO} = \frac{S}{\frac{1}{5}} = \frac{1}{1} \Rightarrow OC = \frac{1}{2}OA$ $\frac{AO}{RO} = \frac{S}{\frac{1}{5}} = \frac{1}{1} \Rightarrow OC = \frac{1}{2}OA$ $\frac{AO}{RO} = \frac{PC}{RO} + PC = OC =$		$\Delta APO \sim \Delta CQO [AA similarity]$	16
23. $\frac{AO}{CO} = \frac{\frac{2}{5}}{\frac{1}{5}} = \frac{2}{1} \implies OC = \frac{1}{2}OA$ 23. $PA = PB; CA = CE; DE = DB [Tangents to a circle] Perimeter of \Delta PCD = PC + CD + PD = PC + CC + ED + PD = PC + CA + BD + PD = PC + CA + BD + PD = PA + PB Perimeter of \Delta PCD = PA + PA = 2PA = 2(10) = 20 CM 24. \because \tan(A + B) = \sqrt{3} \therefore A + B = 60^{\circ} \qquad \dots (1) \because \tan(A - B) = \frac{1}{\sqrt{3}} \therefore A - B = 30^{\circ} \qquad \dots (2) Adding (1) & (2), we get 2A = 90^{\circ} \Rightarrow A = 45^{\circ} Also (1) - (2), we get 2B = 30^{\circ} \Rightarrow B = 45^{\circ} [or] 2 \cos cc^{2}30 + x \sin^{2}60 - \frac{3}{4} \tan^{2}30 = 10 \Rightarrow 2(2)^{2} + x \left(\frac{\sqrt{3}}{2}\right)^{2} - \frac{3}{4} \left(\frac{1}{\sqrt{3}}\right)^{2} = 10 \Rightarrow 2(4) + x \left(\frac{3}{4}\right) - \frac{3}{4} + \frac{1}{10} \Rightarrow 32 + x (3) - 1 = 40 \Rightarrow 3x = 9 \Rightarrow x = 3 25. Total area removed = \frac{2A}{360} mr^{2} + \frac{2C}{360} mr^{2} = \frac{2A + 2B + 2C}{360} mr^{2} = \frac{180}{360} \sqrt{7} = \frac{1360}{360} \sqrt{7} = \frac$		$\frac{AP}{CO} = \frac{PO}{OO} = \frac{AO}{CO}$	72
23. PA = PB; CA = CE; DE = DB [Tangents to a circle] Perimeter of ΔPCD = PC + CD + PD = PC + CB + ED + PD = PC + CA + BD + PD = PA + PB Perimeter of ΔPCD = PA + PA = 2PA = 2(10) = 20 cm 24.		$\frac{2}{2}$ a $\frac{2}{3}$	1/2
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Perimeter of $\triangle PCD = PC + CD + PD$ $= PC + CE + ED + PD$ $= PC + CA + BD + PD$ $= PA + PB$ $= PA + PB$ Perimeter of $\triangle PCD = PA + PA = 2PA = 2(10) = 20$ cm $24. \because \tan(A + B) = \sqrt{3} \therefore A + B = 60^{\circ} \qquad \dots (1)$ $\because \tan(A - B) = \frac{1}{\sqrt{3}} \therefore A - B = 30^{\circ} \qquad \dots (2)$ $Adding (1) & (2), we get 2A = 90^{\circ} \Rightarrow A = 45^{\circ} Also (1) - (2), we get 2B = 30^{\circ} \Rightarrow B = 45^{\circ} [or] 2 \cos c^{2}30 + x \sin^{2}60 - \frac{3}{4} \tan^{2}30 = 10 \Rightarrow 2(2)^{2} + x \left(\frac{\sqrt{3}}{2}\right)^{2} - \frac{3}{4} \left(\frac{1}{\sqrt{3}}\right)^{2} = 10 \Rightarrow 8 + x \left(\frac{3}{4}\right) - \frac{1}{4} = 10 \Rightarrow 32 + x (3) - 1 = 40 \Rightarrow 3x = 9 \Rightarrow x = 3 25. Total area removed \frac{2A}{360} \pi r^{2} + \frac{2B}{360} \pi r^{2} = \frac{180}{360} \pi r^{2} = \frac{180}{360} \pi r^{2} = \frac{180}{360} \frac{3}{4} \times \frac{22}{4} \times 1(4)^{2} = 308 \text{ cm}^{2} [or] The side of a square = Diameter of the semi-circle = a Area of the unshaded region = \text{Area of a square of side 'a'} + 4(\text{Area of a semi-circle of diameter 'a'}) The horizontal/vertical extent of the white region = 14-3-3 = 8 cm$	23.	PA = PB: CA = CE: DE = DB [Tangents to a circle]	1/2
$ = \text{PC} + \text{CA} + \text{BD} + \text{PD} \\ = \text{PA} + \text{PB} \\ \text{Perimeter of } \Delta \text{PCD} = \text{PA} + \text{PB} \\ \text{Parimeter of } \Delta \text{PCD} = \text{PA} + \text{PA} = 2\text{PA} = 2(10) = 20 \\ \text{cm} \\ \text{24.} \qquad \because \tan(A+B) = \sqrt{3} \therefore A+B=60^{\circ} \qquad \dots(1) \\ \because \tan(A-B) = \frac{1}{\sqrt{3}} \therefore A-B=30^{\circ} \qquad \dots(2) \\ \text{Adding (1) & (2), we get } 2A=90^{\circ} \Rightarrow A=45^{\circ} \\ \text{Also (1) -(2), we get } 2B=30^{\circ} \Rightarrow B=45^{\circ} \\ \text{[or]} \\ \\ \text{2 cosec}^{2}30+x\sin^{2}60-\frac{3}{4}\tan^{2}30=10 \\ \Rightarrow 2(2)^{2}+x\left(\frac{\sqrt{3}}{2}\right)^{2}-\frac{3}{4}\left(\frac{1}{\sqrt{3}}\right)^{2}=10 \\ \Rightarrow 8+x\left(\frac{3}{4}\right)-\frac{1}{4}=10 \\ \Rightarrow 32+x(3)-1=40 \\ \Rightarrow 32+x(3)-1=40 \\ \Rightarrow 3x=9 \Rightarrow x=3 \\ \text{25.} \qquad \text{Total area removed } = \frac{2A}{360} \pi r^{2} + \frac{2B}{360} \pi r^{2} + \frac{2C}{360} \pi r^{2} \\ = \frac{2A+2B+2C}{360} \pi r^{2} \\ = \frac{180}{360} \frac{3}{4} \times \frac{22}{7} \times (14)^{2} \\ = 308 \text{ cm}^{2} \\ \text{The side of a square = Diameter of the semi-circle = a} \\ \text{Area of the unshaded region} \\ = \text{Area of a square of side 'a' + 4(\text{Area of a semi-circle of diameter 'a')}} \\ \text{The horizontal/vertical extent of the white region = 14-3-3=8 cm} $		Perimeter of $\triangle PCD = PC + CD + PD$, 2
24.			
Perimeter of ΔPCD = PA + PA = 2PA = 2(10) = 20 cm 24.		\	1
24. \begin{align*} \text{cm} \times \tan(A+B) = \sqrt{3} \times A + B = 60^0 \times \text{(1)} \\ \times \tan(A-B) = \frac{1}{\sqrt{3}} \times A - B = 30^0 \times \text{(2)} \\ \text{Adding (1) & (2), we get 2A = 90^0 \Rightarrow A = 45^0 \\ \text{Also (1) - (2), we get 2B = 30^0 \Rightarrow B = 45^0} \\ \text{[or]} \] \[\text{2 cosec}^2 30 + x \sin^2 60 - \frac{3}{4} \tan^2 30 = 10 \\ \Rightarrow 2(2)^2 + x \left(\frac{\sqrt{3}}{2} \right)^2 - \frac{3}{4} \left(\frac{1}{\sqrt{3}} \right)^2 = 10 \\ \Rightarrow 3(4) + x \left(\frac{3}{4} \right) - \frac{3}{4} \left(\frac{1}{3} \right)^2 = 10 \\ \Rightarrow 32 + x \left(3 \right) - \frac{1}{4} = 10 \\ \Rightarrow 3x = 9 \Rightarrow x = 3 \\ \text{25.} \] Total area removed = \frac{\trian A}{360} \pi r^2 + \frac{\trian B}{360} \pi r^2 + \frac{\trian C}{360} \pi r^2 \\ \Rightarrow \frac{2A + B + C}{360} \pi r^2 + \frac{\trian C}{360} \pi r^2 \\ \Rightarrow \frac{2A + B + C}{360} \pi r^2 + \frac{\trian C}{360} \pi r^2 \\ \Rightarrow \frac{2A + B + C}{360} \		Perimeter of APCD = PA + PA = $2PA = 2(10) = 20$	
$\frac{1}{\sqrt{2}} \frac{\tan(A-B)}{\sqrt{3}} = \frac{1}{\sqrt{3}} \therefore A-B = 30^{\circ} \qquad \dots(2)$ $\frac{1}{\sqrt{2}} \frac{1}{\sqrt{2}}$ $\frac{1}{\sqrt{2}} \frac{1}{\sqrt{2}}$ $\frac{1}{\sqrt{2}} \frac{1}{\sqrt{2}} \frac{1}{\sqrt{2}} = 30^{\circ} \Rightarrow B = 45^{\circ}$ $[or]$ $2 \csc^{2}30 + x \sin^{2}60 - \frac{3}{4} \tan^{2}30 = 10$ $\Rightarrow 2(2)^{2} + x \left(\frac{\sqrt{3}}{2}\right)^{2} - \frac{3}{4} \left(\frac{1}{\sqrt{3}}\right)^{2} = 10$ $\Rightarrow 2(4) + x \left(\frac{3}{4}\right) - \frac{3}{4} = 10$ $\Rightarrow 32 + x (3) - 1 = 40$ $\Rightarrow 3x = 9 \Rightarrow x = 3$ $25.$ $3x = 9 \Rightarrow x = 3$ $3x = 9$	24	cm /	1/
Adding (1) & (2), we get $2A = 90^0 \Rightarrow A = 45^0$ $Also (1) - (2), we get 2B = 30^0 \Rightarrow B = 45^0 [or] 2 \csc^2 30 + x \sin^2 60 - \frac{3}{4} \tan^2 30 = 10 \Rightarrow 2(2)^2 + x \left(\frac{\sqrt{3}}{2}\right)^2 - \frac{3}{4} \left(\frac{1}{\sqrt{3}}\right)^2 = 10 \Rightarrow 8 + x \left(\frac{3}{4}\right) - \frac{1}{4} = 10 \Rightarrow 32 + x (3) - 1 = 40 \Rightarrow 3x = 9 \Rightarrow x = 3 25. Total area removed = \frac{2A}{360} \pi r^2 + \frac{2B}{360} \pi r^2 + \frac{2C}{360} \pi r^2 = \frac{2A + 2B + 2C}{360} \pi r^2 = \frac{180}{360} x^2 = \frac{180}{360} x^2 = \frac{180}{360} x^2 The side of a square = Diameter of the semi-circle = a Area of the unshaded region = Area of a square of side 'a' + 4(Area of a semi-circle of diameter 'a') The horizontal/vertical extent of the white region = 14-3-3 = 8 cm$	24.		
Also (1) -(2), we get $2B = 30^{\circ} \Rightarrow B = 45^{\circ}$ [or] $2 \operatorname{cosec}^{2}30 + x \sin^{2}60 - \frac{3}{4} \tan^{2}30 = 10$ $\Rightarrow 2(2)^{2} + x \left(\frac{\sqrt{3}}{2}\right)^{2} - \frac{3}{4} \left(\frac{1}{\sqrt{3}}\right)^{2} = 10$ $\Rightarrow 2(4) + x \left(\frac{3}{4}\right) - \frac{3}{4} = 10$ $\Rightarrow 32 + x (3) - 1 = 40$ $\Rightarrow 33 + x (3) - 1 = 40$ $\Rightarrow 34 + x (3) - 1 = 40$ $\Rightarrow 36 + x (3) - 1 = 40$ $\Rightarrow 36 + x (3) - 1 = 40$ $\Rightarrow 36 + x (3) - 1 = 40$ $\Rightarrow 36 + x (3) - 1 = 40$		1.5	
$[or]$ $2 \operatorname{cosec}^{2}30 + x \sin^{2}60 - \frac{3}{4} \tan^{2}30 = 10$ $\Rightarrow 2(2)^{2} + x \left(\frac{\sqrt{3}}{2}\right)^{2} - \frac{3}{4} \left(\frac{1}{\sqrt{3}}\right)^{2} = 10$ $\Rightarrow 2(4) + x \left(\frac{3}{4}\right) - \frac{3}{4} \left(\frac{1}{3}\right) = 10$ $\Rightarrow 8 + x \left(\frac{3}{4}\right) - \frac{1}{4} = 10$ $\Rightarrow 32 + x (3) - 1 = 40$ $\Rightarrow 3x = 9 \Rightarrow x = 3$ $25.$ Total area removed $= \frac{2A}{360} \pi r^{2} + \frac{2B}{360} \pi r^{2} + \frac{2C}{360} \pi r^{2}$ $= \frac{2A + 2B + 2C}{360} \pi r^{2}$ $= \frac{180}{360} x^{2} \times 27 \times (14)^{2}$ $= \frac{180}{360} x \times 27 \times (14)^{2}$ $= 308 \operatorname{cm}^{2}$ The side of a square = Diameter of the semi-circle = a Area of the unshaded region $= \operatorname{Area of a square of side 'a' + 4(\operatorname{Area of a semi-circle of diameter 'a'})}$ The horizontal/vertical extent of the white region = 14-3-3 = 8 cm			1/2
$\Rightarrow 2(2)^2 + x \left(\frac{\sqrt{3}}{2}\right)^2 - \frac{3}{4}\left(\frac{1}{\sqrt{3}}\right)^2 = 10$ $\Rightarrow 2(4) + x \left(\frac{3}{4}\right) - \frac{3}{4}\left(\frac{1}{3}\right) = 10$ $\Rightarrow 8 + x \left(\frac{3}{4}\right) - \frac{1}{4} = 10$ $\Rightarrow 32 + x (3) - 1 = 40$ $\Rightarrow 3x = 9 \Rightarrow x = 3$ $25.$ Total area removed $= \frac{\frac{2A}{360}}{\frac{360}{360}} \frac{\pi r^2}{\pi r^2} + \frac{\frac{2C}{360}}{\frac{360}{360}} \frac{\pi r^2}{\pi r^2}$ $= \frac{\frac{2A4 + 2B + 2C}{360}}{\frac{360}{360}} \frac{\pi r^2}{\pi r^2}$ $= \frac{180}{360} \frac{360}{360} x^2$ $= \frac{180}{360} x \frac{22}{7} x (14)^2$ $= 308 \text{ cm}^2$ [or] The side of a square = Diameter of the semi-circle = a Area of the unshaded region $= \text{Area of a square of side 'a'} + 4(\text{Area of a semi-circle of diameter 'a'})$ The horizontal/vertical extent of the white region = 14-3-3 = 8 cm			
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$32 + x (3) - 1 = 40$ $\Rightarrow 3x = 9 \Rightarrow x = 3$ 25. Total area removed = $\frac{2A}{360} \pi r^2 + \frac{2B}{360} \pi r^2 + \frac{2C}{360} \pi r^2$ $= \frac{2A + 2B + 2C}{360} \pi r^2$ $= \frac{180}{360} x^2$ $= \frac{180}{360} x^2 \times \frac{22}{7} \times (14)^2$ $= 308 \text{ cm}^2$ [or] The side of a square = Diameter of the semi-circle = a Area of the unshaded region $= \text{Area of a square of side 'a'} + 4(\text{Area of a semi-circle of diameter 'a'})$ The horizontal/vertical extent of the white region = 14-3-3 = 8 cm		\Rightarrow 2(4) + x $\left(\frac{3}{4}\right) - \frac{3}{4}\left(\frac{1}{3}\right) = 10$	1/2
$32 + x (3) - 1 = 40$ $\Rightarrow 3x = 9 \Rightarrow x = 3$ 25. Total area removed = $\frac{2A}{360} \pi r^2 + \frac{2B}{360} \pi r^2 + \frac{2C}{360} \pi r^2$ $= \frac{2A + 2B + 2C}{360} \pi r^2$ $= \frac{180}{360} x^2$ $= \frac{180}{360} x^2 \times \frac{22}{7} \times (14)^2$ $= 308 \text{ cm}^2$ [or] The side of a square = Diameter of the semi-circle = a Area of the unshaded region $= \text{Area of a square of side 'a'} + 4(\text{Area of a semi-circle of diameter 'a'})$ The horizontal/vertical extent of the white region = 14-3-3 = 8 cm		\Rightarrow 8 + x $\left(\frac{3}{4}\right)$ $-\frac{1}{4}$ = 10	
$3x = 9 \Rightarrow x = 3$ 25. Total area removed = $\frac{\angle A}{360} \pi r^2 + \frac{\angle B}{360} \pi r^2 + \frac{\angle C}{360} \pi r^2$ $= \frac{\frac{\angle A}{360} \times \frac{22}{360} \pi r^2}{\frac{180}{360} \times \frac{22}{7} \times (14)^2}$ $= \frac{180}{360} \times \frac{22}{7} \times (14)^2$ $= 308 \text{ cm}^2$ [or] The side of a square = Diameter of the semi-circle = a Area of the unshaded region $= \text{Area of a square of side 'a'} + 4(\text{Area of a semi-circle of diameter 'a'})$ $= \text{The horizontal/vertical extent of the white region} = 14-3-3 = 8 \text{ cm}$		$\Rightarrow 32 + x(3) -1 = 40$	1/2
$= \frac{2A+2B+2C}{360} \pi r^2$ $= \frac{180}{360} \pi r^2$ $= \frac{180}{360} \times \frac{22}{7} \times (14)^2$ $= 308 \text{ cm}^2$ [or] The side of a square = Diameter of the semi-circle = a Area of the unshaded region $= \text{Area of a square of side 'a'} + 4(\text{Area of a semi-circle of diameter 'a'})$ The horizontal/vertical extent of the white region = 14-3-3 = 8 cm	25	$\Rightarrow 3x = 9 \Rightarrow x = 3$	
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$= \frac{180}{360} \times \frac{22}{7} \times (14)^2$ $= 308 \text{ cm}^2$ [or] The side of a square = Diameter of the semi-circle = a Area of the unshaded region $= \text{Area of a square of side 'a'} + 4(\text{Area of a semi-circle of diameter 'a'})$ The horizontal/vertical extent of the white region = 14-3-3 = 8 cm		$-\frac{360}{180 - 2}$ III	1/
The side of a square = Diameter of the semi-circle = a Area of the unshaded region = Area of a square of side 'a' + 4(Area of a semi-circle of diameter 'a') The horizontal/vertical extent of the white region = 14-3-3 = 8 cm		$=\frac{\pi}{360}\pi r^2$	72
The side of a square = Diameter of the semi-circle = a Area of the unshaded region = Area of a square of side 'a' + 4(Area of a semi-circle of diameter 'a') The horizontal/vertical extent of the white region = 14-3-3 = 8 cm		$= \frac{100}{360} \times \frac{22}{7} \times (14)^2$	1/2
The side of a square = Diameter of the semi-circle = a Area of the unshaded region = Area of a square of side 'a' + 4(Area of a semi-circle of diameter 'a') The horizontal/vertical extent of the white region = 14-3-3 = 8 cm		$= 308 \text{ cm}^2$	
Area of the unshaded region = Area of a square of side 'a' + 4(Area of a semi-circle of diameter 'a') The horizontal/vertical extent of the white region = 14-3-3 = 8 cm		[or]	
Area of the unshaded region = Area of a square of side 'a' + 4(Area of a semi-circle of diameter 'a') The horizontal/vertical extent of the white region = 14-3-3 = 8 cm		The side of a square = Diameter of the semi-circle = a	
The horizontal/vertical extent of the white region = $14-3-3=8$ cm		Area of the unshaded region	1/2
·			1/-
Radius of the semi-circle + side of a square + Radius of the semi-circle = 8 cm		Radius of the semi-circle + side of a square + Radius of the semi-circle = 8 cm	72

	2 (radius of the semi-circle) + side of a square = 8 cm	
	$2 \text{ (radius of the senii-circle) + side of a square = 6 cm}$ $2a = 8 \text{ cm} \Rightarrow a = 4 \text{ cm}$	1/2
	Area of the unshaded region	/2
	= Area of a square of side 4 cm + 4 (Area of a semi-circle of diameter 4 cm)	
		1/2
	$= (4)^2 + 4 X \frac{1}{2} \pi (2)^2 = (16 + 8\pi) \text{ cm}^2$	/2
	SECTION C	
	Section C consists of 6 questions of 3 marks each	
26.	Number of students in each group subject to the given condition = HCF (60,84,108)	1/2
	HCF (60,84,108) = 12	1/2
	Number of groups in Music = $\frac{60}{12}$ = 5	
		1/2
	Number of groups in Dance = $\frac{84}{12}$ = 7	1/2
	Number of groups in Handicrafts = $\frac{108}{12}$ = 9	1/2
	Number of groups in Handicrarts $=\frac{1}{12}$	1/2
	Total number of rooms required = 21	
27.	$P(x) = 5x^2 + 5x + 1$	1/2
	$\alpha + \beta = \frac{-b}{-} = \frac{-5}{-} = -1$	
	$egin{array}{cccccccccccccccccccccccccccccccccccc$	1/2
	$\alpha\beta = \frac{1}{a} = \frac{1}{5}$	1/2
	$\alpha + \beta = \frac{-b}{a} = \frac{-5}{5} = -1$ $\alpha \beta = \frac{c}{a} = \frac{1}{5}$ $\alpha^2 + \beta^2 = (\alpha + \beta)^2 - 2\alpha\beta$	1,
	$=(-1)^2-2\left(\frac{1}{5}\right)$	1/2
		1/
	$=1-\frac{2}{1}=\frac{3}{1}$	1/2
	5 5 1 1	1/2
	$= 1 - \frac{2}{5} = \frac{3}{5}$ $\alpha^{-1} + \beta^{-1} = \frac{1}{\alpha} + \frac{1}{\beta}$	72
	$=\frac{(\alpha+\beta)}{\alpha\beta}=\frac{(-1)}{\frac{1}{\alpha}}=-5$	
	5	
28.	Let the ten's and the unit's digits in the first number be x and y, respectively.	
	So, the original number = $10x + y$	
	When the digits are reversed, x becomes the unit's digit and y becomes the ten's	
	Digit.	1/2
	So the obtain by reversing the digits= 10y + x	
	According to the given condition.	
	(10x + y) + (10y + x) = 66	
	i.e., $11(x + y) = 66$	1/2
	i.e., $x + y = 6 (1)$	1,
	We are also given that the digits differ by 2,	1/2
	therefore, either $x - y = 2 - (2)$	1/2
	or $y - x = 2$ (3) If $y = y = 2$ then solving (1) and (2) by elimination was get $y = 4$ and $y = 2$	1,
	If $x - y = 2$, then solving (1) and (2) by elimination, we get $x = 4$ and $y = 2$.	1/2
	In this case, we get the number 42. If $y = y = 2$, then solving (1) and (2) by elimination, we get $y = 2$ and $y = 4$.	1/
	If $y - x = 2$, then solving (1) and (3) by elimination, we get $x = 2$ and $y = 4$. In this case, we get the number 24.	1/2
	Thus, there are two such numbers 42 and 24.	
	[or]	+
		1/2
	Let $\frac{1}{\sqrt{x}}$ be 'm' and $\frac{1}{\sqrt{y}}$ be 'n',	72
	Then the given equations become	
	2m + 3n = 2	1/2
	4m - 9n = -1	/2

	$(2m + 3n = 2) X-2 \Rightarrow -4m - 6n = -4$ (1)	
	4m - 9n = -1 $4m - 9n = -1$ (2)	
	Adding (1) and (2) $We get -15n = -5 \Rightarrow n = \frac{1}{3}$	1/2
	We get $-13h = -3 \Rightarrow h = \frac{1}{3}$	/2
	Substituting $n = \frac{1}{3}$ in $2m + 3n = 2$, we get	
	2m + 1 = 2	1/2
	2m = 1	
	$m = \frac{1}{-}$	1
	$m = \frac{1}{2}$ $\Rightarrow \sqrt{x} = 2$ $\Rightarrow x = 4$ and $n = \frac{1}{3}$ $\Rightarrow \sqrt{y} = 3$ $\Rightarrow y = 9$	
29.	$\frac{111 - \frac{1}{2}}{2} \rightarrow \sqrt{\chi} - \frac{1}{2} \rightarrow \chi - \frac{1}{4} \text{ and } 11 - \frac{1}{3} \rightarrow \sqrt{y} - \frac{1}{3} \rightarrow y - \frac{1}{3}$	
29.	$\angle OAB = 30^{\circ}$	
	∠OAP = 90° [Angle between the tangent and	
	the radius at the point of contact]	
	$\angle PAB = 90^{\circ} - 30^{\circ} = 60^{\circ}$	1/2
	AP = BP [Tangents to a circle from an external point] \angle PAB = \angle PBA [Angles opposite to equal sides of a triangle]	1/2
	In $\triangle ABP$, $\angle PAB + \angle PBA + \angle APB = 180^{\circ}$ [Angle Sum Property]	72
	$60^{\circ} + 60^{\circ} + \angle APB = 180^{\circ}$	
	∠APB = 60°	1/2
	∴ \triangle ABP is an equilateral triangle, where AP = BP = AB.	
	PA = 6 cm In Picht AOAB (OBA = 20°)	1/2
	In Right $\triangle OAP$, $\angle OPA = 30^{\circ}$	
	$\tan 30^{\circ} = \frac{OA}{PA}$	1/2
	$\frac{1}{\sqrt{3}} = \frac{OA}{6}$	
	$\frac{1}{\sqrt{3}} = \frac{\stackrel{PA}{OA}}{\stackrel{6}{6}}$ $OA = \frac{6}{\sqrt{3}} = 2\sqrt{3}cm$	1/2
	[or]	
	P	
	Let $\angle TPQ = \theta$	
	\angle TPO = 90° [Angle between the tangent and the radius at the point of contact]	1/2
	$\angle OPQ = 90^{\circ} - \theta$	
	TP = TQ [Tangents to a circle from an external	
	point]	1/
	$\angle TPQ = \angle TQP = \theta$ [Angles opposite to equal sides of a triangle]	1/ ₂ 1/ ₂
	In $\triangle PQT$, $\angle PQT + \angle QPT + \angle PTQ = 180^{\circ}$ [Angle Sum Property]	1/2
	$\theta + \theta + \angle PTQ = 180^{\circ}$	
	$\angle PTQ = 180^{\circ} - 2 \theta$ $\angle PTQ = 2 (90^{\circ} - \theta)$	1/2
	$\angle PTQ = 2 \angle OPQ [using (1)]$	1/2
30.	Given, $1 + \sin^2\theta = 3 \sin \theta \cos \theta$	
	Dividing both sides by $\cos^2\theta$,	
	$\frac{1}{\cos^2\theta} + \tan^2\theta = 3\tan\theta$	
	$\sec^2\theta + \tan^2\theta = 3\tan\theta$	1/2
	$1 + \tan^2\theta + \tan^2\theta = 3 \tan \theta$	1/ ₂
	$1 + 2 \tan^2 \theta = 3 \tan \theta$	1/ ₂ 1/ ₂
	$2 \tan^2 \theta - 3 \tan \theta + 1 = 0$ If tan $\theta = y$, then the equation becomes $2y^2 - 2y + 1 = 0$	12
	If $\tan \theta = x$, then the equation becomes $2x^2 - 3x + 1 = 0$	

	$\Rightarrow (x-1)(2x-1) = 0 \text{ x} = 1 \text{ or } \frac{1}{2}$						
				$\tan \theta = 1$	or $\frac{1}{2}$		1
31.	Longth	Number of					
	Length [in mm]	leaves (f)	CI	Mid x	d	fd	
	118 - 126	3	117.5- 126.5	122	-27	-81	
	127 - 135	5	126.5-135.5	131	-18	-90	
	136 - 144	9	135.5- 144.5	140	-9	-81	
	145 - 153	12	144.5 - 153.5	a = 149	0	0	
	154 - 162	5	153.5 - 162.5	158	9	45	2
	163 - 171	4	162.5 - 171.5	167	18	72	1/2
	172 - 180	2	171.5 - 180.5	176	27	54	1/2
		Mean	$= a + \frac{\sum fd}{\sum f} = 149 - \frac{1}{2}$	-8			
			$\sum f$ = 149 - 2.025 = 1				
	Average length		= 146.975				
			SECTI	ON D			
		Section D	consists of 4 qu	uestions of 5 n	narks each		
32.	I at the s	eneed of the st	ream be x km/h.				
52.	The spee	ed of the boat	upstream = (18 -	x) km/h and			
	the spee	d of the boat o	lownstream = (1)				1
	The time taken to go upstream = $\frac{distance}{speed} = \frac{24}{18-x}$ hours						
	the time taken to go downstream = $\frac{distance}{distance} = \frac{24}{distance}$ hours					1	
	According to the question, spe $18+x$					1	
	$\frac{24}{18-x} - \frac{24}{18+x} = 1$					1	
			18-x $18+x$	— 1			1
		24(18 + x)	-24(18-x)=(1				
			$x^2 + 48x - 324$	= 0 = 6 or – 54			1
	Since x is the speed of the stream, it cannot be negative.						
	Therefo	ore, $x = 6$ gives	the speed of the	stream = 6 km	/h.		1
			[0	_			
	Let the time taken by the smaller pipe to fill the tank = x hr. Time taken by the larger pipe = $(x - 10)$ hr						1/2
	Part of the tank filled by smaller pipe in 1 hour = $\frac{1}{1}$, 2	
				\boldsymbol{x}			1
			oy larger pipe in				
	The tank can be filled in $9\frac{3}{8} = \frac{75}{8}$ hours by both the pipes together.					1/2	
	Part of the tank filled by both the pipes in 1 hour = $\frac{8}{}$					1/2	
	75						

		1
	Therefore, $\frac{1}{x} + \frac{1}{x - 10} = \frac{8}{75}$ $8x^2 - 230x + 750 = 0$	1/2
	$x = 25, \frac{30}{8}$	1
	Time taken by the smaller pipe cannot be $30/8 = 3.75$ hours, as the time taken by	1/2
	the larger pipe will become negative, which is logically not possible. Therefore, the time taken individually by the smaller pipe is 25 hours and the larger	1/2
	pipe will be 25 – 10 =15 hours.	72
33.	(a) Statement – ½	
	Given and To Prove – ½	2
	Figure and Construction ½ Proof – 1 ½ A	3
	P1001 - 1 72	
	[b] Draw DG BE	
		1/2
	In \triangle ABE, $\frac{AB}{BD} = \frac{AE}{GE}$ [BPT]	
	CF = FD [F is the midpoint of DC](i)	1/2
	In \triangle CDG, $\frac{DF}{CF} = \frac{GE}{CE} = 1$ [Mid point theorem]	1/2
	GE = CE(ii)	
	$\angle CEF = \angle CFE$ [Given]	
	CF = CE [Sides opposite to equal angles] (iii)	1/2
	From (ii) & (iii) CF = GE(iv) From (i) & (iv) GE = FD	
	$\therefore \frac{AB}{BD} = \frac{AE}{GE} \Rightarrow \frac{AB}{BD} = \frac{AE}{FD}$	
34.		
	Length of the pond, $l = 50m$, width of the pond, $b = 44m$	
	Water level is to rise by, $h = 21 \text{ cm} = \frac{21}{100} \text{ m}$	
	Volume of water in the pond = lbh = $50 \times 44 \times \frac{21}{100} \text{ m}^3 = 462 \text{ m}^3$	1
	Diameter of the pipe = 14 cm	
	Radius of the pipe, $r = 7cm = \frac{7}{100}m$	
	Area of cross-section of pipe = πr^2	
	$= \frac{22}{7} \times \frac{7}{100} \times \frac{7}{100} = \frac{154}{10000} \text{ m}^2$	1
	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	1/2
	Rate at which the water is flowing through the pipe, h = 15km/h = 15000 m/h	1,
	Volume of water flowing in 1 hour = Area of cross-section of pipe x height of water	1/2
	coming out of pipe	1
	$= \left(\frac{154}{10000} \times 15000\right) m^3$	•
	Time required to fill the pond = $\frac{Volume\ of\ the\ pond}{Volume\ of\ water\ flowing\ in\ 1\ hour}$	1
	462 ×10000	
	$=\frac{162 \times 1666}{154 \times 15000} = 2 \text{ hours}$	
	Speed of water if the rise in water level is to be attained in 1 hour = 30km/h	
	[or]	

	Radius of the cylindrical tent (r) = 14 m		
	Total height of the tent = 13.5 m		
	Height of the cylinder = 3 m	10.5m	
	Height of the Conical part = 10.5 m		1/2
	Slant height of the cone (l) = $\sqrt{h^2 + r^2}$		
	$=\sqrt{(10.5)^2+(14)^2}$ 14m	3m	
	$=\sqrt{110.25+196}$		1
	$=\sqrt{306.25}=17.5 \text{ m}$		1
	Curved surface area of cylindrical portion		
	$=2\pi rh$		
	$=2x\frac{22}{5}\times14\times3$		1
	$= 264 \text{ m}^2$		
	Curved surface area of conical portion		
	=πrl		
	$=\frac{22}{5} \times 14 \times 17.5$		
	7		1
	$=770 \text{ m}^2$		1/2
	Total curved surface area = $264 \text{ m}^2 + 770 \text{ m}^2 = 1034 \text{ m}^2$		
	Provision for stitching and wastage = 26 m^2		1,
	Area of canvas to be purchased = 1060 m^2		1/2
	Cost of canvas = Rate × Surface area		1/2
			72
	= 500 x 1060 = ₹ 5,30,000/-		
35.			
	Number of Cumulative		

Marks obtained	Number of students	Cumulative frequency
20 - 30	р	р
30 - 40	15	p + 15
40 - 50	25	p + 40
50 - 60	20	p + 60
60 – 70	q	p + q + 60
70 – 80	8	p + q + 68
80 - 90	10	p + q + 78
	90	

$$p + q + 78 = 90$$

$$p + q = 12$$

$$Median = (l) + \frac{\frac{n}{2} - c}{f} \cdot h$$

$$50 = 50 + \frac{45 - (p + 40)}{20} \cdot 10$$

$$\frac{45 - (p + 40)}{20} \cdot 10 = 0$$

$$45 - (p + 40) = 0$$

$$P = 5$$

$$5 + q = 12$$

$$q = 7$$

$$Mode = l + \frac{f1 - f0}{2f1 - f0 - f2} \cdot h$$

1

1/₂
1/₂

1/2

1/2

½ ½

	25-15	Т			
	$=40+\frac{25-15}{2(25)-15-20}.10$				
	$=40 + \frac{100}{15} = 40 + 6.67 = 46.67$				
	15	_			
	SECTION E				
36.	(i) Number of throws during camp. a = 40; d = 12	1			
	$t_{11} = a + 10d$				
	$= 40 + 10 \times 12$				
	= 160 throws	1/			
	(ii) $a = 7.56 \text{ m}$; $d = 9 \text{cm} = 0.09 \text{ m}$ n = 6 weeks	1/ ₂ 1/ ₂			
	$t_n = a + (n-1) d$	1/2			
	= 7.56 + 6(0.09)	/2			
	= 7.56 + 0.54	1/2			
	Sanjitha's throw distance at the end of 6 weeks = 8.1 m	/2			
	(or)				
	a = 7.56 m; $d = 9 cm = 0.09 m$	1/2			
	$t_n = 11.16 \text{ m}$	1/2			
	$t_n = a + (n-1) d$				
	11.16 = 7.56 + (n-1)(0.09)	1/2			
	3.6 = (n-1)(0.09)				
	$n-1 = \frac{3.6}{0.09} = 40$				
	n = 41	1/2			
	Sanjitha's will be able to throw 11.16 m in 41 weeks.				
	(iii) a = 40; d = 12; n = 15				
	$S_n = \frac{n}{2} [2a + (n-1) d]$	1/2			
	$S_n = \frac{15}{2} [2(40) + (15-1)(12)]$				
	$=\frac{15}{2}[80+168]$				
	\boldsymbol{L}				
	$=\frac{15}{2}$ [248] =1860 throws	1/2			
37.	(i) Let D be (a,b), then				
	Mid point of AC = Midpoint of BD				
	$(1+6 \ 2+6) - (4+a \ 3+b)$	1/2			
	$\left(\frac{1+6}{2}, \frac{2+6}{2}\right) = \left(\frac{4+a}{2}, \frac{3+b}{2}\right)$				
	4 + a = 7 $3 + b = 8$				
	$a=3 \qquad b=5$				
	Central midfielder is at (3,5)	1/2			

	(II) OXX (C. 0. 0.2) (F. 1.2) (G. 1.6) (G. 1.6)	1/
	(ii) GH = $\sqrt{(-3-3)^2 + (5-1)^2} = \sqrt{36+16} = \sqrt{52} = 2\sqrt{13}$	1/ ₂ 1/ ₂
	$GK = \sqrt{(0+3)^2 + (3-5)^2} = \sqrt{9+4} = \sqrt{13}$	1/2
	$HK = \sqrt{(3-0)^2 + (1-3)^2} = \sqrt{9+4} = \sqrt{13}$	1/2
	GK +HK = GH \Rightarrow G,H & K lie on a same straight line	
	[or]	1/
	$CJ = \sqrt{(0-5)^2 + (1+3)^2} = \sqrt{25+16} = \sqrt{41}$	1/ ₂ 1/ ₂
	$CI = \sqrt{(0+4)^2 + (1-6)^2} = \sqrt{16+25} = \sqrt{41}$	/2
	Full-back J(5,-3) and centre-back I(-4,6) are equidistant from forward C(0,1)	
	Mid-point of IJ = $\left(\frac{5-4}{2}, \frac{-3+6}{2}\right) = \left(\frac{1}{2}, \frac{3}{2}\right)$	1/2
		1/2
	C is NOT the mid-point of IJ	
	(iii) A D and E lie on the game straight line and D is equidistant from A and E	
	(iii) A,B and E lie on the same straight line and B is equidistant from A and E⇒ B is the mid-point of AE	
		1/2
	$\left(\frac{1+a}{2}, \frac{4+b}{2}\right) = (2, -3)$	1/2
	1 + a = 4; $a = 3$. $4+b = -6$; $b = -10$ E is (3,-10)	
38.	$1 + a = 4; a = 3. 4+b = -6; b = -10 E is (3,-10)$ (i) $tan 45^{\circ} = \frac{80}{CB} \Rightarrow CB = 80m$ (ii) $tan 30^{\circ} = \frac{80}{CE}$ $\Rightarrow \frac{1}{\sqrt{3}} = \frac{80}{CE}$	1
	(ii) $tan 20° = \frac{80}{100}$	1/2
	$\frac{(11)^{-1}CE}{CE}$	1/2
	$\Rightarrow \frac{1}{\sqrt{2}} = \frac{80}{32}$	1/2
	$\sqrt{3}$ CE	1/2
	\Rightarrow CE = $80\sqrt{3}$	
	Distance the bird flew = AD = BE = CE-CB = $80\sqrt{3}$ – $80 = 80(\sqrt{3}$ -1) m	
		1/2
	(or)	1/2
	$\tan 60^\circ = \frac{80}{CG}$	
		1/
	$\Rightarrow \sqrt{3} = \frac{80}{33}$	1/ ₂ 1/ ₂
	$\Rightarrow \sqrt{3} = \frac{80}{CG}$ $\Rightarrow CG = \frac{80}{\sqrt{3}}$	/2
	80	
	$\Rightarrow CG = \frac{1}{\sqrt{3}}$	
	Distance the ball travelled after hitting the tree =FA=GB = CB -CG	
	GB = $80 - \frac{80}{\sqrt{3}} = 80 \left(1 - \frac{1}{\sqrt{3}}\right) \text{ m}$	
	$\sqrt{3}$ $\sqrt{3}$ Distance $20(\sqrt{3}+1)$	1/2
	(iii) Speed of the bird = $\frac{Distance}{Time\ taken} = \frac{20(\sqrt{3}+1)}{2}$ m/sec	, 2
	$= \frac{20(\sqrt{3}+1)}{2} \times 60 \text{ m/min} = 600(\sqrt{3}+1) \text{ m/min}$	1/2
	$-\frac{2}{2} \times \frac{1}{2} \times 1$	