MATHEMATICS

CLASS X

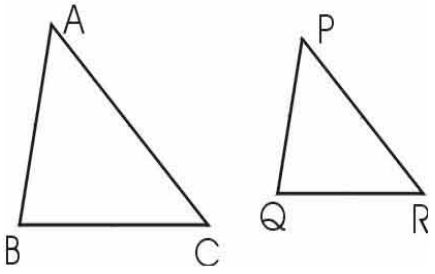
Time allowed : 3 hours
Maximum Marks : 100

General Instructions :

(i) Question number 1 to 10 carry 3 marks each.(Section A)
(ii) Question number 11 to 20 carry 4 marks each..(Section B)
(iii) Question number 21 to 25 carry 6 marks each. .(Section C)
(iv) Write the serial number of the question before attempting it.
(v) Use of logarithmic and trignometric tables is permitted. Use of calculator is not permitted

SECTION - A

1. Draw the graphs of the equations. $4x - y = 4 and 4x + y = 12$ Determine the vertices of the triangle formed by the lines representing these equations and the x-axis. Shade the triangular region so formed.
2. Find the sum of the series: 1017 + 1035 + 1053 + ...+9999.
3. A color television is available for Rs 12000 cash or Rs 4740 as cash down payment along with 2 equal monthly installments. If the dealer charges an interest of 20% p.a. compounded monthly under the
4. The diagonals of a rhombus are 24 cm and 10 cm. Find its area and perimeter.
5. Points P and R are the point of contact. S is the center of the circle. If m(arc PTR) = 110^0 then find $\angle$PQR.



6. A hemispherical tank of radius $1^3/4$ m is full of water. A pipe connected to it empties it at the rate of 7 liters per second. How much time will it take to empty the tank?
7. Prove that $\frac{\sec\theta + \tan\theta - 1}{\tan\theta - \sec\theta + 1} = \frac{1 + \sin\theta}{\cos\theta}$

8. Find the value of p in case

x_i	5	8	11	p	17
f_i	2	4	8	4	2

Given than the Arithmetic mean of this distribution is 11.

9. In an equilateral Δ ABC, D is a point on BC such that DC = $\frac{1}{4}$ BC. Prove that $AD^2 = 13CD^2$

10. Construct a Δ ABC in which BC = 5.5 cm, ∠A = 65° and altitude from A to BC is 4.2 cm. Write the steps of construction.

SECTION - B

11. What rational expression should be added to $\frac{x - x^2 + 2}{x(x^2 - 1)}$ to get $\frac{x + 1}{x^2 - 1}$

12. Construct a triangle ABC in which AB=6cm, ∠B=95°, AC=8cm. Now construct a triangle similar to triangle ABC such that each of its side is three fourth of the corresponding side of triangle ABC.

13. The number of students in various classes in a hobby school are as the following table :-

Hobby	Computers	Painting	Pottery	Paper cutting	Glass work
Students	180	150	27	75	108

14. Prove that quadrilateral formed by joining following points is a parallelogram (2, 1), (8, 9), (-3, 11) and (-9, 3).

15. The king, queen and jack of black suit are removed from a deck of 52 playing cards and then well shuffled. One card is selected from the remaining cards. Find the probabilities of getting i) a heart ii) a king iii) a club and iv) the '10' of hearts.

OR

In a non-leap year , find the probability of getting 53 Sundays and what is the chance that a leap year selected at random will contain 53 Mondays.

16. Find the mean marks from the following data :-

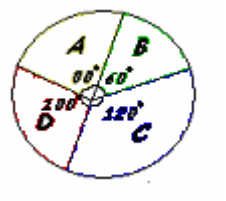
Class Interval	0 – 10	10 – 20	20 – 30	30 – 40	40 - 50
Frequency	12	11	8	10	9

17. The adjoining pie chart represents the number of valid votes obtained by four students who contested for school leadership.

The total number of valid votes poled was 720. Answer the following questions by reading pie chart:

(a) Who was won the election?

(b) What is the minimum number of votes obtained by any candidate?



(c) By how many votes did winner defeat the nearest contestant?

18. Prove the identity:

$\sin^2 A \cot^2 A + \cos^2 A \tan^2 A = 1$ OR

Without using trigonometric tables, evaluate:

$$\frac{\sin 27^\circ}{\cos 63^\circ}^2 + \frac{\cos 63^\circ}{\sin 27^\circ}^2$$

19. Given two concentric circles of radii a and b where a>b. Find the length of chord of larger circle which touches the others.

20. Find the ratio in which the segment joining the points (5,6) and (2, -3) is divided by x-axis

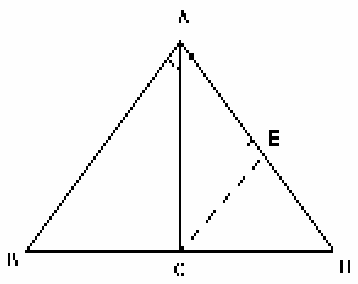
SECTION - C

21. If two circles touch each other (internally or externally), the point of contact lies on the line through the centers-prove it.
Use it to prove the following:
"If two circles C (O, r) and C (O', r) touch externally at a point A and PAQ is a line segment intersecting the circles at P and Q respectively,
prove that ∠OPA = ∠O'QA".

22. If two sides and a median bisecting the third side of a Δ are respectively proportional to the two sides and the corresponding median of another triangle, then prove that the triangles are similar.

Or

In figure ΔABC, ∠B = 90°, AD is its bisector.



If DE $\perp$ AC, prove that DE (AB + AC) = AB $\times$ AC

23. A man on the top of a rock on seashore observes a boat coming towards him at an angle of depression is 30°. Ten minutes later the angle of depression is 60°. The height of the rock is 1200m. Find the speed of the boat and the time taken by it to reach the tower from the first position.

Or

From the top of a tower, the angles of depression of two objects on same side of tower are found to be θ and β ($\theta > \beta$). If the distance between the objects is 'p' metres, show that the height 'h' of the tower is given by $h = \frac{p\tan\theta\tan\beta}{\tan\theta - \tan\beta}$.

Also determine the height of tower if p = 50 metre, θ = 60° and β = 30°.

24. Find, the mean for the above data

Classes	0-9	10-19	20-29	30-39	40-49	50-59	60-69
Frequency (f)	323	135	217	156	534	400	234

25. Aastha aged 68 years has annual income (excluding HRA) of Rs.4, 72,306. She contributes Rs.1200 per month in her provident fund and pays Rs.8,411 as premium for an insurance policy twice a year. She buys NSC worth Rs.13000. She buys infrastructure bonds worth Rs.50, 000. Find tax payable at end of year if her employer deducted Rs.1500 as income tax per month for first 11 months at source

(a) Standard deduction:

(1) 40% of the gross salary subject to a maximum of Rs.30000 in case the annual salary is up to Rs.500000.

(2) Rs.20000 in case the annual salary is more than Rs.500000.

(b) Rates of income tax:

(1) Up to Rs.50000: No tax

(2) From Rs.50001 to 60000: 10% of the amount exceeding Rs.50000

(3) From Rs.60001 to 150000: Rs.1000 + 20% of the amount exceeding Rs.60, 000

(4) Above Rs.150000: Rs.19000 + 30% of the amount exceeding Rs.150000.

(c) Rebate in income tax:

(1) 20% of the amount of the saving subject to max. Rs.20000 if taxable

income is up to Rs.150000*

(2) 15% of the amount of saving subject to max. Rs.1500 if taxable income is between Rs.1, 50,001 to 5,00,000*

(3) NIL, if taxable income is above Rs.500000.

(4) 30% of the amount of saving subject to a max. Of Rs.21, 000* if total income (before allowing standard deduction does not exceed Rs.1, 00,000)*

*If at least Rs.30, 000 are invested in specified infrastructure bonds.

(d) Surcharge: 10% of tax payable, if taxable income is above Rs.850000.

(e) Rebate in tax for women	Rs.5000 or 100% of total tax payable whichever is less.
(f) Rebate for senior citizens (Aged 65 years or above)	Rs.15000 or 100% of total tax payable whichever is less.