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

21st
YEAR OF QUALITY EDUCATION

CODE:- AG-TS-7-7936   REGNO:-TMC -D/79/89/36

GENERAL INSTRUCTIONS :-

1. All questions are compulsory.
2. The question paper consists of 34 questions divided into four sections A,B,C and D. Section – A comprises of 8 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 10 questions of 4 marks each.
3. Question numbers 1 to 8 in Sections – A are multiple choice questions where you are to select one correct option out of the given four.
4. There is no overall choice. However, internal choice has been provided in 1 question of two marks, 3 questions of three marks each and 2 questions of four mark each. You have to attempt only one lf the alternatives in all such questions.
5. Use of calculator is not permitted.
6. Please check that this question paper contains 6 printed pages.

सामान्य निर्देश :

1. सभी प्रश्न अनिवार्य हैं।
2. इस प्रश्न पत्र में 34 प्रश्न है, जो चार खण्डों में अ, ब, स व द में विभाजित है। खण्ड – अ में 8 प्रश्न हैं और प्रत्येक प्रश्न 1 अंक का है। खण्ड – ब में 6 प्रश्न हैं और प्रत्येक प्रश्न 2 अंको के हैं। खण्ड – स में 10 प्रश्न हैं और प्रत्येक प्रश्न 3 अंको का है। खण्ड – द में 10 प्रश्न हैं और प्रत्येक प्रश्न 4 अंको का है।
3. प्रश्न संख्या 1 से 8 बहुविकल्पीय प्रश्न हैं। दिए गए चार विकल्पों में से एक सही

विकल्प चुनें।

4. इसमें कोई भी सर्वोपरि विकल्प नहीं है, लेकिन आंतरिक विकल्प 1 प्रश्न 2 अंको में, 3 प्रश्न 3 अंको में और 2 प्रश्न 4 अंको में दिए गए हैं। आप दिए गए विकल्पों में से एक विकल्प का चयन करें।
5. कैलकुलेटर का प्रयोग वर्जित है।
6. इस प्रश्न–पत्र को पढ़ने के लिऐ 15 मिनिट का समय दिया गया है। इस अवधि के दौरान छात्र केवल प्रश्न–पत्र को पढेंगे और वे उत्तर–पुस्तिका पर कोई उत्तर नहीं लिखेंगें।
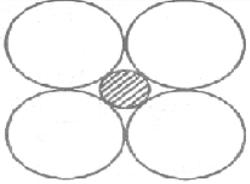
Pre-Board Examination 2012 -13

MATHEMATICS   CLASS X   (SA-2)

| Time : 3 to $3\frac{1}{4}$ Hours	Maximum Marks : 90

SECTION A

Q.1	A tree breaks due to storm and broken part bends so that the top of the tree touches the ground making an angle of 30^0 with ground. If the distance between the foot of the tree to the point where the top touches the ground is 8m, then the height of the tree is (a) $\frac{8}{3}$ (b) $\frac{3}{8}$ (c) $\frac{8}{\sqrt{3}}$ (d) $8\sqrt{3}$ **Ans d**
Q.2	For an A.P. if $T_{25} - T_{18} = 63,$ then d = (a) 9 (b) -9 (c) 18 (d) 23 **Ans a**
Q.3	If A and B are two points having coordinates $(3, 4)$ and $(5, -2)$ respectively and P is a point such that $PA = PB$ and area of triangle $PAB = 10$ square unit, then the coordinates of P are (a) $(7,2)\ or\ (1,0)$ (b) $(7,2)\ or\ (13,4)$ (c) $(2,7)\ or\ (4,13)$ (d) none **Ans. a**

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Q.4	In the adjoining figure , the radius of the inner circle, if other circles are of radii 1 m, is : (A) $(\sqrt{2}-1)$m (B) $\sqrt{2}$ m (C) $\frac{1}{\sqrt{2}}$ m (D) $\frac{2}{\sqrt{2}}$ m **Ans a**
Q.5	To divide a line segment AB in the ratio 4 : 7 , a ray AX is drawn first such that $\angle BAX$ is an acute angle and then points A_1 , A_2 , A_3 ..... are located at equal distance on the ray AX and the point B is joined to (A) A_{12} (B) A_{11} (C) A_{10} (D) A_9 **Ans b**
Q.6	Two unbiased dice are thrown. The probability that the total score is > 5 is (a) $\frac{1}{18}$ (b) $\frac{7}{18}$ (c) $\frac{13}{18}$ (d) $\frac{11}{18}$. **Ans c**
Q.7	The curved surface area of a cylinder is 264 m^2 and its volume is 924 m^3. the ratio of its diameter to its height is (a) 3:7 (b) 7:3 (c) 6:7 (d) 7:6 . **Ans b**
Q.8	If (3,2), (6,3), (x,y) and (6,5) are the vertices of a ‖ gm, then x + y = (a) 13 (b) 14 (c) 16 (d) 15 . **Ans d**
	SECTION B
Q.9	Find the sum of all three digit number which leave the same remainder 2 when divded by 5 .

The required A.P. is 102, 107, ...997 which leave the same remainder 2 when divided by 5, a = 102, d = 5, a$_n$ = 997   ½

$\Rightarrow$ a + (n−1)d = 997

102 + (n−1)5 = 997   1½

900 = 5n, n = 900/5 = 180

S$_n$ = n/2[a+l] = 180/2 × [102+997] = 90 × 1099 = 98910   1

OR

For an AP show that $a_p + a_{p+2q} = 2a_{p+q}$

a$_p$ + a$_{p+2q}$ = a + (p−1)d + a + (p+2q−1)d
        = a + pd − d + a + pd + 2qd − d
        = 2a + 2pd + 2qd − 2d   1
        = 2[a + (p+q−1)d] − (i)

2a$_{p+q}$ = 2[a + (p+q−1)d] − (ii)

From (i) and (ii)

a$_p$ + a$_{p+2q}$ = 2a$_{p+q}$ ½

Q.10	Find the area of the sector of a circle with radius 4 cm and of angle 30^0 .also find the area of the corresponding major sector. . **Ans 46.1 cm**
Q.11	Determine the ratio in which the line 2x + y – 4 = 0 divides the line segment joining A(2,-2) and B(3,7) . **Ans 2:9**
Q.12	A letter of English alphabets is chosen at random. Determine the probability that the latter is a consonant. . **Ans 21/26**
Q.13	The measure of the minor arc of a circle is 1/5 of the measure of the corresponding major arc. If the radius of the circle is 10.5 cm, find the area of the sector corresponding to the major arc. Take $\left(\pi = \frac{22}{7}\right)$. {Ans.288.78

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	cm^2
Q.14	Show that the point P(-4, 2) lies on the line segment joining the points A (-4, 6) and B(-4, -6). Ans If p (-4,2) lies on the line segment joining the points A(-4,6) and B(-4,-6),then points P, A and B are collinear .The area of triangle formed by these points will be zero.Now area $$\Delta PAB = \frac{1}{2}[-4(+6+6)+(-4)(2-6)]$$.[ar ΔPAB = [$$= \frac{1}{2}[-48+32+16] = 0$$ $x_1(y_2 - y_3) + x_2(y_3 - y_1) + x^3(y_1 - y_2)]$ Point P,A, B are collinear.

<div align="center">

SECTION C
3
</div>

Q.15	Let ABC be a right triangle in which AB = 3CM ; BC = 4 CM and ∠B = 90^0. BD is perpendicular from B on AC . The circle through B , C , D is drawn . construct the tangent from A to this circle .
Q.16	There are 900 students in a public school in which 180 students comes to school by their own car,225 by their own motor bike and remaining by their bicycle. Find the probability: (i) who come by car ? (ii) who come by motor bike (iii) who come by bicycle (iv) Which mode of transport you will suggest to students and why? Ans: (i) $\frac{1}{5}$ (ii) $\frac{1}{4}$ (iii) $\frac{11}{20}$ (iv) I would like to suggest bicycle to the student because . (i) It save fuel and helps reducing the pollution in environment . (ii) Bicycle is good source for physical exercise. **There can be multiple answers to the value based questions. Students may have their own opinion about answering them, there is no specific solution. Marks would be given for all sensible answers.**

Q.17	A tower stands vertically on the ground. From a point on the ground which is 20 *m* away from the foot of the tower, the angle of elevation of the top of the tower is found to be 60º. Find the height of the tower.Ans Let AB be vertical tower, C is point 20m away from the foot of the tower at which top of tower makes an angle of elevation 60^0 as shown in the figure .In right angled triangle ABC, $\tan 60^0 = \frac{AB}{20} \Rightarrow \sqrt{3} = \frac{AB}{20} = AB = 20\sqrt{3}m$. The height of tower $= 20\sqrt{3}m$
Q.18	Tanu shree deposited a sum of ₹ 50000 at 7% simple interest p.a. The interest received to be utilized for the education of poor children at the end of 10 years. Does the interest from an A.P? Also, find the total interest received and utilized for education of poor children after 10 years. Which value is depicted by priya? Ans: yes,rs 3500, rs 7000,rs 10500... total interest = rs 35000 Tanu shree wishes to help the poor children in the filed of their education .**There can be multiple answers to the value based questions. Students may have their own opinion about answering them, there is no specific solution. Marks would be given for all sensible answers.** **4**
Q.19	A solid metallic right circular cone 20 cm high with vertical angle 60^0 is cut into two parts at the middle point of its height by a plane parallel to the base. If the frustum, so obtained, be drawn into a wire of diameter $\frac{1}{3}$mm, find the length of the wire. (Ans. 28000 meters = 28 KM **OR** A copper wire 4 mm in diameter is evenly bound about a cylinder whose length is 24 cm and diameter 20 cm so as to cover the whole surface. Find the length of the wire in terms of π . Ans :Length of wire = 1200π
Q.20	If two circles touch each other internally or externally, the point of contact lie on the line joining their centres.prove it .
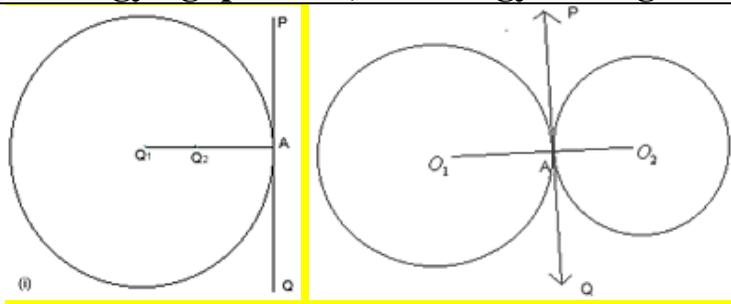
Given:- Two circles with centres O_1 and O_2 touch internally in figure (i) and externally in figure (ii) at A.

To prove: - The points O_1, O_2 and A lie on the same line.

Construction:- A common tangent PQ is drawn at A.

Proof: - In figure (i) $\angle PAO_2 = \angle PAO_1 = 90^0$ (PA is tangent to the two circles)

$\therefore$ O_1, O_2 and A are collinear.

In figure (ii) $\angle PAO_1 = \angle PAO_2 = 90^0$ (PA is tangent to the circles)

$\therefore \angle PAO_1 + \angle PAO_2 = 90^0 + 90^0$

$= 180^0$

i.e. $\therefore \angle PAO_1 \ and\ \angle PAO_2$ from a linear pair

$\therefore$ O_1, O_2 and A lie on the same line.

| Q.21 | A bag contains lemon flavored candy only. MALINI takes out one candy without looking into the bag. What is the probability that she takes out. (i)an orange flavor candy   (ii)a lemon flavor candyANS: |

Probability of orange flavoured Candy = 0
Because there is no orange flavoured Candy
Probability of lemon flavoured Candy = 1
Because there is only lemon flavoured Candy.

OR

There are 1000 sealed envelopes in a box, 10 of them contain a cash price of ₹ 100 each, 100 of them contain a cash prize of ₹ 50 each and 200 of them contain a cash price of ₹ 10 each and rest do not contain any cash prize. If they are will shuffled and an envelope is picked up out, what is the probability that it contain no cash price? Ans 0.69

Q.22	Find the sum of all two digit numbers greater than 50 which when divided by 7 leaves a remainder of 4. Ans : 53 + 60 + 67 + -----------+ 95 = 518 (number of term = 7)

OR

A man repays a loan of Rs. 3250 by paying ₹ 20 in the first month and then increases the payment by ₹ 15 every month. How long will it take him to clear the loan? Ans : 20 + 35 + 50 + --------- nterm = 3250 then n = 20

Q.23	The vertices of a Δ PQR are P (4, 6), Q (1, 5) and R (7, 2). A line is drawn to intersect sides PQ and PR at S and T respectively, such that $\frac{PS}{PQ} = \frac{PT}{PR} = \frac{1}{4}$. Calculate the area of the ΔPST and compare it with the area of ΔPQR .Ans:S(13/4 , 23/4) T(19/4 ,20/4)& $A(\Delta PST) = \frac{15}{32}$ & $A(\Delta PQR) = \frac{15}{2}$; $Raito = 1:16$

Q.24	The angle of elevation of a cloud from a point 60m above the lake is 30° and the angle of depression of the reflection of the cloud in the lake is 60°. Find the height of the cloud. Ans 120*m*

SECTION D

| Q.25	AB is a diameter and AC is a chord of a circle such that $\angle BAC = 30°$. If the tangent at C intersects AB produced at D, prove that BC = BD.
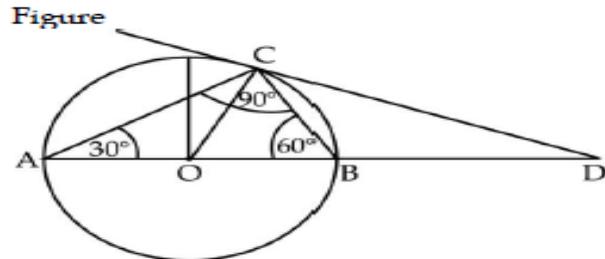
Figure

AB is diameter
∴ ∠ACB = 90° (Angle in a semicircle)
∠BAC = 30° (given)
∴ ∠ABC = 60° (angle sum property)
∠CBD = 180° − 60° = 120° (linear pair)
Also ∠OCD = 90° (Since CD is a tangent)
In ΔAOC, ∠OAC = ∠OCA = 30° (OA = OC = r)
∴∠OCB = 90° − ∠OCA = 90 − 30 = 60°
∠BCD = 90° − ∠OCB
= 90° − 60° = 30°
In ΔBCD, ∠CBD + ∠BCD + ∠BDC = 180°
⇒ ∠BDC = 30°
Since ∠BDC = ∠BCD = 30°, Therefore ΔBCD is an isosceles triangle
BC = BD
ANS: Hence proved.

Q.26	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 π) Ans (a) 12 cm (b) $312\alpha\pi cm^3$ (c)$129\pi cm^2$

Q.27	In the given figure, ABC is a right angled triangle right angled at A. Semi – circles are drawn on AB, AC and BC as diameters. Find the area of the shaded region.
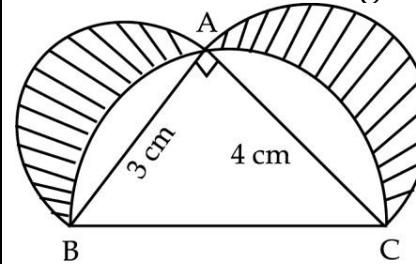
ANS:
Area of shaded region
= (Area of semi circle on AB) + (Area of semi circle on AC)
− [Area af semi circle on BC − Area of triangle]
$= \frac{\pi(1.5)^2}{2} + \frac{\pi(2)^2}{2} - \frac{\pi(2.5)^2}{2} + \frac{1}{2} \times 3 \times 4$
$= \frac{\pi}{2}((1.5)^2 + (2)^2 - (2.5)^2) + 6.$
$= \frac{\pi}{2}(0) + 6 = 6\ cm^2$

Q.28	Find the coordinates of the point which is at a distance of 2 units from (5,4) and 10 units from(1 , -2) . Ans (5,6) (3,4) **OR** Prove that the diagonals of a rectangle bisect each other and are equal (Using coordinate geometry).
Q.29	From a point P, two tangents PA and PB are drawn to a circle with centre O. If OP is equal to the diameter of the circle, prove that ΔPAB is equilateral.

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Q.30	A two-digit number is such that product of its digits is 18. Where 63 is subtracted from the number, the digits interchange their places. Find the number. Ans 92
Q.31	How many terms of the A.P. -6 , $-\dfrac{11}{2}$, -5 ,..... are needed to give the sum -25 ? Explain double answer. Ans : $$-25 = \frac{n}{2}\left[2\times(-6)+(n-1)\frac{1}{2}\right] \Rightarrow n^2 - 25n + 100 = 0 \therefore n = 5,20$$ Explaination : - Sum of first 5 terms of an AP is same the sum of its 20 terms because the sum of last 15 terms is equal to zero
Q.32	A well of diameter 3 m and 14 m deep is dug. The earth, taken out of it, has been evenly spread all around it in the shape of a circular ring of width 4 m to form an embankment. Find the height of the embankment. Diameter of well = 3m Radius of well = $\dfrac{3}{2}m$ .Depth of well = 14m.The volume of earth taken out from well = $\pi r^2 h = \pi .\left(\dfrac{3}{2}\right)^2 \times 14$ ……….(i) This earth is used to made the embankment around the well of width 4m. The volume of embankment = $\pi\left[\left(\dfrac{11}{2}\right)^2 - \left(\dfrac{3}{2}\right)^2\right]\times h$ The volume of embankment = Volume of earth taken out from well [where h is the height of the embankment] . From (i) and (ii) $$\pi\times\frac{9}{4}\times 14 = \pi\left[\frac{121}{4} - \frac{9}{4}\right]\times h = \text{Height of embankment} = 9/8m$$ **OR** A field is in the form of a circle. A fence is to be erected around the field. The cost of fencing would be ₹ . 2640 at the rate of ₹ 12 per metre.

	Then the field is to be thoroughly ploughed at the cost of ₹ 0.50 per m². What is the amount required to plough the field ? Ans Rs 1925
Q.33	A boy standing on a horizontal plane finds a bird flying at a distance of 100m from him at an angle of elevation 30º. A girl standing on the roof of 10m high building finds the angle of elevation of the same bird, at the same time, to be 45º. Both the boy and the girl are on opposite sides of the bird. Find the distance of bird from the girl. Ans $40\sqrt{2}m$
Q.34	A sphere, of diameter 12 cm, is dropped in a right circular cylindrical vessel, partly filled with water. If the sphere is completely submerged in water, the water level in the cylindrical vessel rises by $3\dfrac{5}{9}cm.$ Find the diameter of the cylindrical vessel. Ans 18cm
	Hey, Good Luck For Your Exams.!
	HAPPINESS IS NOTHING MORE THAN GOOD HEALTH AND A BAD MEMORY.

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