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**TARGET MATHEMATICS**  
**THE EXCELLENCE KEY**  
 AGYAT GUPTA (M.Sc., M.Phil.)



**CODE:1802-AG-TS-10**

**REGNO:-TMC-D/79/89/36/63**

**GENERAL INSTRUCTIONS :**

- All questions are compulsory.
- The question paper consists of 30 questions divided into four sections A,B,C and D. Section – A comprises of 6 question of 1 mark each. Section – B comprises of 6 questions of 2 marks each. Section – C comprises of 10 questions of 3 marks each and Section – D comprises of 8 questions of 4 marks each.
- There is no overall choice. However, an internal choice has been provided in four questions of 3 marks each and three questions of 4 mark each. You have to attempt only one of the alternatives in all such questions.
- Use of calculator is not permitted.

**MATHEMATICS**

**CLASS X**

Time : 3 to 3 1/4 Hours

Maximum Marks : 80

**SECTION A**

Question numbers 1 to 6 carry 1 mark each

Q.1 In Fig. 2, all three sides of a triangle touch the circle. Find the value of x.

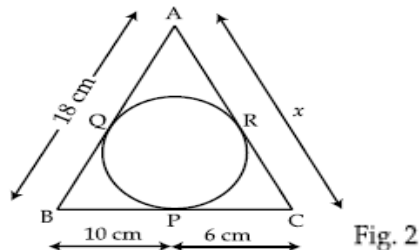
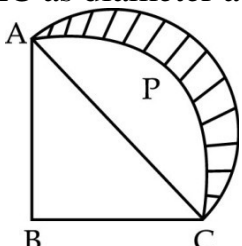
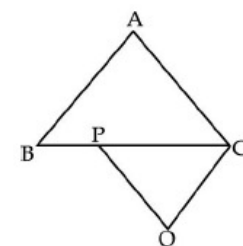
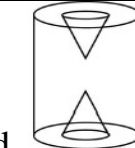
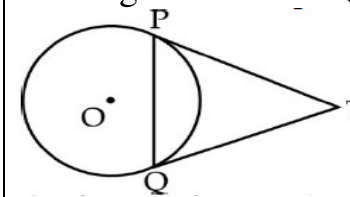
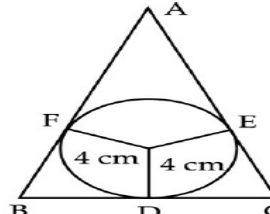


Fig. 2

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Q.2	In an isosceles triangle ABC, if AB = AC = 13 cm and the altitude from A on BC is 5 cm, find BC.
Q.3	Without using trigonometric tables, prove that: $\frac{\sec^2 35^\circ - \cot^2 55^\circ}{\cos^2 39^\circ - \tan^2 51^\circ} + \sin 61^\circ \sec 29^\circ = 2$
Q.4	Find the point of trisection of the line segment joining the points (5, -6) and (-7, 5).
Q.5	Find the next two terms of the A.P. $\sqrt{2}, \sqrt{8}, \sqrt{18}$
Q.6	The perimeters of two similar triangles ABC and PQR are respectively 36 cm and 24 cm. If PQ = 10 cm, find AB.
<b>SECTION B</b> Question numbers 7 to 12 carry 2 marks each	
Q.7	What is the greatest number that divides 442,569, 696 leaving remainder 1,2 and 3 respectively.
Q.8	The sum of three numbers in A.P. is 27 and their product is 405. Find the numbers.
Q.9	From a well shuffled pack of 52 cards, two black kings and two black jacks are removed. From the remaining cards, a card is drawn at random. Find the probability that the drawn card is not a king.
Q.10	LCM of two numbers is 45 times their HCF. If one of the numbers is 125 and the sum of HCF and LCM is 1150, find the other number.
Q.11	Solve for x : $\frac{1}{(x-1)(x-2)} + \frac{1}{(x-2)(x-3)} = \frac{2}{3}$ , $x \neq 1, 2, 3$
Q.12	In a simultaneous throw of a pair of dice, find the probability of getting: product of the number is a prime number .
<b>SECTION C</b> Question numbers 13 to 22 carry 3 marks each	

Q.13	Solve for x and y: $\frac{2}{x+2y} + \frac{1}{x-2y} = \frac{-5}{7}; \frac{1}{x+2y} - \frac{2}{x-2y} = \frac{15}{7}$ .
Q.14	<p>ABCP is a quadrant of a circle of radius 14 cm. With AC as diameter a semicircle is drawn. Find the area of the shaded region.</p> 
Q.15	<p>The areas of two similar triangles are <math>49 \text{ cm}^2</math> and <math>64 \text{ cm}^2</math> respectively. If the difference of the corresponding altitudes is 10 cm, then find the lengths of altitudes (in centimeters).</p> <p>OR</p> <p>In the given figure, <math>AB \parallel CQ</math> and <math>AC \parallel PQ</math>. If <math>BP = \frac{1}{3} BC</math>, find the ratio of the areas of <math>\triangle ABC</math> and <math>\triangle QCP</math>.</p> 
Q.16	If d is the HCF of 45 and 27, find x, y satisfying $d = 27x + 45y$ .
Q.17	If two zeroes of the polynomial $p(x) = x^4 - 6x^3 - 26x^2 + 138x - 35$ are $2 \pm \sqrt{3}$ , find the other zeroes.
Q.18	<p>Water is flowing at the rate of 5 km/h through a pipe diameter 14 cm into a rectangular tank which is 25 m long and 22 m wide. Determine the time in which the level of water in the tank will rise by 21 cm.</p> <p>OR</p> <p>In given figure, the height of a solid cylinder is 15 cm and diameter of the base is 7 cm. Two equal conical holes each of radius 3 cm and height 4 cm are cut off as shown in the figure. Find the surface area of the</p>

	 <p>remaining solid.</p>
Q.19	<p>In given figure, PQ is a chord of length 8 cm in a circle of radius 5 cm. The tangents at P and Q intersect at a point T. Find the length of TP.</p>  <p>OR</p> <p>In the figure, the radius of the circle of <math>\triangle ABC</math> is 4 cm and segments into which one side BC is divided by the point of contact D are 6 cm and 8 cm. Find AB and AC.</p> 
Q.20	<p>The line segment joining the points A (3, -4) and B (1, 2) is trisected at the point P and Q. If the co-ordinates of p and q are <math>(p, -2)</math> and <math>(\frac{5}{3}, q)</math> where P nearer to A and Q nearer to B. Find the values of p and q.</p> <p>OR</p> <p>If the three vertices of a parallelogram A(6,1), B(8,2), C(9,4). E is the mid point of CD. Find the area of triangle AED.</p>
Q.21	Prove that: $\frac{\tan^3 \theta}{1 + \tan^2 \theta} + \frac{\cot^3 \theta}{1 + \cot^2 \theta} = \sec \theta \operatorname{cosec} \theta - 2 \sin \theta \cos \theta$

OR

If  $\cos \theta + \sin \theta = \sqrt{2} \cos \theta$ , show that  $\cos \theta - \sin \theta = \sqrt{2} \sin \theta$ .

Q.22 Draw the graphs of the following equations:  $2x - y - 2 = 0$  ;  $4x + 3y - 24 = 0$  ;  $y + 4 = 0$ . Obtain the vertices of the triangle so obtained. Also, determine its area.

**SECTION D**

**Question numbers 23 to 30 carry 4 marks each**

Q.23 An aero plane, when 3000 m high, passes vertically above another plane at an instant when the angles of elevation of the two aero planes from the same point on the ground are  $60^\circ$  and  $45^\circ$  respectively. Find the vertical distance between the two aero planes.

Q.24 Solve :  $\frac{a}{ax-1} + \frac{b}{bx-1} = a + b$  .

OR

Solve for x :  $\frac{1}{a+b+x} = \frac{1}{a} + \frac{1}{b} + \frac{1}{x}$  ;  $a, b, x \neq 0$

Q.25 Construct a quadrilateral ABCD with  $AB = 3$  cm,  $AD = 2.7$  cm,  $DB = 3.6$  cm,  $\angle B = 110^\circ$  and  $BC = 4.2$  cm. Construct another quadrilateral A'BC'D similar to quadrilateral ABCD so that diagonal  $BD' = 4.8$  cm.

Q.26 Find the number of identical term the two AP 's  $3, 7, 11, \dots, 407$  . &  $2, 9, 16, \dots, 709$  .Also find its sum.

OR

Find the two sum which is before and after middle term of the A.P. :  $1, 8, 15, \dots, 505$ .

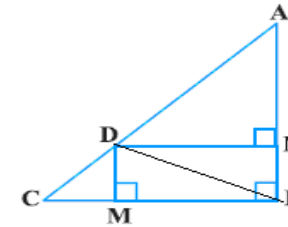
Q.27 If  $T_n = \sin^n \theta + \cos^n \theta$ , prove that  $\frac{T_3 - T_5}{T_1} = \frac{T_5 - T_7}{T_3}$  .

Q.28 A bucket of height 8 cm and made up of copper sheet is in the form of

frustum of a right circular cone with radii of its lower and upper ends as 3 cm and 9 cm respectively. Calculate:

- (a) the height of the cone of which the bucket is a part.
- (b) the volume of water which can be filled in the bucket.
- (c) the area of copper sheet required to make the bucket.( Leave the answer in terms of  $\pi$  )

Q.29



In given Fig. , D is a point on hypotenuse AC of  $\Delta ABC$ , such that  $BD \perp AC$  &  $DM \perp BC$  and  $DN \perp AB$ . Prove that :

- (i)  $DM^2 = DN \times MC$  (ii)  $DN^2 = DM \times AN$

OR

In a  $\Delta ABC$ ,  $AB = BC = CA = 2a$  and  $AD \perp BC$ . Prove that

- (i)  $AD = a\sqrt{3}$  (ii)  $\text{area}(\Delta ABC) = \sqrt{3} a^2$  .

Q.30 Find the missing frequencies in the following frequency distribution table, if  $N=100$  and median is 32.

Marks obtained	0-10	10-20	20-30	30-40	40-50	50-60	Total
No. of students	10	?	25	30	?	10	100

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" THE TWO MOST POWERFUL WARRIORS ARE PATIENCE AND TIME "