

Sample Paper – 2007
Class – X
Mathematics

Time: 3 Hours
80.

Max. Marks:

General Instructions:

1. All questions are compulsory.
 2. The question paper consist of 25 questions divided into three sections A,B and C.
Section A
contains of 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, internal choices has been provided in two questions of two marks each, two questions of three marks each and two questions of five marks each.
 4. In questions 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 equations for x:

$$\begin{aligned}(b^2/a)x - (a^2/b)y &= ab(a+b) \\ b^2x - a^2y &= 2a^2b^2\end{aligned}$$

OR

For what value of k will the equations $2x - y + 8 = 0$ and $4x - ky + 16 = 0$ represent coincident lines?

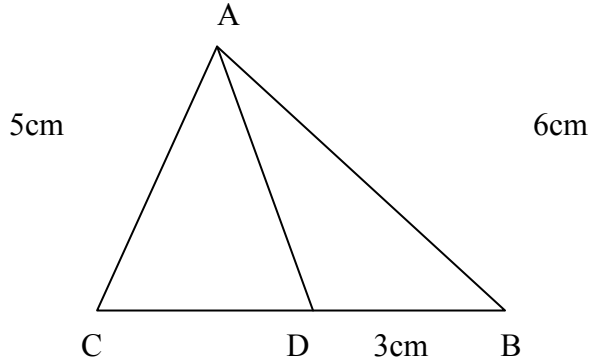
2. Which term of the A.P 24,21,18,15,... is the first negative term?
3. Find the sum of the first 20 terms of the A.P whose second term is 2 and fourth term is 8.
4. A bicycle is sold for Rs 1800 cash or for Rs 600 cash down payment followed by two monthly installments of Rs 610 each. Compute the rate of interest charged under the installment scheme.

5. In $\triangle ABC$, angle $B = 90^\circ$ and D is the mid point of BC. Prove that $AC^2 - AD^2 = 3BD^2$.

6. BC is a chord of a circle with centre O.A is a point on minor arc BC. Prove that angle BAC – angle OBC = 90°

OR

In the given figure, AD is the bisector of angle BAC, AB = 6cm, AC = 5cm and BD = 3cm. Find DC.



7. Find the probability that a leap year selected at random contains 53 Sundays.

7. Find the probability that a leap year selected at random contains 53 Sundays.

SECTION-B

8. Solve the following system of equations graphically : $3x - y = 2$, $x + 2y = 3$. Also find the area of the triangle formed by the two lines and x axis.

9. The LCM and HCF of two polynomials $p(x)$ and $q(x)$ are $27x^3(x + a)(x^3 - a^3)$ and $x^2(x - a)$ respectively. If $p(x) = 3x^2(x^2 - a^2)$, find $q(x)$.

10. Solve the following quadratic equation for x:

$$x^2 + 2(a + 2)x + (a + 1)(a + 2) = 0$$

OR

Simplify : $\frac{1}{(x + a)} + \frac{1}{(x + b)} + \frac{1}{(x + c)} + \frac{ax}{(x^3 + ax^2)} + \frac{bx}{(x^3 + bx^2)} + \frac{cx}{(x^3 + cx^2)}$.

11. Find the ratio in which the point $p(m,3)$ divides the join of the points $(2,-2)$ and $(-4,1)$. Also find the value of m .

12. Find the coordinates of a point P on y-axis which is equidistant from the points $A(-3,4)$ and $B(3,6)$.

13. If h , c and V are respectively the height, the curved surface area and volume of a cone, prove that, $3\pi Vh^3 - c^2h^2 + 9V^2 = 0$.

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

OR

Without using trigonometric tables, evaluate the following:

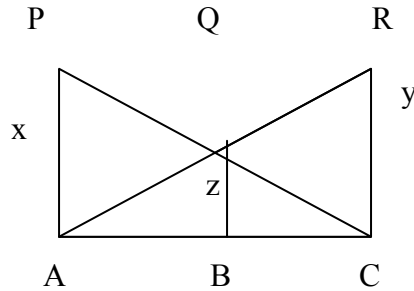
$$3(\sin 36^\circ / \cos 54^\circ)^2 - 2(\tan 18^\circ / \cot 72^\circ)^3 + 2 \tan 13^\circ \tan 21^\circ \tan 69^\circ \tan 77^\circ$$

15. A person borrowed some money on compound interest and returned it in three years in equal annual instalments. If the rate of interest is 15% per annum and annual instalment is Rs 486680, find the sum borrowed.

16. Construct a triangle ABC in which $BC = 6\text{cm}$, angle $A = 45^\circ$ and median $AD = 5\text{cm}$.

17. In the following figure, PA , QB and RC are each perpendicular to AC . Prove that

$$\frac{1}{x} + \frac{1}{y} = \frac{1}{z}$$



18, Prove that the angle bisectors of the angles formed by producing the opposite sides of a cyclic quadrilateral (provided they are not parallel) intersect at right angles.

19. In the month of July 2002, a house holder spent his monthly salary amounting to Rs 7200 on different items as given below:

Items	Clothing	Food	House rent	Education	Miscellaneous
Amount spent (in Rs)	600	4000	1200	400	1000

Represent the information in the form of a pie chart.

SECTION-C

20. A person on tour has Rs 360 for his daily expenses. If he extends his tour for four days, he has to cut down his daily expenses by Rs 3. Find the original duration of the tour.

21. A circus tent of total height 50 metres is to be made in the form of a right circular cylinder surrounded by a right circular cone. If the height and radius of the conical portion of the tent are 15 metres and 20 metres respectively, find the cost of cloth required, at the rate of Rs 14 per square metre to make the tent. (Take $\pi = 22/7$)

OR

If the radii of the ends of a bucket 45 cm high are 28cm and 7cm, determine its capacity and surface area.

22. If the angle of elevation of a cloud from a point h metres above a lake is α and the angle of depression of its reflection in the lake is β , prove that the distance of the cloud from the point of observation is $2h \sec \alpha / (\tan \beta - \tan \alpha)$.

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

Using the above prove the following:

If two rays ABP and ACQ are intersected by two parallel lines in B, C and P, Q respectively then the circum circles of $\triangle ABC$ and $\triangle APQ$ touch each other at A.

OR

State and prove the converse of Pythagoras Theorem.

Using this prove the following:

In $\triangle PQR$, $QM \perp PR$. If $PR^2 - PQ^2 = QR^2$ then $QM^2 = PM \cdot MR$

24. The mean of the following frequency distribution is 196.8. Find the values of x and y if the total number of observations is 150.

Class Interval	0-80	80-160	160-240	240-320	320-400
Frequency	22	x	44	y	24

25. Mr. Varadarajan, Principal of a public school has a monthly salary of Rs 32000(exclusive of HRA). He contributes Rs 7000 per month towards provident fund during the year and pays half yearly premium of Rs 5000 for his LIC policy. He invests Rs 1000 in National Savings Certificates. He donated Rs 30000 to Prime minister's National Relict Fund, earning 100% deduction for income tax. Calculate the income tax liability of Mr. Varadarajan if he has paid Rs 2500 per month as income tax for first 11 months of the year. Use the following for calculating income tax:

(a) Savings : 100% exemption for savings upto Rs 100000.
 (b) Rates of income tax

Slab	Income tax
(i)Upto Rs 100000	No tax
(ii)From Rs 100001 to Rs 150000	10% of the taxable income above Rs 100000
(iii)From Rs 150001 to Rs 250000	Rs 5000 + 20% of the amount exceeding Rs 150000
(iv)From Rs 250001 and above	Rs 25000 + 30% of the amount exceeding Rs 2500000

(c) Educational cess : 2% of the tax payable.