Additional Practice Question Paper

Class X Session 2023-24

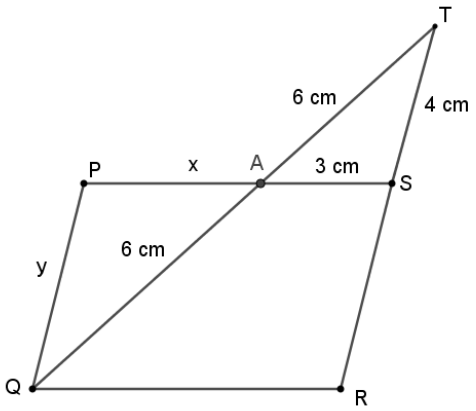
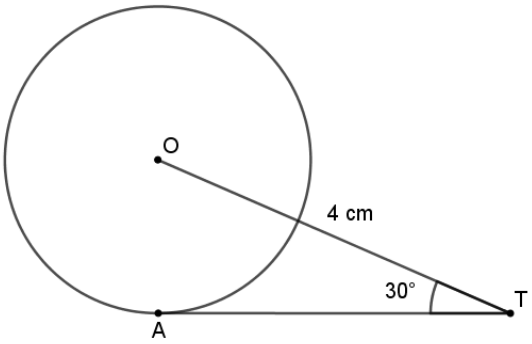
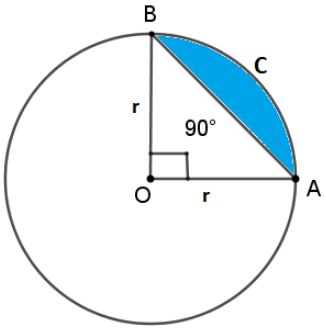
MATHEMATICS STANDARD (Code No.041)

TIME: 3 hours **MAX. MARKS: 80**

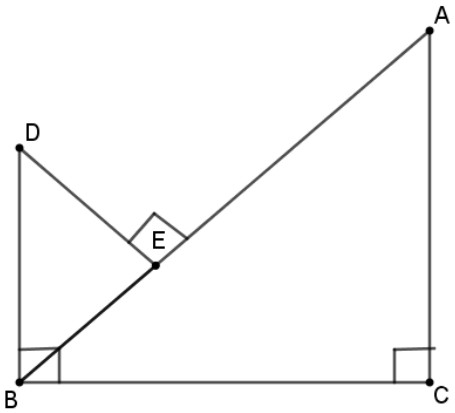
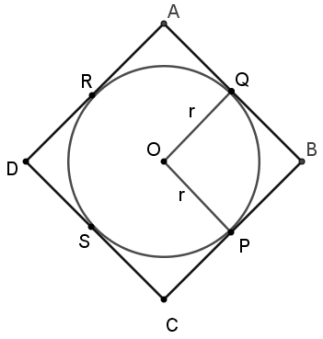
General Instructions:

1. This Question Paper has 5 Sections A, B, C, D and E.
2. Section A has 20 MCQs carrying 1 mark each
3. Section B has 5 questions carrying 02 marks each.
4. Section C has 6 questions carrying 03 marks each.
5. Section D has 4 questions carrying 05 marks each.
6. Section E has 3 case based integrated units of assessment (04 marks each) with subparts of the values of 1, 1 and 2 marks each respectively.
7. All Questions are compulsory. However, an internal choice in 2 Qs of 5 marks, 2 Qs of 3 marks and 2 Questions of 2 marks has been provided. An internal choice has been provided in the 2marks questions of Section E
8. Draw neat figures wherever required. Take π =22/7 wherever required if not stated.

	SECTION A	
	Section A consists of 20 questions of 1 mark each.	
1.	A quadratic polynomial, the sum of whose zeroes is 0 and one zero is 4, is (a) $x^2 - 16$ (b) $x^2 + 16$ (c) $x^2 + 4$ (d) $x^2 - 4$	1
2.	In a formula racing competition, the time taken by two racing cars A and B to complete 1 round of the track is 30 minutes and ***p*** minutes respectively. If the cars meet again at the starting point for the first time after 90 minutes and the HCF (30, ***p***) = 15, then the value of ***p*** is (a) 45 minutes (b) 60 minutes (c) 75 minutes (d) 180 minutes	1
3.	Graphically, the pair of equations $6x - 3y + 10 = 0$ and $2x - y + 9 = 0$ represents two lines which are (a) intersecting at exactly one point (b) intersecting at exactly two points (c) coincident (d) parallel	1
4.	If the quadratic equation $x^2 - 8x + k = 0$ has real roots, then (a) $k < 16$ (b) $k \leq 16$ (c) $k > 16$ (d) $k \geq 16$	1
5.	If the sum of first n odd natural numbers is equal to k times the sum of first n even natural numbers, then k is equal to (a) $\frac{n+1}{2n}$ (b) $\frac{2n}{n+1}$ (c) $\frac{n+1}{n}$ (d) $\frac{n}{n+1}$	1
6.	Two APs have the same common difference. The first term of one of these is –1 and that of the other is – 8. Then the difference between their 4th terms is (a) -1 (b) -8 (c) 7 (d) -9	1
7.	If in two triangles, DEF and PQR, $\angle D = \angle Q$ and $\angle R = \angle E$, then which of the following is not true? (a) $\frac{EF}{PR} = \frac{DF}{PQ}$ (b) $\frac{EF}{RP} = \frac{DE}{PQ}$ (c) $\frac{DE}{QR} = \frac{DF}{PQ}$ (d) $\frac{EF}{RP} = \frac{DE}{QR}$	1
8.	In given figure, PQRS is a parallelogram, if AT = AQ = 6 cm, AS = 3 cm and TS = 4 cm, then	1

	 (a) x = 4, y = 5 (b) x = 2, y = 3 (c) x = 1, y = 2 (d) x = 3, y = 4	
9.	In given figure, AT is a tangent to the circle with centre O such that OT = 4 cm and ∠OTA = 30°. Then AT is equal to  (a) 4 cm (b) 2 cm (c) $2\sqrt{3}$ cm (d) $4\sqrt{3}$ cm	1
10.	If $4\cot\theta - 5 = 0$, then the value of $\frac{5\sin\theta - 4\cos\theta}{5\sin\theta + 4\cos\theta}$ is (a) $\frac{5}{3}$ (b) $\frac{5}{6}$ (c) 0 (d) $\frac{1}{6}$	1
11.	In the given figure, the area of the segment ACB is  (a) $\frac{r^2}{4}(\pi - 2)$ (b) $\frac{r^2}{4}(\pi + 2)$ (c) $\frac{r^2}{4}(\pi - 1)$ (d) $\frac{r^2}{4}(\pi + 1)$	1
12.	Two cubes each with 6 cm edge are joined end to end. The surface area of the resulting cuboid is (a) 180 cm^2 (b) 360 cm^2 (c) 300 cm^2 (d) 260 cm^2	1

13.	A sphere of maximum volume is cut out from a solid hemisphere of radius 7 cm. Then the ratio of the volume of the original hemisphere to that of the cut-out sphere is (a) $2:1$ (b) $16:1$ (c) $3:1$ (d) $4:1$	1
14.	The distance between two points A and B, on a graph is given as $\sqrt{10^2+7^2}$. The coordinates of A are $(-4,3)$. Given that the point B lies in the first quadrant, then all the possible x-coordinates of point B are (a) multiple of 2 (b) multiple of 3 (c) multiple of 5 (d) multiple of 6	1
15.	If $A(1,2)$, $B(4,3)$ and $C(6,6)$ are the three vertices of a parallelogram ABCD, then the coordinates of the fourth vertex D are (a) $\left(\frac{1}{2},4\right)$ (b) $\left(\frac{7}{2},5\right)$ (c) $(3,4)$ (d) $(3,5)$	1
16.	Two linear equations in variables x and y are given below: $a_1x+b_1y+c=0$ $a_2x+b_2y+c=0$ Which of the following pieces of information is independently sufficient to determine if a solution exists or not for this pair of linear equations? I. $\frac{a_1}{b_1}=\frac{a_2}{b_2}=1$ II. $\frac{a_1}{a_2}=\frac{b_1}{b_2}$ III. $\frac{a_1}{a_2}=\frac{a_1}{b_1}\neq 1$ IV. $\frac{a_1}{a_2}\neq\frac{b_1}{b_2}$ (a) IV only (b) I and IV (c) II and IV (d) I and III	1
17.	If mode of some data is 7 and their mean is also 7 then their median is (a) 10 (b) 9 (c) 8 (d) 7	1
18.	In an MCQ test, a student guesses the correct answer x out of y times. If the probability that the student guesses the answer to be wrong is $\frac{2}{3}$ then what is the relation between x and y (a) $y=3x$ (b) $x=3y$ (c) $3x=2y$ (d) $2x=3y$	1
	ASSERTION REASON BASED QUESTIONS: **In the question number 19 and 20, a statement of Assertion(A) is followed by a statement of Reason (R).** **Choose the correct answer out of the following choices** **(a) Both (A) and (R) are true and (R) is the correct explanation of (A).** **(b) Both A and (R) are true and (R) is not the correct explanation of (A).** **(c) (A) is true but (R) is false.** **(d) (A) is false but (R) is true.**	
19.	**Assertion(A):** Maximum value of $\frac{1}{\sec\theta}+\frac{1}{cosec\,\theta}$ is 1 **Reason(R):** Maximum value of both $\sin\theta$ and $\cos\theta$ is 1	1
20.	**Assertion(A):** The probability of getting a bad egg in a lot of 400 is 0.035. The number of good eggs in the lot is 386. **Reason(R):** If the probability of an event is p, the probability of its complementary event will be 1-p	1

	SECTION B	
	Section B consists of 5 questions of 2 marks each.	
21.	A forester wants to plant 66 apple trees, 88 banana trees and 110 mango trees in equal rows (in terms of number of trees). Also, he wants to make distinct roots of the trees (only one type of tree in one row). Find the minimum number of rows required.	2
22.	If α and β are the zeroes of $x^2 - x - 2$, form a quadratic polynomial whose zeroes are $2\alpha + 1$ and $2\beta + 1$ **OR** If α and β are the zeroes of $f(x) = 2x^2 + 5x + k$ such that $\alpha^2 + \beta^2 + \alpha\beta = \frac{21}{4}$, find the value of k	2
23.	In given figure, $DB \perp BC, DE \perp AB$ and $AC \perp BC$. Prove that $\frac{BE}{DE} = \frac{AC}{BC}$  **OR** If AD and PM are the medians of triangles ABC and PQR respectively where $\Delta ABC \sim \Delta PQR$, prove that $\frac{AB}{PQ} = \frac{AD}{PM}$	2
24.	In given figure, A circle is inscribed in a quadrilateral ABCD in which $\angle B = 90°$. If AD = 23 cm, AB = 29 cm and DS = 5 cm, find the radius r of the circle.  	2
25.	If $\sin A - \cos A = 0$ for some acute angle A, then find the value of $$2tan^2A + \frac{1}{cosec^2A} + 1$$	2
	SECTION C	
	Section C consists of 6 questions of 3 marks each	
26.	Prove that $5 + 6\sqrt{7}$ is irrational.	3
27.	The area of a rectangle reduces by 160 m^2 if its length is increased by 5 m and breadth is reduced by 4 m. However, if the length is decreased by 10 m and breadth is increased by 2 m, then its area is decreased by 100 m^2. Find the dimensions of the rectangle. **OR**	3

	If 16 is subtracted from twice the greater of two positive numbers, the result is half the other number. If 1 is subtracted from half the greater number, the result is still half the other number. Find the two numbers.	
28.	Two tangents TP and TQ are drawn to a circle with centre O from an external point T. Prove that $\angle PTQ = 2\angle OPQ$.	3
29.	Prove that: $(sin^4\theta - cos^4\theta + 1)cosec^2\theta = 2$ **OR** If $\sin x + cosec\ x = 2$, then find the value of $sin^{19}x + cosec^{20}x$	3
30.	A right circular cylinder and a cone have equal bases and equal heights. If their curved surface areas are in the ratio $8 : 5$, then find the ratio between the radius of their bases to their heights.	3
31.	One card is drawn from a well shuffled deck of 52 cards. Find the probability of getting (i) a face card or a black card (ii) neither an ace nor a king (iii) a jack and a black card	3
	SECTION D	
	Section D consists of 4 questions of 5 marks each	
32.	The marks obtained by 80 students of Class X in a mock test of Mathematics are given below in the table:	5

Marks	Number of students
0 and above	80
10 and above	77
20 and above	72
30 and above	65
40 and above	55
50 and above	43
60 and above	28
70 and above	16
80 and above	10
90 and above	8
100 and above	0

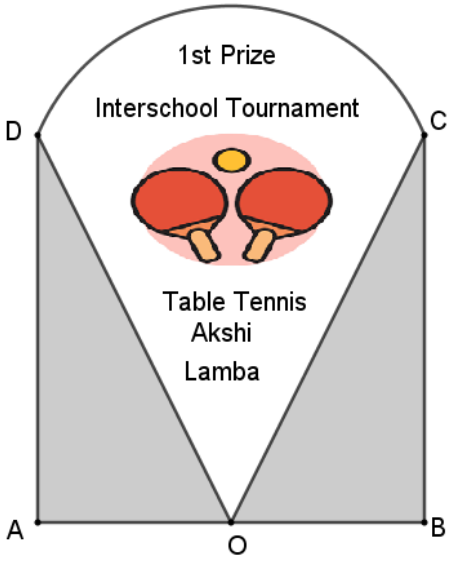
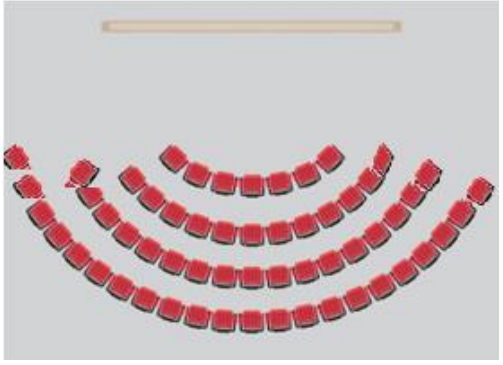
Find the median and the mode of the data

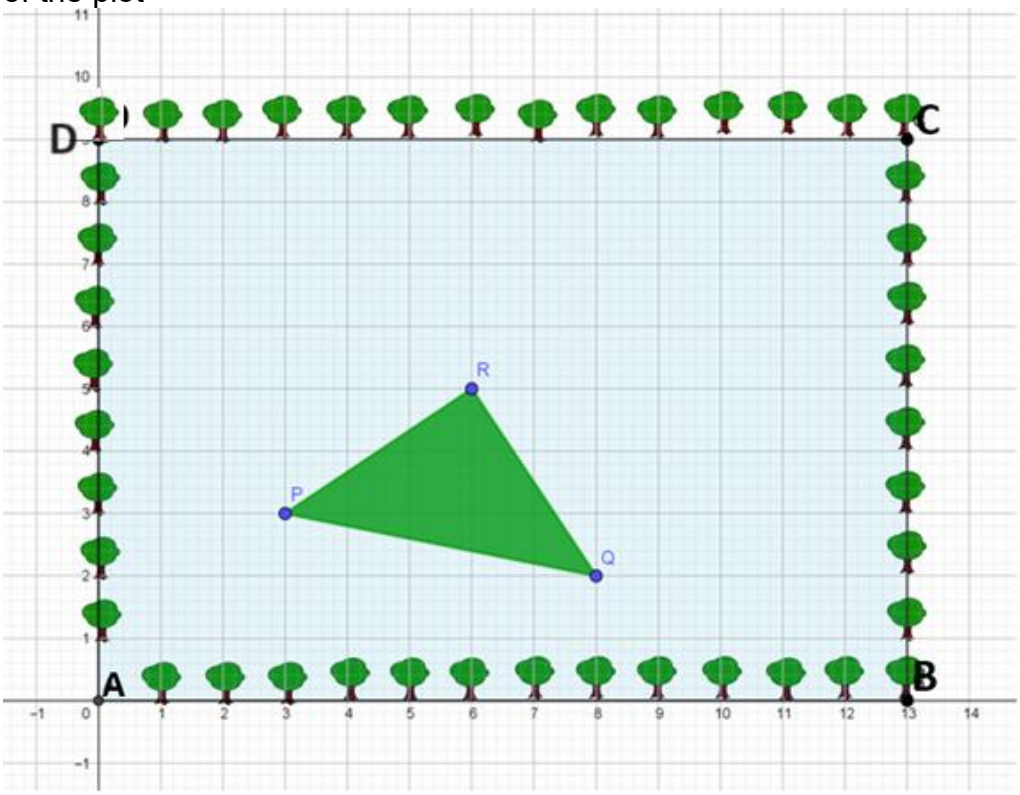
OR

If the mean of the following frequency distribution is 91, find the missing frequencies x and y

Classes	Frequencies
0-30	12
30-60	21
60-90	x
90-120	52
120-150	y
150-180	11
Total	150

33.	State and prove Basic proportionality theorem. In ΔABC, if DE ∥ BC, AD = x, DB = $x - 2$, AE = $x + 2$ and EC = $x - 1$,then using the above result, find the value of x	5
34.	A man on the top of a vertical tower observes a car moving at a uniform speed coming directly towards it. If it takes 12 minutes for the angle of depression to change form $30°$ to $45°$, how soon after this, will the car reach the tower? Give your answer to nearest minutes. (Use $\sqrt{3} = 1.73$)	5

	OR If the angle of elevation of a cloud from a point 10 metres above a lake is $30°$ and the angle of depression of its reflection in the lake is $60°$, find the height of the cloud from the surface of the lake	
35.	A flight left 30 minutes later than the scheduled time and in order to reach its destination 1500 km away in time it has to increase its speed by 250 km/hr from its usual speed. Find its usual speed.	5
	SECTION E	
	Section E consists of 3 Case Studies of 4 marks each	
36.	Shown below is the trophy shield Akshi received on winning an international Table tennis tournament. The trophy is made of a glass sector DOC supported by identical wooden right triangles Δ DAO and Δ COB. Also, AO = 7 cm and AO : DA = $1 : \sqrt{3}$ (Use $\sqrt{3} = 1.73$)  Based on the given information, answer the following questions:	
	(i) Find $\angle DOC$	1
	(ii) Find the area of the wooden triangles	1
	(iii) Find the area of the shape formed by the glass portion **OR** If Akshi wants to decorate the boundary of the glass portion with glitter tape, then find the length of the tape she needs.	2
37.	A school auditorium has to be constructed with a capacity of 2000 people. The chairs in the auditorium are arranged in a concave shape facing towards the stage in such a way that each succeeding row has 5 seats more than the previous one. 	

	(i) If the first row has 15 seats, then how many seats will be there in 12^{th} row?	1
	(ii) If there are 15 rows in the auditorium, then how many seats will be there in the middle row?	1
	(iii) If total 1875 guests were there in the auditorium for a particular event, then how many rows will be needed to make all of them sit? **OR** If total 1250 guests were there in the auditorium for a particular event, then how many rows will be left blank out of total 30 rows?	2
38.	The students of Class X of a secondary school have been allotted a rectangular plot of land for their gardening activity. Saplings are being planted on the boundary at a distance of 1 m from each other. There is a triangular grassy lawn in the plot as shown in the figure. The students are to row seeds of the flowering plant on the remaining area of the plot  	
	(i) If a tree is to be planted exactly in the middle of the triangle PQR ie. at the centroid of ΔPQR to give shed to the people sitting in the lawn, then find the coordinates of the point where the tree should be planted	1
	(ii) What type of triangle is formed by the grassy lawn?	1
	(iii) Find the area of the plot in which the students have to row the seeds. **OR** If a special flowering plant has to be planted at a point which divides the line joining the points C and Q in the ratio 2:3, then find the coordinates of the point where this plant will be planted	2

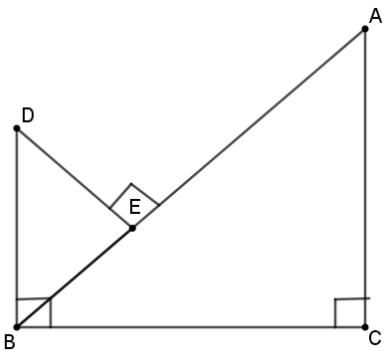
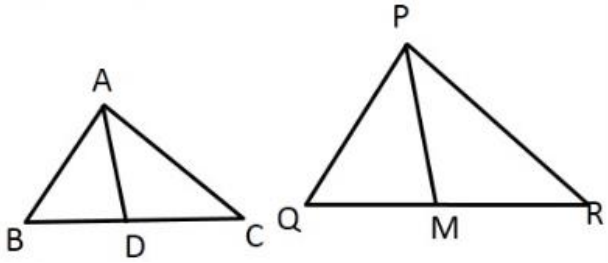
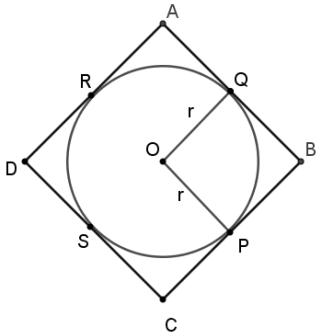
MARKING SCHEME

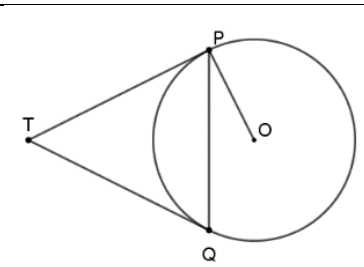
Additional Practice Question Paper

Class X Session 2023-24

TIME: 3 hours **MATHEMATICS STANDARD (Code No.041)** **MAX. MARKS: 80**

	SECTION A	
	Section A consists of 20 questions of 1 mark each.	
1.	(a) $x^2 - 16$	1
2.	(a) 45 minutes	1
3.	(d) parallel	1
4.	(b) $k \leq 16$	1
5.	(d) $\frac{n}{n+1}$	1
6.	(c) 7	1
7.	(b) $\frac{EF}{RP} = \frac{DE}{PQ}$	1
8.	(d) x = 3, y = 4	1
9.	(c) $2\sqrt{3}$ cm	1
10.	(c) 0	1
11.	(a) $\frac{r^2}{4}(\pi - 2)$	1
12.	(b) 360 cm^2	1
13.	(d) $4 : 1$	1
14.	(b) multiple of 3	1
15.	(d) $(3,5)$	1
16.	(b) I and IV	1
17.	(d) 7	1
18.	(a) $y = 3x$	1
19.	(d) (A) is false but (R) is true.	1
20.	(a) Both (A) and (R) are true and (R) is the correct explanation of (A).	1
	SECTION B	
	Section B consists of 5 questions of 2 marks each.	
21.	$66 = 2 \times 3 \times 11$ $88 = 2^3 \times 11$ $110 = 2 \times 5 \times 11$ HCF $= 2 \times 11 = 22$	1 ½

	Total Trees = 264 $\therefore$ Total number of rows = $\frac{264}{22} = 12$	½
22.	Sum of zeroes = $\alpha + \beta = -(-1) = 1$ Product of zeroes = $\alpha\beta = -2$ Sum of other zeroes = $(2\alpha + 1) + (2\beta + 1) = 2(\alpha + \beta) + 2 = 4$ Product of other zeroes = $(2\alpha + 1) \times (2\beta + 1) = 2(\alpha + \beta) + 4\alpha\beta + 1 = -5$ $\therefore$ Required polynomial is $k(x^2 - 4x - 5)$ **OR** $\alpha + \beta = -\frac{5}{2}, \alpha\beta = \frac{k}{2}$ $\alpha^2 + \beta^2 + \alpha\beta = \frac{21}{4} \Longrightarrow (\alpha + \beta)^2 - \alpha\beta = \frac{21}{4}$ $\Longrightarrow \frac{25}{4} - \frac{k}{2} = \frac{21}{4} \Longrightarrow -\frac{k}{2} = -1$ $\therefore k = 2$	½ ½ ½ ½ 1 ½
23.	$\angle DEB = \angle ACB = 90°$ $\angle ABC = 90° - \angle DBE$ Also, $\angle BDE = 90° - \angle DBE$ $\Longrightarrow \angle ABC = \angle BDE$ So, $\Delta BDE \sim \Delta ABC$  **OR** $\Delta ABC \sim \Delta PQR$ $\Longrightarrow \frac{AB}{PQ} = \frac{BC}{QR} = \frac{AC}{PR}$ $\frac{AB}{PQ} = \frac{2BD}{2QM} = \frac{AC}{PR} \Longrightarrow \frac{AB}{PQ} = \frac{BD}{QM}$ Also, $\angle B = \angle Q$ (as $\Delta ABC \sim \Delta PQR$) So, $\Delta ABD \sim \Delta PQM \Longrightarrow \frac{AB}{PQ} = \frac{AD}{PM}$  	½ ½ ½ ½ ½ ½ ½ ½ ½
24.	$DR = DS = 5\ cm$ $\Longrightarrow AR = AD - DR = 18\ cm$ $AQ = AR = 18\ cm$ $\Longrightarrow QB = 29 - 18 = 11\ cm$ In quad. $OQBP, \angle B = 90°$ and $\angle OQB = \angle OPB = 90°$ $\therefore OQBP$ is a square So, $r = 11\ cm$  	½ ½ ½ ½
25.	$\sin A = \cos A \Longrightarrow A = 45°$ $2tan^2A + \frac{1}{cosec^2A} + 1 = 2tan^2A + sin^2A + 1$	½

	$= 2tan^2 45° + sin^2 45° + 1$ $= 2(1)^2 + \left(\frac{1}{\sqrt{2}}\right)^2 + 1$ $= 2 + \frac{1}{2} + 1 = \frac{7}{2}$	 1 ½
	SECTION C	
	Section C consists of 6 questions of 3 marks each	
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 $\Longrightarrow \sqrt{7} = \frac{p-5q}{6q}$ p and q are integers, $\therefore p - 5q$ is an integer $\frac{p-5q}{6q}$ is a rational number $\Longrightarrow \sqrt{7}$ 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 1 ½ ½ ½
27.	Let the length and breadth of rectangle be $x\ m$ and $y\ m$ respectively $\therefore (x + 5)(y - 4) = xy - 160$ and $(x - 10)(y + 2) = xy - 100$ $\Longrightarrow 4x - 5y = 140$ and $2x - 10y = -80$ Solving, we get $x = 60$ and $y = 20$ So, length of rectangle = $60\ m$ Breadth of rectangle = $20\ m$ **OR** Let the two numbers be x and $y(x > y)$ $\therefore 2x - 16 = \frac{1}{2}y \Longrightarrow 4x - y = 32 \ldots (1)$ and $\frac{1}{2}x - 1 = \frac{1}{2}y \Longrightarrow x - y = 2 \ldots (1)$ Solving, we get $x = 10$ and $y = 8$ Hence the two numbers are 10 and 8	½+½ ½+½ 1 1 1 1
28.	$\angle PTQ = \theta$ Now, $TP = TQ \Longrightarrow TPQ$ is an isosceles triangle $\angle TPQ = \angle TQP = \frac{1}{2}(180° - \theta) = 90° - \frac{1}{2}\theta$ $\angle OPT = 90° \Longrightarrow \angle OPQ = \angle OPT - \angle TPQ$ $= 90° - \left(90° - \frac{1}{2}\theta\right) = \frac{1}{2}\theta$ $= \frac{1}{2}\angle PTQ$ So, $\angle PTQ = 2\angle OPQ$  	½ 1 1 ½
29.	LHS= $\left(sin^4\theta - cos^4\theta + 1\right) cosec^2\theta$ $= [(sin^2\theta - cos^2\theta)(sin^2\theta + cos^2\theta) + 1] cosec^2\theta$ $= (sin^2\theta - cos^2\theta + 1) cosec^2\theta$ $= 2\ sin^2\theta cosec^2\theta$ $= 2$ **OR** If $\sin x + cosec\ x = 2$, then find the value of $sin^{19}x + cosec^{20}x$ $\sin x + cosec\ x = 2$	 1 1 1 1

	$\Rightarrow \sin x + \frac{1}{\sin x} = 2 \Rightarrow sin^2x + 1 = 2\sin x$ $\Rightarrow (\sin x - 1)^2 = 0$ $\therefore \sin x = 1 \Rightarrow cosec\ x = 1$ So, $sin^{19}x + cosec^{20}x = 1 + 1 = 2$	1 ½ ½
30.	$\frac{\text{Curved surface area of cylinder}}{\text{curved surface area of cone}} = \frac{8}{5}$ $\Rightarrow \frac{2\pi rh}{\pi rl} = \frac{8}{5}$ $\frac{h}{l} = \frac{4}{5}$ $\frac{h}{\sqrt{h^2+r^2}} = \frac{4}{5}$ $\frac{h^2}{h^2+r^2} = \frac{16}{25}$ $\Rightarrow \frac{r^2}{h^2} = \frac{9}{16}$ $\therefore \frac{r}{h} = \frac{3}{4}$ Hence the ratio of radius and height is $3:4$	1 ½ ½ ½ ½
31.	(i) P (a face card or a black card)= $\frac{12}{52} + \frac{26}{52} - \frac{6}{52} = \frac{32}{52}$ or $\frac{8}{13}$ (ii) P (neither an ace nor a king)= $1 - \text{P(either an ace or a king)} = 1 - \left(\frac{4}{52} + \frac{4}{52}\right)$ $= 1 - \frac{8}{52} = \frac{44}{52}$ or $\frac{11}{13}$ (iii) P (a jack and a black card) = $\frac{2}{52}$ or $\frac{1}{26}$	1 1 1
	SECTION D	
	Section D consists of 4 questions of 5 marks each	
32.		Correct table – 2

Marks	Number of students (Cumulative frequency)	Frequency	Cumulative frequency (less than type)
0 - 10	80	3	3
10 - 20	77	5	8
20 - 30	72	7	15
30 - 40	65	10	25
40 – 50	55	12	37
50 - 60	43	15	52
60 - 70	28	12	64
70 - 80	16	6	70
80 - 90	10	2	72
90 - 100	8	8	80

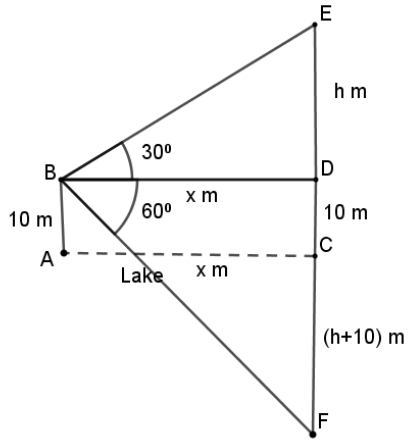
$n = 80 \Rightarrow \frac{n}{2} = 40$ ½

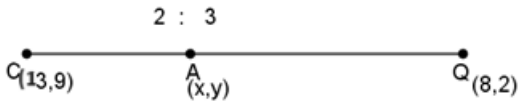
$\therefore 50 - 60$ is the median class

Median $= 50 + \frac{40-37}{15} \times 10 = 52$ 1

$50 - 60$ is the modal class ½

	Mode $= 50 + \frac{15-12}{2\times15-12-12} \times 10 = 55$	1
	OR	
	<table><tr><th>Classes</th><th>Frequencies (f_i)</th><th>x_i</th><th>$f_i x_i$</th></tr><tr><td>0-30</td><td>12</td><td>15</td><td>180</td></tr><tr><td>30-60</td><td>21</td><td>45</td><td>945</td></tr><tr><td>60-90</td><td>x</td><td>75</td><td>$75x$</td></tr><tr><td>90-120</td><td>52</td><td>105</td><td>5460</td></tr><tr><td>120-150</td><td>y</td><td>135</td><td>$135y$</td></tr><tr><td>150-180</td><td>11</td><td>165</td><td>1815</td></tr><tr><td>Total</td><td>150</td><td></td><td>$8400 + 75x + 135y$</td></tr></table>	Correct table – 2
	$96 + x + y = 150 \Longrightarrow x + y = 54$ …(1)	½
	Mean $= 91$ $\Longrightarrow \frac{8400+75x+135y}{150} = 91$	1
	$75x + 135y = 5250$ or $5x + 9y = 350$ …(2)	½
	Solving (1) and (2), we get $x = 34$ and $y = 20$	1
33.	For correct statement, given, to prove, figure and construction For correct proof	1 2½
	In ΔABC, DE ∥ BC $\Longrightarrow \frac{AD}{DB} = \frac{AE}{EC}$ $\Longrightarrow \frac{x}{x-2} = \frac{x+2}{x-1}$ Solving, we get $x = 4$	1 ½
34.	Correct Figure	1
	Let speed of car be x km/h $\Longrightarrow DC = 12x$ m In $\Delta ABC, \frac{AB}{BC} = \tan 30° = \frac{1}{\sqrt{3}}$	1
	$\Longrightarrow BC = \sqrt{3}AB$ … (1)	½
	In $\Delta ABD, \frac{AB}{BD} = \tan 45° = 1$ $\Longrightarrow BD = AB$ …(2)	1
	Now, $DC = BC - BD \Longrightarrow 12x = \sqrt{3}AB - AB = (\sqrt{3} - 1)BD$	½
	$BD = \frac{12x}{\sqrt{3}-1}$	
	∴ Time taken from D to B $\frac{12x}{\sqrt{3}-1} \times \frac{1}{x} = \frac{12}{\sqrt{3}-1} = 6(\sqrt{3}+1)$	½
	$= 16$ minutes (approx.)	½
	OR	

	Correct Figure  Let the position of the cloud be E and F be the image of the cloud in the lake Let $ED = h\,m, BD = AC = x\,m$ In $\Delta BDE, \frac{h}{x} = \tan 30° = \frac{1}{\sqrt{3}}$ $\Rightarrow x = h\sqrt{3}$ … (1) In $\Delta BDF, \frac{FD}{BD} = \frac{10+(h+10)}{x} = \tan 60°$ $\Rightarrow \sqrt{3} = \frac{h+20}{\sqrt{3}h}$ (using (1)) $\Rightarrow 3h = h + 20$ $\therefore h = 10\,m$ So, the height of the cloud from the surface of the lake $= (10 + 10)\,m$ $= 20\,m$	1 1 ½ 1 ½ ½ ½
35.	Let the usual speed of the flight be x km/h $\therefore \frac{1500}{x} - \frac{1500}{x+250} = \frac{30}{60}$ $\Rightarrow x^2 + 250x - 750000 = 0$ $(x - 750)(x + 1000) = 0$ $\therefore x = 750$ (Rejecting negative value) Hence the usual speed of the flight $= 750$ km/h	2 1½ 1 ½
	SECTION E	
	Section E consists of 3 Case Studies of 4 marks each	
36.	(i) Let $\angle DOA = \theta$, then $\tan\theta = \frac{AD}{AO} = \frac{\sqrt{3}}{1} \Rightarrow \theta = 60°$ $\angle DOA = \angle COB = 60°$ $\angle DOC = 180° - (60° + 60°) = 60°$	½ ½
	(ii) Area of two wooden triangles $= 2 \times \frac{1}{2} \times 7 \times 7\sqrt{3} = 84.77\ cm^2$	1
	(iii) $\frac{AO}{DO} = \cos 60° \Rightarrow \frac{7}{DO} = \frac{1}{2}$ $\Rightarrow DO = 14\ cm$ Area of sector $DOC = \frac{60}{360} \times \pi \times 14^2 = 102.67\ cm^2$ **OR** $\frac{AO}{DO} = \cos 60° \Rightarrow \frac{7}{DO} = \frac{1}{2}$ $\Rightarrow DO = 14\ cm$ Length of tape required $= 2 \times 14 + \frac{60}{360} \times 2 \times \pi \times 14 = 42.67\ cm$	1 1 1 1
37.	(i) $a = 15, d = 5$ $a_{12} = 15 + 11 \times 5 = 70$	½ ½
	(ii) $n = 15$ Middle row $= 8^{th}$ row $a_8 = 15 + 7 \times 5 = 50$	½ ½
	(iii) $1875 = \frac{n}{2}[2 \times 15 + (n-1) \times 5]$ $\Rightarrow n^2 + 5n - 750 = 0$	½ 1

	$(n+30)(n-25)=0 \Rightarrow n=25$ ∴ Total number of rows required = 25 **OR** $1250=\frac{n}{2}[2\times 15+(n-1)\times 5]$ $\Rightarrow n^2+5n-500=0$ $(n+25)(n-20)=0 \Rightarrow n=20$ ∴ Number of rows left $=30-20=10$	½ ½ ½ ½ ½
38.	(i) $P(3,3), Q(8,2), R(6,5)$ Coordinates of required point are $\left(\frac{3+8+6}{3}, \frac{3+2+5}{3}\right)=\left(\frac{17}{3}, \frac{10}{3}\right)$	1
	(ii) $PR=QR=\sqrt{13}$ $PQ=\sqrt{26}$ $PQ^2=PR^2+QR^2$ ∴ ΔPQR is an isosceles right triangle	½ ½
	(iii) Area of the plot to row seeds $=13\times 9-\frac{1}{2}\times\sqrt{13}\times\sqrt{13}$ $=110.5\ m^2$ **OR**  Coordinates of required point are $\left(\frac{2\times 8+3\times 13}{2+3}, \frac{2\times 2+3\times 9}{2+3}\right)$ $=\left(11, \frac{31}{5}\right)$	1 1 1 1