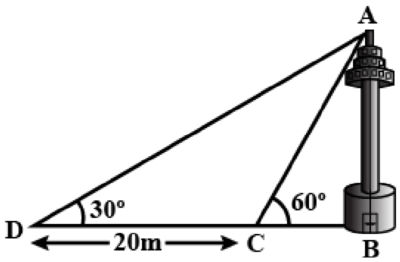
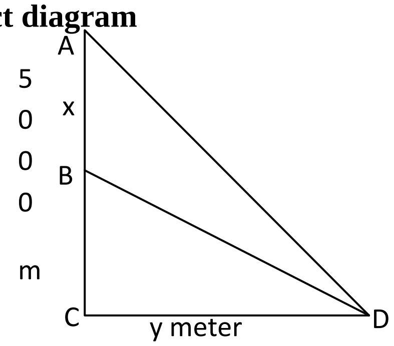
Marking Scheme
Pre Board Exam 2021-22
Class- X
TERM-II
Subject- Mathematics

Q.NO.	SECTION A	MARKS
1	Let the first term is a and common difference is d $S_n = 3n^2 + 5n$ $S_1 = 3 + 5 = 8$ $a_1 = S_1 = 8$ $S_2 = 3 \times 4 + 5\times2 = 22$ $a_2 = s_2 - s_1 = 22-8 = 14$ $S_3 = 3 \times 9 + 5\times3 = 42$ $a_3 = s_3 - s_2 = 42-22 = 20$ Thus AP is 8,14,20 ------- And $a_{15} = a + 14d = 8 + 14 \times 6 = 8 + 84 = 92$ **OR** $5a_5 = 8a_8$ $5(a + 4d) = 8(a + 7d)$ $5a + 20d = 5a + 56d$ $3a + 36d = 0 \Rightarrow a + 12d = 0 \Rightarrow a_{13} = 0$	1 ½ 1 ½ ½ 1
2	$kx(x - 2\sqrt{5}) + 10 = 0$ $kx^2 - 2\sqrt{5}kx + 10 = 0$ $a = k, b = -2\sqrt{5}k, c = 10$ Roots of quadratic equation are equal if D = 0 $b^2 - 4ac = 0$ $(-2\sqrt{5}k)^2 - 4 \times k \times 10 = 0$ $20k^2 - 40k = 0$ $20k(k-2) = 0$ K = 0 , k = 2, rejecting k = 0 then k = 2	 ½ ½ 1
3	Given: PQ is a tangent. AB is a diameter, ∠CAB=30o To find: ∠PCA=? In ΔAOC, ∠CAB=∠OCA (Angles opposite to equal sides are equal) So, $\angle CAB = 30^o = \angle OCA$ Since OC⊥PQ (Tangent is perpendicular to the radius at point of contact) ∠PCO=90o $\angle OCA + \angle PCA = 90^o$ $30^o + \angle PCA = 90^o$ $\angle PCA = 90^o - 30^o$ therefore PCA = 60^0	 1
4	Radius of cylinder = 2.5mm , length of capsule = 14mm Then length of cylinder = 14 - 5 = 9mm , radius of hemisphere = 2.5 mm	½ ½

	TSA of capsule = S.A. of cylindrical part + 2 x C.S.A. of hemisphere $= 2\pi r h + 2 \times 2\pi r^2$ $= 2\pi r (h + 2r)$ $= 2 \times 22/7 \times 2.5 \times (9 + 2 \times 2.5)$ $= 5 \times 22/7 \times 14\ mm^2$ $= 220\ mm^2$	1
5	Modal class =30–40 So, $f_0=x, f_1=16, f_2=12, l=30$ and $h=10$ $\Rightarrow$ Mode=l+ ($f_1 - f_0$) / (2f1 – $f_0 - f_2$) ×h $\Rightarrow$ 36=30+(2×16−x)/ (2x16−x – 12) ×10 $\Rightarrow$ 6= (16 – x) / (20 – x) ×10 $\Rightarrow$ 120−6x=160 – 10x $\Rightarrow$ 4x=40 $\therefore$ x=10	 ½ ½ 1
6	Let the length of the side of the chess board be x cm. Then, Area of 64 squares = $(x-4)^2$ Therefore, $(x-4)^2=64\times6.25$ $x^2-8x+16=400$ $x^2-8x-384=0$ $x^2-24x+16x-384=0$ (x−24)(x+16)=0 x=24 cm OR $4x^2 - 4ax + a^2 - b^2 = 0$ $[(2x)^2 - 4ax + a2] - b^2$ $(2x - a)^2 - b^2 = 0$ [(2x – a) + b] [(2x – a) - b] = 0 [2x – a + b] = 0 , [(2x – a - b] = 0 2x = a – b ,2x = a + b x = a – b / 2 , x = a + b /2 SECTION B	 ½ ½ 1 ½ ½ ½ ½
7	(table below)	1

No of seats (C I)	No. of flights (fi)	Class mark(xi)	fixi
100-104	15	102	1530
104-108	20	106	2120
108-112	22	110	2420
112-116	18	114	2052
116-120	15	118	1770
	∑fi =90		∑fixi = 9892

	X = ∑fixi/∑fi	1/2
	= 9892/90	1/2
	= 109.91 Therefore number of seats= 109.	1

8	Using proper scale construction Steps of construction	2 1
9	N = 50 $\therefore$ f = 50 a =12 , b=13 c = 35 d= 8 e = 5	Each correct answer ½ marks
10	Correct diagram  Here AB is TV tower of height = y meter. Let, BC = x meter Point C and D are points of observations to the top of the TV tower making an angles of elevation 30^0 and 60^0 respectively. $\therefore$ In ΔABC, tan 60 = AB/BC $\sqrt{3}$ = y/x $\therefore$ x = y/$\sqrt{3}$ --------------------------1 Again in ΔABD, tan 30 = AB/BD 1/$\sqrt{3}$ = y/x+20 x+20 = $\sqrt{3}$ y $\therefore$ x = $\sqrt{3}$y – 20----------------------2 By 1 and 2, y/$\sqrt{3}$ = $\sqrt{3}$y – 20 y = 3y -20$\sqrt{3}$ y = 10$\sqrt{3}$ meter **OR** **Correct diagram**  Here A and B are the positions of aeroplane and D are points of observations such that $\angle CDB=45^0$ & $\angle CDA=60^0$ AC= 5000m & AB = x meter	 1 ½ ½ 1 1

	∴ In ΔBCD, tan 45 = BC/BD $1 = BC/y$ BC = y ---------------1 AC = BC + AB =5000 x + y = 5000 ---------2 Again in ΔACD, tan 60 = AC/CD $\sqrt{3} = 5000/y$ $y = 5000/\sqrt{3}$ ----------------3 By substituting the value of y in equation(2) , w get $x = 5000 – 5000/\sqrt{3}$ $x = 5000(1-1/\sqrt{3})$ or 2113.25 meter	½ ½ ½ ½
	Section C	
11	Let ∠PTQ = θ ΔTPQ is an isosceles triangle $\angle TPQ = \angle TQP = 1/2(180 - \theta) = 90^0 - \theta/2$ $\angle OPT = 90^0$ ∠OPQ = ∠OPT - ∠TPQ $= 90^0 – (90^0 - \theta/2)$ $= \theta/2$ ∠OPQ = 1/2∠PTQ 2∠OPQ = ∠PTQ	1 ½ ½ ½ ½ 1
12	The well is in the form of cylinder having radius 3/2 meter and height 14 meter. The width of the circular ring (Embankment) is 4 meter R = 4 +3/2 = 11/2 met and r = 3/2 met and h = 14 met Volume of the earth taken out from well = volume of embankment $\pi R^2 H = \pi(R^2 - r^2) H$ $(3/2)^2 \times 14 = [(11/2)^2 – (3/2)^2] \times h$ Therefore h = 9/8 meter **OR** Let N be the number of ice cream to be filled. Vol. of ice cream in cylindrical container = N x Vol. of ice cream cones $\pi R^2 H = N \times \{1/3\pi r^2 h + 2/3\pi r^3\}$ $\pi R^2 H = N \times 1/3\pi r^2 (h + 2r)$ $(6)^2 \times 15 = N \times 1/3 (3)^2 \times (12 + 2 \times 3)$ ∴ N = 10	1 1 1 1 1 1 1 1
13(i)	Case Study 1 (i) $\sin(\alpha+\beta) = 1$ ∴ $(\alpha+\beta) = 90^0$ --1 $\cos(\beta - \alpha) = \sqrt{3}/2$ ∴ $(\beta - \alpha) = 30^0$ ---2 From (1) and (2) , we get $\beta = 60^0$ & $\alpha = 30^0$	½ ½ 1
13(ii)	(ii) Let RB =x met & QR = y met tan 30 = 28.5/ x+y $1/\sqrt{3} = 28.5/x+y$ $x = 28.5\sqrt{3} – y$ ------------------------------------1	½

	tan 60 = 28.5/ x $\sqrt{3}$ = 28.5/x x = 28.5/$\sqrt{3}$ -------------------------------------2 From (1) and (2) , we get y = 19$\sqrt{3}$ meter	 ½ 1
14(i)	(i) As in the problem given the number of trees to be planted by each class is double the class they are studying as in every class, there are two sections . For class I , the trees to be planted is equal to 2(1) + 2(1) = 4 Similarly for class II, the trees to be planted is equal to 2(2) + 2(2) = 8 Similarly for class III, the trees to be planted is equal to 2(3) + 2(3) =12 and so on. The AP will be as 4,8,12,16 ,….	 ½ ½ 1
14(ii)	(ii)Sn = n/2 {2a + (n-1)d} Here a = 4 , d = 4 and n =12 S_n = 12/2{2x4 + (12-1)(4)} $\therefore S_n$ = 312 Trees to be planted	½ ½ ½ ½