Class- X Session- 2022-23
Mathematics (Standard)
TARUN CLASSES OF MATHEMATICS

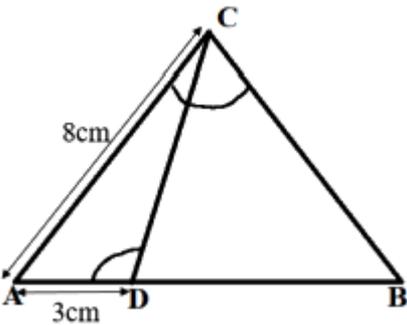Time Allowed: 3 Hrs.   Maximum Marks : 80
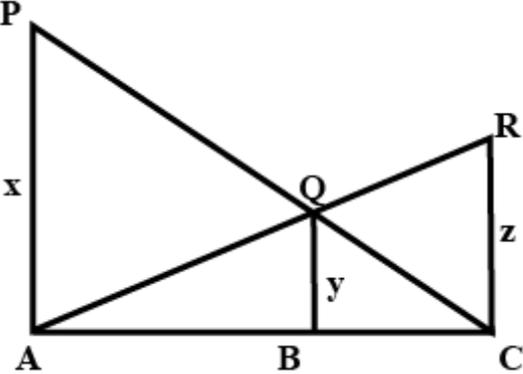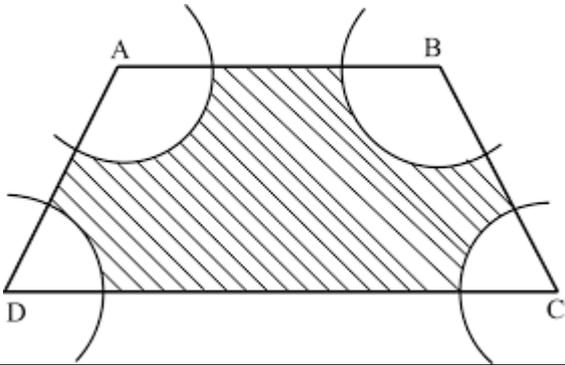
General Instructions:

1. This Question Paper has 5 Sections A-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
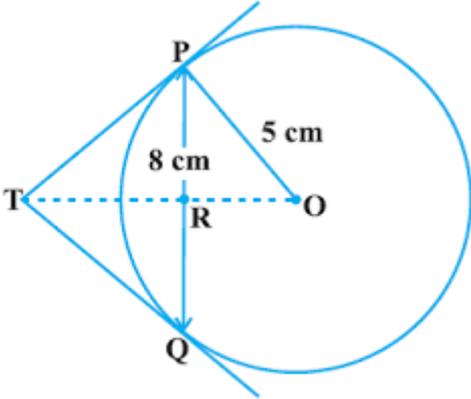8. Draw neat figures wherever required. Take π =22/7 wherever required if not stated.
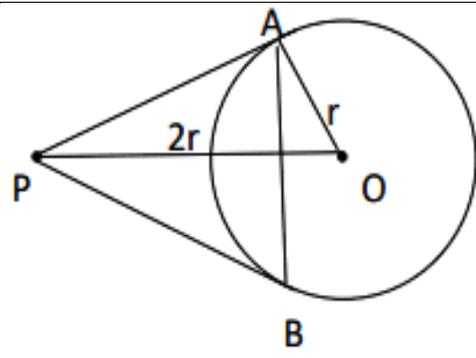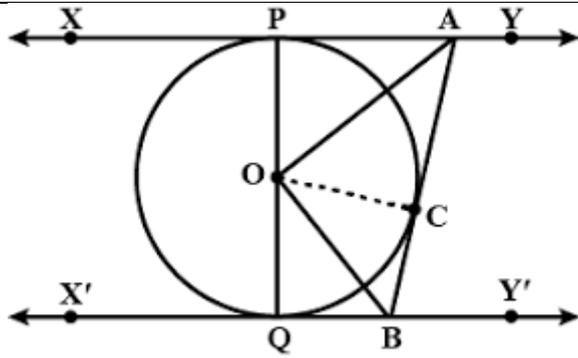
	SECTION -A
	Section A consists of 20 questions of 1 mark each.
1.	The LCM of two prime numbers p and q (p > q) is 221. Find the value of 3p – q. (a) 4　　(b) 28　　(c) 38　　(d) 48
2.	A natural number, when increased by 12, equals 160 times its reciprocal. Find the number. (a) 3　　(b) 8　　(c) 4　　(d) 7
3.	If α and β are zeroes of x^2 - (k - 6)x + 2(2k - 1) find the value of k if $\alpha + \beta = (1/2)\ \alpha\ \beta$ (a) 3　　(b) -3　　(c) -7　　(d) 7
4.	If the system of equations 3x+y =1 and (2k-1)x +(k-1)y =2k+1 is inconsistent, then k = (a) -1　　(b) 0　　(c) 1　　(d) 2
5.	Consider the data: <table><tr><td>Marks</td><td>Below 10</td><td>Below 20</td><td>Below30</td><td>Below 40</td><td>Below 50</td><td>Below 60</td></tr><tr><td>No.of Students</td><td>3</td><td>12</td><td>27</td><td>57</td><td>75</td><td>80</td></tr></table> The modal class is: (a) 10-20　　(b) 20-30　　(c) 30-40　　(d) 50-60
6.	In the given figure, $\angle ACB = \angle CDA$, AC = 8cm, AD = 3cm, then BD is (a) 22/3 cm　　(b) 26/3 cm　　(c) 55/3 cm　　(d) 64/3 cm
7.	If 1+ $\sin^2\alpha$ = 3 sinα cosα, then values of cot α are (a) -1, 1　　(b) 0,1　　(c)1, 2　　(d) -1,-1

8.	If $4\tan\Theta = 3$, Find the value of : $\dfrac{4\sin\theta - 3\cos\theta}{4\sin\theta + 3\cos\theta}$.
	(a) 0 (b) 1/3 (c) 2/3 (d) 3/4
9.	If PA, QB and RC are each perpendicular to AC.If x = 8 cm and z = 6 cm,then y is equal to
	(a) 56/7 (b) 7/56 (c) 25/7 (d) 24/7.
10.	If $\tan\alpha + \cot\alpha = 2$, then value of $\sin^3\alpha + \cos^3\alpha$
	(a) $\dfrac{1}{2}$ (b) 1 (c) $\sqrt{2}$ (d) $\dfrac{\sqrt{2}}{2}$
11.	ABCD is a trapezium with AD ∥ BC and AD = 4cm. If the diagonals AC and BD intersect each other at O such that AO/OC = DO/OB =1/2, then BC =
	(a) 6cm (b) 7cm (c) 8cm (d) 9cm
12.	AT is a tangent to the circle with centre O such that OT = 4 cm and ∠OTA = 30°. Then AT is equal to if A is point of contact
	(A) 4 cm (B) 2 cm (C) $2\sqrt{3}$ cm (D) $4\sqrt{3}$ cm
13.	If A(4, -2), B(7, -2) and C(7, 9) are the vertices of a ΔABC, then ΔABC is
	(a) equilateral triangle (b) isosceles triangle (c) right angled triangle (d) isosceles right angled triangle
14.	If the perimeter of a circle is equal to half of a square, then the ratio of their areas is
	(A) 22 : 7 (B) 7 : 11 (C) 7 : 22 (D) 11: 7
15.	If X , M and Z are denoting mean, median and mode of a data and X: M = 9 : 8, then the ratio M: Z is (a) 3 : 4 (b) 4 : 9 (c) 4 : 3 (d) 2 : 5
16.	The minute hand of a clock is 84 cm long. The distance covered by the tip of minute hand from 10:10 am to 10:25 am is
	(a) 44 cm (b) 88 cm (c) 132 cm (d) 176 cm
17.	Two dice are rolled simultaneously. What is the probability that 5 will come up at least once?
	(a)1/6 (b) 7/36 (c) 11/36 (d) 5/13
18.	A medicine-capsule is in the shape of a cylinder of diameter 0.5 cm with two hemispheres stuck to each of its ends. The length of entire capsule is 2 cm. The capacity of the capsule is
	(A) 0.36 cm³ (B) 0.35 cm³ (C) 0.34 cm³ (D) 0.33 cm³

19.	DIRECTION: In the question number 19 and 20, a statement of assertion (A) is followed by a statement of Reason (R). Choose the correct option
	Statement A (Assertion): If product of two numbers is 5780 and their HCF is 17, then their LCM is 340 Statement R(Reason) : HCF is always a factor of LCM (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 and 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.	Statement A (Assertion): If the co-ordinates of the mid-points of the sides AB and AC of ΔABC are D(3,5) and E(-3,-3) respectively, then BC = 20 units Statement R(Reason) : The line joining the mid points of two sides of a triangle is parallel to the third side and equal to half of it. (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 and 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.	Draw the graphs of the pair of linear equations $x - y + 2 = 0$ and $4x - y - 4 = 0$. Calculate the area of the triangle formed by the lines so drawn and the x-axis .
22.	A girl of height 90 cm is walking away from the base of a lamp-post at a speed of 1.2 m/s. If the lamp is 3.6 m above the ground, find the length of her shadow after 4 seconds.
23.	The wheel of a motor cycle is of radius 35 cm. How many revolutions per minute must the wheel make so as to keep a speed of 66 km/h? OR ABCD is a trapezium with AB || DC, AB = 18 cm, DC = 32 cm and distance between AB and DC = 14 cm. If arcs of equal radii 7 cm with centres A, B, C and D have been drawn, then find the area of the shaded region of the figure.
24.	Prove that : $\sqrt{\dfrac{1+\sin\theta}{1-\sin\theta}} + \sqrt{\dfrac{1-\sin\theta}{1+\sin\theta}} = 2\sec\theta$. OR If $\sec\theta + \tan\theta = p$, Prove that : $\sin\theta = \dfrac{p^2-1}{p^2+1}$.

25.	AB is a diameter and AC is a chord of a circle with centre O such that ∠BAC = 30°. The tangent at C intersects extended AB at a point D. Prove that BC = BD.
	SECTION C **Section C consists of 6 questions of 3 marks each.**
26.	Given that √3 is irrational, prove that 5 + 2√3 is irrational.
27.	If α & β are the zeroes of the polynomial $3x^2 + kx + 3$ & $\alpha^2 + \beta^2 + \alpha\beta = \frac{21}{4}$, then find the value of k . Hence find polynomial whose zeroes are reciprocal of zeroes of given polynomial.
28.	A railway half ticket costs half the full fare, but the reservation charges are the same on a half ticket as on a full ticket. One reserved first class ticket from the station A to B costs Rs 2530. Also, one reserved first class ticket and one reserved first class half ticket from A to B costs Rs 3810. Find the full first class fare from station A to B, and also the reservation charges for a ticket. OR . A shopkeeper sells a saree at 8% profit and a sweater at 10% discount, thereby, getting a sum Rs 1008. If she had sold the saree at 10% profit and the sweater at 8% discount, she would have got Rs 1028. Find the cost price of the saree and the list price (price before discount) of the sweater.
29.	Prove that : $\dfrac{(1+\cot A+\tan A)\,(\sin A-\cos A)}{\sec^3 A- \csc^3 A} = \sin^2 A \cos^2 A$
30.	PQ is a chord of length 8 cm of a circle of radius 5 cm. The tangents at P and Q intersect at a point T . Find the length TP. OR i) XY and X'Y' are two parallel tangents to a circle with centre O and another tangent AB with point of contact C intersecting XY at A and X'Y' at B. Prove that ∠ AOB = 90° ii) From a point P, two tangents PA and PB are drawn to a circle C(0, r). If OP = 2r, then find $\angle APB$. What type of triangle is APB?

| 31. | 2 Black Kings & 2 red Jacks are removed from pack of 52 cards. One card is drawn from rest of cards, what is Probability that drawn card is :

i) Neither king nor queen
ii) Either face card or Heart
iii) Either king or Spade |

SECTION D
Section D consists of 4 questions of 5 marks each.

| 32. | A trader bought a number of articles for Rs. 900, five articles were found damaged. He sold each of the remaining articles at Rs. 2 more than what he paid for it. He got a profit of Rs. 80 on the whole transaction. Find the number of articles he bought.

OR

Two pipes running together can fill a cistern in $3\frac{1}{13}$ minutes. If one pip e takes 3 minutes more than the other to fill it, find the time in which each pipe would fill cistern. |

| 33. | Prove that if a line is drawn parallel to one side of a triangle intersecting the other two sides in distinct points, then the other two sides are divided in the same ratio.   OR
Sides AB and AC and median AD of a triangle ABC are respectively proportional to sides PQ and PR and median PM of another triangle PQR. Show that Δ ABC ~ Δ PQR. |

| 34. | A solid toy is in the form of a hemisphere surmounted by a right circular cone. The height of the cone is 4 cm and the diameter of the base is 8 cm. Determine the volume of the toy. If a cube circumscribes the toy, then find the difference of the volumes of cube and the toy. Also, find the total surface area of the toy.   OR
Due to heavy floods in a state, thousands were rendered homeless. 50 schools collectively decided to provide place and the canvas for 1500 tents and share the whole expenditure equally. The lower part of each tent is cylindrical with base radius 2.8 m and height 3.5 m and the upper part is conical with the same base radius, but of height 2.1 m. If the canvas used to make the tents costs ₹120 per m^2, find the amount shared by each school to set up the tents. |

| 35. | The median of the data is 52.5 , Find x & y , If the total frequency is 100. |

Class	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100
Frequency	2	5	x	12	17	20	y	9	7	4

Hence find the Mean & Mode of data.

SECTION E
Case study based questions are compulsory.

36.	Trigonometry in the form of triangulation forms the basis of navigation, whether it is by land, sea or air. GPS a radio navigation system helps to locate our position on earth with the help of satellites. A guard, stationed at the top of a 240m tower, observed an unidentified boat coming towards it. A clinometer or inclinometer is an instrument used for measuring angles or slopes(tilt). The guard used the clinometer to measure the angle of depression of the boat coming towards the lighthouse and found it to be 30°.
	i) Make a labelled figure on the basis of the given information and calculate the distance of the boat from the foot of the observation tower.
	ii) After 10 minutes, the guard observed that the boat was approaching the tower and its distance from tower is reduced by $240(\sqrt{3} - 1)$ m. He immediately raised the alarm. What was the new angle of depression of the boat from the top of the observation tower?
37.	A craftsman thought of making a floor pattern after being inspired by the above design. To ensure accuracy in his work, he made the pattern on the Cartesian plane. He used regular octagons, squares and triangles for his floor tessellation pattern
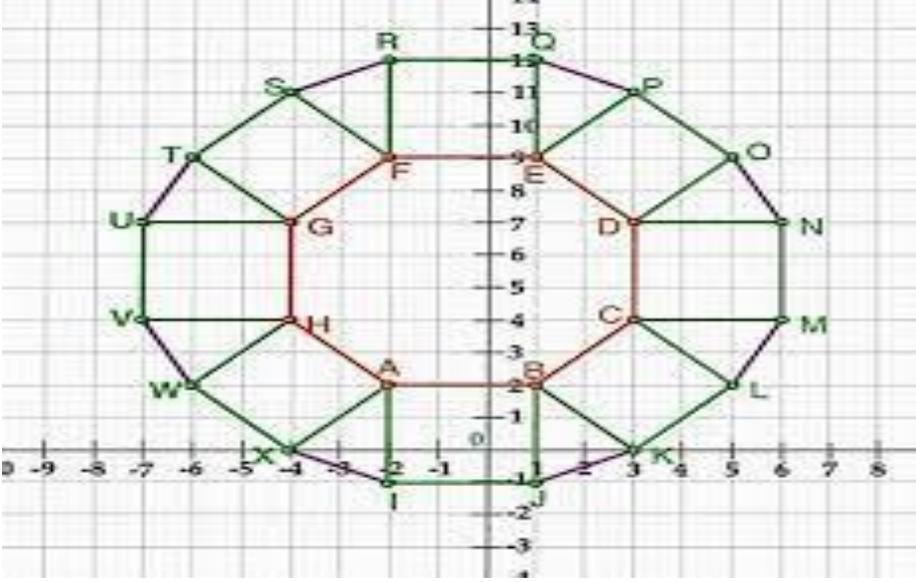
	Use the above figure to answer the questions that follow:
	(i) What is the length of the line segment joining points B and F?
	(ii) The centre 'Z'of the figure will be the point of intersection of the diagonals of quadrilateral WXOP. Then what are the coordinates of Z?
	(iii) What are the coordinates of the point on y axis equidistant from A and G? OR What is the area of Trapezium AFGH?
38.	Your friend Veer wants to participate in a 200 m race. He can currently run that distance in 51 seconds and with each day of practice it takes him 2 seconds less. He wants to do in 31 seconds.
	i) What is minimum number of days he need to practice till his goal is achieved.
	ii) If nth term of AP is given by $a_n = 2n + 3$, find the S_n .
	iii) In an AP, if $S_n = 3n^2 + 5n$ and $a_k = 164$, find the value of k.
	iv) How many numbers lie between 10 and 300, which when divided by 4 leave a remainder 3?