

**SAMPLE PAPER**  
**Class : X**  
**MATHEMATICS**

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Time: 3 hrs

Marks: 80

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*General Instructions:*

- ( i ) All questions are compulsory.*
  - ( ii ) The question paper consists of 25 questions divided into three sections –A,B and C. Section A contains 7 questions of 2 marks each. Section B is of 12 questions of 3 marks each and section C is of 6 questions of 5 marks each.*
  - ( iii ) There is no overall choice. However, an internal choice has been provided in two questions of two marks each, two questions of three marks each and two questions of five marks each.*
  - ( iv ) In question on construction, the drawing should be neat and exactly as per the given measurements.*
  - ( v ) Use of calculator is not permitted.*
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**SECTION A**

( Qns 1 – 7 carry 2 marks each )

1. Solve for x and y.  
 $ax + by - 2a + 3b = 0$   
 $bx - ay - 3a - 2b = 0$

or

The sum of the digits of a two digit number is 7. If the digits are reversed, the new number will be 2 more than twice the original number. Find the number.

2. If  $(x + 2)(x + 7)(x - 3)$  is the H.C.F of the polynomials  $P(x)$  and  $Q(x)$  where  $P(x) = (x^2 + 9x + 14)(x^2 - ax - 3)$  and  $Q(x) = (x^2 - x - 6)(x^2 + 9x + b)$ . Find the values of 'a' and 'b'.

3. Solve for x:

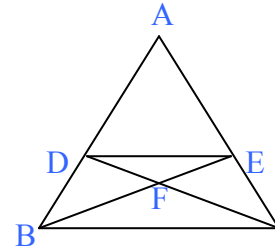
$$\frac{x - 1}{x - 2} + \frac{x - 3}{x - 4} = \frac{x - 5}{x - 6} + \frac{x - 7}{x - 8}$$

4. If 9<sup>th</sup> term of an A.P is 99 and 99<sup>th</sup> term is 9, find its 108<sup>th</sup> term.

5. A cycle is sold for Rs 900 cash or Rs 200 cash down payment followed by three monthly instalments of Rs 250 each. Find the rate of interest charged under the instalment plan.
6. Prove that the area of the equilateral triangle described on the side of a square is half the area of the equilateral triangle described on its diagonal.

or

In fig.  $DE \parallel BC$  and  $AD : DB = 5 : 4$ . Find  $\frac{\text{ar}(\triangle DFE)}{\text{ar}(\triangle CFB)}$



C

7. A bag contains 18 balls out of which  $x$  balls are black:
  - (i) If one ball is drawn at random what is the probability that it is black?
  - (ii) If 2 more black balls are put in the bag, the probability of the drawing a black ball will be  $\frac{9}{8}$  times than that in (i). Find  $x$ .

#### SECTION B

(Q ns 8 – 19 carry 3 marks each)

8. Solve the following system of linear equations graphically:
 
$$2x - y = 3$$

$$3x - 2y = 1$$
 Shade the region bounded by these lines and the y-axis.

9. If  $P = \frac{x+1}{x-1}$ ,  $Q = \frac{x-1}{x+1}$  and  $R = x + \frac{1}{x}$ , find  $\left\{ \frac{P-Q}{2(P+Q)} \right\} \times R$

10. A person on tour has Rs 360 for his daily expenses. If he exceeds his tour programme by 4 days, he must cut down his daily expenses by Rs 3 per day. Find the number of days of his tour programme.

11. How many three digits numbers leave remainder 2 when divided by 9. Also find their sum.

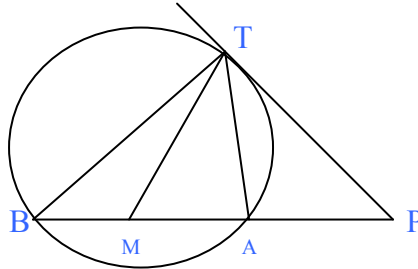
Or

Which term of the sequence  $20, 19 \frac{1}{4}, 18 \frac{1}{2}, \dots$  is the first negative term.

12. A gas oven is marked at Rs3,500 cash or Rs1,400 cash down payment together with

2 equal annual instalments. If the dealer charges interest at 10% p.a. compounded annually, what is the amount of each instalment.

13. In fig PT is a tangent and PAB is a secant of the circle. If the bisector of  $\angle ATB$  intersects AB at M, Prove that  $PT = PM$ .



14. Construct a triangle ABC in which  $BC = 6.5\text{cm}$ ,  $\angle A = 60^\circ$  and altitude  $AD = 4.5\text{cm}$

15. A vessel is in the form of an inverted cone which is open at the top. Its depth is 8cm and the radius of its top is 5cm. It is filled with water up to the brim. When lead shots, each of which is a sphere of radius 0.5cm are dropped into the vessel, one-fourth of the water flows out. Find the number of lead shots dropped in the vessel.

16. Prove the following identity:

$$(\sin \theta + \cos \theta)^2 + (\cos \theta + \sec \theta)^2 = 7 + \tan^2 \theta + \cot^2 \theta$$

or

Without using trigonometric tables. Evaluate:

$$\frac{2 \sin 68^\circ}{\cos 22^\circ} - \frac{2 \cot 15^\circ}{5 \tan 75^\circ} - \frac{3 \tan 45^\circ \tan 20^\circ \tan 40^\circ \tan 50^\circ \tan 70^\circ}{5}$$

17. The data about annual production of an Indian state is given below:

Commodity	Wheat	Sugar	Rice	Maize	Gram	Total
Production (in tonnes)	2750	2500	1500	1000	1250	9000

Draw a pie-chart to represent the data.

18. Find the coordinates of the circumcentre of the triangle whose vertices are  $(8, 6)$ ,  $(8, -2)$  and  $(2, -2)$ . Also find its circum-radius.

19. The vertices of a triangle are  $(a, b - c)$ ,  $(b, c - a)$  and  $(c, a - b)$ . Prove that its centroid lies on x-axis.

SECTION C

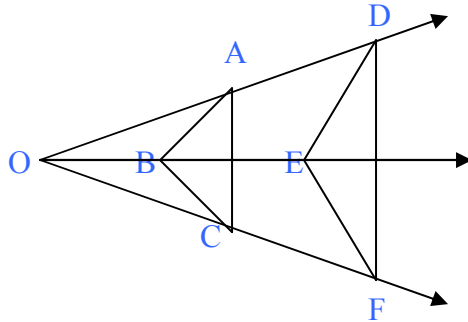
( Qns 20 – 25 carry 5 marks each )

20. Prove that 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.

Using the above do the following:

In fig.  $AB \parallel DE$  and  $BC \parallel EF$ . Prove that  $AC \parallel DF$



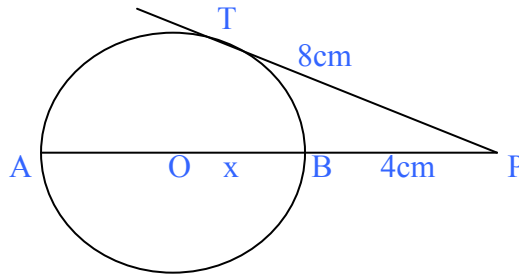
21. If PAB is a secant to a circle intersecting at A and B, and PT is a tangent then prove

that  $PA \cdot PB = PT^2$

Using the above do the following:

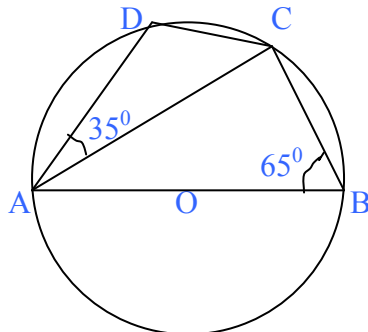
In fig. PT is a tangent to the circle at T and PBA is a secant. If  $PB = 4\text{cm}$ ,  $PT = 8\text{cm}$ ,

find the value of  $x$ .



or

Prove that the sum of either pair of the opposite angles of a cyclic quadrilateral is  $180^\circ$ . Using the above theorem, find the angles  $\angle ACD$  and  $\angle BAC$ , if AB is a diameter of the circle in fig.



22. A circus tent is made of canvas, and is in the form of a right circular cylinder and a right circular cone above it. The diameter and height of the cylindrical part of the tent are 126m and 5m respectively. The total height of the tent is 21m. Find the total cost of canvas used to make the tent when the cost per square metre of the canvas is Rs 12 ( Take  $\pi = 22 / 7$  ).

23. A man on the roof of a house which is 10m high, observes the angle of elevation of the top of a building is  $45^\circ$  and the angle of depression of the base of the building as  $30^\circ$ . Find the height of the building and its distance from the house.

Or

From an aeroplane vertically above a straight horizontal plane, the angles of depression of two consecutive kilometer stones on the opposite sides of the aeroplane are found to be  $\alpha$  and  $\beta$ . Show that the height of the aeroplane is  $\frac{\tan \alpha \tan \beta}{\tan \alpha + \tan \beta}$ .

24. Find the mean marks from the following data:

Marks	Number of students
Below 10	4
Below 20	10
Below 30	18
Below 40	28
Below 50	40
Below 60	70

25. Annual income from salary of Mrs. Preethi, who is a senior citizen, is Rs 3,85,000. She donates Rs 10,000 to Prime Minister's Relief Fund ( 100% exemption ) and Rs 10,000 to a Charitable Society ( 50% exemption). She contributes Rs 70,000 towards PPF and pays half-yearly premium of Rs 7,000 towards Life Insurance She also purchases NSC for Rs 20,000. She pays Rs 1,600 per month towards income tax for 11 months. What is her tax liability for the last month of the financial year?

Use the following for calculating income tax.

( a ) Savings : 100% exemption for savings upto Rs. 1,00,000.

( b ) Rate of income tax for senior citizens:

Slab	Income Tax
( i ) Upto Rs. 1,85,000	No tax
( ii ) From Rs. 1,85,001 to Rs. 2,50,000	20% of the taxable income above Rs. 1,85,000
( iii ) Above Rs. 2,50,000	Rs. 13,000 + 30% of the income exceeding Rs. 2,50,000

( c ) Education Cess: 2% of income tax