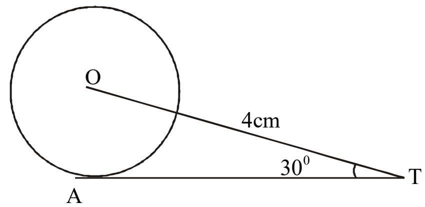
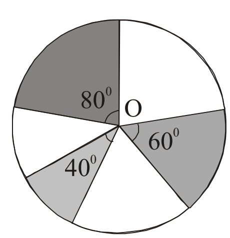
Pre. Question Paper - 02

Sub. : Maths | **Total Marks : 80**

Std. X (CBSE) | **Time : 3 hours**

	SECTION A **Section A consists of 20 questions of 1 mark each.**	
1.	The polynomial equation $x(x + 1) + 8 = (x + 2)(x - 2)$ is a) linear equation b) quadratic equation c) cubic equation d) bi-quadratic equation	1
2.	There are 312, 260 and 156 students in class X, XI and XII respectively. Buses are to be hired to take these students to a picnic. Find the maximum number of students who can sit in a bus if each bus takes equal number of students. a) 52 b) 56 c) 48 d) 63	1
3.	Find the value of k if the points A(2, 3), B(4, k) and C(6, –3) are collinear. a) 2 b) 3 c) 0 d) 1	1
4.	The $(n-1)^{th}$ term of an A.P. is given by 7,12,17, 22,… is a) $5n + 2$ b) $5n + 3$ c) $5n - 5$ d) $5n - 3$	1
5.	If in two triangles ABC and PQR, $\frac{AB}{QR} = \frac{BC}{PR} = \frac{CA}{PQ}$, then a) $\Delta PQR \sim \Delta CAB$ b) $\Delta PQR \sim \Delta ABC$ c) $\Delta CBA \sim \Delta PQR$ d) $\Delta BCA \sim \Delta PQR$	1
6.	If the discriminant of a quadratic polynomial, $D > 0$, then the polynomial has a) two real and equal roots b) two real and unequal roots c) imaginary roots d) no roots	1

7	In the following figure, AT is a tangent to the circle with centre O such that OT = 4 cm and $\angle OTA = 30^0$. Then AT is equal to  a) 4 cm b) 2 cm c) $2\sqrt{3}$ cm d) $4\sqrt{3}$ cm	1
8.	$\dfrac{2\tan 30^0}{(1+\tan^2 30^0)} =$ a) $\sin 60^0$ b) $\cos 60^0$ c) $\tan 60^0$ d) $\sin 30^0$	1
9.	If the height of the building and distance from the building foot's to a point is increased by 20%, then the angle of elevation on the top of the building: a) Increases b) Decreases c) Do not change d) None of the above	1
10.	It is proposed to build a single circular park equal in area to the sum of areas of two circular parks of diameters 16 m and 12 m in a locality. The radius of the new park would be a) 10 m b) 15 m c) 20 m d) 24 m	1
11.	If we change the shape of an object from a sphere to a cylinder, then the volume of cylinder will a) Increase b) Decrease c) Remains unchanged d) Doubles	1
12.	Mean of 100 items is 49. It was discovered that three items which should have been 60, 70, 80 were wrongly read as 40, 20, 50 respectively. The correct mean is a) 48 b) 49 c) 50 d) 60	1
13.	In the given figure, three sectors of a circle of radius 7 cm, making angles of 60°, 80° and 40° at the centre are shaded. The area of the shaded region (in cm^2) is [Using $\pi = \dfrac{22}{7}$]  a) 77 b) 154 c) 44 d) 22	1

14. A card is drawn from a deck of 52 cards. The event E is that card is not an ace of hearts. The number of outcomes favourable to E is: 1

a) 4 b) 13 c) 48 d) 51

15. In a hospital, weights of new born babies were recorded, for one month. Data is as shown: 1

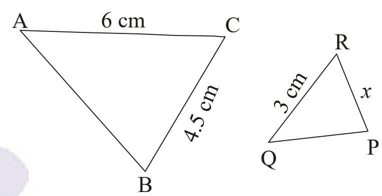
Weight of new born baby (in kg)	1.4 – 1.8	1.8 – 2.2	2.2 – 2.6	2.6 – 3.0
No of babies	3	15	6	1

Then the median weight is:

a) 2kg b) 2.03kg c) 2.05 kg d) 2.08 kg

16. In the given figure, $\Delta ABC \sim \Delta QPR$. The value of x is. 1

a) 2.25 cm b) 4 cm c) 4.5 cm d) 5.2 cm



17. The pair of equations $3x - 5y = 7$ and $-6x + 10y = 7$ have 1

a) a unique solution b) infinitely many solutions

c) no solution d) two solutions

18. The value of $\cos 0^0 . \cos 1^0 . \cos 2^0 . \cos 3^0 \ldots \cos 89^0 \cos 90^0$ is. 1

a) 1 b) –1 c) 0 d) $1\sqrt{2}$

19. **Assertion(A):** If $x \sin^3 \theta + y \cos^3 \theta = \sin\theta\cos\theta$ and $x \sin\theta = y\cos\theta$, then $x^2 + y^2 = 1$. 1

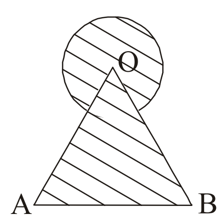
Reason(R): For any value of $\theta, \sin^2 \theta + \cos^2 \theta = 1$

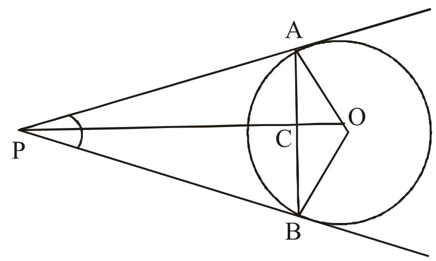
a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).
b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).
c) Assertion (A) is true but reason (R) is false.
d) Assertion (A) is false but reason (R) is true.

20. **Assertion(A):** If one zero of polynomial $p(x) = (k^2 + 4)x^2 + 13x + 4k$ is reciprocal of the other, then $k = 2$. 1

Reason(R): If $(x - a)$ is a factor of $p(x)$, then $p(a) = 0$ i.e., a is a zero of $p(x)$.

a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).
b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

	c) Assertion (A) is true but reason (R) is false. d) Assertion (A) is false but reason (R) is true.	
	SECTION B **Section B consists of 5 questions of 2 marks each.**	
21.	Find value of k for which the consecutive terms $3k+1$, $2k+3$, $6k+2$, form an AP.	2
22.	The distance between A(1, 3) and B(x, 7) is 5. calculate the possible values of x.	2
23.	If a circle touches the side BC of $\triangle ABC$ at P and extended sides AB and AC at Q and R respectively, prove that $AQ = \frac{1}{2}(BC + CA + AB)$.	2
24.	Find the roots of quadratic equation $x^2 - 7x + 12 = 0$. **OR** Find the value of p so that the quadratic equation $x^2 + px + 1 = 0$ has real roots.	2
25.	If $\sqrt{3}\sin\theta - \cos\theta = 0$ and $0^0 < \theta < 90^0$, find the value of θ. **OR** If $x = a\sin\theta$ and $y = b\tan\theta$, then prove that $\frac{a^2}{x^2} - \frac{b^2}{y^2} = 1$.	2
	SECTION C **Section C consists of 6 questions of 3 marks each.**	
26.	Show that $\sqrt{5}$ is an irrational number.	3
27.	Find the area of the shaded region in the fig., where a circular arc of radius 6cm has been drawn with vertex O of an equilateral triangle OAB of side 12cm as centre. 	3
28.	'Mr. Kasam runs a small business of making earthen pots. He makes certain number of pots on daily basis. Production cost of each pot is ₹40 more than 10 times total number of pots, he makes in one day. If production cost of all pots per day is ₹600, find production cost of one pot and number of pots he makes per day. **OR** The sum of squares of two consecutive even natural numbers is 244; find the numbers.	3

29.	If $5\tan\alpha = 4$, show that $\dfrac{5\sin\alpha - 3\cos\alpha}{5\sin\alpha + 2\cos\alpha} = \dfrac{1}{6}$.	3
30.	Prove that the lengths of tangents drawn from an external point to a circle are equal **OR** If PA and PB are two tangents drawn from a point P to a circle with centreO touching it at A and B. Prove that OP is the perpendicular bisector of AB.  	3
31.	Find the probability of getting 53 Tuesdays in a leap year.	3
	SECTION D **Section D consists of 4 questions of 5 marks each.**	
32.	Kargil's temperature was recorded in a week from Monday to Saturday. All readings were in A.P. The sum of temperatures of Monday and Saturday was 5^0C more than sum of temperatures of Tuesday and Saturday. If temperature of Wednesday was -30^0 Celsius then find the temperature on the other five days. **OR** A man borrows ₹ 8000 and agrees to repay with a total interest of ₹ 1360 in 12 monthly instalments. Each instalment being less than the preceding one by ₹ 40. Find the amount of the first and last instalment.	5
33.	A Solid is in the form of a circular cone mounted on a hemisphere. The radius of the hemisphere is 2.1 cm and the height of the cone is 4 cm. The solid is placed in a cylindrical tub full of water, in such a way that the whole solid is submerged in water. If the radius of the cylinder is 5 cm and its height is 9.8 cm, find the volume of the water left in the cylindrical tub.	5
34.	If the length of a rectangle is increased by 2 cm and width by 3 cm, its area is increased by 35 cm^2. If the length and width are decreased by 2cm each, the area is decreased by 18.4 cm^2. Find the dimensions of the rectangle. **OR** A man travels 300 km partly by train and partly by car. He takes 4 hours if he travels 60 km by train and the rest by car. If he travels 100 km by train and the remaining by car, he takes 10 minutes longer. Find the speeds of the train and the car separately.	5
35.	Find the mean marks of students for the following distribution :	5

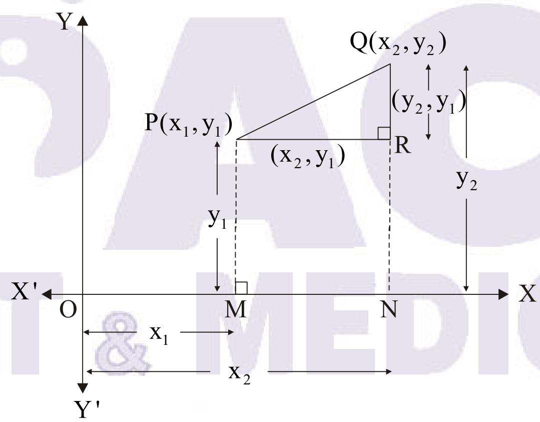
Marks	No. of Students
0 and above	80
10 and above	77
20 and above	72
30 and above	65
40 and above	55
50 and above	43
60 and above	28
70 and above	16
80 and above	10
90 and above	8
100 and above	0

SECTION E

Case study based questions are compulsory.

36. **Case study Based**

Distance Formula



Let P(x_1, y_1) and Q(x_2, y_2) be any two points. PM and QN are perpendiculars drawn from P and Q on the x-axis and PR $\perp$ QN.

From the figure, we have

$OM = x_1$, $PM = y_1$, $ON = x_2$, $QN = y_2$

Thus, $PR = MN = ON - OM = x_2 - x_1$

and $QR = QN - RN = y_2 - y_1$.

Let PQ be d.

In right triangle PQR, right-angled at R,

$PQ^2 = PR^2 + QR^2$

[Using Pythagoras Theorem]

$= (x_2 - x_1)^2 + (y_2 - y_1)^2$

$\Rightarrow \quad PQ = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

a) Find the distance between the points A(c, 0) and B(0, –c). 1
b) What is the perpendicular distance of the point P(2, 3) from the x-axis. 1
c) AOBC is a rectangle whose three vertices are A(0, 3), O(0, 0) and B(5, 0). Find the length of its diagonal. 2

OR

Find the perimeter of a triangle with vertices (0, 4), (0, 0) and (3, 0).

37. **Case Study Based :**

In a marriage ceremony of her daughter, Manita, Rakesh has to make arrangements for the accomodation of 150 persons. For this purpose, he plans to build a conical tent in such a way that each person has 4 sq. m. of the space on the ground and 20 m^3 of the air to breathe.

a) Find the volume of conical tent. 1
b) What is the height of conical tent which Rakesh is plannilg to make? 1
c) The height of cone is 48cm and the radius of its base is 36cm. Find the curved surface area (take $\pi = 3.14$). 2

OR

If the curved surface area of a right circular cone is 12, 320 cm^2 and its base radius is 56cm then find its height $\left(\pi = \frac{22}{7}\right)$.

38. **Case Study Based :**

Basic Proportionality Theorem

(Fig. 1)

A teacher is teaching Basic Proportionality theorem in a class.

He has proved the result $\frac{AD}{BD} = \frac{AE}{EC}$ for $\triangle ABC$ as shown in figure 2.

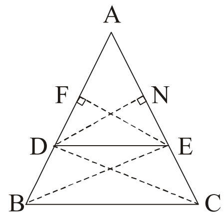


Fig. 2

He proved the theorem using the following steps :

Step 1 : $\dfrac{ar(\Delta ADE)}{ar(\Delta BDE)} = \dfrac{\frac{1}{2} \times AD \times EF}{\frac{1}{2} \times BD \times EF} = \dfrac{AD}{BD}$

Step 2 : Similarly, $\dfrac{ar(\Delta ADE)}{ar(\Delta CDE)} = \dfrac{\frac{1}{2} \times AE \times DN}{\frac{1}{2} \times EC \times DN} = \dfrac{AE}{EC}$

Step 3 : But $ar(\Delta BDE) = ar(\Delta CDE)$

[$\because$ Triangles on the same base DE and between the same parallels DE and BC are equal in area]

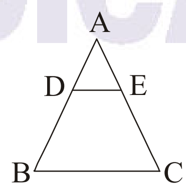
$\therefore \quad \dfrac{ar(\Delta ADE)}{ar(\Delta BDE)} = \dfrac{ar(\Delta ADE)}{ar(\Delta CDE)}$

$\Rightarrow \quad \dfrac{AD}{DB} = \dfrac{AE}{EC}$

a) In a ΔABC, D and E are points on the sides AB and AC respectively such that DE || BC. If AD = 2.5cm, BD = 3.0cm and AE = 3.75cm, then find AC. 1

b) In a ΔABC, D and E are points on the sides AB and AC respectively such that DE || BC. If AD = 4x –3, AE = 8x – 7, BD = 3x – 1 and CE = 5x – 3, then find value of x. 1

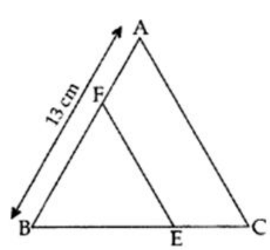
c) In the given Fig., DE || BC and $\dfrac{AD}{DB} = \dfrac{3}{5}$. 2



If AC = 4.8cm, then find AE.

OR

In the figure, EF || AC, BC = 10 cm, AB = 13 cm and EC = 2 cm, find AF.



* * *