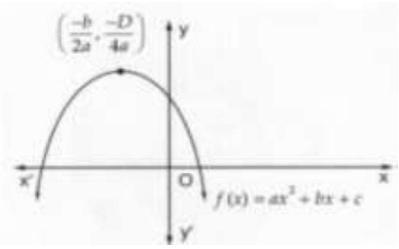
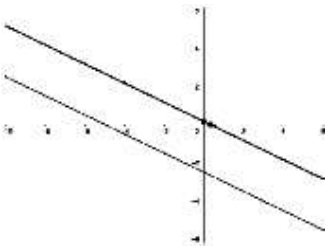
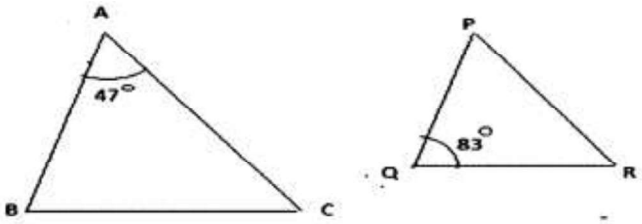
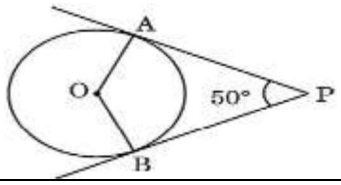
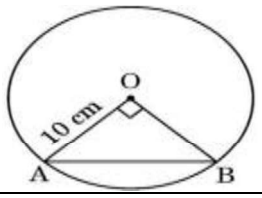
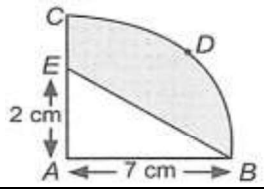
KENDRIYA VIDYALAYA SANGATHAN
BHOPAL REGION
PREBOARD 1 (SET 1)
CLASS 10 - MATHEMATICS

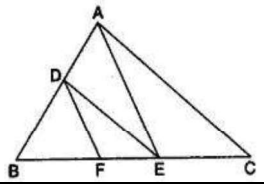
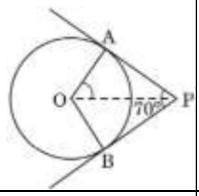
Time Allowed: 3 hours **Maximum Marks:** 80

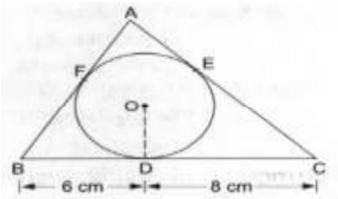
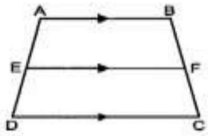
General Instructions:
Read the following instructions carefully and follow them:

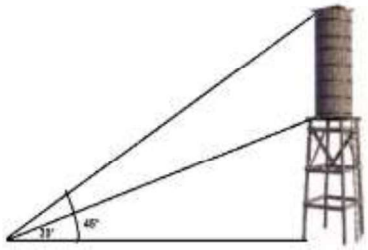
1. This question paper contains 38 questions.
2. This Question Paper is divided into 5 Sections A, B, C, D and E.
3. In Section A, Questions no. 1 - 18 are multiple choice questions (MCQs) and questions no. 19 and 20 are Assertion - Reason based questions of 1 mark each.
4. In Section B, Questions no. 21 - 25 are very short answer (VSA) type questions, carrying 02 marks each.
5. In Section C, Questions no. 26 - 31 are short answer (SA) type questions, carrying 03 marks each.
6. In Section D, Questions no. 32 - 35 are long answer (LA) type questions, carrying 05 marks each.
7. In Section E, Questions no. 36 - 38 are case study - based questions carrying 4 marks each with sub - parts of the values of 1,1 and 2 marks each respectively.
8. All Questions are compulsory. However, an internal choice in 2 Questions of Section B, 2 Questions of Section C and 2 Questions of Section D has been provided. An internal choice has been provided in all the 2 marks questions of Section E.
9. Draw neat and clean figures wherever required.
10. Take$\pi = 22/7$ wherever required if not stated.
11. Use of calculators is not allowed.

	Section A	
1	If 1080 = $2^x \times 3^y \times 5$, then (x - y) is equal to: a) 1b) 0c) 6d) - 1	**[1]**
2	If the diagram in Fig. shows the graph of the polynomialf(x) =ax^2 +bx+c, then a) a < 0, b < 0 and c < 0 b) a <0, b < 0 and c > 0 c) a < 0, b > 0 and c < 0 d) a < 0, b > 0 and c > 0 	**[1]**
3	The pair of equations x + 2y + 5 = 0 and –3x – 6y + 1 = 0 have a) exactly two solutions b) a unique solution c) no solution d) infinitely many solutions 	**[1]**
4	Value of k for which x = 2 is a solution of the equation $5x^2$ - 4x + (2 + k) = 0, is a) 10 b) – 10 c) – 14 d) 14	**[1]**
5	The common difference of an AP, whose n^{th} term is an = (3n + 7), is a) 10 b) 7 c) 3 d) 6	**[1]**
6	The distance between the points$(0,2\sqrt{5})$ and $(-2\sqrt{5},0)$ is a) $2\sqrt{20}$ units b) $2\sqrt{10}$ units c) $4\sqrt{10}$ units d) 0	**[1]**
7	If the endpoints of a diameter of a circle are (- 4, - 3) and (2, 7), then the coordinates of the centre are	**[1]**

	a) (- 1, 2) b) (2, - 1) c) (0, 0) d) (1, - 2)	
8	If ABC and PQR are similar triangles where AB corresponds to PQin which∠ A = 47 ^{o} and ∠ Q = 83 ^{o} ,then ∠ C is: a) 50^o b) 60^o c) 80^o d) 70^o 	**[1]**
9	In the given figure, PA and PB are tangents to a circle centred at O. If$\angle APB = 50^o$, then $\angle AOB$ is equal to: a) 120^o b) 50^o c) 90^o d) 130^o 	**[1]**
10	A chord of a circle of radius 10 cm subtends a right angle at its centre. The length of the chord (in cm) is: a) $10\sqrt{3}$ b) $10\sqrt{2}$ c) $5\sqrt{2}$ d) $\frac{5}{\sqrt{2}}$ 	**[1]**
11	9 sec^2 A - 9 tan ^{2} A = a) 99 b) 0 c) 9 d) 1	**[1]**
12	If$cosA + cos^2A = 1$, then $sin^2A + sin^4A$ = a) 0 b) -1 c) 2 d) 1	**[1]**
13	If the angle of depression of a car from a 100 m high tower is$45°$, then the distance of the car from the tower is a) $200\sqrt{3}$ m b) $100\sqrt{3}$ m c) 200 m d) 100 m	**[1]**
14	In the figure, ABDCArepresents a quadrant of a circle of radius 7 cm a with centre A. Find the area of the shaded portion. a) 14 cm^2 b) 24.5 cm^2 c) 31.5 cm^2 d) 38.5 cm^2 	**[1]**
15	The length of an arc that subtends an angle of 24^o at the centre of a circle with 5 cm radius is a) $\frac{\pi}{3}$ cm b) $\frac{3\pi}{2}$ cm c) $\frac{2\pi}{3}$ cm d) $\frac{5\pi}{3}$ cm	**[1]**
16	The probability that a leap year selected at random will have 53 Fridays is a) $\frac{1}{7}$ b) $\frac{4}{7}$ c) $\frac{2}{7}$ d) $\frac{6}{7}$	**[1]**
17	A bag contains 3 red balls, 5 white balls and 7 black balls. What is the probability that a ball drawn from the bag at random will be neither red nor black? a) $\frac{8}{15}$ b) $\frac{1}{5}$ c) $\frac{7}{15}$ d) $\frac{1}{3}$	**[1]**
18	For the following frequency distribution: **Class:** 0 - 5 | 5 - 10 | 10 - 15 | 15 - 20 | 20 - 25 **Frequency:** 8 | 10 | 19 | 25 | 8 The upper limit of median class is a) 15 b) 25 c) 10 d) 20	**[1]**
	Q.NO. 19 and 20 choose the correct option from following: a) Both A and R are true and R is the correct explanation of A.	

	b) Both A and R are true but 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):** Two identical solid cubes of side 5 cm are joined end to end. The total surface area of the resulting cuboid is 350 cm ^{2} . **Reason (R):** Total surface area of a cuboid is 2(lb + bh + hl)	**[1]**
20	**Assertion (A):** Sum of natural number from 1 to 100 is 5050. **Reason (R):** Sum of n natural number is $\frac{n(n+1)}{2}$.	**[1]**
	Section B	
21	If the primefactorization of 2520 is expressible as$2^3 \times 3^p \times q \times 7$, then find the values of p and q. **OR** An army contingent of 612 members is to march behind an army band of 48 members in a parade. The two groups are to march in the same number of columns. What is the maximum number of columns in which they can march?	**[2]**
22	In figure DE || AC and DF || AE. Prove that$\frac{BF}{FE} = \frac{BE}{EC}$ 	**[2]**
23	In Figure, if tangents PA and PB drawn from a point P to a circle with centre O, are inclined to each other at an angle of 70^o, then find the measure of ∠ POA. 	**[2]**
24	If cos (A - B) =$\frac{\sqrt{3}}{2}$ and sin (A + B) = $\frac{\sqrt{3}}{2}$, find A and B, where (A + B) and {A - B) are acute angles. **OR** Evaluate: 2(sin^2 45 ^{o} + cot ^{2} 30 ^{o}) - 6(cos ^{2} 45 ^{o} - tan ^{2} 30 ^{o})	**[2]**
25	A piece of wire 20 cm long is bent into the form of an arc of a circle subtending an angle of 60° at its centre. Find the radius of the circle.	**[2]**
	Section C	
26	Prove that $\sqrt{5}$ is irrational.	**[3]**
27	Find a quadratic polynomial, the sum and product of whose zeroes are$\frac{1}{4}$and - 1, respectively.	**[3]**
28	Three unbiased coins are tossed simultaneously. Find the probability of getting (i) exactly 2 heads, (ii) at least 2 heads, (iii) at most 2 heads.	**[3]**
29	The care hire charges in a city comprise of a fixed charge together with the charge for the distance covered. For a journey of 12 km, the charge paid is Rs.89 and for a journey of 20 km, the charge paid is Rs.145. What will a person have to pay for travelling a distance of 30 km? **OR** The sum of the digits of a two digit number is 15. The number obtained by interchanging the two digits exceeds the given number by 9. Find the number.	**[3]**
30	If sinθ + cos θ = p and sec θ + cosec θ = q, show that q (p ^{2} - 1) = 2p.	**[3]**

31	Prove that the angle between the two tangents drawn from an external point to a circle is supplementary to the angle subtended by the line - segment joining the points of contact at the centre. **OR** In the given figure, a triangle ABC is drawn to circumscribe a circle of radius 3 cm, such that the segments BD and DC into which BC is divided by the point of contact D are of lengths 6 cm and 8 cm respectively. Find the side AB, if the area of Δ ABC is 63 cm ^{2} 	**[3]**
	Section D	
32	Find the mean and the median of the following data: Class: 85 - 90 | 90 - 95 | 95 - 100 | 100 - 105 | 105 - 110 | 110 - 115 Frequency: 10 | 12 | 15 | 14 | 12 | 7	**[5]**
33	If a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, the other two sides are divided in the same ratio, Prove it. Use this result to prove the following:In the given figure, if ABCD is a trapezium in which AB || DC || EF, then $\frac{AE}{ED} = \frac{BF}{FC}$ 	**[5]**
34	A motor boat whose speed is 18 km/h in still water takes 1 hour more to go 24 km upstream, than to return to the same point. Find the speed of the stream and total time of the journey. **OR** In a flight of 600 km, the speed of the aircraft was slowed down due to bad weather. The average speed of the trip was decreased by 200 km/hr and thus the time of flight increased by 30 minutes. Find the average speed of the aircraft originally.	**[5]**
35	A toy is in the form of a cone mounted on a hemisphere. The diameter of the base of the cone is 7 cm and its height is 15.5 cm. Find the volume of the toy. (Useπ = 3.14). **OR** A tent is in the shape of a right circular cylinder up to a height of 3 m and then a right circular cone, with a maximum height of 13.5 m above the ground. Calculate the cost of painting the inner side of the tent at the rate of ₹ 2 per square metre, if the radius of the base is 14 m.	**[5]**
	Section E	
36	**Read the following text carefully and answer the questions that follow:** Akshat's father is planning some construction work in his terrace area. He ordered 360 bricks and instructed the supplier to keep the bricks in such as way that the bottom row has 30 bricks and next is one less than that and so on. The supplier stacked these 360 bricks in the following manner, 30 bricks in the bottom row, 29 bricks in the next row, 28 bricks in the row next to it, and so on. 1. In how many rows, 360 bricks are placed? (1) 2. How many bricks are there in the top row? (1) 3. How many bricks are there in 10^{th} row? (2) **OR** If which row 26 bricks are there? (2) 	**[4]**
37	**Read the following text carefully and answer the questions that follow:** In an examination hall, students are seated at a distance of 2 m from each other, to maintain the social distance due to CORONA virus pandemic. Let three students sit at points A, B and C whose coordinates are (4, - 3), (7, 3) and (8, 5) respectively. 1. What is the distance between A and C? (1) 2. If an invigilator at point 7, lying on the straight line joining B and C such that it divides the distance between them in the ratio of 1: 2. Then what are the coordinates of I(invigilator)? (1) 3. What is the mid - point of the line segment joining A and C? (2) **OR** 	**[4]**

	What is the ratio in which B divides the line segment joining A and C? (2)	
38	**Read the following text carefully and answer the questions that follow:** In a society, there are many multistory buildings. The RWA of the society wants to install a tower and a water tank so that all the households can get water without using water pumps. For this they have measured the height of the tallest building in the society and now they want to install a tower that will be taller than that so that the level of water must be higher than the tallest building in their society. Here is one solution they have found and now they want to check if it will work or not.From a point on the ground 40 m away from the foot of a tower, the angle of elevation of the top of the tower is 300. the angle of elevation of the top of the water tank is 45 ^{o} . 1. What is the height of the tower? (1) 2. What is the height of the water tank? (1) 3. At what distance from the bottom of the towerthe angle of elevation of the top of the tower is 45^{o}. (2) **OR** What will be the angle of elevation of the top of the water tank from the place at $\frac{40}{\sqrt{3}}$ m from the bottom of the tower. (2) 	**[4]**