

# Sample Paper – 2007

## Class - X

### MATHEMATICS

Time allowed: 3 hours

Maximum Marks: 80

#### General Instructions:

1. All questions are compulsory.
2. 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.
3. 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 mark each.
4. In question on construction, the drawing should be neat and exactly as per the given measurements.
5. Use of calculators is not permitted. However, you may ask for mathematical tables.

#### SECTION – A

1. Solve the following system of linear equations:  $x + 2y - 7 = 0$  ;  $2x - y - 4 = 0$
2. Reduce the following to a rational expression in lowest terms:  
$$\left[ x + \frac{1-x}{1+x} \right] x \div \left[ 1 - \frac{x(1-x)}{1+x} \right]$$
3. Solve for x:  $a^2b^2x^2 - 6abcx + 9c^2 = 0$
4. The  $n^{\text{th}}$  term of a sequence is  $a_n = 3 + \frac{2}{3}n$ . Examine whether this sequence is an A.P. Hence find the sum of 10 terms of this sequence.

**OR**

If the  $n^{\text{th}}$  term of a progression be a linear expression in 'n', then prove that this progression is an A.P

5. An article is available for Rs 7000 cash or for RS 1900 cash down payment and six equal monthly instalments. If the rate of interest charged is  $2\frac{1}{2}\%$  per month. Determine each instalment.
6. Prove that angle in the semi – circle is a right angle.
7. The king, queen and jack of clubs are removed from a deck of 52 playing cards then well shuffled. One card is selected from the remaining cards . Find the probability of getting  
(i) a heart (ii) a king (iii) a club (iv) the '10' of hearts.

**OR**

Three coins are tossed together, Find the probability of getting: (i) exactly two heads (ii) at least two heads

#### SECTION – B

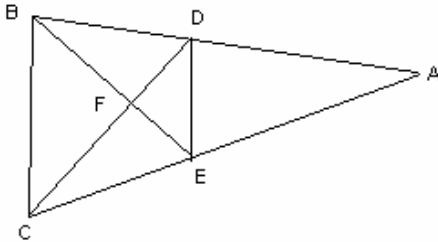
8. Determine graphically, the coordinates of the vertices of a triangle, the equations of whose lines are  $y = x$  ;  $y = 2x$  and  $y + x = 6$
9. L.C.M & H.C.F of two polynomials  $p(x)$  and  $q(x)$  are  $36x^3(x+a)(x^3 - a^3)$  and  $x^2(x-a)$  respectively. If  $p(x) = 4x^2(x^2 - a^2)$  , find  $q(x)$ .
10. Divide 32 into four parts which are in A.P , such that the product of extremes to the product of the means is 7 : 15
11. The side of a square exceeds the side of another square by 4 cm and the sum of the areas of the two squares is 400 sq.cm. Find the dimensions of the squares.

**OR**

If I had walked 1 km per hour faster, I would have taken 10 minutes less to walk 2 km. Find the rate of my walking.

12. Construct a  $\Delta ABC$  in which  $AB = 6$  cm ,  $\angle B = 60^\circ$  and  $AC = 5.5$  cm. Draw circle touching the sides of the triangle. Write the steps of construction. 13. In fig DE  $\parallel$  BC and  $AD : DB = 5 : 4$

$$\frac{\text{area}(\triangle DEF)}{\text{Find } \text{area}(\triangle CFB)}$$



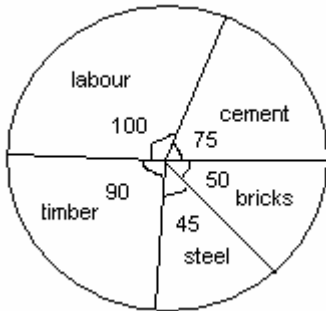
14. A man borrows money from a finance company and has to pay it back in two equal half yearly instalments of Rs 4945 each. If the interest is charged by the finance company at the rate of 15 % per annum compounded semi annually, Find the principal and the total interest paid.
15. If  $x = a \sec \theta + b \tan \theta$  and  $y = a \tan \theta + b \sec \theta$ , Prove that  $x^2 - y^2 = a^2 - b^2$

**OR**

Evaluate without using Trigonometric tables:

$$\cot \theta \times \tan(90 - \theta) - \sec(90 - \theta) \times \cos \theta + \sqrt{3}(\tan 5^\circ \tan 15^\circ \tan 30^\circ \tan 75^\circ \tan 85^\circ) + \sin^2 25^\circ + \sin^2 65^\circ$$

16. A hemispherical tank full of water is emptied by a pipe at the rate of  $\frac{34}{7}$  litres per second. How much time will it take to half empty the tank, if the tank is 3 metres in diameter?
17. The pie chart given below represents the expenditure on different items in constructing a flat in a metro-city. If the cost of the flat is Rs 540,000, find the following
- the expenditure incurred on steel and cement separately.
  - difference of expenditures incurred on timber and bricks.



18. Find the distance of the point  $(1, 2)$  from the mid – point of the line – segment joining the points  $(6, 8)$  and  $(2, 4)$ .
19. Show that the points  $(-3, 2)$ ,  $(1, -2)$  and  $(9, -10)$  are collinear.

### SECTION – C

20. Mr. Amar has a total annual income of Rs 12, 90,000 excluding HRA. He donates Rs 60,000 for the renovation of a temple (eligible for 50 %), and contributes Rs 14,000 per month to his GPF and pays an annual LIC premium of Rs 25,000. If he pays Rs 15,000 per month for the first 11 months, find his income tax liability for the last month.

Use the following for calculating income tax:

**The rates of income tax for male Employees (below 65 years) are as under:**

SLAB	RATE OF TAX
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1. Taxable income upto Rs.1,00,000

NIL

2. Taxable income from Rs.1,00,001 to Rs. 1,50,000

10% of the amount by which taxable income exceeds Rs. 1,50,000.

3. Taxable income from Rs.1,50,001 to Rs. 250,000

Rs. 5000 + 20% of the amount by which taxable income exceeds Rs. 1,50,000

4. Taxable income above Rs.2,50,000

Rs. 25,000 + 30% of the amount by which taxable income exceeds Rs. 250,000

5. Surcharge

10% of the amount of tax payable if the taxable income exceeds Rs. 10,00,000

6. Education Cess

2% of the amount of tax payable.

21. If the angle of elevation of a cloud from a point 'h' metres above a lake is  $\alpha$  and angle of depression of its reflection in the lake is  $\beta$ , prove that the height of the cloud above the lake is

$$\frac{h(\tan \beta + \tan \alpha)}{\tan \beta - \tan \alpha}$$

**OR**

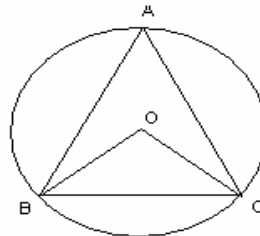
A man is standing on the deck of a ship, which is 10 m above water level. He observes that the angle of elevation of the top of a hill as  $60^\circ$  and the angle of depression of the base of the hill as  $30^\circ$ . Calculate the distance of the hill from the ship and also the height of the hill.

22. The mean of the following frequency distribution is 62.8 and the sum of all frequencies is 50. compute the missing frequencies  $f_1$  and  $f_2$ .

Class	0-20	20 – 40	40 – 60	60 – 80	80–100	100–120	Total
Frequency	5	$f_1$	10	$f_2$	7	8	50

23. A toy is in the shape of a right circular cylinder with a hemisphere in one end and a cone in the other. The height and radius of the cylindrical part are 13 cm and 5 cm respectively. The radii of the hemispherical and conical parts are the same as that of the cylindrical part. Calculate the surface area of the toy if the height of the conical part is 12 cm.
24. Prove that the angle subtended by an arc at the centre is double the angle subtended by it at any point on the remaining part of the circle.

Using the above, do the following:  
In fig. O is the centre of the circle.  
If  $\angle BAC = 50^\circ$ , Find  $\angle OBC$

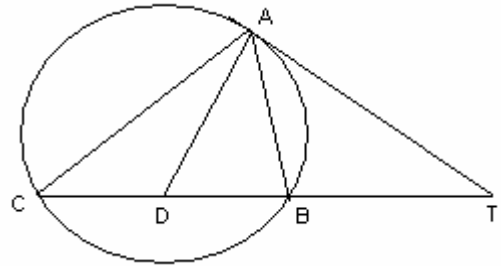


**OR**

Prove that if a line touches a circle and from the point of contact a chord is drawn, the angles which this chord makes with the given line are equal respectively to the angles formed in the corresponding alternate segments.

Using the above do the following:

In fig , TA is a tangent to a circle From the point T and TBC is a secant to the circle. If AD is the bisector of  $\angle BAC$ , Prove that  $\Delta ADT$  is isosceles.



25. If a line is drawn parallel to one side of a triangle, then the other two sides are divided in the same ratio. Prove this theorem. Using the above theorem, prove that in the Fig , if ABCD is a trapezium in which

triangles, intersecting the other two sides,

$$AB \parallel DC \parallel EF \text{ then } \frac{AE}{ED} = \frac{BF}{FC} .$$

