

Guess Paper – 2007 Class – X Mathematics

General Instructions:

1. All questions are compulsory
2. The question paper contains 25 questions divided into three sections A, B and C. Section A contains 8 questions of 2 marks each and section B is of 12 questions of 3 marks each and section C is of 6 questions of 5 marks each.
3. Use of calculator is not permitted.

- Section-A
1. solve : $\frac{3(2a+3b)}{3(2a+b)} = \frac{15ab}{9ab}$

2. Solve for X : $(x+1)/x + x/(x+1) = 41/20$

OR

- Solve for X : $4X^2 - 2(a^2 + b^2)x + a^2b^2 = 0$
3. Find G.C.D. and L.C.M. of the following polynomials:

$$X^4 + 6X^3 + 8X^2 \text{ and } 7X^5 - 7X^4 - 140X^3$$

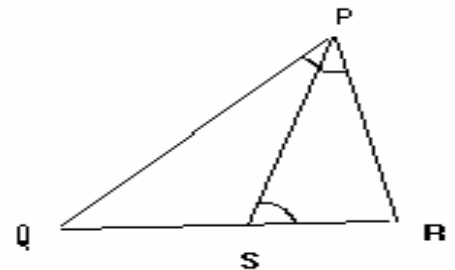
OR

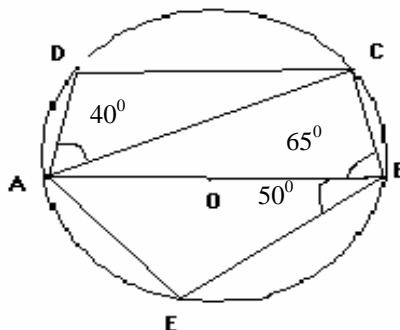
If $(X-2)(X+3)$ is the GCD of the polynomials $P(X) = (X^2 - 3X + 2)(aX^2 + 7X + 3)$ and $Q(X) = (3X^2 + 8X - 3)(X^2 + bX + 6)$, Find the values of a and b.

4. Simplify:

$$\frac{1}{x-1} - \frac{1}{x+1} - \frac{2}{x^2+1} - \frac{4}{x^4-1}$$

5. The sum of three numbers which are in A.P. is 9 and sum of their squares is 35. Find the numbers.
6. A radio is available for Rs. 1500 cash or Rs 360 as cash down payment followed by three equal monthly instalments of Rs. 390. Find the rate of interest charged under instalment scheme.
7. In the given figure. S is a point on the side QR of $\triangle PQR$ such that $\angle PSR = \angle QPR$. Prove that $\frac{PR}{RS} = \frac{QR}{PR}$
8. Find the sum of first 20 terms of an A.P. whose n_{th} term is given by $t_n = 5 - 3n$
9. A loan of Rs 21200 has to be repaid in two equal annual instalments. If the interest is charged at the rate of 12% per annum compounded annually, find the amount of each installment.





10. In fig. AB is the diameter c
If $\angle ABC = 65^\circ$, $\angle DAC = 40^\circ$, $\angle ABC = 50^\circ$, find $\angle BAC$,
 $\angle ACD$ and $\angle BAE$
11. Solve the following system of linear equations graphically.
 $3X + 2Y - 14 = 0$, $X - 4Y = -7$
12. Solve for X and Y
 $\frac{4}{X} + 5Y = 7$
 $\frac{3}{X} + 4Y = 5$
OR
A father was 30 years old when his son was born now sum of their ages is 40 years. Find their present ages.
13. A solid sphere of radius 3cm is melted and then cast into smaller spherical balls, each of diameters 0.6cm. Find the number of small balls thus obtained.
14. If $X = a \cos \theta - b \sin \theta$ and $Y = a \sin \theta + b \cos \theta$ then .Prove that $X^2 + Y^2 = a^2 + b^2$
OR
without using trigonometric tables, evaluate the following:
 $\frac{2 \sin 63^\circ}{\cos 27^\circ} - \frac{2 \cot 25^\circ}{5 \tan 65^\circ} - \frac{3 \tan 45^\circ \cdot \tan 23^\circ \cdot \tan 10^\circ \cdot \tan 80^\circ \cdot \tan 67^\circ}{5}$
15. Construct a triangle ABC in which $BC = 6\text{cm}$, $\angle A = 75^\circ$ and median AD is 3.5cm long.
16. Show that the middle point of the hypotenuse of a right-angled triangle is equidistant from all the vertices.
17. Determine the ratio in which P(K,3) divides the join of A(1,2) and B(-3,4) also find the value of K.
OR
Find the centroid of the triangle formed by the straight lines $X - 2Y = 0$, $X + Y = 3$ and $2X + Y + 4 = 0$
18. A bag contains 5 Red, 3 white and 2 Black balls. A ball is drawn at random from the bag. Find the probability the ball drawn is:
(i) Red (ii) Black (iii) not Red
(iv) Neither Black nor Red

19. Find the value of P_1 and P_2 . If mean of this distribution is 50. Sum of frequencies is 120.

Class-Interval	0-20	20-40	40-60	60-80	80-100
Frequency	17	P_1	32	P_2	19

20. The following Data shows the expenditure of a person on different items during a month represent the Data by a pie-chart:

Item	Amount(in Rs.)
Rent	2700
Education	1,800
Food	2,400
Clothing	1,500
Miscellaneous	2,400

21. From the top of a lighthouse, the angles of depression of two ships on the opposite sides of it are observed to be α and β . If the height of the light house be h metres and the line joining the ships passes, through the foot of the lighthouse, show that the distance between the ships is $h(\tan\alpha + \tan\beta)$

$$\tan\alpha \cdot \tan\beta$$

OR

A round balloon of radius r subtends an angle α at the eye of the observer while the angle of elevation of its centre is β . Prove that the height of the centre of the balloon is $r \sin\beta \operatorname{Cosec}(\alpha/2)$

22. Prove that the ratio of the areas of two similar triangles is equal to the ratio of the squares of their corresponding sides. Using the above, do the following:
The areas of two similar triangles ABC and PQR are in the ratio 16:25, If $BC = 3.2\text{cm}$. Find the length of QR.
23. State and prove "Basic Proportionality Theorem". Using this theorem prove the diagonals of a trapezium intersect each other in the same ratio.
24. The height of a cone is 100 cm, a plane parallel to the base divides it into two parts and upper part is removed from it. If the volume of the cut off cone is $\frac{1}{64}$ of the volume of original cone. Find the height of the plane from the base of the cone.
25. Mr. Shyam has an annual income of Rs. 4,60,000(exclusive of HRA). He contributes Rs. 6,000 Per month towards his GPF and pays an annual LIC premium of Rs 25,000. He has invested Rs. 10,000 in N.S.C. He pays Rs. 2,500 as income tax per month for the first 11 months. Find his income tax liability for the last month of the financial year. Use the following for calculating income tax.

Taxable income	Rate
Up to Rs. 1,00,000	Nil
Rs. 1,00,001-1,50,000	10% of amount exceeding rs. 1,00,000
Rs 1,50,001-2,50,000	Rs.5000+20% of the amount exceeding Rs.1,50,000

Exceeding Rs 2,50,000	Rs. 25,000+30% of the amount exceeding Rs 2,50,000
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GUESS PAPER - 2007 CLASS – X MATHEMATICS

MARKS: 80

Time allowed: 3 hours

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- All questions are compulsory
- The question paper consists of 25 question divided into three sections A, B and C. Section A contains 7 question of 2 marks each, Section B is 12 questions of 3 marks each and Section C is of 6 questions of 5 marks each..
- There is no overall choice. However 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
- Write the serial number of the question before attempting it.
- In question on construction, the drawing should be neat and exactly as per the given measurements
- Use of calculators is not permitted. However you may ask for mathematical tables.

Section - A

1. Solve for x and y

$$\frac{2}{3x+2y} + \frac{3}{3x-2y} = \frac{17}{5}$$

$$\frac{5}{3x+2y} + \frac{1}{3x-2y} = 2$$

OR

The incomes of X and Y are in the ratio 8:7 and their expenditures are in the ratio 19: 16. If each saves Rs 1250, find their income

2. Simplify $\sqrt{\frac{(x^2 + 3x + 2)(x^2 + 5x + 6)}{x^2(x^2 + 4x + 3)}}$

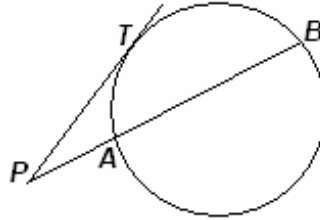
3. Solve for x : $2\left(\frac{x+2}{x-3}\right) + \left(\frac{x-3}{x+2}\right) + 3 = 0$

OR

Using quadratic formula, solve the equation for x : $6a^2x^2 - 7abx - 3b^2 = 0$

4. Determine the A.P whose 3rd term is 16 and the difference of 5th term from the 7th term is 12

5. In the given figure $PT = 12$ cm, $AB = 7$ cm Find PA .



6. A watch is available for Rs 485 cash payment or for some cash down payment followed by three equal monthly instalments of Rs 130 each. If the rate of interest charged under instalment plan is 16% p.a. find the amount paid as cash down payment.
7. 40 cards numbered 1, 2, 3, ..., 39, 40 are put in a box and mixed thoroughly. One person draws a card from the box. Find the probability that the number on the card is
- a) a prime b) divisible by 3 c) perfect square d) Divisible by 3 and 7 both

Section B

8. Solve graphically $\begin{cases} 2x - y = 2 \\ x - 2y + 5 = 0 \end{cases}$
9. The H.C.F and L.C.M of two polynomials $p(x)$ and $Q(x)$ are $(2x - 1)$ and $(6x^3 + 25x^2 - 24x + 5)$ respectively. If $p(x) = 2x^2 + 9x - 5$, determine $Q(x)$.
10. A man borrows some money on compound interest and returns it in two equal instalments in two years. If the rate of interest is 5% and annual instalment is Rs.4,410, find the money borrowed.?
11. The sum of the 5th and 7th terms of an A.P is 52 and 10th term is 46. Find the A.P.
12. A rectangular field is 16m long and 10m wide. There is a path of uniform width all around it, having an area of 120 sq.m. Find the width of the path.

OR

13. The speed of a boat in still water is 15 km/h. It can go 30 km upstream and return downstream into the original point in 4 hours 30 minutes. Find the speed of the stream.
14. Draw a circle of radius 3.5 cm. From a point P outside the circle at a distance of 6 cm from the centre of the circle, draw two tangents to the circle.
15. P and Q are midpoints of sides CA and CB respectively of triangle ABC, right angled at C. prove that $4(AQ^2 + BP^2) = 5AB^2$
16. A 20metre deep well with diameter 14metre is dug up and the earth from digging is spread evenly to form a platform 22m x 14 m. Determine the height of the platform

16. Prove that $\frac{(1 + \cot A + \tan A)(\sin A - \cos A)}{\sec^3 A - \operatorname{cosec}^3 A} = \sin^2 A \cos^2 A$

OR

Evaluate $\frac{\cos 70^\circ}{\sin 20^\circ} + \frac{\cos 55^\circ \operatorname{cosec} 35^\circ}{\tan 5^\circ \tan 25^\circ \tan 45^\circ \tan 65^\circ \tan 85^\circ}$

17. Find the circumcentre of the triangle whose angular points are (4, 3), (-2, 3) and (6, -1)
18. Determine the ratio in which the point $P(b, 1)$ divides the join of A (7, -2) and B(-5, 6). Also find the value of b .
19. The expenditure of a household on various heads is given below:

Draw pie-chart depicting the above data

Head	Food	Rent	Education	Miscellaneous
Percentage of Expenditure	$37\frac{1}{2}\%$	$33\frac{1}{3}\%$	25%	$\frac{1}{4}\%$

Section C

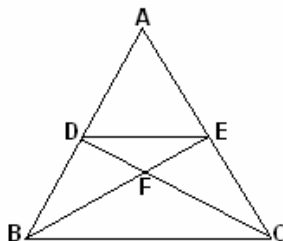
20. The mean of the following frequency table is 50. But the frequencies f_1 and f_2 in classes 20 - 40 and 60 - 80 are missing. Find the missing frequencies.

Class	0 - 20	20 - 40	40 - 60	60 - 80	80 - 100	Total
Frequency	17	f_1	32	f_2	19	100

21. Prove that the ratio of the areas of two similar triangles is equal to the ratio of the squares of any two corresponding sides.

Using the above result do the following:

In the given figure $DE \parallel BC$ and AD: DB is 5:4. Find $\frac{\text{area}(\triangle DFE)}{\text{area}(\triangle CFB)}$



22. If a chord is drawn through the point of contact of a tangent to a circle, then angles which this chord makes with the given tangent are equal respectively to the angles formed in the corresponding alternate segments. Prove.

Using the above theorem, do the following:

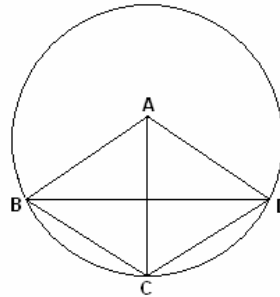
In a cyclic quadrilateral ABCD, the diagonal CA bisects $\angle BCD$. Prove that the diagonal BD is parallel to the tangent at A to the circle through the points A, B, C and D

OR

The degree measure of an arc of a circle is twice the angle subtended by it at any point of alternate segment of a circle with respect to the arc. Prove

Using the result prove the following

ABCD is quadrilateral in which A is the centre of the circle. Prove that



$$\angle BAD = 2(\angle CBD + \angle CDB)$$

23. The angle of elevation of the top of an unfinished tower at a point $40\sqrt{3}$ m away from its base is 30° . How much higher more the tower must be raised so that its angle of elevation at the same point may be 60° .

OR.

At the foot of the mountain the elevation of its summit is found to be 45° after ascending one km towards the mountain up a slope of 30° inclination the elevation is found to be 60° . Find the height of the mountain..

24. A solid is composed of a cylinder with hemispherical ends. The whole height of the solid is 19 cm and the radius of the cylinder is 3.5 cm. Find the weight of the solid if 1 cu. cm of metal weighs 4.5 gm.
25. The annual income of Yuva Raj Patel is Rs. 3, 80,000 exclusive of H.R.A. he contributes Rs7000 per month in his provident fund and pays an annual premium of Rs. 35,000 towards life Insurance Policy. He also invested Rs.15, 000 in NSC. He donates Rs 25000 to the National Defence Fund (100% exemption) Calculate the income tax paid by him in the last month of the year, if his earlier deductions for first 11 months for income tax were at the rate of Rs 2000 per month.

Use the following for calculating the income tax:

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

b) Rate of income tax

Slab	Income tax
i) Upto Rs 100,000	No tax
ii) From Rs 100,001 to Rs 1,50,000	10% of the amount exceeding Rs 100,000
iii) From 150,001 to Rs 2,50,000	5000 + 20% of the amount exceeding Rs 150,000
iv) Above Rs 250,000	Rs 25,000 + 30% of the amount exceeding Rs 250,000
c) Education Cess	2% of the tax payable.

Ans: 1.(1,1) 2. $\frac{x+2}{x}$ 3. $(\frac{1}{2}, -\frac{1}{3})$ or $(\frac{3b}{2a}, -\frac{b}{3a})$ 4. 28, 22, 16, ... 5. 9cm 6.105 7. $(\frac{11}{40}, b), \frac{13}{40}c), \frac{6}{40}d), \frac{1}{40})$
 9. $(Q(x) = 6x^2 - 5x + 1)$ 10 Rs 8200. 11. 1, 6, 11, ... 12. 2 m or 5 km/hr 15. 10m 16. 2 17. (1, -1) 18. (3: 5, b = 4) 20 $f_1 = 18, f_2 = 14$ 21. $\frac{25}{81}$ 23. 80m or 1361 m 24. 2.88 kg 25 = Rs 5030

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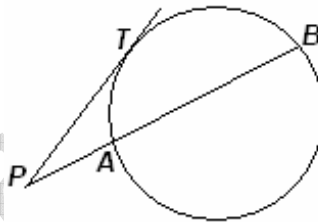
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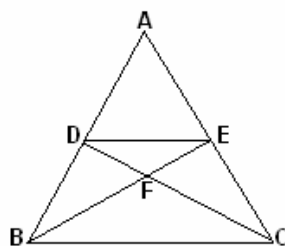
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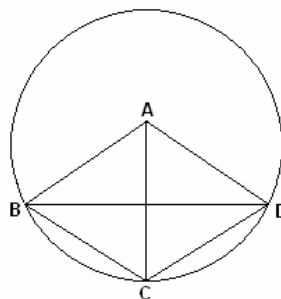
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MATHEMATICS

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Section - A

41. Solve for x and y

$$\begin{aligned} 2(ax - by) + (a + 4b) &= 0 \\ 2(bx + ay) + (b - 4a) &= 0 \end{aligned}$$

OR

A boat goes 45 km upstream and 65 km downstream in 14 hrs. In 11 hours it can go 35 km upstream and 52 km downstream. Find the speed of the stream and that of the boat in still water.

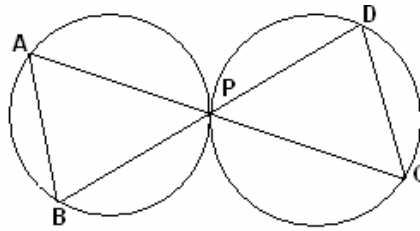
42. If $A = \frac{x+1}{x-1}$ find $A - \frac{1}{A}$ in the simplified form .

43. Solve for x : $\frac{3x+1}{x+1} + \frac{x+1}{3x+1} = \frac{5}{2}$

OR

Solve the equation for x : $\frac{1}{a+b+x} = \frac{1}{a} + \frac{1}{b} + \frac{1}{x}$ ($a, b, x \neq 0$)

44. Solve for x : $1+6+11+16+\dots+x=970$
45. In the given figure two circles touch each other externally at P. APC and BPD be the lines through P, meeting the two circles at A, B and C, D respectively. Show that $AB \parallel CD$



46. A sofa set is available for Rs 990 cash or Rs 310 cash down payment followed by three equal monthly instalments of Rs 240. Find the rate of interest charged under instalment plan..
47. In a single throw of two dice, find the probability of getting
- i) an odd number on the first dice and 6 on the second dice ii) a number greater than 4 on each dice.

Section B

48. Solve graphically $2x+3y-12=0$
 $7x-3y-15=0$
49. If $(x+3)(x-2)$ is the G.C.D of $f(x) = (x+3)(2x^2-3x+a)$ and $g(x) = (x-2)(3x^2+10x+b)$ find the value of $3a+2b$
50. A loan of 21,200 has to be repaid in two equal annual instalments. If the interest charged is at the rate of 12% per annum, compounded annually find the amount of each instalment.
51. If 9th term of an A.P is 99 and 99th term 9. Find the 108th term of the A.P.
52. The length of the hypotenuse of a right triangle exceeds the length of the base by 2 cm and exceeds twice the length of the altitude by 1 cm. Find the length of each side of the triangle.

OR

Divide 16 into two parts such that twice the square of the longer part exceeds the square of the smaller part by 164

53. Construct ΔABC in which $BC = 7$ cm, $\angle A = 60^\circ$ and the foot of the perpendicular D on BC from A is 4 cm away from B . Also $\Delta A'BC'$ similar to ΔABC such that each side is $\frac{2}{3}$ rd of the corresponding sides of ΔABC .
54. $ABCD$ is a rhombus, prove that $AC^2 + BD^2 = 4AB^2$
55. A well of diameter 2 m is dug 14 m deep. The earth taken out if it is spread evenly all around it to a width of 5 m to form an embankment. Find the height of the embankment.
56. Prove that $\frac{\tan \theta}{1 - \cot \theta} + \frac{\cot \theta}{1 - \tan \theta} = 1 + \sec \theta \csc \theta$

OR

Without using tables, evaluate

$$\cot A \cdot \tan(90^\circ - A) - \sec(90^\circ - A) \csc A + \sin^2 25^\circ + \sin^2 65^\circ + \sqrt{3}(\tan 5^\circ \tan 45^\circ \tan 85^\circ)$$

57. The line segment joining the points $(3, -4)$ and $(1, 2)$ is trisected at points P and Q . If the coordinates P and Q are $(p, 2)$ and $(\frac{5}{3}, q)$ respectively, find the values of p and q
58. If the point $P(x, y)$ is equidistant from the points $A(5, 1)$ and $B(-1, 5)$, prove that $3x = 2y$

59. Draw a pie chart to represent the following data showing the break-up of the cost (in Rs) of construction of a house in a small town.

Item	Bricks	Cement	Steel	Timber	Labour
Cost (in Rs)	54,000	36,000	27,000	24,000	75,000

Section C

20. Compute the arithmetic mean for the following frequency distribution:.

Marks	Below 10	Below 20	Below 30	Below 40	Below 50	Below 60	Below 70	Below 80
No of Students	5	9	14	28	45	60	70	80

21. State and prove converse of Pythagoras Theorem

Using the above result, prove the following:

In an isosceles triangle ABC if $AC = BC$ and $AB^2 = 2AC^2$, prove that $\angle C$ is a right angle

22. If two chords of a circle intersect inside or outside the circle, then the rectangle formed by the two parts of one chord is equal in area to the rectangle formed by the two parts of the other ..

Using the above result, determine the following

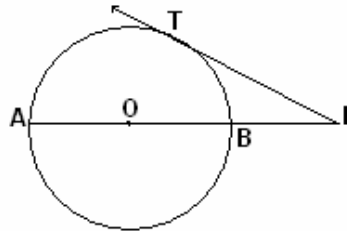
Two chords AB and CD of a circle intersect each other at O. If AO = 8 cm, CO = 6 cm, and OD = 4 cm, find OB

OR

If PAB is a secant of a circle, intersecting it at A and B and PT is a tangent, then prove that $PA \times PB = PT^2$

Using the above, do the following:

In figure PT is a tangent to the circle at T and PBA is a secant. If PB = 4 cm, PT = 8 cm, and OB = x , find the value x



23. From an aeroplane vertically above a straight horizontal road, the angles of depression of two consecutive milestones on opposite sides of the aeroplane are observed to be α and β . Show that the height of the aeroplane above the road is $\frac{\tan \alpha \tan \beta}{\tan \alpha + \tan \beta}$

OR.

A path separates two walls. A ladder leaning against one wall rests at a point on the path. It reaches a height of 90 m on the other wall and makes an angle of 60° with the ground. If while resting at the same point on the path, it were made to lean against the other wall, it would have made an angle of 30° with the ground. Find the height it would have reached on the second wall.

24. An iron pillar has some part in the form of a right circular cylinder and remaining in the form of a right circular cone. The radius of base each of cone and cylinder is 15 cm. The cylindrical part is 250 cm high and conical part is 20 cm high. Find the cost of painting the cylinder at the rate of Rs 145 per sq.m
25. The annual income of Dr Rakesh who is a senior citizen aged 67 years. He earns Rs 24,000 per month. He donates Rs 6,000 to the Prime Minister Relief Fund (100% relief) and Rs 4000 to an

educational institution (50% relief).. He contributes Rs 5,000 per month in his provident fund. He also invested Rs.15, 000 in NSC. Calculate the income tax paid by him in the last month of the year, if his earlier deductions for first 11 months for income tax were at the rate of Rs 350 per month.

Use the following for calculating the income tax:

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

b) Rate of income tax

Slab	Income tax
i) Upto Rs 185,000	No tax
ii) From Rs 185,001 to Rs 2,50,000	20% of the amount exceeding Rs 185,000
iii) Above Rs 250,000	Rs 13,000 + 30% of the amount exceeding Rs 250,000
c) Education Cess	2% of the tax payable.

Ans: 1) $(-\frac{1}{2}, 2)$ or. (4km/h, 9km/h) (2) $\frac{4x}{x^2 - 1}$ (3) $\left(1, -\frac{1}{5}\right)$ or $(-a, -b)$ (4) 96 (6) 36.36% (7) i) $\frac{1}{12}$ ii) $\frac{1}{9}$ (9) 0

(10)Rs 12544 (11) 0. (12) 8cm, 15 cm, 17 cm or 10, 6 (15)0.4 m (16) 1 (17) $p = \frac{7}{3}, q = 0$ (20) 46.125 (23)

$30\sqrt{3}$ (24) Rs167.5 (25) Rs 230

Guess Paper - 2007

Class – X Mathematics

SECTION - A

Question numbers 1 to 10 carry 3 marks each.

Q. 1. Express the following as a rational expression in lowest terms:

Ans:

Q. 2. Find 10th term from end of the A.P. 4, 9, 14,...254.

Ans: (209)

Q. 3. Solve the following system of linear equations:

Ans: ($x = 6, y = -1$)

Q. 4. Find the L.C.M. of the following polynomials:

Ans:

Q. 5. Solve for x.

Ans: ($c/a, -b/a$)

Or

Solve for x.

Ans: ($c/a, -b/a$)

Q. 6. Find the number of terms of the A.P. 54, 51, 48 ... so that their sum is 513.

Ans: ($n = 18$ or $n = 19$)

Or

If the n th term of an A.P. is $(2n + 1)$, find the sum of first n terms of the A.P.

Ans: $n(n + 2)$

Q. 7. A loan of Rs 10,815 is to be returned in three equal half-yearly instalments.

Calculate the amount of each instalment, if the rate of interest is _____ per annum, compounded half-yearly.

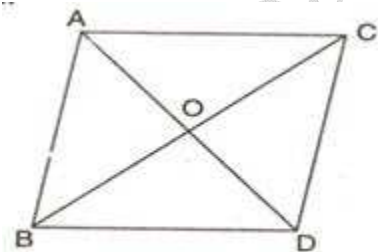
Ans: (Rs. 4,096)

Q. 8. A fan is available for Rs 970 cash or Rs 210 as cash down payment followed by three equal monthly instalments of Rs 260 each. Find the rate of interest charged under instalment plan.

Ans: (16% p.a.)

Q. 9. In the figure, _____ are on the same base BC. AD and BC intersect

at O. prove that



Q, 10. OD is perpendicular to a chord AB of a circle whose centre is O . If BC is a diameter, prove that $CA = 2 OD$.

SECTION B

Question numbers 11 to 20 carry 4 marks each.

Q, 11. Solve the following system of equations graphically :

Also find the points where the lines meet the x-axis.

Ans: $B(5, 0)$, $C(-2, 0)$

Q, 12. The sum of two numbers a and b is 15, and the sum of their reciprocals $1/a$ and $1/b$ is $3/10$. Find the numbers a and b .

Ans: $(a = 10, b = 5 \text{ or } a = 5, b = 10)$

Q, 13. A hemispherical bowl of internal radius 9 cm is full of liquid. The liquid is to be filled into cylindrical shaped small bottles each of diameter 3 cm and height 4 cm. How many bottles are needed to empty the bowl?

Ans: (54)

Q, 14 Prove that:

find the value of:

Ans:

Q, 15. Draw a circle of radius 3.5 cm. From a point P outside the circle at a distance of 6 cm from the centre of circle, draw two tangents to the circle.

Q, 16. Find the value of x such that $PQ = QR$ where the coordinates of P, Q and R are (6, -1);

(1, 3) and (x, 8) respectively.

Ans: ($x = 5$ or $x = -3$)

Or

Find a point on x-axis which is equidistant from the points (7, 6) and (-3, 4).

Ans: (3, 0)

Q, 17. The line-segment joining the points (3, -4) and (1, 2) is trisected at the points P and Q. If the

Coordinates of P and Q are (p, -2) and respectively, find the values of p and q.

Ans: ($p = 7/3$; $q = 0$)

Q, 18. Find the mean of the following distribution:

Class	Number of Students
4-8	2
8-12	12
12-16	15
16-20	25
20-24	18
24-28	12
28-32	13
32-36	3

Ans: (19.92)

Q. 19. Given below is the expenditure of a person on different items out of his salary of Rs 14,400.

Item:	Clothing	Food	Rent	education	others	G. total
Expn. : (in Rs.)	2,800	3,600	3,600	1,800	2,600	14,400

Draw a pie-chart to depict the above data.

Q. 20. A card is drawn at random from a well shuffled pack of 52 cards. Find the Probability that the card drawn is neither a red card nor a queen.

Ans:(6/13)

SECTION C

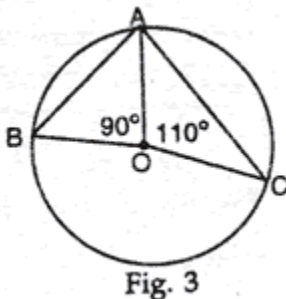
Q. 21. Prove that the ratio of the areas of two similar triangles is equal to the ratio of the squares of their corresponding sides.

Using the above, do the following:

The areas of two similar triangles ABC and PQR are in the ratio of 9 :16 . If BC = 4.5 cm, find the length of QR.

Q. 22. 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:

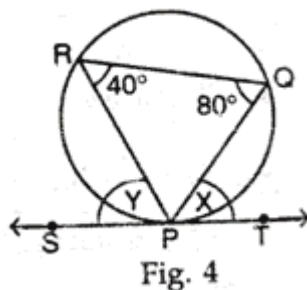


In Fig. 3, A, B and C are three points on the circle with centre O such that

Ans.

Or

If a line touches a circle and from the point of contact a chord is drawn, prove that 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. 4, SPT is a tangent to the circle at P and PQ is a chord of the circle. If

Ans.

Q. 23. If the angle of elevation of a cloud from a point h metres above a lake is a and the angle of depression of its reflection in the lake is b , prove that the distance of the cloud from the point of observation is

Or

From an aeroplane vertically above a straight horizontal plane, the angles of depression of two consecutive kilometre stones on the opposite sides of the aeroplane are found to be α and β . Show that the height of the aeroplane is

Q. 24. A circus tent is cylindrical to a height of 3 m and conical above it. If its base radius is 52.5 m and slant height of the conical portion is 53 m, find the area of the canvas needed to make the tent.
Ans. (9735)

Q. 25. Amit's monthly salary is Rs. 19,250. He contributes Rs. 2,500 per month towards GPF and Rs. 20,000 towards PPF. He donates Rs. 11,000 to a school and gets a relief of 50% on the donation. Calculate the income tax deducted from his salary in the last month of the year, if the tax deduction is made from his salary for 11 months at the rate of Rs. 800 per month.

Guess Paper – 2007

Class – X Mathematics

Time allowed: 3 hours

Maximum Marks: 80

- Please check that this question paper contains 5 printed pages.
- Code number given on the right hand side of the question paper should be written on the title page of the answer-book by the candidates
- Please check that this question paper contains 25 questions.
- Please write down the serial number of the question before attempting it.

GENERAL INSTRUCTIONS: -

01. All questions are compulsory.
02. This 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.
03. There is no overall choice. However an internal choice has been provided in two questions of 2 Marks each, two questions of 3 Marks each and two questions of 5 marks each.
04. In questions on constructions, the drawing should be neat and exactly as per the given measurements.

05. Use of calculator is not permitted.

SECTION - A

Question numbers 1 to 7 carry 2 Marks each.

- Q.1 A toy is in the form of a cone mounted on a hemisphere of radius 3.5 cm. The total height of the toy is 15.5 cm. Find the total surface area of the toy.
- Q.2 An electric generator is sold for Rs.39000 cash or for 25% cash down payment and eight equal monthly instalments of Rs.3900 each. Calculate the rate of interest charged.
OR
A car is available for Rs.402200 cash or for Rs.150000 cash down payment and 3 equal half yearly instalments. If the interest is charged at 10% per annum compounded half yearly. Find the value of each instalment.
- Q.3 A wrist watch is available for Rs.500 cash or for Rs.200 cash down payment followed by 6 monthly equal instalments. If the rate of interest charged is 37% per annum, find the monthly instalment.
- Q.4 Draw a circle of radius 6cm. From a point anywhere outside the circle, construct a pair of tangents to the circle without using the centre and measure their lengths. Steps of constructions not required.
- Q.5 Find the ratio in which the line segment joining (2, - 3) and (5, 6) is divided by x - axis.
OR
The three vertices of a rhombus, taken in order, are (2, - 1), (3, 4) and (- 2, 3). Find the fourth vertex.
- Q.6 A bag contains 25 cards numbered from 1 to 25. One card is drawn from bag. Find the probability that
(i) It has a number divisible by both 2 and 3.
(ii) It has a prime number less than 20.
- Q.7 In a leap year, find the probability that there are 53 Sundays in the year.

SECTION - B

Question numbers 8 to 19 carry 3 Marks each.

- Q.8 The angle of elevation of the bottom of a window 10 meter above the ground level from a point on the ground is 30° . A pole projecting outwards and upwards from the bottom of the window makes an angle of 30° with the wall. If the angle of elevation of the top of the pole observed from the same point on the ground is 60° , find the length of the pole.

OR

From a window h metres high above the ground in a street, the angle of elevation and depression of the top and foot of the other house on the opposite side of the street are α and β respectively. Show that the height of the opposite house is $h(1 + \tan \alpha \cot \beta)$ metres.

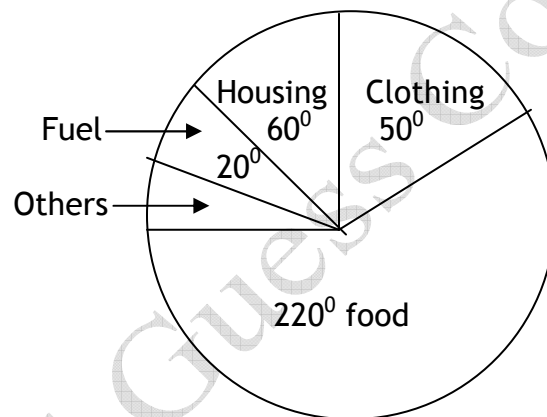
- Q.9 A tree 12m high, is broken by the wind in such a way that its top touches the ground and makes an angle 60° with the ground. At what height from the bottom the tree is broken by the wind?
- Q.10 A rectangular reservoir is 120m long and 75m wide. At what speed per hour must water flow into it through a square pipe 20cm wide so that the water rises by 2.4m in 18 hours?
- Q.11 The length of a line segment is 10. If one end is at (2, - 3) and the ordinate of the second end is 3. Find the abscissa of the second end.
- OR
- Find the vertices of the triangle, the mid point of whose sides are (3, 1) and (5, 6) and (-3, 2).
- Q.12 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.
- Q.13 Construct a triangle ABC in which $AB = 5\text{cm}$, angle $C = 30^\circ$ and altitude $CD = 4\text{cm}$. Write steps of construction.
- Q.14 Construct a quadrilateral similar to a given quadrilateral ABCD in which $AB = 6.3\text{ cm}$, $BC = 5.2\text{ cm}$, $CD = 5.6\text{ cm}$, $DA = 7.1\text{ cm}$ and angle $B = 60^\circ$, whose sides are $\frac{5}{4}^{\text{th}}$ of corresponding sides ABCD. Write steps of construction.
- Q.15 A spherical ball of lead 3cm in diameter is melted and recast into three spherical balls. The diameters of these balls are 1cm and 1.5 cm. Find the diameter of the third ball.

Q.16 Find the ratio in which the line $x - y - 2 = 0$ divides the line segment joining the points (3, -1) and (8, 9), also find the point of intersection.

Q.17 Draw a pie chart for the following data.

Years	First	Second	Third	Fourth	Fifth
% age exp	$\frac{125}{9}$	$\frac{250}{9}$	$\frac{125}{6}$	$\frac{125}{6}$	$\frac{50}{3}$

Q.18 The given pie chart represents the expenditure of a family on different items.



On the basis of the above pie chart answer the following.

- Find the percentage expenditure on clothing
- If the expenditure on Housing is Rs.2000, find the total expenditure of the family.
- Find the difference in expenditure on food and other items taken together.

Q.19 Annual income from salary of Miss S. Naidu, whose age is 65 years is Rs.385000. She donates Rs.10000 to Prime Minister's relief fund (100% exemption) and Rs.10000 to a charitable society (50% exemption). She contributes Rs.70000 towards PPF annually and pays quarterly premium of Rs.3500 towards LIC. She also purchases NSC for Rs.20000. She pays Rs.1600 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.

- Savings: - 100% exemption for savings up to Rs. 100000
- Rate of income tax for working women.

Slab

Income Tax

1. Up to 135000	No Tax
2. From 135001 to 150000	10% of the taxable income exceeding Rs. 135000.
3. From 150001 to 250000	Rs.1500 + 20% of the taxable income exceeding Rs.150000.
4. Above 250000	Rs.21500 + 30% of the taxable income exceeding Rs.250000.
c. Rate of income tax for Senior Citizens	
Slab	Income tax
1. Up to Rs.185000	No tax
2. From Rs.185001 to Rs. 250000	20% of the taxable income above Rs. 185000
3. From Rs.250001 and above	Rs.13000 + 30% of the income exceeding Rs.250000.
d. Education cess	2% of the income tax.

SECTION -C

Question numbers 20 to 25 carry 5 marks each.

- Q.20 The angles of depression of the top and bottom of a building 50 metres high as observed from the top of a tower are 30° and 60° respectively. Find the height of the tower and also the horizontal distance between the building and the tower.

OR

The angle of elevation of the top of a tower as observed from a point on the ground is ' α ' and on moving ' a ' metres towards the tower, the angle of elevation is ' β '. Prove that the height of the tower is

$$\frac{a \tan \alpha \tan \beta}{\tan \beta - \tan \alpha}$$

- Q.21 A bucket made up of a metal sheet is in the form of a frustum of a cone of height 16cm with radii of its lower and upper ends as 8cm and 20 cm respectively. Find the cost of the bucket if the cost of metal sheet used is Rs.15 per 100 cm², also find cost of the milk that can fill the bucket if cost of 1 lt. of milk is Rs.15.

- Q.22 Find the mean mark of the students from the following cumulative frequency table.

Marks	Number of Students
0 and above	80
10 and above	77
20 and above	72
30 and above	65
40 and above	55
50 and above	43
60 and above	28
70 and above	16
80 and above	10
90 and above	08
100 and above	00

- Q.23 The mean of the following frequency table is 50, but the frequencies f_1 and f_2 in classes 20 - 40 and 60 - 80 respectively are not known. Find these frequencies.

Class	Frequency
0 - 20	17
20 - 40	f_1
40 - 60	32
60 - 80	f_2
80 - 100	19
Total	120

OR

The mean of the flowing frequency distribution is 62.8 and the sum of all frequencies is 50. Compute the missing frequencies f_1 and f_2

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

- Q.24 The monthly salary of Arjun is Rs.31500. He donates Rs.15000 to Prime Minister's relief fund (100% exemption) and Rs.10000 to a charitable society (50% exemption). He contributes Rs.6000 per month towards his provident fund and pays an annual premium of Rs.12000 towards LIC. He also purchases NSC for Rs.6000. Calculate the income tax deducted from his salary in the last month of the year, if tax deduction is made from his salary for 11 months at the rate of Rs.2500 per month.
- Rebate for savings: 100% exemption for savings up to a maximum of Rs.100000
 - Rebate of income tax

Slab	Income Tax
(i) Up to Rs.100000	No tax
(ii) From Rs.100001 to Rs. 150000	10% of the amount exceeding 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.250000
(c) Education cess	2% of the income tax
(d) Surcharge	10% of the net income tax if gross income is more than Rs.100000

Q.25

- (i) A gas cooking range is available for Rs.2500 cash or for Rs.520 cash down payment followed by 4 equal monthly instalments. If rate of interest charged is 25% per annum, calculate the monthly instalment.
- (ii) A sum of Rs.390200 is to be paid back in three equal annual instalments. How much is each instalment, if the rate of interest charged is 4% per annum compounded annually.

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GUESS PAPER - 2007
Class: X
MATHEMATICS

Time: 3 hrs

Marks: 80

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.

SECTION - A
(Qns 1 – 7 carry 2 marks each)

SECTION – A

1. Find the value of p for which the system of equations has a unique solution:
$$\begin{aligned} px + 2y &= 5 \\ 3x + y &= 1 \end{aligned}$$
2. If $m = \frac{x+1}{x-1}$ and $n = \frac{x-1}{x+1}$ find $m^2 + n^2 - mn$.
3. Equilateral triangles are drawn on the sides of a right angled triangle. Show that the area of the triangle on hypotenuse is equal to the sum of the areas of triangles on the other two sides. (Use similarity of triangles)
4. A TV can be purchased for Rs 24,000 cash or for Rs 8,000 cash down payment and six equal monthly installments of Rs 2,800 each. Calculate the rate of interest charged under the installment scheme.
5. Ram borrowed a sum of money and returned it in three equal quarterly installments of Rs 17,576 each. Find the sum borrowed, if the rate of interest charged was 16% per annum compounded quarterly. Find also the total interest charged.
6. If α and β are the roots of the equation $x^2 - 3x - 2 = 0$, form an equation whose roots are $1 / (2\alpha + \beta)$ and $1 / (2\beta + \alpha)$.
7. Which term of the Arithmetic Progression 3, 10, 17, will be 84 more than its 13th term?

SECTION – B

(Q No 8 to 19 carry 3 marks each)

8. If three times the larger of the two numbers is divided by the smaller one, we get 4 as quotient and 3 as remainder. Also if seven times the smaller number is divided by the larger one, we get 5 as quotient and 1 as remainder. Find the numbers.
9. Express as rational expression $1 / (x - 1) - 1 / (x + 1) - 2 / (x^2 + 1) - 4 / (x^4 + 1)$
10. A takes 6 days less than the time taken by B to finish a piece of work. If both A and B together can finish it in 4 days, find the time taken by B to finish the work.
11. How many numbers of two digits are divisible by 7.

12. A mixer is available for Rs 1,500 cash payment or for Rs 360 cash down payment followed by three equal monthly installments of Rs 390 each. Compute the rate of interest charged under the installment scheme.

OR

A loan of Rs 2,700 is to be paid back in two equal annual installments. How much is each installment if the interest is compounded annually at 16%.

13. ABC is a triangle in which $AB = AC$ and D is any point in BC. Prove that $AB^2 - AD^2 = BD \cdot CD$.

14. Construct a ΔABC in which $BC = 7$ cm, $\angle A = 70^\circ$ and the foot of the perpendicular D on BC from A is 4.5 cm away from B.

15. How many spherical bullets can be made of a solid cube of lead whose edge measures 44 cm, each bullet measures 4 cm in diameter.

16. Prove that,
 $\tan A / (1 - \cot A) + \cot A / (1 - \tan A) = 1 + \tan A + \cot A = 1 + \sec A \operatorname{cosec} A$.

17. Represent the following data on a pie chart.

Items	Family A	family B
Food	40	60
Rent	20	40
Clothing	20	30
Education	10	40
Litigation	5	10
Miscellaneous	5	20

18. In what ratio does the y – axis divide the line segment joining the points P (– 4, 5) and Q (3, – 7)?

19. let the opposite angular vertices of a square be (3, 4) and (1, – 1). Find the co-ordinates of the remaining angular points.

SECTION – C

(Q No 20 – 25 carry 5 marks each)

20. In ΔABC , $DE \parallel BC$, $D \in AB$ and $E \in AC$, and $AD:DB = 5 : 4$. BE and CD intersect in F. Find $\text{Area} (\Delta DFE) / \text{Area} (\Delta CFB)$

21. If a chord is drawn through the point of contact of a tangent to a circle, then the angles which the chord makes with the tangent are equal to the angles formed by the chord in the alternate segment.
Two circles touch internally at a point P and a chord of the larger circle intersects the smaller circle in C and D. Prove that $\angle CPA = \angle DPB$.
22. The angle of elevation of a cliff from a fixed point is θ . After going up a distance of k metres towards the top of the cliff at an angle of ϕ , it is found that the angle of elevation is α . Show that the height of the cliff is $k (\cos \phi - \sin \phi \cot \alpha) / (\cot \theta - \cot \alpha)$ metres.
23. A solid iron rectangular block of dimensions 4.4 m, 2.6 m and 1 m is cast into a hollow cylindrical pipe of internal radius 30 cm and thickness 5 cm, Find the length of the pipe.
24. Find the missing frequency (p) for the following distribution whose mean is 7.68.
- | | | | | | | |
|----|---|---|----|---|----|----|
| x: | 3 | 5 | 7 | 9 | 11 | 13 |
| f: | 6 | 8 | 15 | p | 8 | 4 |
25. Anil has an annual income of Rs 3,60,000. He contributes Rs 4,000 per month in his P.F and pays an annual premium of Rs 15,000 for his LIC policy. How much should he invest in NSC's so as to get maximum deduction? After getting maximum deduction he wants to pay income tax. He pays Rs 2,500 per month for 11 months towards income tax. How much he has to pay in the last month of the year?

Rates of Income tax for male persons (Below 65 years)

Taxable income	Income tax
(I) Upto Rs 1,00,000	Nil
(ii) Rs 1,00,001 to Rs 1,50,000	10% of income exceeding Rs 1,00,000
(iii) Rs 1,50,001 to Rs 2,50,000	Rs 5000 + 20% of income exceeding Rs 1,50,000
(iv) More than Rs 2,50,000	Rs 25000 + 30% of income exceeding Rs 2,50,000

- (a) Savings: 100% exemption for permissible savings upto Rs 1,00,000.
(b) Education cess: 2% of the income tax.

Guess Paper – 2007
Class – X
Mathematics

Time: 75 minutes

MM: 50

(Students do the ncert book thoroughly. Do examples very very carefully. This is a practice paper. Try to do in the time limits)

1-10 carries 2 marks each

11-20 carries 3 marks each

Algebra test

- Which term of the series $12+9+6+\dots$ Be -100 ?
- Find the sum of natural numbers from 1 to 200 excluding those divisible by 5?
- solve for x

$$6a^2x^2 - 7abx - 3b^2 = 0, a \neq 0$$

- simplify the following

$$\frac{1}{2x+3y} - \frac{(2x-3y)^2}{8x^3+27y^3}$$

- A wire 112 cm long is bent to form a right angled triangle. If the hypotenuse is 50 cm long, find the area of the triangle?

$$\frac{4(a^3+a-2)}{6(a^3+2a^2-a-2)}$$

- Simplify
- One root of the equation $2x^2 - 8x - m = 0$ is $\frac{15}{2}$. Find the value of m and the other root?

- Reduce the expression into lowest terms:-

$$\frac{16x^5-16x}{4(x^2+1)(2x+2)}$$

- If $(x^2 - x - 2)$ is the HCF of the polynomials $(x+1)(2x^2+ax+2)$ and $(x-2)(3x^2+bx+1)$. Find the value of a and b.
- Find the A.P whose third term is 16 and 7th term exceeds its first term by 12.
- Simplify the following

$$\frac{x^2 + 3x - 28}{x^2 + 2x - 3} + \frac{x^2 + x - 20}{x^2 - 3x - 18} \times \frac{x^2 + x - 42}{x^2 + 4x - 5}$$

12. Solve for x and y graphically

$$3x + y - 5 = 0$$

$$2x - y - 5 = 0$$

13. The GCD and LCM of two polynomials P(x) and Q(x) are

$$x(x+a) \quad \text{and} \quad 12x^2(x+a)(x^2 - a^2) \text{ respectively,}$$

$$\text{if } P(x) = 4x(x+a)^2, \text{ find } Q(x)$$

14. If we add 1 in the numerator of a fraction and subtract 1 from its denominator, the fraction becomes 1, It is also given that the fraction becomes $\frac{1}{2}$ when we add 1 to its denominator, and then what is the fraction.

15. Find the value of a and b so that the polynomials P(x) and Q(x) have $(x - 1)(x + 4)$ as their HCF:

$$P(x) = (x^2 - 3x + 2)(x^2 + 7x + a)$$

$$Q(x) = (x^2 + 5x + 4)(x^2 - 5x + b)$$

16. If the equation $(1 + m^2)x^2 + 2mcx + (c^2 - a^2) = 0$ has equal roots, prove that

$$c^2 = a^2(1 + m^2)$$

17. A Person can row 8 km upstream and 24 km down stream in 4 hours. He can row 12 km downstream and 12 km upstream in 4 hours. Find the speed of the person in still water and also the speed of the current.

18. A farmer wishes to grow a 100m^2 rectangular vegetable garden. Since he has with him only 30m barbed wire, he fences three sides of the rectangular

garden letting compound wall of his house act as the fourth side-fence. Find the dimensions of his garden.

19. Shikha works in a factory, in one week she earned Rs 707 for working 47 Hours, of which 7 hours was overtime. The next week she earned Rs 756 for working 50 hours, of which 8 hours was overtime. What is Shikha's hourly income rate?
20. Find the sum of all natural numbers between 2 and 101, which are NOT divisible by 5.

GUESS PAPER 2007
Class - X
MATHEMATICS

CLASS 10

MARKS: 80

Time allowed: 3 hours

General Instructions:-

- All questions are compulsory.
- 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 12 questions of 3 marks each and Section C is of 6 questions of 5 marks each..
- There is no overall choice. However 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.
- Write the serial number of the question before attempting it.
- In question on construction, the drawing should be neat and exactly as per the given measurements.
- Use of calculators is not permitted. However you may ask for mathematical tables.

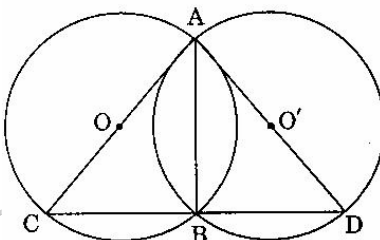
Section - A

1. Solve for x and y $\frac{x}{a} + \frac{y}{b} = 2$
 $ax - by = a^2 - b^2$
2. Simplify $\frac{1}{1+x+x^2} - \frac{1}{1-x+x^2} + \frac{2}{1+x^2+x^4}$
3. Solve for x : $9x^2 - 6a^2x + (a^4 - b^4) = 0$
4. How many terms of the A.P 16, 12, 8 ... are required to get the sum zero?

OR

Find the 8th term from the end of the A.P 7, 10, 13,184

5. In figure two circles intersect at A and B. AC and AD are respectively the diameters of the circles. Prove that C, B, D are collinear



6. A room cooler is available for Rs 1500 cash payment or for some cash down payment followed by three equal monthly instalments of Rs 390 each. If the rate of interest charged under instalment plan is 16% p.a. find the amount paid as cash down payment.
7. A bag contains 100 tickets numbered 1 to 100. A ticket is drawn at random from the bag. Find the probability of getting a ticket with number divisible by 3 and 5

OR

From a group of 3 boys and 5 girls, a child is to be selected for the competition. Find the probability that the selected child is i) boy ii) girl

Section B

8. Draw the graph of $2x + y = 6$ and $2x - y + 2 = 0$. Shade the region bounded by these lines and x -axis. Find the area of the shaded region.

9. The L.C.M and G.C.D of the polynomials and $q(x)$ are $56(x^4 + x)$ and $4(x^2 - x + 1)$ respectively. If $p(x) = 28(x^3 + 1)$ find $q(x)$
10. A car is available for Rs 4, 02,200 cash or for Rs 1, 50,000 cash down payment and 3 equal half yearly instalments. If the interest is charged at 10% per annum compounded half yearly, find the value of each instalment
11. A tree in each year grows 4 cm less than it grew in the previous year. If it grew 1 m in the first year, in how many years will it have ceased growing and what will be its height then?
12. Two pipes running together can fill a cistern in $2\frac{1}{13}$ minutes. If one pipe takes 3 minutes more than the other to fill the cistern, find the time in which each pipe would fill the cistern.

OR

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

13. Construct a triangle ABC in which $AB = 6.5$ cm, $\angle C = 60^\circ$ and median $CD = 5.2$ cm. Also construct $\Delta AB'C'$ similar to ΔABC whose base $AB' = 9$ cm.
14. In the given figure, PT touches the circle whose centre is O, at R. Diameter SQ when produced meets PT at P. Given $m\angle QRP = y^\circ$ and $m\angle SPR = x^\circ$ Show that $x^\circ + 2y^\circ = 90^\circ$
15. A solid cylinder of diameter 12 cm and height 15cm is melted and recast into 12 toys in the shape of a right circular cone mounted on a hemisphere. Find the radius of the hemisphere and total height of the toy if the height of the cone is three times its radius.
16. Prove that $\frac{\sin A}{\sec A + \tan A - 1} + \frac{\cos A}{\operatorname{cosec} A + \cot A - 1} = 1$

OR

Show that $\sin^2 5^\circ + \sin^2 10^\circ + \sin^2 15^\circ + \dots + \sin^2 85^\circ + \sin^2 90^\circ = 9\frac{1}{2}$

17. The points A (0, 3), B (-2, y) and C (-1, 4) are the vertices of a triangle ABC right angled at A. Find the value of y .
18. The vertices of a parallelogram taken in order are (1, 2), (2, 4) and (3, 7). Find the fourth vertex
19. The following data gives the monthly expenditure of a student residing in a hostel.

Item	Mess charges	College fees	Coaching	Books	Miscellaneous
Expenditure	45%	20%	15%	12.5%	7.5%

Represent the data by a pie chart

Section C

20. Compute the arithmetic mean for the following frequency distribution:.

Weights (in Kg)	Above 80	Above 75	Above 70	Above 65	Above 60	Above 55	Above 50	Above 45
No of persons	0	4	11	22	38	45	48	50

21. Prove that in a triangle, a line drawn parallel to one side is to intersect the other two sides in distinct points, divides the two sides in the same ratio.

Using the above theorem prove the following:

ABCD is a parallelogram. E is a point on BC. The diagonal BD intersect AE in F. Prove that $DF \times FE = FB \times FA$

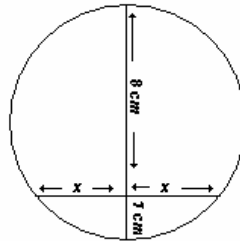
22. If PAB is a secant to the circle intersecting the circle A and B and PT is tangent at T. Prove that $PA \times PB = PT^2$. Using the above result prove the following.

In $\triangle ABC$, $AB = AC$. A circle passing through B cuts in P and touches side AC at its mid point D. Prove that $AB = 4AP$

OR

If two chords of a circle intersect inside or outside the circle, then the rectangle formed by the two parts of one chord is equal in area to the rectangle formed by the two parts of the other.

Using the above result solve for x in the following figure.



23. If the angle of elevation of a cloud from a point h metres above 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 $\frac{2h \sec \alpha}{\tan \beta - \tan \alpha}$

OR.

Two ships are sailing in the sea on either side of a lighthouse. The angles of depression of the ships as observed from the lighthouse are 60° and 45° respectively. If the distance between the ships is $\frac{200(\sqrt{3} + 1)}{\sqrt{3}}$ metres, find the height of the lighthouse

24. Four right circular cylindrical vessels each having diameter 21 cm and height 38 cm are full of ice cream. The ice cream is to be filled in cones of height 12 cm and diameter 7 cm having a hemispherical shape on the top. Find the total number of such cones which can be filled with ice cream
25. The annual income of Mrs. Vijaya Kumar is Rs. 3, 20,000 exclusive of H.R.A. She contributes Rs5000 per month in her provident fund and pays an annual premium of Rs. 30,000 towards life Insurance Policy. She also invested Rs.15, 000 in NSC. Calculate the income tax paid by her in the last month of the year, if her earlier deductions for first 11 months for income tax were at the rate of Rs 1000 per month.

Use the following for calculating the income tax:

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

b) Rate of income tax

Slab

Income tax

i) Upto Rs 135,000

No tax

ii) From Rs 135,001 to Rs 1,50,000

10% of the amount exceeding Rs 135,000

iii) From 150,001 to Rs 2,50,000

1500 + 20% of the amount exceeding Rs 150,000

iv) Above Rs 250,000

Rs 21,500 + 30% of the amount exceeding Rs 250,000

c) Education Cess

2% of the tax payable.

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Guess Papers – 2007

Class – x

Mathematics

SET - I

1. Solve the following System of equations graphically

$$2x - 3y - 6 = 0$$

and

$$2x + y + 10 = 0$$

2. Solve for $x : 1 + 6 + 11 + 16 + \dots + x = 148$

3. In $\triangle ABC$, $BD \perp AC$, $CE \perp AB$ such that they intersect at point P. Prove that $BP \times PD = EP \times PC$.
4. A loan of Rs.12,750 is to be paid back in two equal half yearly installments. If the interest is compounded half-yearly 8% per annum, how much is each installment.
5. One can purchase a room cooler for s.2,400 cash or for Rs.1,200 cash down payment and two monthly installment of Rs.610 each. Find the rate of interest charged under the installment plan.
6. The perimeter of the end of a frustum of cone are 48cm and 36cm. If the height of the frustum be 11cm, find its volume.
7. Draw a circle of radius 6cm. from a point 10cm away from its centre, construct a pair of tangents to the circle and measure its lengths.
8. A solid metallic cylinder of radius 14cm and height 21cm is melted and recast into 72 equal small sphere. Find the radius of one such sphere.

OR

The total surface area of a right circular cylinder is 6512 cm^2 and the circumference of its base is 88 cm. Find the volume of the cylinder. (use $\pi=22/7$).

9. The mean of the following frequency table is 50. But frequencies of f_1 and f_2 in class 20-40 and 60-80 are missing. Find the missing frequencies.

Class Interval	0-20	20-40	40-60	60-80	80-100	Toatl
Frequencies	17	f_1	32	f_2	19	20

10. A dice is thrown once. Find the probability of getting

- (i) a number of greater than 2
- (ii) An even number.

Write sample space of the random experiment.

OR

A bag contains 3 red, 4 black, 5 white balls. A ball is drawn at random. Find the probability that it is

- (i) Black ball
- (ii) Non Red ball.

11. Solve the following linear equation for x and y :

$$\frac{x}{a} + \frac{y}{b} = a + b \text{ and } \frac{x}{a^2} + \frac{y}{b^2} = 2.$$

12. For what value of k is H.C.F. of $x^2 + x - (2k + 2)$ and $2x^2 + kx - 12$, $x + 4$?

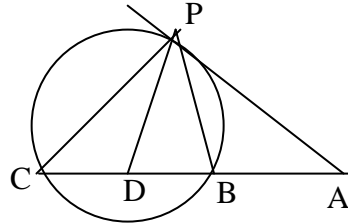
$$13. \text{ Simplify : } \frac{1}{x+y} - \frac{1}{x-y} - \frac{4y}{y^2 - x^2} + \frac{2y}{x^2 + y^2}$$

14. Solve the following equations using quadratic formula.

15. A passenger train takes 2 hours less for a journey of 300 km. If its speed is increased 5km/hr from its usual speed. What is its usual speed ?

OR

Out of certain number of saras birds one fourth the number are moving in lotus plants $\frac{1}{9}^{\text{th}}$ coupled with $\frac{1}{4}^{\text{th}}$ as well as 7 times the square root of the number moves on a hill, 56 birds remain in vakula tree, what is the total number of birds ?



16. In figure, AP is a tangent to the circle at P. ABC is a secant such that PD is bisector of $\angle BPC$. Prove that

$$\angle BPD = \frac{1}{2} [\angle ABP - \angle APB]$$

17. A sphere and a cube have the same surface. Show that the ratio of the volume of sphere to that of cube is $\sqrt{6} : \sqrt{\pi}$.

18. Prove that : $\frac{1}{\sec A + \tan A} - \frac{1}{\cos A} = \frac{1}{\cos A} - \frac{1}{\sec A - \tan A}$.

OR

If $\operatorname{cosec} \theta - \sin \theta$ and $\sec \theta - \cos \theta = n$, then show that $(m^2 n)^{2/3} + (mn^2)^{2/3} = 1$.

19. In what ratio does the point $C\left(\frac{3}{5}, \frac{11}{5}\right)$ divide the line segment joining the points $A(3,5)$ and $B(-3,-2)$?

20. If the points (x, y) is equidistant from the points $(a+b, b-a)$ and $(a-b, a+b)$, prove that $bx = ay$.

OR

Three vertices of a parallelogram are $(a+b, a-b)$; $(2a+b, 2a-b)$; $(a-b, a+b)$. Find the fourth vertex.

21. The following data relate to the cost of construction of a house in Delhi

Items	Cement	Steel	Bricks	Timber	Labour	Misc.
Expenditure	30%	10%	10%	15%	25%	10%

22. A round balloon of radius 'r' subtends an angle α at the eye of the observer while the angle of elevation of its centre is

β . Prove that the height of the centre of the balloon is $r \sin \beta \operatorname{cosec} \left(\frac{\alpha}{2} \right)$.

OR

The angle of elevation of the top of a rock from the top and foot of a 100m high tower are, respectively 30° and 45° . Find the height of the rock. (Use $\sqrt{3} = 1.73$).

23. Prove that in a right angled triangle, the square of hypotenuse is equal to the sum of squares of the other two sides.

24. 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 lines are equal respectively to the angles termed in the corresponding alternate segments.

Use above theorem to prove the following

Two circles cut at A and B and a straight line PAQ cuts the circles at P and Q. If the tangent at P and Q intersect at I. Prove that P, B, Q and T are concyclic.

25. Mala aged 28, is a PR executive and has an annual income of Rs.3,00,000 (excluding HRA). In addition, she gets a performance bonus of 7.5% of her annual salary at the end of the year. She contributes Rs.2,500 per month towards Company Provident Fund. In addition, she has donated Rs.10,000 towards Cancer Research Society, which is eligible for 10% deduction. She pays Rs.1,850 per quarter as premium on her LIC policies besides investing Rs.30,000 in her PPF account. What amount should be deducted as income tax from her salary per month so that the deduction in March is not more than Rs.1,000 ?

Guess Paper – 2007 Class – X Mathematics

Note : This paper will guide the students how to do self assessment.

1. If a student is scoring 99-100 % in this paper he/she may get 100% in board exam.
2. If a student is getting only 80-90% in this paper, he/she needs a thorough revision of whole syllabus. Thorough revision can be done by revising all concepts, facts and tricks. No need to do all questions which is not possible in 5 days. Attempt all important questions which are told by your teachers.
3. As you are getting 5 days before your Maths paper, day 1 and day 2 revise all topics or do quick revision. Revise all formulae.
4. On 3rd and 4th day solve guess papers and do the self assessment.
5. On 5th day analyze your mistakes and work accordingly. Cent percent marks are sure.
6. All the best for 100%.

SECTION – A

1. Solve for x and y: $\frac{5}{x+1} - \frac{2}{y-1} = \frac{1}{2}, \frac{10}{x+1} + \frac{2}{y-1} = \frac{5}{2}, x \neq -1 \text{ and } y \neq 1$

OR $\frac{b}{a}x + \frac{a}{b}y = a^2 + b^2, x + y = 2ab$

2. Simplify: $\left[\frac{a-b}{a+b} + \frac{a+b}{a-b} \right] \div \left[\frac{a^2+b^2}{a^2-b^2} \times \frac{a+b}{2} \right] \times \frac{1}{ab}$

3. The H.C.F. and L.C.M. of two polynomials P(x) and Q(x) are (3x+2) and (x-3) (x^3+11x^2+6x). If P(x)= x^3-9x , find Q(x).
4. Using quadratic formula, solve the following quadratic equation:
 $(b-c)x^2 + (c-a)x + (a-b) = 0$

OR,

The product of two consecutive multiples of 5 is 300. Find the numbers.

5. Which term of the sequence $24, 23\frac{1}{4}, 22\frac{1}{2}, \dots$ is the first negative term?
6. The present age of a father is 3 years more than three times the age of the son. 3 Years hence, father's age will be 10 years more than twice the age of the son. Determine their present ages.
7. A T.V. set is available for Rs. 13,500 or Rs. 4500 cash down payment and 4 monthly instalments of Rs. 2400 each. Calculate the rate of interest charged under the instalment scheme.

SECTION - B

8. Find graphically the vertices of the triangle whose sides have the following equations: $2y-x=8, 5y-x=14, y-2x=1$
9. A plane left 20 minutes late due to bad weather and in order to reach its destination 1200 km away in time, it had to increase its speed by 120 km/hr. from its usual speed. Find the usual speed of the plane.
10. A man borrows a certain sum and pays it back in two years in two equal instalments. If compound interest is reckoned at 4% and if he pays back annually Rs. 6760, what sum did he borrow?
11. If the diagonals of a quadrilateral divide each other proportionally, prove that it is a trapezium.

OR

In a right angled triangle ABC, a circle with side AB as diameter is drawn to intersect the hypotenuse AC in L. Prove that the tangent to the circle at L bisects the side BC.

12. A copper wire 4mm in diameter is evenly wound about a cylinder whose length is 24 cm and diameter 20 cm so as to cover the whole surface. Find the length and weight of the wire assuming the specific gravity to be 88.8 gram per cubic centimeter.
13. Construct a triangle ABC, in which $\angle A = 60^\circ$, $BC = 5$ cm, altitude $AD = 4.5$ cm. How many triangles are possible in this case?
14. If the points $(3,5)$, $(p,2)$ and $(7,-6)$ are collinear. Find the value of p.

OR

If the coordinates of the mid points of the sides of a triangle be $(3,-2)$, $(-3,1)$ and $(4,-3)$, then find the co-ordinates of its vertices.

15. Percentage of the different products of a village in a particular district are given below. Draw a pie chart representing this information.

Items	Wheat	Pulses	Jwar	Ground Nuts	Vegetables	Total
Percentage	125/3	125/6	25/2	50/3	25/3	100

16. How many terms of the A.P. 78, 71, 64, Are needed to give the sum 468? Also find the last term of this A.P.
17. Without using trigonometric table evaluate:
 $\tan 5^\circ \tan 10^\circ \tan 15^\circ \tan 75^\circ \tan 80^\circ \tan 85^\circ$

OR

Prove: $\frac{\cot A + \operatorname{cosec} A - 1}{\cot A - \operatorname{cosec} A + 1} = \frac{1 + \cos A}{\sin A}$

18. A bag contains identical tokens on which numbers 5 to 105 are marked. A token is drawn randomly. What is the probability that the number on the token is (i) an even number (ii) an odd number (iii) a multiple of 5 and 10.
19. Find the co-ordinates of the points of trisection of the line segment joining the points A(2,1) and B(5, -8).

SECTION - C

20. A right triangle whose sides are 15cm and 20 cm is made to revolve about its hypotenuse. Find the volume and surface area of the double cone so formed. (use $\pi = 3.14$)

OR

The diameters of the top and bottom of a bucket are $2R$ and $2r$ unit. If the bucket is h unit high and its slant height is l unit. Derive the formulas for its volume and Curved Surface Area.

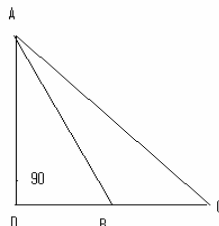
21. Mr Gopal Singh is a senior lecturer in Uttarakhand Govt. His monthly salary is Rs. 32000. If he donates Rs. 3000 per month to Chinmaya Mission and get 50% relief. His per month deduction towards G.P.F. is 1000, he pays L.I.C. premium as Rs. 5000 quarterly. He also invested Rs. 20000 in N.S.C. What salary he will get in the last month if tax deduction for first 11 months is Rs. 300 per month.

INCOME TAX SLAB

Taxable income	Rate
Up to Rs. 1,00,000	Nil
Rs. 1,00,001-1,50,000	10% of amount exceeding rs. 1,00,000
Rs 1,50,001-2,50,000	Rs.5000+20% of the amount exceeding Rs.1,50,000
Exceeding Rs 2,50,000	Rs. 25,000+30% of the amount exceeding Rs 2,50,000

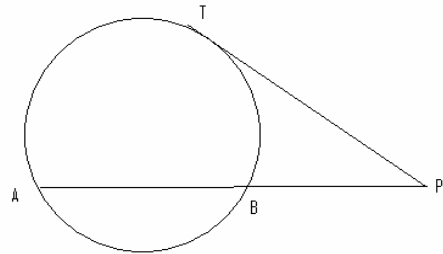
22. State and Prove Converse of Pythagoras Theorem.

In the adjacent figure $AD \perp BC$,
 Prove $AC^2 = AB^2 + BC^2 + 2 BC \cdot BD$



23. 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.

In the adjacent figure if PT is the tangent and PAB is a secant to the circle, Using this, Prove $PT^2 = PA \cdot PB$



24. An aeroplane is flying at a constant height of 3000m. At an instant the angle of elevation of this plane at a point is 60° . After 15 seconds the angle of elevation at the same point is 30° . Calculate the speed of the plane in Km per hour.

25. If the mean of the following data is 57.6. Find the missing frequencies.

Class	0-20	20-40	40-60	60-80	80-100	100-120
Frequency	7	f	12	g	8	5

“You see things; and you say "Why?" But I dream things that never were; and I say "Why not?" George Bernard Shaw

You will never leave where you are, until you decide where you'd rather be.

“Your aspirations are your possibilities”. Samuel Johnson:

Sample Papers – 2007
Class – X
Mathematics

➤ **GENERAL INSTRUCTIONS:**

- All questions are compulsory.
- The question paper consists of 25 questions divided in to 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.
- There is no overall choice. However 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.
- In question on theorems, the drawing should be neat and exactly as per the given measurements.
- Use of calculator is not permitted.

SECTION A

Question numbers 1 to 7 carry 2 marks each.

Q1. Solve the following system of equations.

$$(a + 2b)x + (2a - b)y = 2, \quad (a - 2b)x + (2a + b)y = 3$$

OR

The charges of a 10 day trip by a tourism bus for 1 full and a half ticket are Rs.1440 inclusive of boarding charges, which is same for a full as well as for a half ticket.

The charges for the same trip for 2 full and one half ticket inclusive of boarding charges are Rs.2220; the fare for a half ticket is 75% of the full fare ticket. Find the fare and the boarding charges separately for one full ticket.

Q2. If $(x^2 - x - 2)$ is the GCD of $(x - 2)(2x^2 + ax + 1)$ and $(x + 1)(3x^2 + bx + 2)$, Find a and b.

Q3. If the roots of the equation $(b - c)x^2 + (c - a)x + a - b = 0$ are equal, then Prove that $2b = a + c$.

OR

Solve the equation $\frac{4x}{x-2} - \frac{3x}{x-1} = 7\frac{1}{2}$

Q4. The sum of n terms of an AP. whose first term is 5 and common difference is 36 is equal to the sum of $2n$ terms of another AP. whose first term is 36 and the common difference is 5. Find n .

Q5. Deepak borrowed a sum of money and returned it in three equal quarterly instalments of Rs.140608. If the rate of interest charged is 16% per annum compounded quarterly, find the sum borrowed. Also find the total interest charged.

Q6. The perpendicular from the vertex A on the side BC of a triangle ABC intersects BC at point D such that $DB = 3 CD$. Prove that $2AB^2 = 2AC^2 + BC^2$.

Q7. Tickets numbered from 1 to 30 are mixed up together and then a ticket is drawn at random. What is the probability that
(i) Ticket has a number which is either multiple of 3 or 7
(ii) It is perfect square.

SECTION – B

Question numbers 8 to 19 carry 3 Marks each.

Q8. Solve the following system of equations graphically.

$$x - y + 1 = 0$$

$$4x + 3y = 24$$

Find the points where the lines meet the x-axis.

Q9. Express the following expressions as a rational expression in lowest terms.

$$\frac{1 + \frac{3x - 18x^2}{2}}{3 + 6x + 12x} \times \frac{\frac{3x}{2} - \frac{6x^2}{2}}{1 - 9x + 18x} \div \frac{(1 - 2x)^2}{1 - 8x}$$

Q10. An aeroplane takes one hour less for a journey of 1200km if speed is increased by 100km/hr from its usual speed. Find its usual speed.

Q11. Find the sum of all three digit numbers each of which leave the remainder 3 when divided by 5

OR

How many terms of the A.P. 78, 71, 64, are needed to give the sum 473?
Also find the last term of this A.P.

Q 12. A bicycle is available for Rs.1425 cash or for 20% of the cash value as cash down payment followed by three equal monthly instalments if the rate of interest charged Under the instalment scheme is 16% per annum, Find each instalment.

Q 13. The radius of the in-circle of a triangle is 4cm and the segment into which one side is divided by the point of contact are 6cm and 8cm. Determine the other two sides of the triangle.

Q14. Construct a $\triangle ABC$, in which $AB = 5\text{cm}$, $\angle B = 60^\circ$ and altitude $CD = 3.5\text{ cm}$.
Construct a $\triangle AQR$ similar to $\triangle ABC$ such that each of its sides is 1.5 times that of corresponding sides of $\triangle ABC$. Write the steps of construction

Q15. show that

$$2\sec^2\theta - \sec^4\theta - 2\operatorname{cosec}^2\theta + \operatorname{cosec}^4\theta = \cot^4\theta - \tan^4\theta$$

OR

Find the value of.

$$\frac{\sin 69^\circ 30'}{\cos 20^\circ 30'} + \frac{\operatorname{cosec} 36^\circ}{\sec 54^\circ} - \frac{2\cos 43^\circ \operatorname{cosec} 47^\circ \sin 30^\circ}{\tan 10^\circ \tan 40^\circ \tan 45^\circ \tan 50^\circ \tan 80^\circ}$$

Q16. Find the lengths of the medians of a ΔABC whose vertices are $A(7, -3)$, $B(5, 3)$ and $C(3, -1)$

Q17. Solid spheres of diameter 6cm are dropped into cylindrical beaker containing some water and are fully submerged. If the diameter of the beaker is 12cm and the water rises by 36cm, find the number of solid spheres dropped in the water.

Q18. In the month of JANUARY, a house holder spent his monthly salary amounting to Rs.7200 on different items as given below.

ITEMS	AMOUNT SPENT
Clothing	600
Food	4000
House Rent	1200
Education	400
Miscellaneous	1000

Represent the information in the form of a pie-chart.

Q19. The line joining the points $(2, 1)$ and $(5, -8)$ is trisected at the points P and Q. If the point P lies on the line $2x - y + K = 0$. find the value of K.

SECTION-C

Question numbers 20 to 25 carry 5 marks each.

Q20. Prove that the ratio of the areas of two similar triangles is equal to the ratio

of squares of their corresponding sides.

Use the above in the following

In the trapezium ABCD. O is the point of intersections of AC and BD, $AB \parallel CD$
And $AB = 2CD$. If the area of $\triangle AOB = 84\text{cm}^2$ find the area of $\triangle COD$.

Q21. Prove that if a line touches the 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

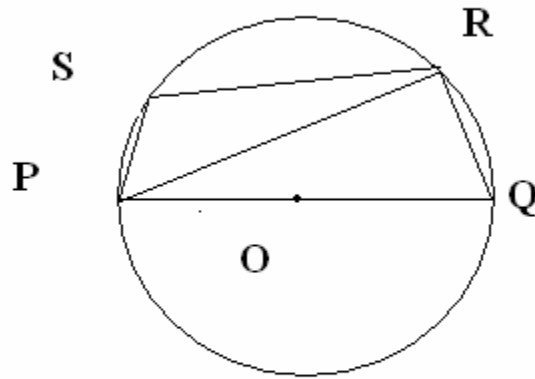
AB is the diameter and AC is a chord of a circle such that $\angle BAC = 30^\circ$. The tangent
at C intersects AB produced in a point D. Prove that $BC = BD$.

OR

Prove that the sum of either pair of opposite angles of a cyclic quadrilateral is 180° .

Use the above, solve the following.

In the given figure, POQ is a diameter and PQRS is a cyclic quadrilateral.
If $\angle PSR = 150^\circ$. Find the $\angle RPQ$.



Q22. If the mean of the following frequency distribution is 188, find the missing frequencies f_1 and f_2

Classes	0-80	80-160	160-240	240-320	320-400	TOTAL
Frequency	20	25	f_1	f_2	10	100

OR

The following table gives the distribution of expenditure of different families on education. Find the mean expenditure on education of a family.

Expenditure	Number of families
1000-1500	24
1500-2000	40
2000-2500	33
2500-3000	28
3000-3500	30
3500-4000	22
4000-4500	16
4500-5000	7

Q23. Water is flowing at the rate of 15km per hours through a pipe of diameter 14cm into a rectangular tank which is 50m long and 44m wide. Find the time in which the level of water in the tank will rise by 21cm.

Q24. The angle of elevation (θ) of the top of a light house at a point 'A' on the ground is such that $\tan \theta = 5/12$. when the point is moved 240m towards the light house, The angle of elevation becomes Φ , such that $\tan \Phi = 3/4$. Find the height of the light house.

Q25. Ramesh has a monthly salary of Rs.35250(excluding HRA). He contributes Rs.5000 per month towards GPF during the year and pays a quarterly premium of Rs.2500 for his L.I.C. policy. He invests Rs.15000 in NSCs. He donates Rs.16000 to a charitable trust (50% exemption). He has donated Rs.8000 to Prime Minister's relief fund (100% exemption) .How much he can save through PPF , so as to have minimum tax liability. Also calculate the income tax liability of Ramesh for the last month of the year if he has paid Rs.2000 per month as income tax for the first 11 months of the year.

Use the following for calculating income tax.

- a) Rebate for savings : 100% exemption for savings up to a maximum of Rs.100000
- b) Rebate of income tax.

Taxable Income	Income tax
(i) Upto Rs 1,00,000	Nil
(ii) Rs 1,00,001 to Rs 1,50,000	10% of income exceeding Rs 1,00,000
(iii) Rs 1,50,001 to Rs 2,50,000	Rs 5000 + 20% of income exceeding Rs 1,50,000
(iv) More than Rs 2,50,000	Rs 25000 + 30% of income exceeding Rs 2,50,000

c) Education Cess

2% of the income tax

d) Surcharge

10% of the net income tax if gross income is more than Rs.1000000

Guess Paper – 2007

Class – X

Mathematics

C.S.MODEL PAPER – 2007

General Instructions:

- All questions are Compulsory.
- This question paper consist of 25 questions divided into **three sections** : **Section A** (Q. 1 to 7 of 2 marks each), **Section B** (Q.8 to 19 of 3 marks each) and **Section C** (Q. 20 to 25 of 5 marks each).
- As far as possible answer questions in serial order. When you are not sure of answering the question, you may leave it for the time being and proceed without wasting your time.
- When you wish to re-answer any question, please cancel the first one.
- Use of a Calculator is not permitted.
- Keep some time for revision.

SECTION A

1. Solve:

$$\frac{5}{x+y} - \frac{2}{x-y} = -1; \quad \frac{15}{x+y} + \frac{7}{x-y} = 10$$

2. If $P = \frac{x+1}{x-1}$, $Q = \frac{x-1}{x+1}$, find $P + Q$

3. Find the values of a and b so that the polynomials $P(x)$ and $Q(x)$ have $(x-1)(x+4)$

as their HCF :

$$P(x) = (x^2 - 3x + 2)(x^2 + 7x + a)$$

$$Q(x) = (x^2 + 5x + 4)(x^2 - 5x + b)$$

4. If the roots of the equation $(b-c)x^2 + (c-a)x + (a-b) = 0$ are equal, then prove that $2b = a + c$
5. The 10th term of an A.P. is 52 and 16th term is 82. Find the 32nd term and the general term.
6. A cycle is available for Rs 3000 cash price or Rs 800 cash down payment followed by 5 equal monthly instalments of Rs 450 each, Find the rate of interest.
7. Prove, any line parallel to the parallel sides of a trapezium divides the non-parallel sides Proportionally.

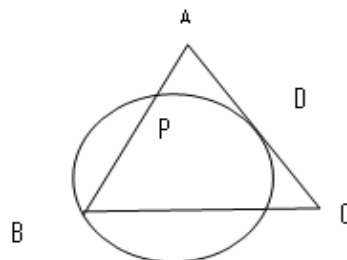
SECTION : B

8. Draw the graphs of $2x + y = 6$ and $2x - y + 2 = 0$. Shade the region bounded by these lines and x -axis. Find the area of the shaded region.
9. How many spherical bullets can be made out of a solid cube of lead whose edge measures 44 cm, each bullet being 4 cm in diameter.
10. If $\sin \theta + \cos \theta = \sqrt{2} \cos (90^\circ - \theta)$, determine $\cot \theta$.

Or

$$\text{Evaluate : } \cot 12^\circ \cot 38^\circ \cot 52^\circ \cot 60^\circ \cot 78^\circ$$

11. In the given figure $AB = AC$. A circle through B touches the side AC at D intersects side AB at P. If $AD = DC$, prove that $AB = 4AP$.



12. Derive the formula for the distance between two point $P(x_1, y_1)$ and $Q(x_2, y_2)$

Or

If point P divides a line segment AB in the ratio m_1, m_2 , and the Co-ordinates of A & B are (x_1, y_1) & (x_2, y_2) respectively, Find the co-ordinates of P.

13. If the points A $(-2, 3)$, B $(p, 2)$ and C $(7, 0)$ are collinear. Find p.

Or

Find the point, whose ordinate is equal to the abscissa which is equidistant from $(0, 4)$ and $(2, 0)$

14. A coin and a dice are thrown. What is the probability of getting (i) a head (ii) an even number (iii) a head and an even number (iv) a tail or an odd number.

15. A right-angled triangle, whose remaining angles are 60° and 30° revolves about the hypotenuse, which is 84 cm long. Find the volume of the double cone thus formed.

16. Prove : $\frac{\operatorname{Cosec} A}{\operatorname{Cosec} A - 1} - \frac{\operatorname{Cosec} A}{\operatorname{Cosec} A + 1} = 2 \sec^2 A$

Or

Evaluate : $\frac{\cot 54^\circ}{\tan 36^\circ} + \frac{\tan 20^\circ}{\cot 70^\circ} - 2$

17. Construct a $\square ABCD$ in which $AB = BC = 5$ CM, $AD = 4.5$ CM, $CD = 6$ CM, $\angle B = 80^\circ$. Construct a $\square A'BC'D'$ similar to $\square ABCD$, whose each side is $\frac{4}{5}$ -th of corresponding side of $\square ABCD$.

18. Find the average marks of students from the following table :

Marks	Above 0	Above 10	Above 20	Above 30	Above 40	Above 50	Above 60	Above 70	Above 80	Above 90
No. of students	80	77	72	65	55	43	28	16	10	8

19. A sum of Rs 50,400 is borrowed to be paid back in 3 years in 3 equal instalments. What is the annual instalment if the rate of interest is 5 % per annum compound yearly ?

20. The annual income statement of Dr. Shukla, a civil judge is given below :

- (i) Basic pay = Rs 2,10,000 (ii) Dearness Allowance = 95,000
(iii) House rent allowance = Rs 39,000 (iv) Interim relief = Rs 2,000
(v) City compensatory allowance = Rs 5,500
(vi) Deductions : (a) Contribution to P.F. = Rs 2,200 per month
(b) L.I.C. Premium = Rs 6,000 quarterly (c) Investment in PPF = Rs 2,000
Per month

He donates Rs . 40,000 to a charitable trust and get 50 % relief .

1.Income Tax Slab :

		NIL
(i)	Upto Rs 100000	10 % of amount exceeding Rs 100000
(ii)	Rs 100001 – 1,50,000	Rs 5000 + 20 % of the amount exceeding Rs 1,50, 000
(iii)	Rs 1,50,001- 250,000	
(iv)	Amount Exceeding Rs 2,50000	Rs 25000 + 30% of the amount exceeding Rs 250000.

2. Surcharge :- 10 % of the amount of tax payable if the taxable income exceeds Rs 1000000.

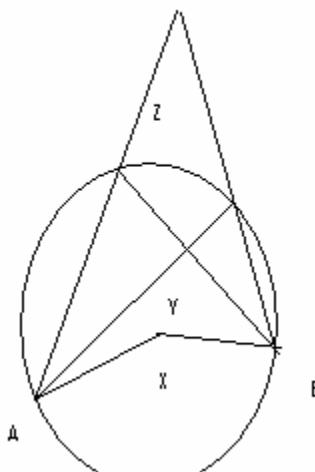
3.Educational : 2 % of the amount of tax payable

21. State and prove alternate segment theorem.

Using this theorem , prove $\angle PAQ + \angle PBQ = 180^\circ$, if PQ is the common tangent of two circles which interest at A and B .

22. Prove in any circle the angle subtended at the centre is double of the angle subtended in the remaining segment by same arc.

In the figure if O is the centre of circle, prove $\angle x = \angle y + \angle z$



23. The angle of elevation of a cliff from a fixed point is α . After going up a distance of k meters towards the top of the hill at an angle of σ it is found that the angle of elevation is ϕ . Show that the height of the cliff is $K \frac{(\cos \sigma - \sin \sigma \cot \sigma)}{\cot \alpha - \cot \phi}$.
24. A bucket is 32 cm in diameter at the top and 20 cm in diameter at the bottom. Find the capacity of bucket in liters if it is 21 cm deep. Also find the cost of the tin sheet used in making the bucket at the rate of Rs , 1.50 per sq .dm.
25. The following data shows the number of students opting different subjects in a college : Draw Pic chart

Subject :	English	Maths	Physics	Chemistry	Eco	Commerce
No of students :	45	60	20	30	10	15

Guess Paper – 2007
Class – X
Mathematics

GRADE 10

MARKS: 80

Time allowed: 3 hours

General Instructions:-

- All questions are compulsory

- The question paper consists of 25 question divided into three sections A, B and C. Section A contains 7 question of 2 marks each, Section B is 12 questions of 3 marks each and Section C is of 6 questions of 5 marks each..
- There is no overall choice. However 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
- Write the serial number of the question before attempting it.
- In question on construction, the drawing should be neat and exactly as per the given measurements
- Use of calculators is not permitted. However you may ask for mathematical tables.

Section A

26. Solve for x and y

$$\frac{148}{x} + \frac{231}{y} = \frac{527}{xy}$$

$$\frac{231}{x} + \frac{148}{y} = \frac{610}{xy}$$

27. Simplify $\frac{1}{x-1} - \frac{1}{x+1} - \frac{2}{x^2+1} - \frac{4}{x^4+1}$

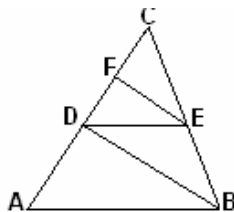
28. Solve for x : $\frac{2}{x^2} - \frac{5}{x} + 2 = 0$

29. If 7 times the 7th term of an AP is equal to 11 times its 11th term, Show that the 18th tem of the A.P is zero.

OR

Find the sum of the first 24 terms of the sequence whose n^{th} term is given by $a_n = 3 + \frac{2}{3}n$

30. In the given figure $AB \parallel DE$ and $BD \parallel EF$, prove that $DC^2 = CF.AC$



31. A washing machine is available at Rs 9,600 cash or for Rs 2,100 cash down payment followed by five monthly instalments of Rs1, 545 each. Find the rate of interest charged under instalment plan.

32. A bag contains 7 red balls, 8 white balls and x black balls. If the probability of getting a black ball is $\frac{2}{5}$, find x also find the probability of getting a non-red ball.

OR

Find the probability of getting 53 Mondays in a non-leap year.

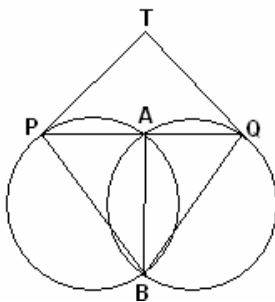
Section B

33. Solve the system of linear equations graphically
 $5x - 6y + 30 = 0$
 $5x + 4y - 20 = 0$ Also find the vertices of the triangle formed by the above two lines and x -axis
34. Find the values of a and b so that the polynomials $P(x) = (x - 4)(2x^2 + x - a)$ and $Q(x) = (x + 1)(2x^2 + bx - 12)$ have $x^2 - 3x - 4$ as H.C.F
35. A TV set is available for Rs 19,650 cash payment or for Rs 3,100 cash down payment and three equal annual instalments. If the shopkeeper charges interest at the rate of 10% per annum compounded annually, calculate the amount of each instalment.
36. Find the sum of all three digits numbers which leave the remainder 2, when divided by 7
37. 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 square.

OR

Two trains leave a railway station at the same time. The first train travels due West and the second due North. The first train travels 5 km/h faster than the second. If after two hours they are 50 km apart, find the average speed of the each train.

38. Construct a quadrilateral ABCD such that $AB = 3.2\text{cm}$, $AD = 3.7\text{cm}$, $DB = 4.2\text{cm}$, $BC = 4.5\text{cm}$, $\angle B = 120^\circ$. Construct a quadrilateral A'B'C'D' similar to quadrilateral ABCD so that diagonal D'B is of length = 5.3 cm.
39. In figure two circles intersect at points A and B. A straight line through A intersects the circles at P and Q. If tangents at P and Q intersect at T. prove that P, B, Q, T are concyclic.



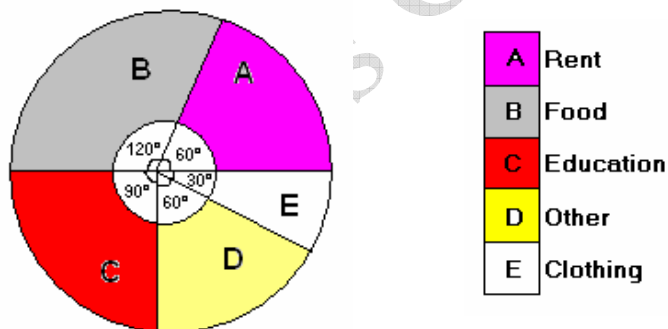
40. A cylindrical bucket 32cm high and 9 cm of radius of the base is filled with sand. The bucket is emptied on the ground and a conical heap of sand is formed. If the height of the conical heap is 24cm. find the radius and slant height of the heap.

41. Prove that $\frac{\cos A}{1 - \tan A} + \frac{\sin A}{1 - \cot A} = \sin A + \cos A$

OR

Without using tables, evaluate $\cos(40^\circ + \theta) - \sin(50^\circ - \theta) + \frac{\cos^2 40^\circ + \cos^2 50^\circ}{\sin^2 40^\circ + \sin^2 50^\circ}$

42. Show that the line joining the points (4, 3) and (8, 6) passes through the origin.
43. The line joining the points (2, 2) and (8, -1) is trisected at the points P and Q. If the point P lies on the line $3x - 2y - k = 0$, find the value of k
44. The given pie chart represents the expenditure of a family on different items. A, B, C, D and E. Using the angles given, find the percentage of expenditure on these items. If the total expenditure of the family is Rs 27,000 answer the following



- i) What is the expenditure on Food?
- ii) How much more money is spent on education than on rent?

Section C

45. Find the mean age from the following data.

Age in years	Below 10	Below 20	Below 30	Below 40	Below 50	Below 60	Below 70
Number of Students	5	9	17	25	34	45	50

46. Prove that ratio of the areas of two similar triangles is equal to the ratio of the squares on the corresponding sides.

Using the above theorem prove that area of an equilateral triangle on hypotenuse of a right triangle is equal to the sum of the areas of equilateral triangles on the other two sides.

OR

Prove that in a triangle, the line drawn parallel to one side to intersect the other two sides in distinct points, divides the two sides in the same ratio.

Using the above result, prove the following.

Diagonals of trapezium divide each other proportionally.

47. Prove that the sum of the opposite angles of each pair of a cyclic quadrilateral is supplementary. .

Using the above result solve for x and y

In a cyclic quadrilateral ABCD, $\angle A = (2x + 4)^\circ$, $\angle B = (x + 10)^\circ$, $\angle C = (4y - 4)^\circ$ and $\angle D = (5y + 5)^\circ$

48. A round balloon of radius ' a ' subtends an angle θ at the eye of the observer while the angle of elevation of its centre is ϕ . Prove that the height of the centre of the balloon is $a \sin \phi \sec \frac{\theta}{2}$

OR

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

49. A solid is in the form of a right circular cone mounted on a hemisphere. The radius of the hemisphere is 2.1 cm, and the height of the cone is 4 cm. The solid is placed in a cylindrical tub, full of water, in such a way that the whole solid is submerged in water. If the radius of the cylindrical tub is 5 cm and its height is 9.8 cm, find the volume of the water left in the cylindrical tub.
50. Mr. Alisha's monthly salary is Rs 32,500(exclusive of H.R.A) He contributes Rs 7000 per month towards GPF and Rs 20,000 per annum in PPF. He donates Rs20,000 to a school and gets a relief of 50% on the donation. If he has been paying Rs 2800 per month as income tax for the first 11 months of the year, find the liability for last month of the year.

Use the following for calculating the income tax:

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

b) Rate of income tax

Slab	Income tax
i) Upto Rs 100,000	No tax
ii) From Rs 100,001 to Rs 1,50,000	10% of the amount exceeding Rs 100,000

- iii) From 150,001 to Rs 2,50,000 5000 + 20% of the amount exceeding Rs 150,000
- iv) Above Rs 250,000 Rs 25,000 + 30% of the amount exceeding Rs 250,000
- c) Education Cess 2% of the tax payable.
- d) Special rebate for women Rs 5000 in tax payable

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Guess Paper – 2007
Class – X
Mathematics

Board Exam Preparatory Test Paper

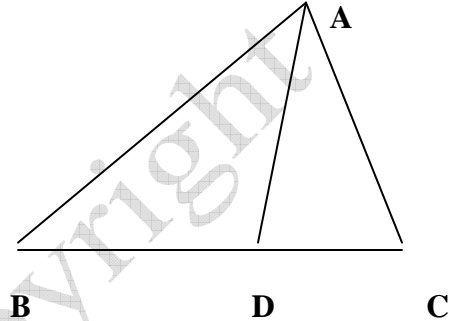
Maximum Marks: 80

Time allowed: 3 Hours

Section A

1. Solve for x and y : $2(ax - by) + (a + 4b) = 0$; $2(bx + ay) + (b - 4a) = 0$
2. Cars A and B start from the same point. A travels in the south direction while B travels in the west. A travels 10 km/hr faster than B. If, after 2 hours, they are 100 km apart, find their speeds.
3. If $(x + 3)(x - 2)$ is the HCF of the polynomials $P(x) = (3x^2 + 8x - 3)(x^2 + ax + 6)$ and $Q(x) = (x^2 - 3x + 2)(bx^2 + 7x + 3)$, find the values of 'a' and 'b'.
4. Determine the value of p for which the quadratic equation $8x^2 - 6px + 18 = 0$ has real roots.
5. An fan is sold for Rs. 600 cash or Rs. 250 cash down payment followed by three equal monthly instalments. If each monthly instalment is Rs. 125, find the rate of interest charged under scheme.

6. Cards numbered from 21 to 38 are thoroughly shuffled and one card is drawn. Find the probability that the number on the card is (i) a multiple of 4 (ii) not a prime number.
7. In the given figure, D is a point on BC of the triangle ABC such that $\angle ADC = \angle BAC$.
Prove that $CA^2 = CB \times CD$



Section B

8. Find the ratio in which the point M(k , 6) divides the line segment joining the points A(2 , 8) and B(− 4 , 3). Also, find the value of k.
9. Find the coordinates of a point equidistant from the points (1 , 2), (3 , −4) and (5 , −6).
10. Construct a circle of radius 5 cm. From a point 13cm away from its centre, construct the pair of tangents to the circle and measure their lengths.
11. A loan of Rs. 1,10,000 is to be returned in two years. If the interest is charged at 20 % per annum, compounded annually, find the value of each instalment. Also, find the interest charged.
12. If the n^{th} term of an AP is $(2n + 1)$, find the expression for the sum of its n terms. Using it, find S_{20} .
13. Solve graphically: $5x - 3y + 30 = 0$; $5x + 4y - 20 = 0$.
Also, write the vertices of the triangle obtained by these lines and x-axis.
14. Simplify

$$\frac{x^3 - 8}{(x+2)^2 - 2x} \div \frac{x^2 - 4}{x^2 + 6x + 8}$$

15. An agricultural field is in the form of a rectangle of length 20 m and width 14 m. A 10 m deep well of diameter 7m is dug in a corner of the field and earth taken out of the well is spread evenly over the remaining part of the field. Find the rise in its level.
16. The perpendicular from P on the side QR of a ΔPQR intersects QR at S such that $QS = 3 RS$.
Prove that $2 PQ^2 = QR^2 + 2 PR^2$
17. If $\sin \theta + \cos \theta = p$ and $\sec \theta + \csc \theta = q$, then prove that $(p^2 q - q) = 2.p$
18. Solve for x: $4x^2 - 4a^2x + (a^4 - b^4) = 0$
19. In a television viewer-ship survey, the following data was collected. Depict the data with the help of a pie-chart.

Movies	Serials	Sports	Cartoons	News
3000	1800	2700	1200	2100

Section C

20. State and prove *Basic Proportionality Theorem*. Using it, prove that the diagonals of a trapezium divide each other in the same ratio.
21. Find the value of f_1 and f_2 , if the mean of the following distribution is 62.8 and the sum of all the frequencies is 50.
- | Class | 0-20 | 20-40 | 40-60 | 60-80 | 80-100 | 100-120 |
|-----------|------|-------|-------|-------|--------|---------|
| Frequency | 5 | f_1 | 10 | f_2 | 7 | 8 |
22. Prove that if a line touches a circle and from the point of contact a chord is drawn, the angles that this chord makes with the given line are equal respectively to the angles formed in the corresponding alternate segments. Using it, prove the following: *Two circles intersect each other at two points A and B. At A, tangents AP and AQ are drawn which intersect other circles at the points P and Q respectively. Prove that AB is the bisector of angle A.*
23. A man on the top of a tower observes a car moving at a uniform speed coming directly towards the foot of the tower. If it takes 8 minutes for the angle of depression to change from 30° to 60° , how soon after this, will the car reach the tower?

24. A circus tent is cylindrical to a height of 3 m and conical above it. If its base radius is 52.5 m and the slant height of the conical portion is 53m, find its capacity and the area of the canvas needed to make the tent. (use $\pi = 22/7$)
25. Mrs. Sharma earns a monthly salary of Rs. 38,500. She contributes Rs. 5,500 per month to her Provident Fund and pays a bimonthly premium of Rs. 5000 towards a life insurance policy. She has also purchased NSCs worth Rs. 30,000 during the financial year. She has donated Rs. 14,000 to PMNRF (100% relief). Calculate the IT payable by her if she has already paid Rs. 3000 per month as tax for first eleven months.

Income Slabs and Rates for computation of Income Tax

Taxable Income	Rate
Up to Rs 1,35,000	Nil
Rs 1,35,001 to 1,50,000	10 % of the amount exceeding Rs. 1,35,000
Rs. 1,50,001 to 2,50,000	1500 + 20 % of the amount exceeding Rs. 1,50,000
Rs. 2,50,001 and above	21,500 + 30 % of the amount exceeding Rs. 2,50,000
Surcharge	10% of the total tax payable if taxable income exceeds Rs. 10,00,000
Educational Cess:	2% of the Net Tax payable.

ADMISSIBLE DEDUCTIONS:

The savings made under the following heads get deducted from the gross annual income. Provident Fund, Insurance premium, National Savings Certificates, Infrastructure bonds, Mutual Funds etc
There is no limit to savings made to these individual heads, but a maximum deduction of Rs. 1,00,000 can be taken for the purpose of tax savings.

**Guess Papers – 2007
CLASS - X**

Mathematics

Time: 3 hrs

Marks: 80

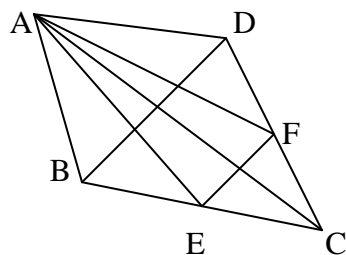
General Instructions:

- (i) All questions are compulsory.
- (ii) The question paper consists of 25 questions divided into three section – A, B and C.
Section A contains 10 questions of 2 marks each. Section B is of 10 questions of 3 marks each and section C is of 5 questions of 5 marks each.
- (iii) There is no overall choice. However, an internal choice has been provided in two questions of three marks each, two questions of four marks each and two questions of six marks each.
- (iv) In question on construction, the drawing should be neat and exactly as per the given measurements.
- (v) Use of calculators is not permitted.

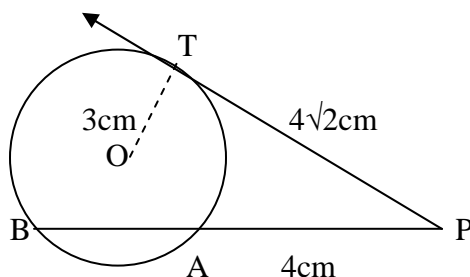
SECTION A

(Qns 1 – 10 carry 3 marks each)

1. Solve: $\frac{148}{x} + \frac{231}{y} = \frac{527}{xy}$ or $ax + by = a - b$
 $\frac{231}{x} + \frac{148}{y} = \frac{610}{xy}$ $bx - ay = a + b$
2. If $x - 3$ is the G.C.D of $x^3 - 2x^2 + px + 6$ and $x^2 - 5x + q$, find $6p + 5q$.
3. If $\frac{5x - 13}{x^2 - 5x + 6} = \frac{A}{x - 2} + \frac{B}{x - 3}$, find A and B.
4. Solve: $2 \left(\frac{2x-5}{x+3} \right) - 3 \left(\frac{x+3}{2x-5} \right) = 5$
or
 $\frac{1}{a+b+x} = \frac{1}{a} + \frac{1}{b} + \frac{1}{x}$, $a + b = 0$
5. Find the three terms of the A.P such that their sum is 6 and product is – 42.
Or
The angles of a quadrilateral are in A.P whose common difference is 10° . Find the angles.
6. Find the sum: $3 + 11 + 19 + \dots + 803$.
7. A typewriter is available for Rs 7200 cash or for Rs 3040 cash down payment and five equal monthly instalments of Rs 860 each. Find the rate of interest charged under the instalment scheme.
8. Ram borrowed a sum of money and returned in three equal quarterly instalments of Rs 17576 each. Find the sum borrowed, if the rate of interest charged was 16% per annum compounded quarterly. Find also the total interest charged.
9. In fig. ABCD is a quadrilateral with $AB = AD$. AE and AF are respectively bisectors of $\angle BAC$ and $\angle DAC$. Prove that $EF \parallel BD$.



10. In fig, O is the centre of the circle with radius 3cm and PT is the tangent to the circle at T. If $PT = 4\sqrt{2}$ cm and $PA = 4$ cm, find the distance of AB from the centre of the circle.



SECTION B

(Qns 11- 20 carry 4 marks each)

11. Show graphically the following system of equations has no solution. Also find the area between these lines representing the equations in the first quadrant.
 $2x + 3y = 6$
 $4x + 6y = 24$
12. A shopkeeper buys a number of books for Rs 80. If he had bought 4 more books for the same amount, each book would cost him Re 1 less. How many books did he buy?
13. Construct a triangle ABC with $BC = 5$ cm, vertical $\angle A = 60^\circ$ and median through vertex A of length 3.8 cm.
14. Prove that: $\frac{\cos^3\theta + \sin^3\theta}{\cos\theta + \sin\theta} + \frac{\cos^3\theta - \sin^3\theta}{\cos\theta - \sin\theta} = 2$
 or
 Without using trigonometric tables, evaluate the following:
 $\cot\theta \cdot \tan(90^\circ - \theta) - \sec(90^\circ - \theta) \cdot \operatorname{cosec}\theta + \sin^2 25^\circ + \sin^2 65^\circ + \sqrt{3}(\tan 5^\circ \tan 45^\circ \tan 85^\circ)$
15. Find the number of coins 1.5 cm in diameter and 0.2 cm thick to be melted to form a right circular cylinder whose height is 8 cm and diameter 6 cm.
16. Calculate the arithmetic mean of the following frequency distribution:

Class-interval	0-20	20-40	40-60	60-80	80-100	100-120	120-140
Frequency	12	18	15	25	26	15	9

17. Given below is the expenditure of a person on different items out of his salary of

Rs 14,400.

Item	Clothing	Food	Rent	Education	Others	G. Total
Expenditure (in Rs)	2800	3600	3600	1800	2600	14400

Draw a pie chart to depict the above data.

18. The king, queen and jack of clubs are removed from a deck of 52 playing cards and 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 heart.
19. A(6,8) is a point on a circle with centre at (3,4). Find the point on the circle which is diametrically opposite to A. Also find the radius of the circle.

Or

Three consecutive vertices of a parallelogram are (3,0), (5,2) and (-2,6). Find its fourth vertex. Also find the length of the diagonal to the fourth vertex.

20. The line joining the points (2,1) and (5,-8) is trisected at the points P and Q. If point P lies on the line $2x - y + k = 0$, find the value of k.

SECTION C

(Qns 21 – 25 carry 6 marks each)

21. Prove that in a right-angled triangle, the square on the hypotenuse is equal to the sum of the squares on the other two sides.

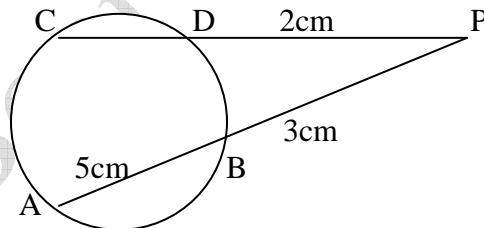
Using the above do the following:

In $\triangle ABC$, $\angle A = 90^\circ$ and $AD \perp BC$. Prove that $AB^2 + CD^2 = BD^2 + AC^2$.

22. Prove that if two chords of a circle intersect inside or out side the circle, then the rectangle formed by the two parts of one chord is equal in area to the rectangle formed by two parts of the other.

Using the above do the following.

If $AB = 5\text{cm}$, $BP = 3\text{cm}$ and $PD = 2\text{cm}$, find CD.



23. The angle of elevation of a cloud from a point 200m above the lake is 30° and the angle of depression of its reflection in the lake is 60° . Find the height of the cloud.

Or

A man on a cliff observes a boat at angle of depression of 30° which is approaching the shore to the point immediately beneath the observer with uniform speed. Six minutes later, the angle of depression of the boat is found to be 60° . Find the time

taken by the boat to reach the shore.

24. A right triangle, whose sides are 15cm and 20cm, is made to revolve about its hypotenuse. Find the volume and the surface area of the double cone so formed.
(Use $\pi = 3.14$)

or

A container made up of a metal sheet is in the form of a frustum of a cone of height 16cm with radii of its lower and upper ends as 8cm and 20cm respectively. Find the cost of milk which can completely fill the container at the rate of Rs 15 per litre.

(Use $\pi = 3.14$)

25. Ashish's annual income is Rs 1,80,000. She contributes Rs 1,000 per month in P.F and pays Rs 2,000 as annual LIC premium and donates Rs 6,000 in National Defence Fund (100% relief on donation). Find the amount she has to pay in the last month of the year if Rs 300 is deducted at source from her monthly salary for 11 months.

Use the following for calculating income tax.

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

(b) Rates of Income tax for male persons (Below 65 years)

Taxable Income	Income tax
(i) Upto Rs 1,00,000	Nil
(ii) Rs 1,00,001 to Rs 1,50,000	10% of income exceeding Rs 1,00,000
(iii) Rs 1,50,001 to Rs 2,50,000	Rs 5000 + 20% of income exceeding Rs 1,50,000
(iv) More than Rs 2,50,000	Rs 25000 + 30% of income exceeding Rs 2,50,000

(c) Surcharge: If taxable income exceeding Rs 10 lakh, a surcharge of 10% is levied on the amount of tax payable.

(d) Education cess: 2% of income tax.

Guess Papers – 2007 Class – X Mathematics

Max.Marks:80

Time: 3 Hrs

General Instructions:

- The question paper consists of 25 questions divided into three sections A, B and C.
- Section A contains 10 questions of 2 marks each. Section B contains 10 questions of 3 marks each. Section C contains 5 questions of 5 marks each.
- There is no overall choice. However, an internal Choice is given in some questions.

SECTION A

1. Solve the following system of equation :

$$\frac{1}{2x} - \frac{1}{y} = -1$$

$$\frac{1}{x} + \frac{1}{2y} = 8$$

2. Find the value of K for which the HCF of $x^2 + x - (2K+2)$ and $2x^2 + Kx - 12$ is $(x+4)$.

3. Simplify:

$$\frac{(x+y)^2}{(x+y+z)^2} \div \left\{ \frac{(x-z)^2 - y^2}{(x^2 + xy + zx)} \right\} \div \left[\frac{(x-y)^2 - z^2}{(x^2 - xy + zx)} \right]$$

4. Using quadratic formula, solve the following for y:

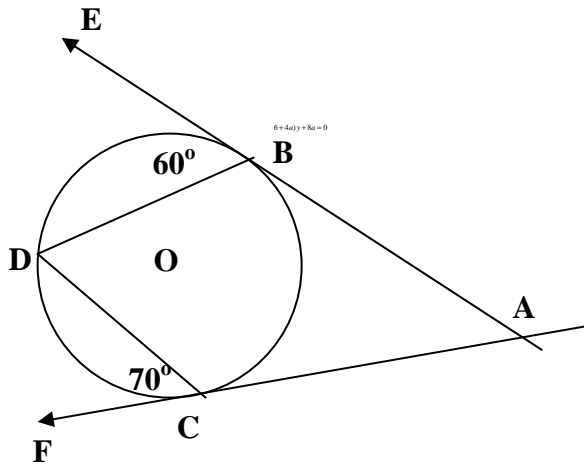
$$3y^2 + (6 + 4a)y + 8a = 0$$

5. The 8th term of an Arithmetic Progression is 37 and its 12th term is 57. Find the A.P
6. Find the A.P whose 10th term is -8 and 20th term is 12. Also find the sum of first 10 terms

OR

The 5th term of an A.P is 1 and its 31st term is -77. Which term of the A.P is -17.

7. An article is sold for Rs.2000 cash or for Rs.1000 cashdown payment together with Rs.1040 to be paid after 3 months. Find the rate of interest charged under the instalment plan.
8. The cost of a motorcycle is Rs.27000. A customer agrees to make a down payment of Rs.7140, followed by 3 equal annual instalments. If the rate of interest be 10% per annum, compounded annually, what is the value of each instalment?
9. In the given figure, ABE , ACF are tangents to the circle with centre O .
 $\angle EBD = 60^\circ$ and $\angle DCF = 60^\circ$. Find $\angle BAC$ and $\angle BDC$.



10. The diagonal BD of a parallelogram $ABCD$ intersects the line segment AE at the point F , where E is any point on side BC . Prove that $DF \times EF = FB \times FA$

SECTION-B

11. Find graphically the co-ordinates of the triangle formed by the lines $y = x$, $y = 2x$, $x + y = 6$.
12. Find the point on y-axis which is equidistant from $(-5, -2)$ and $(3, 2)$.
13. Find the co-ordinates of centroid of a triangle whose vertices are (x_1, y_1) , (x_2, y_2) , (x_3, y_3) .
14. A card is drawn at random from a pack of 52 cards. Find the probability that the card drawn is
- a black king
 - spade or an ace
 - neither a heart nor a king
 - a jack, queen or a king.

15. Prove that $\frac{\cos A}{1 - \tan A} - \frac{\sin^2 A}{\cos A - \sin A} = \sin A + \cos A$

OR

Find the value of: $\frac{\tan 20^\circ}{\cot 70^\circ} + \frac{\cot 50^\circ}{\tan 40^\circ} + \frac{\sin^2 20^\circ + \sin^2 70^\circ}{\sin \theta \cos(90^\circ - \theta) + \cos \theta \sin(90^\circ - \theta)}$

16. Find the value of n , if the mean of the following data is 20.

X	15	17	19	$20 + n$	23
F	2	3	4	$5n$	6

17. A well of diameter 3m is dug 14m deep. The earth taken out of it has been spread evenly all around it to a width of 4m to form an embankment. Find the height of the embankment.

18. Solve : $\frac{x-1}{x-2} + \frac{x-3}{x-4} = \frac{10}{3}$, ($x \neq 2, 4$)

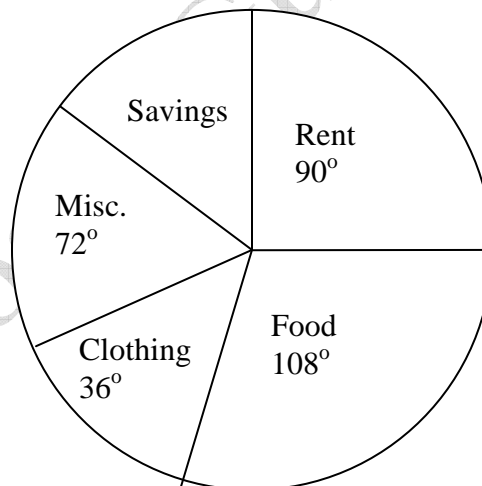
OR

Two pipes running together can fill a tank in 6 minutes. If one pipe takes 5 minutes more than the other to fill the tank, find the time in which each pipe would fill the tank.

19. Construct $\triangle ABC$ in which $BC = 7\text{cm}$, $\angle A = 70^\circ$ and foot of the perpendicular D on BC from A is 4.5cm away from B . How many such triangles are possible?

20. The pie chart alongside shows the monthly expenditure of a family on food, clothing, rent, miscellaneous expenses and savings. Read the pie chart carefully and answer the following:

- What is the central angle for savings?
- What is the ratio of expenditure on food to that of rent?
- If family spends Rs.825 on clothing, what is the total monthly income?
- What percent of the total income does the family save?



SECTION-C

- 21.(i) Prove that the sum of either pair of the opposite angles of a cyclic quadrilateral is 180° .
(ii) $ABCD$ is a cyclic trapezium with $AD \parallel BC$. If $\angle B = 70^\circ$, find the other three angles of the trapezium.
22. Prove that the ratio of the areas of two similar triangles is equal to the ratio of the squares of their corresponding sides.
Using the above result, prove that the area of equilateral triangle described on the side of a square is half the area of the equilateral triangle described on its diagonal.
23. A pole 5m high is fixed on the top of a tower. The angle of elevation of the top of the pole observed from a point 'A' on the ground is 60° and the angle of depression of the point 'A' from the top of the tower is 45° . Find the height of the tower.
24. A hollow cone is cut by a plane parallel to the base and the upper portion is removed. If the curved surface area of the remaining portion is $\frac{8}{9}$ of the curved surface of the whole cone, find the ratio of the line-segments into which the cone's altitude is divided by the plane.
OR
The interior of a building is in the form of a cylinder of base radius 12m and height 3.5m, surmounted by a cone of equal base and slant height 12.5m. Find the internal curved surface area and the capacity of the building.
25. Mr. Shahid income is Rs.60, 000 (excluding HRA). He pays a premium of Rs.30, 000 annually towards L.I.C, and contributes Rs.5, 000 per month towards P.F. He purchases NSC for Rs.20, 000 and contributes Rs.10, 000 towards P.M.s National Relief fund. He also donates Rs.8, 000 to a school where he studied, earning deduction 100% relief and 50% of the amount donated respectively. Find the total income tax to be paid by him for that year. If Rs.8000 is deducted from his salary every month towards income tax, find the tax to be paid by him in the last month of the year.

For calculation purpose use the following instructions:

Use the following for calculating income tax.

- (a) Savings: 100% exemption for savings upto Rs 1,00,000.
(b) Rates of Income tax for male persons (Below 65 years)

Taxable Income	Income tax
(i) Upto Rs 1,00,000	Nil
(ii) Rs 1,00,001 to Rs 1,50,000	10% of income exceeding Rs 1,00,000
(iii) Rs 1,50,001 to Rs 2,50,000	Rs 5000 + 20% of income exceeding Rs 1,50,000
(iv) More than Rs 2,50,000	Rs 25000 + 30% of income exceeding Rs 2,50,000

- (c) Surcharge: If taxable income exceeding Rs 10 lakh, a surcharge of 10% is levied on the amount of tax payable.
- (d) Education cess: 2% of income tax.

GUESS PAPERS

CLASS- X

MATHEMATICS

Max. Marks 100

Max. Time 3 Hours

1. Solve the following system of equations graphically
 $2x - 3y - 6 = 0$ and $2x + y + 10 = 0$
2. Solve for x, $1 + 6 + 11 + 16 + \dots + x = 148$.
3. In $\triangle ABC$, $BD \perp AC$, $CE \perp AB$ such that they intersect at point P, prove that $BP \times PD = EP \times PC$.
4. A loan of Rs.12,750 is to be paid back in two equal half yearly installments. If the interest is compounded half yearly at 8% per annum, how much is each installment.
5. One can purchase a room-cooler for Rs.2400 cash or for Rs.1,200 cash down payment and two monthly installments of Rs.610 each. Find the rate of interest charged under the installment plan.
6. The perimeters of the ends of a frustum of a cone are 48cm and 36cm. If the height of the frustum be 11cm, Find its volume.
7. Draw a circle of radius 6cm, from a point 10 cm. away from, its centre, construct a pair of tangents to the circle and measure its lengths.
8. A solid metallic cylinder of radius 14cm and height 21cm is melted and re cast into 72 equal small spheres. Find the radius of one such sphere.

OR

The total S.A. of a right circular cylinder is 6512 cm^2 and the circumference of its base is 88cm. Find the volume of the cylinder (use $\pi = 22/7$).

9. The mean of the following frequency table is 50. But freq. f_1 & f_2 in class 20-40 and 60-80 are missing find f_1 & f_2 .

Class interval	0-20	20-40	40-60	60-80	80-100	Total
Frequency	17	f_1	32	f_2	19	200

10. A dice is thrown once. Find the probability of getting

- (i) A number greater than 2
- (ii) An even no.

OR

A bag contains 3 Red, 4 black, 5 White balls. A ball is drawn at random. Find the probability that it is (i) Black ball (ii) none red ball.

11. Solve the following linear equations for x & y

$$\frac{x}{a} + \frac{y}{b} = a + b \quad (1) \qquad \frac{x}{a^2} + \frac{y}{b^2} = 2$$

12. For what value of k is HCF of $x^2 + x - (2k + 2)$ and $2x^2 + kx - 12$ is $x + 4$?

13. Simplify $\frac{1}{x+y} - \frac{1}{x-y} - \frac{4y}{y^2 - x^2} + \frac{2y}{x^2 + y^2}$

14. Solve the following equations using quadratic formula

$$(x + 4)(x + 5) = 3(x + 1)(x + 2) + 2x$$

15. A passenger train takes 2 hours less for a journey of 300 km if its speed is increased by 5km/hr from its usual speed. What is its usual speed.

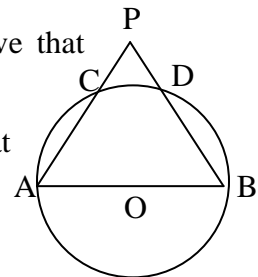
OR

Out of a certain no. of saras birds one fourth of the no. are moving about in lotus plants, $1/9$ the coupled with $1/4^{\text{th}}$ as well as 7 times the square root of the square no. of total move on a hill, 56 birds remain in vakula tree, what is the total no. of birds.

16. In the given figure, AB is the diameter of the circle. Prove that

$$AB^2 = AP \times AC + BP \times BD.$$

17. A sphere and a cube have the same surface area. Show that ratio of the volumes of sphere and cube is $1 : \sqrt{\pi/6}$.



18. Prove that $\frac{1}{\sec A + \tan A} - \frac{1}{\cos A} = \frac{1}{\cos A} - \frac{1}{\sec A - \tan A}$.

OR

If $\operatorname{cosec} \theta - \sin \theta = m$ and $\sec \theta - \cos \theta = n$, show that $(m^2 n)^{2/3} + (mn^2)^{2/3} = 1$.

19. In what ratio the line segment joining the points (2,-2) and (5,4) is divided by (i) x-axis and (ii) y-axis.
20. If the points (x,y) is equidistant from the points (a + b, b - a) and (a - b, a + b), prove that bx = ay.

OR

Three vertices of a parallelogram are (a + b, a - b); (2a + b, 2a - b); (a - b, a + b). Find the fourth vertex.

21. The following data relate to the construction of a house in Delhi

Items	Cement	Steel	Bricks	Timber	Labour	Misc.
Expenditure	30%	10%	10%	15%	25%	10%

22. Around a balloon of radius r, subtends an angle α at the eye of the observer while the angle of elevation of its centre is β . Prove that the height of the centre of the balloon is $r \sin \beta \operatorname{cosec} \frac{\alpha}{2}$.

OR

The angle of elevation of a cliff from a fixed point is θ . After going up a distance of k mts. towards the top of the cliff at an angle of ϕ it is found that the angle of elevation is α . Show that the height of the cliff is $\frac{k(\cos \phi - \sin \phi \cot \alpha)}{\cot \theta - \cot \alpha}$.

23. State and prove the converse of Pythagoras theorem and use it to determine whether the Δ having sides (a - 1)cm, $2\sqrt{a}$ cm and (a + 1)cm is a right Δ or not.
24. 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 termed in the corresponding alternate segments. Use above theorem to prove the following :
- (i) two circles cut at A & B and a straight line PAQ cuts the circles at P & Q. If the tangent at P & Q intersect at I. Prove that P, B, Q and I are concyclic.
25. Gayatri, aged 66, retired as a branch manager with a bank. She is receiving a monthly pension of Rs.14,400. She has bought NSCs worth Rs.7,500 and plans to deposit Rs.2,100 per quarter in her PPF account. She has donated Rs.5,500 to a charitable trust, which is eligible for 50% deduction. How much more should she deposit in her PPF account so that her tax liability is zero?

Guess Paper – 2007
Mathematics
Class - X

26. Solve the following system of equations :

$$x + y - (a + b) = 0 \text{ and } ax - by - (a^2 - b^2) = 0$$

27. Simplify : $\frac{1}{x-1} - \frac{1}{x+1} - \frac{2}{x^2+1} - \frac{4}{x^4+1}$

28. If PAQ is a tangent at A to the circumcircle of $\triangle ABC$ such that $PAQ \parallel BC$. Prove that $\triangle ABC$ is an isosceles triangle.

29. A pressure cooker is sold for Rs.500 cash or for Rs.250 cash down payment followed by Rs.260 after three months. Find the rate of interest charged under this scheme.

30. A man borrows money from a finance company and has to pay it back in two equal half yearly installment of Rs.4,945 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.

31. For what values of k is the H.C.F. of $x^2 + x - (2k + 2)$ and $2x^2 + kx - 12x, x + 4$?

32. Using quadratic formula, solve the following equation for x :

$$abx^2 + (b^2 - ac)x - bc = 0$$

OR

There are three consecutive positive integers such that the sum of the square of the first and the product of the other two is 154. What are the integers ?

33. Derive the formula for sum of the first n terms of an A.P. whose first term is 'a' and the common difference is 'd'.

OR

Determine the A.P. whose third term is 16 and the difference of 5th term from 7th term is 12.

34. Find the sum of the first 20 terms of an A.P. in which 3rd term is 7 and 7th term is two more than thrice of its 3rd term.

35. ABC is triangle in which $AB = AC$ and D is a point on the side AC such that $BC^2 = AC \times DC$. Prove that $BD = BC$.

OR

- In $\triangle ABC$, $\angle B = 2\angle C$ and the bisector of $\angle B$ intersect AC at D. Prove that $\frac{BD}{DA} = \frac{BC}{BA}$.
36. Solve for $x + \frac{1}{x-3} - \frac{1}{x+5} = \frac{1}{6}$ ($x \neq 3, -5$).
37. 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.
38. Construct a triangle ABC in which AB = 5cm angle C = 30° and median CD = 4cm.
39. A cone of height 24 cm has a curved surface area 550 cm^2 . Find its volume. (Take $\pi = 22/7$).
- OR
- If the radii of the circular ends of a conical bucket which is 45cm high are 28cm and 7cm. Find the capacity of the bucket. (Take $\pi = 22/7$)
40. Prove that $\frac{\tan \theta + \sec \theta - 1}{\tan \theta - \sec \theta + 1} = \frac{\sin \theta + 1}{\cos \theta}$.
- OR
- If $\sin \theta + \cos \theta = \sqrt{2} \sin(90^\circ - \theta)$, find $\cot \theta$
41. In what ratio is the join of A(4,3) and B(2,-6) divided by x-axis. Also, find the coordinates of the point of intersection.
42. Find the point on the Y-axis which is equidistant from (-5,-2) and (3,2).
- OR
- Find the coordinate of the centroid of a triangle whose vertices are (x_1, y_1) ; (x_2, y_2) ; (x_3, y_3) .
43. Following table gives the distribution of total house hold expenditure (in rupees) of manual workers in a city.
- | Exp. | 100-150 | 150-200 | 200-250 | 250-300 | 300-350 | 350-400 | 400-450 | 450-500 | Total |
|-------|---------|---------|---------|---------|---------|---------|---------|---------|-------|
| Freq. | 24 | 40 | 33 | 28 | 30 | 22 | 16 | 7 | 200 |
- Find the average expenditure (in rupees) per household.
44. Three coin are tossed simultaneously
- Write sample space of the experiment.
 - Find the probability of exactly 2 heads.
 - Find the probability of all heads.
45. The pie chart (as shown in figure) represent the number of students opting different subjects in a school. If total number of student in school is 180, find the number of students opting on each subject.
46. Prove that the ratio of the areas of two similar triangles are equal to the ratio of the squares of their corresponding sides.
- Using above theorem, find area ($\triangle DEF$) : area ($\triangle CFB$) from following figure if $DE \parallel BC$ and $AD : DB = 5:4$.
47. If PAB is a secant to a circle intersection it at A and B, and PT is a tangent, then $PA.PB = PT^2$.
- Using above theorem find the value of PT from the following figure is $PT = 2AP$ and $AB = 9\text{cm}$.

48. The angle of elevation of a cloud from a point 200 metres above a lake is 30° and the angle of depression of its reflection in the lake is 60° . Find the height of the cloud.

OR

From the top of a light house, the angle of depression of two ships on the opposite sides of it are observed to be α and β . If the height of the light house be h metres and line joining the ships passes through the foot of the light house, show that the distance between the ship is $\frac{h(\tan \alpha + \tan \beta)}{\tan \alpha \cdot \tan \beta}$ metres.

49. A cylindrical water tank of diameter 1.4m and height 2.1m is being fed by a pipe of diameter 3.5 cm through which water flows at a rate of 2 m/s. Calculate the time (in minutes) it takes to fill the tank. (Use $\pi = 22/7$).

OR

The radius of the internal and external surface of a hollow spherical shell are 3cm and 5cm respectively. If it melted and recast into a solid cylinder of height $2\frac{2}{3}$ cm, find the diameter of the cylinder.

50. Jagdish Lal, aged 66, is a retired bank executive drawing a pension of Rs.15,000 per month. His contribution towards PPF is Rs.2,500 per quarter. In addition, he buys NSCs worth Rs.10,000 in the year. What will be his income tax liability for the year ?

Mathematics sample questions

1. Linear equation:

1. Draw the graph :- (**5 x 2 = 10**)

- a. $5x + 4y + 20 = 0$ (find the coordinate of the point on the graph when

i. $x = 8$

ii. $y = -5$

- b. Draw the graph of the equation $3x + 4y = 14$. Check whether (3, -2) is a point on the line.

2. Solve the following system of equation graphically

$x + y = 7$, $5x + 2y = 20$ (**4 marks**)

3. Obtain graph (vertices of the triangle)

$2y - x = 8$

$5y - x = 14$

$y - 2x = 1$ (**2 marks**)

4. Solve the following by elimination method (substitution)

- a. $2x - y = 5$
 $3x + 2y = 11$ **(2 marks)**
- b. $(a + b)x + (a - b)y = a^2 + b^2$
 $(a - b)x + (a + b)y = a^2 + b^2$

5. Solve by equating co-efficient **(3 x 2 = 6)**

- a. $2/x - 1 + 3/y + 1 = 2$, $3/x - 1 + 2/y + 1 = 13/6$
- b. $4x + 6/y = 15$, $6x - 8/y = 14$
- c. $0.5x + 0.8y = 3.4$, $0.6x - 0.3y = 0.3$

6. Solve equation by cross multiplication method. **(3 x 2 = 6)**

- a. $x/a + y/b = a + b$, $x/a^2 + y/b^2 = 2$
- b. $ax + by = 1$, $bx + ay = (a + b)^2/a^2 + b^2$
- c. $a/x - b/y = 0$, $ab^2/x + a^2b/y = a^2 + b^2$

7. Solve the value of k for which the following system of equation has No solution

- a. $x + 2y = 3$, $(k - 1)x + (k + 1)y = k + 2$ **(5 marks)**
- b. Find the value of k for which the system of equations
 $4x + 5y = 0$, $kx + 10y = 10$ has Non zero solution

8. Find the whole no which when decreased by 20 is equal to 69 times the reciprocal of number . **(3 marks)**

9. 5 years hence the age of a man will be 3 times that of his son . 5 year ago the father's age was seven times that of his son . what are their present age? **(3 marks)**

10. The sum of the numerator and denominator of a fraction is 4 more than twice the numerator . if the numerator and denominator are increased by 3, they are in the ratio 2 : 3. Determine the fraction . **(3 marks)**

11. A plane left 30 min later than its scheduled time and in order to reach the destination 1500 km away in time , it has to increase the speed by 250 km / hr from the usual speed . Find its usual speed . **(3 marks)**

12 . The area of a rectangle gets reduced by 8 square meters. If its length is reduced by 5 meters and width is increased by 3 meters. If we increased the length by 3 meters and breadth by 2 meters , the area is increased by 74 sq. meters. Find the length and breadth of the rectangle. **(3 marks)**

2. Height and distance:

1. Two ships are sailing in the sea on either side of a lighthouse. The angles of depression of the two ships are observed as 60° and 45° respectively. If the distance between the two ships is $\frac{200(\sqrt{3} + 1)}{\sqrt{3}}$ m Find the height of the lighthouse.

2. From the top of a lighthouse, the angles of depression of two ships on the opposite sides of it are observed to be α and β . If the height of the light house be h meters and the line joining the ships passes, through the foot of the lighthouse, show that the distance between the ships is $h(\tan \alpha + \tan \beta)$.

Or

A round balloon of radius r subtends an angle α at the eye of the observer while the angle of elevation of its centre is β . Prove that the height of the centre of the balloon is $r \sin \beta \operatorname{cosec} \frac{\alpha}{2}$.

3. An airplane when flying at a height of 4000 m from the ground passes vertically above another airplane at an instant when the angles of elevation of the two airplanes from the same point on the ground are 60° and 45° respectively. Find the vertical distance between the two airplanes at that instant.

Or

The angle of elevation of the top Q of a vertical tower PQ from a point X on the ground is 60° . At a point Y , 40m vertically above X , the angle of elevation is 45° . Find the height of the tower PQ and the distance XQ .

4. The angle of elevation of a cliff from a fixed point is θ . After going up a distance of k meters towards the top of the cliff at an angle of ϕ , it is found that angle of elevation is α . Show that the height of the cliff is $\frac{k(\cos \phi - \sin \phi \cos \alpha)}{\cot \theta - \cot \alpha}$ meters.

Or

The angle of elevation of a jet plane from a point A on the ground is 60° . After a flight of 15 seconds, the angle of elevation changes to 30° . If the jet plane is flying at a constant height of $1500\sqrt{3}$ m, find the speed of the jet plane.

5. A man on the top of a vertical tower observes a car moving at a uniform speed coming directly towards it. If it takes 12 minutes for the angle of depression to change from 30° to 45° , how soon after this, will the car reach the tower? Give your answer to the nearest second.

Or

The angle of elevation of the top of a tower from a point on the same level as the foot of the tower is α . On advancing p meters

$$h = \frac{p \cdot \tan \alpha \cdot \tan \beta}{\tan \beta - \tan \alpha}$$

towards the foot of the tower, the angle of elevation become β . Show that the height of the tower is h . Also, determine the height of the tower if $p = 150$ meters, $\alpha = 30^\circ$ and $\beta = 60^\circ$.

6. The hypotenuse of a right triangle is 1m less than twice the shortest side. If the third side is 1m more than the shortest side, find the sides and area of the triangle.

Or

A swimming pool is filled with three pipes with uniform flow. The first two pipes operating simultaneously fill the pool in the same time during which the pool is filled by the third pipe alone. The second pipe fills the pool five hours faster than the first pipe and four hours slower than the third pipe. Find the time required by each pipe to fill the pool separately.

7. A pole 5m high is fixed on the top of a tower. The angle of elevation of the top of the pole observed from a point 'A' on the ground is 60° and the angle of depression of the point 'A' from the top of the tower is 45° . Find the height of the tower.

8. A person standing on the bank of a river observes that the angle of elevation of the top of a tree standing on the opposite bank is 60° . When he moves 30 m away from the bank, he finds the angle of elevation to be 30° . Find the height of the tree and the width of the river.

Or

The angle of elevation of a jet plane from a point A on the ground is 60° . After flight of 7 seconds, the angle of elevation changes to 30° . If the jet is flying at a constant height of $1750\sqrt{3}$ m. find the speed of the jet plane.

9. A man on the top of a vertical observation tower observes a car moving at a uniform speed coming directly towards it. If it takes 12 minutes for the angle of depression to change from 30° to 45° , how soon after this will be the car reach the observation tower. 16.4 min approx

Or

An aircraft is flying along a horizontal course AB directly towards an observer on the ground at P, maintaining an altitude of 5000 m. when the aircraft is at A, the angle of depression is 30° and when at B, it is 60° respectively. Calculate the distance AB. 5773.33m

10. The horizontal distance between two towers is 140 m. The angle of elevation of the top of the first tower when seen from the top of the second tower is 30° . If the height of the second tower is 60 m, find the height of the first tower.

11. Two stations due south of a leaning tower which leans towards north are at distances a & b from its foot. If angles of elevation of top of tower are α & β from these stations. Prove that inclination θ to the horizontal is given by $\cot \theta = (b \cot \alpha - a \cot \beta) / (b - a)$.

12. From the top of a lighthouse, the angles of depression of two ships on the opposite sides of it are observed to be α and β . If the height of the light house be h meters and the line joining the ships passes, through the foot of the lighthouse, show that the

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

distance between the ships is

13. An airplane flying horizontally at a height of 1.5km above the ground is observed at a certain point on earth to subtend an angle of 60° . After 15 seconds, its angle of elevation at the same point is observed to be 30° . Calculate the speed of the airplane in km/h.

14. The angle of elevation of a cloud from a point 60 m above a lake is 30° and the angle of depression of the reflection of cloud in the lake is 60° . Find the height of the cloud.

15. The angle of elevation of a tower as seen from a point 'A' due North of it is ' α ' and that as seen from a point B due East of A is ' β '. Prove that the height of the tower is $AB \sin \alpha \sin \beta / \sqrt{\sin^2 \alpha - \sin^2 \beta}$

16. A round balloon of radius r subtends an angle α at the eye of the observer while the angle of elevations of its centre is β .

Prove that the height of the centre of the balloon is $a \sin \beta \operatorname{Cosec} \frac{\alpha}{2}$

Or

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

17. A man on a cliff observes a boat at an angle of depression of 30° which is approaching the shore to the point immediately beneath the observer with a uniform speed. Six minutes later, the angle of depression of the boat is found to be 60° . Find the time taken by the boat to reach the shore

Or

The angles of elevation of the top of a tower from two points P and Q at distances of a and b respectively, from the base and in the same straight line with it are complementary. Prove that the height of the tower is \sqrt{ab}

18. A pole 5m high is fixed on the top of a tower. The angle of elevation of the top of the pole observed from a point 'A' on the ground is 60° and the angle of depression of the point 'A' from the top of the tower is 45° . Find the height of the tower.

19. A man on the cliff observes a boat at an angle of depression of 30° approaching the shore immediately beneath the observer with uniform speed. Six minutes later the angle of depression of that boat is found to be 60° . Find the time taken by the boat to reach the shore

Or

A bird sitting on the top of a tree which is 80 m high. The angle of elevation of the bird from a point on the ground is 45° . The bird flies away from the point of observation horizontally and remains constant height. After 2 seconds the angle of elevation of the bird from the point of observation becomes 30° . Find the speed of the flying bird

20. The angle of elevation of a cloud from a point 200m above the lake is 30° and the angle of depression of its reflection in the lake is 60° . Find the height of the cloud.

Or

A man on a cliff observes a boat at angle of depression of 30° which is approaching the shore to the point immediately beneath the observer with uniform speed. Six minutes later, the angle of depression of the boat is found to be 60° . Find the time taken by the boat to reach the shore.

21. A pole is projected outwards from a window 10 m above the ground of a building makes an angle of 30° with the wall. The angles of elevations of the bottom and top of the pole from a point on the ground are 30° and 60° respectively. Find the length of the pole.

2. Tangents:

Q. 1. The diagonals of a parallelogram ABCD intersect in a point E. show that the circumcircles $\triangle ADE$ and $\triangle BCE$ touch each other at E.

Q. 2. 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 segment.

Q. 3. The radius of the incircle of a triangle is 4cm and the segments into which one side is divided by the point of contact are 6cm. and 8cm, determine the other two sides of the triangle.

Q. 4. If PAB is a secant to a circle intersecting it at A and B and PT is a tangent. Then prove that $PA \cdot PB = PT^2$

Q. 5. Given two concentric circles of radii a and b where $a > b$. find the length of a chord of larger circle which touches the other.

Q. 6. If a line is drawn through an end point of a chord of a circle so that the angle formed by it with the chord is equal to the angle subtended by the chord in the alternate segment then the line is a tangent to the circle.

7. Two circles intersect each other at two points A and B. at A, tangents AP and AQ to the two circles are drawn which intersect other circles at the points P and Q respectively. Prove that AB is the bisector of angle PBQ.

Q. 8. If two chords of a circle intersect inside or outside the circle, then the rectangle formed by the two parts of one chord is equal to in area to the rectangle formed by the two parts of the other

Q. 9. Given a right triangle ABC, a circle is drawn with diameter AB intersecting hypotenuse AC at the point P. show that the tangent to the circle at P bisects the side BC.

Q. 10. Two rays ABP and ACQ are intersected by two parallel lines in B, C and P, Q respectively. Prove that the circumcircles of $\triangle ABC$ and $\triangle APQ$ touch each other at A.

Q. 11. A circle touches all the four sides of a quadrilateral ABCD. Prove that the angles subtended at the centre of the circle by the opposite sides are supplementary.

- Q. 12.** Prove that the tangents drawn at the ends of a chord of a circle make equal angles with the chord.
- Q. 13.** Two circles with radii a and b touch each other externally. Let c be the radius of a circle which touches these two circles as well as a common tangent to two circles. Prove that $\frac{1}{\sqrt{c}} = \frac{1}{\sqrt{a}} + \frac{1}{\sqrt{b}}$.
- Q. 14.** Prove that the angle between the two tangents drawn from an external point to a circle is supplementary to the angle subtended by the line segment joining the points of contact at the centre.
- Q. 15.** Let A be one point of intersection of two intersecting circles with centres O and Q . The tangent at A to the two circles meet the circles again at B and C , respectively. Let the point P be located so that $AOPQ$ is a parallelogram. Prove that P is the circumcentre of the triangle ABC .
- Q. 16.** If two circles intersect in two distinct points A and B and line AB intersects the two common tangents at points P and Q . Prove that $PA = QB$.
- Q. 17.** If PA and PB are two tangents drawn from a point P to a circle with centre O touching it at A and B , prove that OP is the perpendicular bisector of AB .
- Q. 18.** A quadrilateral $ABCD$ is drawn to circumscribe a circle. Prove that $AB + CD = AD + BC$.
- Q. 19.** In two concentric circles, prove that all chords of the outer circle which touch the inner circle are of equal length.
- Q. 20.** AB is a line segment and M is its mid point. Semicircles are drawn with AM , MB and AB as diameters on the same side of the line AB . A circle is drawn to touch all the three semicircles. Prove that its radius r is given by $r = \frac{1}{6} AB$.
- Q. 21.** Two circles touch externally at a point P . From a point T on the tangent at P , tangents TQ and TR are drawn to the circles with points of contact Q and R respectively. Prove that $TQ = TR$.
- Q. 22.** TA and TB are tangent segments to a circle with centre O , from an external point T . If OT intersects the circle in P , prove that AP bisects $\angle TAB$.
- Q. 23.** Two circles intersect at two points A and B and a straight line PAQ intersects the circles at P and Q . If the tangents at P and Q intersect in T , prove that P, B, Q, T are concyclic.
- Q. 24.** ΔABC touches the sides BC, CA and AB at D, E , and F respectively. Prove that $AF + BD + CE = AE + BF + CD = \frac{1}{2} \text{ Perimeter of } \Delta ABC$.

3. Linear Equations, H.C.F and L.C.M and Rational Expressions

1. Solve the following system of equations:

$$\frac{9}{x+1} - \frac{8}{y-1} = 1, \quad \frac{3}{x+1} + \frac{4}{y-1} = 2, \quad x \neq -1, y \neq 1 \quad (2)$$

Or

Solve the following system of linear equations: $ax + by = 2ab$, $bx + ay = a^2 + b^2$

2. The HCF and LCM of two polynomials $p(x)$ and $q(x)$ are $(x + 3)$ and $x^3 + 4x^2 + x - 6$ respectively. If $p(x) = x^2 + 5x + 6$, find $q(x)$. (2)

3. Solve the following system of equations graphically: $3x + y - 12 = 0$, $x - 3y + 6 = 0$ Also find the coordinates of the points where the lines meet the x - axis. (3)

4. Find the value of p and q for which the following system of linear equations has infinite number of solutions. $2x + 3y = 7$ and $(p + q)x + (2p - q)y = 3(p + q + 1)$. (2)

5. The sum of the digits of a 2-digit number is 12. The number obtained by interchanging the two digits exceeds the given number by 18. Find the number. (3)

6. There are some lotus flowers in a lake. If one butterfly sits on each flower, one butterfly is left behind. If two butterflies sit on each flower, one flower is left behind. What is the number of flowers? What is the number of butterflies? (3)

7. A 90% acid solution is mixed with a 97% acid solution to obtain 21 liters of a 95% acid solution. Find the quantity of each of the solutions to get the resultant mixture. (3)

8. Simplify the following rational expression: (3)

$$\frac{4a - b}{1 - 4ab} - \frac{4a + b}{1 + 4ab} - \frac{4b(1 - 8a^2)}{16a^2b^2 - 1}$$

9. If $a = \frac{x}{x+y}$ and $b = \frac{y}{x-y}$, show that $\frac{ab}{a+b} = \frac{xy}{x^2 + y^2}$. (3)

10. Solve $4x + 6/y = 15$ and $6x - 8/y = 14$ and hence find p if $y = px - 2$. (3)

11. For what value of k will the equations $x + 2y + 7 = 0$, $2x + ky + 14 = 0$ represent coincident lines? (2)

12. For what value of k , will the system of equations $x + 2y = 5$, $3x + ky = -15$ has no solution? (2)

13. 8 men and 12 boys can finish a piece of work in 10 days while 6 men and 8 boys can finish it in 14 days. Find the time taken by one man alone and that by one boy alone to finish the work.

14. For any rational expressions R and S prove that $R^3 + S^3 = (R + S)(R^2 + S^2 - RS)$

4. Linear, Quadratic, Arithmetic, Trigonometry Equations

Linear Equations in Two Variables

Solve the following equations:

1. $\frac{1}{5x} + \frac{y}{9} = 5$ and $\frac{1}{3x} + \frac{y}{2} = 14$

2. $\frac{2}{9x} - \frac{5}{8y} = \frac{3}{2}$ and $\frac{7}{6x} + \frac{9}{8y} = 2$

3. $\frac{10}{x+y} + \frac{6}{x-y} = 5$ and $\frac{5}{x+y} - \frac{8}{x-y} = -3$

4. $\frac{7}{4x+3y} + \frac{4}{4x-3y} = \frac{5}{4}$ and $\frac{8}{4x-3y} - \frac{14}{4x+3y} = \frac{3}{2}$

5. $\frac{x+y}{2} + \frac{3x-5y}{4} = 2$ and $\frac{x}{4} + \frac{y}{7} = \frac{3}{28}$

6. $\frac{a}{x} - \frac{b}{y} = 0$ and $\frac{ab^2}{x} + \frac{a^2b}{y} = a^2 + b^2$

7. $x + y = a + b$ and $ax - by = a^2 - b^2$

8. $\frac{x}{a} + \frac{y}{b} = a + b$ and $\frac{x}{a^2} + \frac{y}{b^2} = 2$

9. $8u - 3v = 5uv$ and $6u - 5v = -2uv$

10. $3(2u + v) = 7uv$ and $3(u + 3v) = 11uv$

11. For what value of k will the system of equations $4x + 3y = 5$ and $kx + y = 9$ have unique solution?

12. For what value of k will the system of equations $kx + 3y + (3 - k) = 0$ and $12x + ky - k = 0$ have infinite solutions?

13. For what value of k will the system of equations $4x - 5y = 6$ and $2kx + 3y = 5$ have unique solution?

14. For what value of k will the system of equations $kx + 4y - 1 = 0$ and $4x + ky - 1 = 0$ have no solution?

15. For what value of k will the system of equations $5x + ky = 3$ and $2x + 7y = 1$ have no solution?

16. For what value of k will the system of equations $2x - ky = 4$ and $8x - 12y = 16$ have infinite solutions?

17. A man and a boy can do a piece of work in 15 days which would be done in 2 days by 7 men and 9 boys. How long would it take for one man to complete the work?

18. A and B can do piece of work in 16 days, they work together for 4 days, when A leaves, and B alone finished it in 36 days more. In what time can each do the work separately?

19. In a triangle ABC, $m\angle A = x^\circ$, $m\angle B = 2x^\circ$ and $m\angle C = y^\circ$. If $3x - 2y = 45$, Prove that the triangle is right-angled triangle.
20. A boat goes 24km upstream and 28km downstream in 6 hours. It goes 30km upstream and 21 km downstream in 6 hours and 30 minutes. Find the speed of the boat in still water and also the speed of the stream.
21. Two plugs are opened in the bottom of a cistern containing 192 litres of water, after 3 hours one of them becomes stopped and the cistern is emptied by the other in 11 hours. Had 6 hours elapsed before the stoppage, it would have only required 6 hours more to empty it. How many litres will each plug-hole discharge in one hour, supposing the discharge to be uniform?
22. A man wanted to purchase 5 chairs and 5 tables from a market. But for this he had short of Rs.600. He at last purchased 5 chairs and 3 tables with Rs.2005 which he had that time. Find the costs of one chair and one table.
23. In a meeting a government officer wanted to distribute certain number of apples equally among the physically handicapped children. If the number of children was 2 less, each of them would have got one apple more. Again when the ten officers present in the day are also included, then each of them will get 3 apples less. Find the number of the handicapped children and the number of apples.
24. A farmer wishing to purchase a number of sheep found that if they cost him Rs.42 a head, he would not have money enough by Rs.28, but if they cost him Rs.40 a head, he would then have Rs.40 more than he required, find the number of sheep and the money which he had.
25. Says Charles to William, "If you give me 10 of your marbles, I shall then have just twice as many as you", but says William to Charles, "If you give me 10 of yours, I shall then have three times as many as you". How many had each?
26. The difference of two numbers is 33. When the larger number is divided by the smaller one, the quotient is 2 and the remainder is 4. Find the two numbers.
27. A bag contains a total number of 60 coins, Some are of value 50 paise and the others are of 25 paise. If the total amount of money in the bag is Rs.20.50, find the number of coins of each category.
28. Some boys hired a bus for a picnic. All paid the same fare. If there had been 4 more boys, each would have had to pay a rupee less and had there been 5 more boys, then each would have paid Rs.2 less. Find the number of boys and the fare each boy paid.
29. A man had 10 cows more than his horses. He sold half of the horses and one-third of the cows and still he had left with 10 cows more than his horses. Find the number of cows and the horses he had initially.
30. The total cost price of a horse and a cart is Rs.1,200. On selling the horse at a profit of 20% and the cart at a loss of 4%, it found that there was an overall profit of 5%. Find the cost price of the horse.
31. Out of 68 students appeared in an examination, 41 passed. If 5 boys pass out of every 8 and 7 girls pass out of every 12, find the numbers of boys and girls appeared in the examination.
32. Two places A and B are 70km apart on a road. A man starts by car from A and another man starts from B at the same time. If they travel in the same direction, they meet in seven hours, but if they travel towards each other, they meet in one hour. What are their speeds?
33. In 1935, the father's age was four times that of his son. In 1955, the father's age was twice that of his son. Find the year in which the son was born.
34. 10 years ago, the age of a man was 35 years more than that of his son. After 5 years the ratio of their ages was 11:4, find their present ages.
35. Find the area of the triangle formed by the following pair of lines with the x-axis: $x = y$ and $x + y = 2$.
36. Find the area of the triangle formed by the following pair of lines with the y-axis: $4x + y = 7$ and $y = 5$.
37. Draw the graph of the equation $3x - 4y = 12$ From the graph find the value of 'y' if x is -12 and also find the area of the triangle formed by the graph and axes.

Quadratic Equation

Solve for

38. $2\left(\frac{1}{x}\right)^2 + 5\left(\frac{1}{x}\right) + 1 = 0$

39. $\frac{4}{t^2} = \frac{5}{t} - 1$

40. $(y^2 - 3y + 1)^2 = 1$

41. $y^{-6} - 7y^{-3} = 8$

42. $x^{\frac{2}{3}} + x^{\frac{1}{3}} = 2$

43. $3^{2x} - 10 \cdot 3^x + 9 = 0$

44. $4^{1+x} + 4^{1-x} = 10$

45. $(x+1)(x+2)(x+3)(x+4) + 1 = 0$

46. $\sqrt{\frac{x^2+2}{x^2-2}} + 6\sqrt{\frac{x^2-2}{x^2+2}} = 5$

47. $\sqrt{x^2 - 2x + 49} = \sqrt{x^2 - 2x + 16} + 3$

48. $\left(x^2 + \frac{1}{x^2}\right) - 5\left(x + \frac{1}{x}\right) = 4$

49. $(1+x)^{1/3} + (1-x)^{1/3} = 2^{1/3}$

50. $(3+x)^{2/3} + (3-x)^{2/3} = 4(9-x^2)^{1/3}$

51. $\sqrt{2y+1} = 7 - \sqrt{3y+4}$

52. $\frac{x}{a} + \frac{a}{x} = \frac{a}{b} + \frac{b}{a}$

53. $acx^2 + (ad+bc)xy + bdy^2 = 0$ (solve for x)

54. $1+x = \frac{3}{4 - \frac{3}{4-x}}$

55. If k is one of the roots of the equation $4x^2 + 2x - 1 = 0$ then show that the other root is $-\left(k + \frac{1}{2}\right)$.

56. The sum and the product of the two roots of a quadratic equation are 1 and -12 respectively. Find the equation.

57. If the roots of a quadratic equation are 2 and -3 respectively. Find the equation.

58. For what values of k will one root of the equation $x^2 - kx + 8 = 0$ be twice the other?

59. For what values of m will one root of the equation $2x^2 - 14x + m = 0$ be in the ratio 3:4?

60. For what values of m will the equation $x^2 - 2(5+2m)x + 10m = 0$ has repeated roots.

61. If 3 is one of the roots of the equation $2x^2 - 7x + k = 0$ then find the value of k and the other root.

62. If $a^2 = 5a - 3$ and $b^2 = 5b - 3$ find the quadratic equation whose roots are a/b and b/c

63. Two examinees solved the equation $x^2 + px + q = 0$ incorrectly. The first one obtained the roots as 8 and 2 by assuming an incorrect value for p, and the second one obtained -9 and -1 by assuming an incorrect value for q. Find the actual roots of the equation.
64. If $\alpha \pm \beta$ be the roots of the equation $x^2 + px + q = 0$ prove that $\frac{1}{\alpha} \pm \frac{1}{\beta}$ will be the roots of the equation $(p^2 - q)(p^2 x^2 + 4px) = 16q$.
65. In a certain class, $\frac{1}{7}$ th of the total number of students like football, five times the square root of the total students prefer cricket and the remaining 7 students like hockey. Find the total number of students in the class.
66. Divide 16 into two parts such that twice the square of the larger part exceeds the square of the smaller part by 164.
67. A swimming pool can be filled by 2 pipes together in 6 hours. If the larger pipe alone takes 5 hours less than the smaller to fill the pool, find the time in which each pipe alone would fill the pool.
68. If the perimeter of a rectangular field is 50m and its area is 100 m^2 . Find the length and breadth.
69. 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.

Arithmetic Progressions

Find the sum:

70. $5 + 17 + 29 + 41 \dots$ up to the 20 th term.
71. $16 + 12 + 8 + 4 \dots + (-60)$.
72. $(2a - b) + (4a - 3b) + (6a - 5b) + \dots$ to the n th terms.
73. $(x + y)^2 + (x^2 + y^2) + (x - y)^2 \dots$ to the n th terms.]
74. Find the sum of the even numbers between 91 and 259.
75. Find the sum of the multiples of 11 between 100 and 400.
76. The fifth and the ninth terms of an A.P. are 11 and 7 respectively. Find the fourteenth term of the series. Also find the sum of the first sixteen terms.

77. Up to what number of terms, will the sum of the series, $\frac{6}{\sqrt{3}} + 3\sqrt{3} + 4\sqrt{3} + \dots$ be $54\sqrt{3}$?

78. If S_1, S_2, S_3 be the sums of n, 2n and 3n terms of an A.P. then prove that $S_3 = 3(S_2 - S_1)$.
79. The sum of first 9 terms of an A.P. is 171, and of 24 terms is 996. Find the sum of first 41 terms of the A.P.
80. In an A.P. the n th term is p and the sum to p terms is q. Show that the first term is $\frac{2q - pn}{n}$.

There are four numbers in an A.P. the sum of the two extremes is 8, and product of the means is 15. What are the numbers?

81. If the sum of first 'p' terms of an A.P. is equal to the first 'q' terms, show that the sum of the first (p + q) terms is zero.

82. If a, b, c are in A.P. then show that $(b + c), (c + a), (a + b)$ are also in A.P.

83. If $(b + c), (c + a), (a + b)$ are in A.P. then show that $\frac{1}{bc}, \frac{1}{ca}, \frac{1}{ab}$ are also in A.P.

84. If the sum of the three consecutive terms of an A.P. is 36 and their product is 1140, Find the terms.

85. The ratio of three numbers is as 2:5:7. If 7 is subtracted from the second number, then the numbers form an A.P. What were the original numbers?

86. If the sum of first n terms of an A.P. is m and that of the first m terms is n , show that the sum of first $(m + n)$ terms is $-(m + n)$.

87. Find the 15th term of an A.P. whose sum up to the first n terms is $3n^2 + 7n$.

88. If a, b, c are respectively p th, q th and r th terms of an A.P. then prove that $\frac{a}{p}(q - r) + \frac{b}{q}(r - p) + \frac{c}{r}(p - q) = 0$

Trigonometry

Prove the following identities:

89. $\tan \theta + \cot \theta = \operatorname{cosec} \theta \cdot \sec \theta$

$\frac{\cos \theta}{1 + \sin \theta} = \frac{1 - \sin \theta}{\cos \theta}$

90. $\frac{1 + \sin \theta}{\cos \theta} = \frac{1 - \sin \theta}{\cos \theta}$

91. $(\sin \phi - \cos \phi)^2 + (\sin \phi + \cos \phi)^2 = 2$

$\frac{1 + \sec \theta}{\sec \theta} = \frac{\sin^2 \theta}{1 - \cos \theta}$

92. $\frac{\sec \theta}{\cos^2 \theta} + \sin \theta = \operatorname{cosec} \theta$

93. $\frac{\cos^2 \theta}{\sin \theta} + \sin \theta = \operatorname{cosec} \theta$

94. $(\sec A - \tan A)^2 = \frac{1 - \sin A}{1 + \sin A}$

95. $\frac{\tan A + \tan B}{\cot A + \cot B} \tan A \cdot \tan B$

96. $\tan A(1 - \cot^2 A) + \cot A(1 - \tan^2 A) = 0$

$\frac{1}{\sec A + \tan A} - 2 \sec A = \frac{1}{\tan A - \sec A}$

97. $\tan \theta + \sqrt{\frac{1 - \sin \theta}{1 + \sin \theta}} = \sec \theta$

98. $\frac{\sin^3 \alpha + \cos^3 \alpha}{\sin \alpha + \cos \alpha} = 1 - \sin \alpha \cos \alpha$

99. $\frac{\sin^3 x \cos x + \cos^3 x \sin x}{\cos \theta} + \frac{\cos \theta}{\operatorname{cosec} \theta - 1} = 2 \tan \theta$

100. $\frac{\operatorname{cosec} \theta + 1}{\operatorname{cosec} \theta - 1} = 2 \tan \theta$

101. $\operatorname{cosec}^2(90^\circ - \theta) - \tan^2 \theta = \cos^2(90^\circ - \theta) + \cos^2 \theta$

103. $\frac{\sin A - \sin B}{\cos A + \cos B} + \frac{\cos A - \cos B}{\sin A + \sin B} = 0.$
104. $\frac{1}{\operatorname{cosec} A - \cot A} - \frac{1}{\sin A} = \frac{1}{\sin A} - \frac{1}{\operatorname{cosec} A + \cot A}.$
105. $\sec A(1 - \sin A)(\sec A + \tan A) = 1.$
106. $\frac{\sin \theta - 2 \sin^3 \theta}{2 \cos^3 \theta - \cos \theta} = \tan \theta.$
107. $\operatorname{cosec}^4 A - \cot^4 A = 1 + 2 \cot^2 A$
108. $1 + \cot A - \operatorname{cosec} A = \frac{2}{1 + \tan A + \sec A}.$
109. $\left(\frac{1 - \tan \theta}{1 - \cot \theta} \right)^2 = \frac{1 + \tan^2 \theta}{1 + \cot^2 \theta}.$
110. If $\tan A + \sin A = m$ and $\tan A - \sin A = n$, show that $m^2 - n^2 = 4\sqrt{mn}.$
111. If $a \cos \theta - b \sin \theta = c$, prove that $a \sin \theta + b \cos \theta = \pm \sqrt{a^2 + b^2 - c^2}.$
112. If $\cos \theta - \sin \theta = \sqrt{2} \sin \theta$, prove that $\cos \theta + \sin \theta = \sqrt{2} \cos \theta.$
113. If $\sin A + \cos A = 2$, prove that $\sin^7 A + \cos^7 A = 2$
114. If $\cos \theta = \frac{1}{2}$, find the value of $\frac{2 \sec \theta}{1 + \tan^2 \theta}.$
115. If $\frac{\cos \alpha}{\cos \beta} = m$ and $\frac{\cos \alpha}{\sin \beta} = n$, show that $(m^2 + n^2) \cos^2 \beta = n^2.$
116. Evaluate: $\left(\frac{\sin 27^\circ}{\cos 63^\circ} \right)^2 + \left(\frac{\cos 63^\circ}{\sin 27^\circ} \right)^2$
117. If $\sin \theta + \sin^2 \theta = 1$, prove that $\cos^2 \theta + \cos^4 \theta = 1$
118. If $x = a \cos \theta \cos \phi$, $y = a \cos \theta \sin \phi$, $z = a \sin \theta$, prove that $x^2 + y^2 + z^2 = a^2.$

Answers

1. $x = \frac{1}{15}, y = 18$	2. $x = \frac{1}{3}, y = -\frac{3}{4}$	3. $x = 3\frac{1}{2}, y = 1\frac{1}{2}$
4. $x = 4, y = 4$	5. $x = 1, y = -1$	6. $x = \frac{a(b^2 - a^2)}{(b^2 + a^2)}, y = \frac{b(b^2 - a^2)}{(b^2 + a^2)}$
7. $x = a, y = b$	8. $x = a^2, y = b^2$	9. $u = \frac{11}{23}, v = \frac{22}{31}$

10. $u = 1, v = \frac{3}{2}$	11. $k \neq \frac{4}{3}$	12. $k = 6$
13. $k \neq -\frac{6}{5}$	14. $k = -4$	15. $k = 35/2$
16. $k = 3$	17. 20 days	18. A in 24 days, B in 48 days
20. 10 km, 4 km	21. 8 litres, 12 litres	22. Rs.225, Rs.300
23. 20, 180	24. 34 sheep, Rs.1400	25. 22, 26
26. 29,62	27. 22 fifty paise coins, 38 twenty five paise coins	28. 20 boys, Rs.6
29. 30 cows, 20 horses	30. Rs.450	31. 32 boys, 36 girls
32. 40km, 30km	33. In the year 1925	34. 60 years, 25 years
35. $1/2$ sq. unit	36. $1/2$ sq.unit	37. 12, 6 sq. units
38. $\frac{4}{-5 \pm \sqrt{17}}$	39. 1, 4	40. 0, 1, 2, 3
41. $1/2, -1$	42. 1, -8	43. 2, 0
44. $1/2, -\frac{1}{2}$	45. $\frac{-5 \pm \sqrt{5}}{2}$	46. $\pm \sqrt{\frac{5}{2}}, \pm \sqrt{\frac{10}{3}}$
47. 2, 0	48. $3 \pm 2\sqrt{2}$	49. 1, -1
50. $\pm \sqrt{\frac{231}{26}}$	51. 480, 4	52. $b, \frac{a^2}{b}$
53. $-\frac{d}{c}y, -\frac{b}{a}y$	54. $\frac{3 \pm \sqrt{10}}{2}$	56. $x^2 - x - 12 = 0$
57. $x^2 + x - 6$	58. ± 6	59. 24
60. $2(1/2)$	61. $3(1/2)$	62. $3x^2 - 19x + 3 = 0$
63. -2, -8	65. 49	66. 10, 6
67. 10 hrs, 15 hrs	68. 20m, 5m	69. 20days
70. 2380	71. 440	72. $n(n+1)a - n^2b$

73. $n(x^2 + y^2) - n(n-3)xy$	74. 14700	75. 6831
76. 2, 120	77. 9	79. 2747
81. 1, 3, 5, 7	85. 5, 12, 19 or 19, 12, 5	86. 28, 70, 98
88. 94	115. 1	117. 2

5. COORDINATE GEO:

- Q. 1. Show that the points A (a, a), B (-a, -a) and $C(-a\sqrt{3}, a\sqrt{3})$ form an equilateral triangle.
- Q. 2. If the distance of P (x, y) from A (6,3) and B (-3,6) are equal prove that $3x = y$.
- Q. 3. If P and Q are two points whose coordinates are $(at^2, 2at)$ and $(a/t^2, -2a/t)$ respectively, and S is the points (a, 0). Show that $1/SP + 1/SQ$ is independent of t.
- Q. 4. If the pt A(-2, -1) B(1, 0) C(x, 3) and D(1, y) lie on the ends of parallelogram find the value of X and y.
- Q. 5. In what ratio does the point (-2, 3) divides the line segments joining the points (-3 , 5) and (4 , -9).
- Q. 6. Find the length of the median through B and the coordinates of the centroid of a triangle whose vertices are A (-1 , 3) , B (1, -1) and C (5 , 1).
- Q. 7. The centroid of a triangle is at (4,-5). If two of its vertices are (2,5) and (3,-1), find its third vertex.
- Q. 8. If the point P(0,2) is equidistant from the points (3,k) and (k,5) then find the value of k.
- Q. 9. If p is the point of intersection of lines $3x + 4y = 7$ and $2x + 3y = 5$. Find the ratio in which P is divided by the line joining (2,3) and (3,5).
- Q. 10. If the points A(1,0), B(a, 3), C(2, b) and D(-2, 4) are the vertices of a parallelogram, find the values of a and b.
- Q. 11. Prove analytically that the line segments joining the mid-points of two sides of a triangle ABC , whose vertices are $A(x_1, y_1)$, $B(x_2, y_2)$ and $C(x_3, y_3)$, is equal to half of the third side.
- Q. 12. The three vertices of a rhombus, taken in order, are (2,-1), (3, 4) and (-2, 3). Find the fourth Vertex.

- Q. 13. The co-ordinates of two points P and Q are $(at^2, 2at)$ and $(\frac{a}{t^2}, -\frac{2a}{t})$ respectively and of a point S is (a,0). Show that $\frac{1}{SP} + \frac{1}{SQ} = \frac{1}{a}$.
- Q. 14. Find the ratio in which the point (-3,p) divides the line segment joining the points (-5,-4) and (-2,3). Also find the value of p.
- Q. 15. Determine the ratio in which the line $3x + y - 9 = 0$ divides the segment joining the pt (1,3) and (2,7)
- Q. 16. Prove that quadrilateral formed by joining following points is a parallelogram.
(2, 1), (8, 9), (-3, 11) and (-9, 3)
- Q. 17. Find the value of x if the distance between the points $(x, -1)$ and $(3, 2)$ is 5.
- Q. 18. If the mid points of sides of the triangle are (2,6), (6,4) and (4,2) find its vertices.
- Q. 19. Determine the ratio in which the point P(m, 6) divides the join of A(-4, 3) and B(2, 8). Also find the value.
- Q. 20. Show that the points A(5, 6), B(1, 5), C(2, 1) and D(6, 2) are the vertices of a square.
- Q. 21. Show that the points A(2, -2), B(14, 10), C(11,13) and D(-1,1) are the vertices of a rectangle.
- Q. 22. Determine the ratio in which the point (-6, a) divides the join of A(-3, -1) and B(-8,9). Also find the value of.
- Q. 23. The coordinates of the mid-point of the line joining the points (3p, 4) and (-2, 2q) are (5, p). Find the values of p and q.
- Q. 24. If 'a' is the length of one of the sides of an equilateral triangle ABC, base BC lies on x- axis and vertex B is at the origin, find the coordinates of the vertices of the triangle ABC
- Q. 25. The coordinates of the mid-point of the line joining the points and are find the values of.
- Q. 26. Find the ratio in which the line-segment joining the points (6, 4) and (1, -7) is divided by x-axis.
- Q. 27. Find the value of m for which the points with coordinates (3, 5), (m, 6) and are collinear.
- Q. 28. Find the value of k for which the points with coordinates (3, 2), (4, k) and (5, 3) are collinear.
- Q. 29. If the point P(x, y) is equidistant from the points A (5, 1) and B (-1, 5), prove that $3x - 2y = 0$
- Q. 30. The line joining the points (2, 1) and (5, -8) is trisected at the points P and Q. If point P lies on the line $2x - y + k = 0$, find the value of k.

Q. 31. Find the value of x such that $PQ = QR$ where the coordinates of P , Q and R are $(6, -1)$; $(1, 3)$ and $(x, 8)$ respectively.

6. IMPORTANT QUESTIONS

Q. 1 . Find the HCF and LCM

- i. $12(9x^2 - 4)$ and $18(6x^2 - 5x - 6)$
- ii. $(18x^3 + 45x^2 - 27x)$ and $(15x^4 - 135x^2)$
- iii. $18(x^3 - x^2 + x - 1)$ and $12(x^4 - 1)$
- iv. $42(2x^3 - 5x^2 - 3x)$ and $60(8x^4 + x)$
- v. $8(x^4 - 16)$ and $12(x^3 - 8)$
- vi. $(2x^4 - 2y^4)$ and $(3x^3 + 6x^2 - 3xy^2 - 6y^3)$
- vii. $(x^4 - 1)$ and $(x^3 + x^2 + x + 1)$
- viii. $36(3x^4 + 5x^3 - 2x^2)$ and $54(27x^4 - x)$
- ix. $(x^3 - 1)$ and $(x^4 + x^2 + 1)$
- x. $(x^2 + x - 2)$ and $(x^3 + 4x^2 + x - 6)$
- xi. $(x^4 - y^4)$ and $(x^6 - y^6)$
- xii. $(6x^4 - 13x^3 + 6x^2)$ and $(8x^4 - 36x^3 + 54x^2 - 27x)$

Q. 2. For what value of k , the HCF of $x^2 + x - 2(k + 1)$ and $(2x^2 + kx - 12)$ is $(x + 4)$.

Q. 3. If $(x - k)$ is the HCF of $(x^2 + x - 12)$ and $(2x^2 - kx - 9)$ find the value of k .

Q. 4. Find the value of a and b so that $x^3 + ax^2 + bx - 6$ is completely divisible by $x^2 - 4x + 3$.

Q. 5. If $(x - 3)$ is the HCF of $(x^3 - 2x^2 + px + 6)$ and $(x^2 - 5x + q)$ find the value of $(6p + 5q)$.

Q. 6. Find the value of a and b so that $f(x) = 3x^3 + ax^2 - 13x + b$ is divisible by $(x^2 - 2x - 3)$.

Q. 7. If $(x + 1)(x - 4)$ is the HCF of the polynomial $(x - 4)(2x^2 + x - a)$ and $(x + 1)(2x^2 + bx - 12)$, find a and b .

Q. 8. The HCF and LCM of two polynomials $p(x)$ and $q(x)$ are $56(x^4 + x)$ and $4(x^2 - x + 1)$ respectively. If $p(x) = 28(x^3 + 1)$ find $q(x)$.

Q. 9. The HCF and LCM of the polynomials $P(x)$ and $Q(x)$ are respectively $5(x + 3)(x - 1)$ and $20x(x^2 - 9)(x^2 - 3x + 2)$. If $P(x) = 10(x^2 - 9)(x - 1)$ find $q(x)$.

Q. 10. The HCF of the polynomials $P(x) = (x - 3)(x^2 + x - 2)$ and $Q(x) = (x^2 - 5x + 6)$, find the LCM of $P(x)$ and $Q(x)$.

Q. 11. $(x^2 + x - 2)$ is the HCF of the expressions $(x - 1)(2x^2 + ax + 2)$ and $(x + 2)(3x^2 + bx + 1)$. Find the value of a and b .

Q. 12. If $(x + 3)(x - 2)$ is the G.C.D of $f(x) = (x + 3)(2x^2 - 3x + a)$ and $g(x) = (x - 2)(3x^2 + 10x - b)$ Find the value of a and b .

Q. 13. Find the L.C.M of the polynomials: $x(8x^2 + 27)$ and $2x^2(2x^2 + 9x + 9)$.

Q. 14. if $(x - 1)(x + 4)$ is the HCF of the polynomials

$P(x) = (x^2 + 2x - 3)(2x^2 + 5x + a)$ and $Q(x) = (x^2 + x - 12)(3x^2 - x + b)$ find the value of a and b

Q. 15. If the HCF of $P(x) = (2x^2 - x - 1)(px^2 + 8x - 3)$ and $Q(x) = (x^2 + x - 6)(3x^2 + qx - 1)$ is $(x^2 + 2x - 3)$, find the values of p and q .

Guess Paper – 2007
Class – X
Mathematics

MAX. MARKS: 80
3HOURS

TIME:

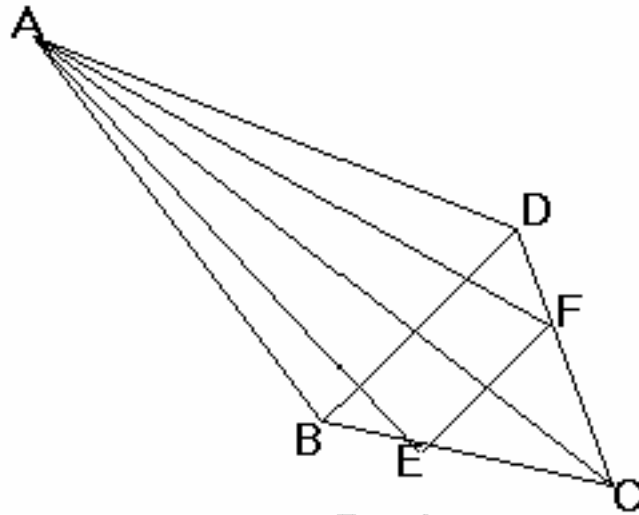
General Instructions

1. All questions are compulsory.
2. The question paper consists of 25 questions divided into three sections A, B & C. Section A contains 10 questions of 3 marks each. Section B is of 10 questions of 4 marks each & Section C is of 5 questions of 6 marks each.
3. There is no overall choice. However, an internal choice has been provided in two questions of 3 mark each, two questions of 4 mark each & two questions of 6 mark each.
4. Write the serial number of the question before attempting it.
5. In question on construction, the drawing should be neat & exactly as per the given measurements.

Use of calculators is not permitted. However you may ask for mathematical tables

1. Solve the following system of equations graphically: ([bottom](#))
 $2x + 3y = 12$
 $x - y = 1$
2. The 7th term of an A.P. is 34 and 15th is 74. Find 40th term.
3. A gas cooking range is available for Rs.2500/- cash or Rs.520 down payment followed by 4 monthly installments. If rate of interest is 25% per annum calculate the monthly installment.

4. A sum of Rs.8, 400/- is borrowed at 10% per annum compound interest, to be paid back in 2 years by two equal annual installments. Find the value of each installment.
5. In figure ABCD is a quadrilateral with $AB=AD$. AE and AF are respectively bisectors of angle BAC and angle DAC. Prove that $EF \parallel BD$.



6. Construct the circum circle of the triangle whose sides are 6.5cm 7cm & 7.5 cm and measure its radius.
7. A well of diameter 2 m is dug 14m deep. The earth taken out is spread evenly all around it to a width of 5m to form an embankment. Find the height of the embankment.
8. The diameter of a metallic sphere is 6 cm and radius of the base is melted and drawn in to wire of uniform cross section .If the length of the wire is 36 m, find its radius.

OR

A solid cone of height 24 cm and radius of base 6 cm is made up of modeling clay. A child reshapes it in the form of a sphere. Find its radius

9. Table below shows daily pocket allowance of children of a building. The mean of pocket allowance is Rs.18.Find out the missing frequency.

Class Interval	11-13	13-15	15-17	17-19	19-21	21-23	23-25
Frequency	3	6	9	13	X	5	4

10. A bag contains 20 balls. There are three different colors, green, red& blue. A ball is chosen at random. The probability of green ball is $\frac{1}{4}$. The probability of red is $\frac{2}{5}$.
 - a. What is the probability of blue ball?
 - b. How many balls are red?
 - c. How many balls are green?

SECTION B

11. Solve for x and y

$$4x + 6/y = 15$$

$$6x - 8/y = 14 \quad (y \text{ not equal to } 0)$$

And hence find P if $y = Px - 2$.

12. Simplify

$$\frac{(x-y)^3}{(x+y)^2 - 2xy} \times \frac{x^4 - y^4}{(x+y)^3 - 3xy(x+y)} \times \frac{(x+y)^2 - 3xy}{(x+y)^2 - 4xy}$$

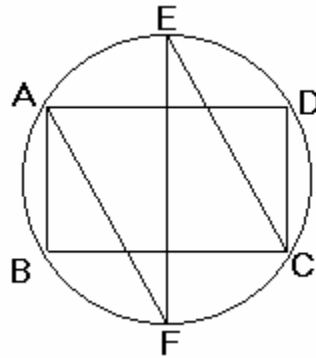
13. If $(x^2 - x - 2)$ is the H.C.F. of the expression $(x-2)(2x^2 + ax + 1)$ and $(x+1)(3x^2 + bx + 2)$ find the values of 'a' and 'b'.

14. Solve for x.

$$\frac{(4x-3)}{(2x-1)} - \frac{10(2x-1)}{(4x-3)} = 3 \quad \{x \text{ not equal to } -1/2 \text{ or } 3/4\}$$

15. Some students planned a picnic. The budget for food was Rs.480. But 8 of these failed to go and thus the cost of food for each increased by Rs.10. How many students went on the picnic?

16. The bisectors of the opposite angles A and C of cyclic quadrilateral ABCD intersect the circle the circle at the points E and F respectively. Prove that EF is a diameter of the circle.



17. Prove the identity

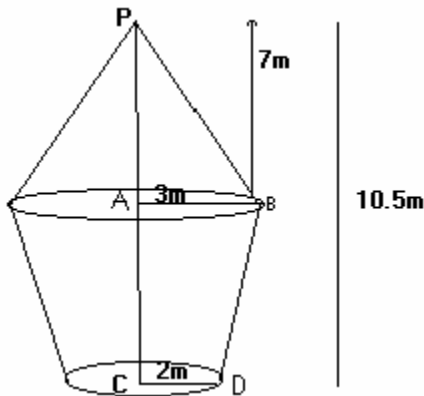
$$\frac{\tan A}{\sec A - 1} + \frac{\tan A}{\sec A + 1} = 2 \operatorname{cosec} A$$

OR

Evaluate

$$\sin(50^\circ + x) - \cos(40^\circ - x) + \tan 1^\circ \tan 10^\circ \tan 20^\circ \tan 70^\circ \tan 80^\circ \tan 89^\circ.$$

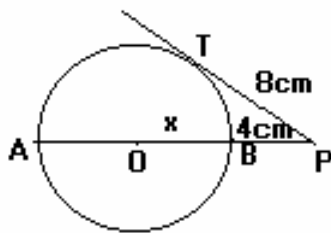
18. The lower portion of a haystack is an inverted cone frustum and upper part is a cone. Find the total volume of the hay stack where $AB=3m$ $CD=2m$ $PA=7m$ $PC=10.5m$



19. Calculate the ratio in which the line segment joining A(3,4) and B(-2,1) is divided by the y-axis.
 20. The coordinates of the center of a circle are (4,5) and one point of the circle is (8,10). Find the coordinates of the other end of the diameter through this point

SECTION C

21. Prove that if in a triangle the square of one side is equal to the sum of squares of other two sides then the angle opposite to first side is a right angle.
 Using this prove
 ABC is an isosceles triangle with $AC=BC$. If $AB^2=2AC^2$, prove that ABC is right triangle.
 22. If PAB is a secant to a circle intersecting at A and B and PT is tangent then prove that $PA \times PB = PT^2$. Using it find x in the following where $PB = 4PT = 8$ and $OB = x$



23. Two ships are sailing in the sea on either side of a lighthouse. The angles of depression of the two ships are observed as 60° and 45° respectively. If the distance between the two ships is $\frac{200(\sqrt{3}+1)}{\sqrt{3}}$ m
 Find the height of the lighthouse.
 24. The number of students in a hostel speaking different languages is given below.
 Represent the data by a pie chart.

Language	Hindi	English	Marathi	Tamil	Bengali	Total
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No. of students	40	12	9	7	4	72
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25. The annual income of Mrs. Rxxx Tom is Rs.570000 exclusive of H.R.A. She contributes Rs. 400001 to PM's Tsunami Relief Fund (100% rebate) and contributes Rs. 20000 for her school where she studied (50% rebate) she contributes Rs. 5000 per month to her P.F. and pays an annual premium of Rs. 10000 towards her LIC policy. The earlier deductions as income tax for the first 11 months are at the rate of Rs.500 per month. Find her income tax due in the last month.

Assume the following for calculation

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

(b) Rates of Income tax for male persons (Below 65 years)

Taxable Income	Income tax
(i) Upto Rs 1,00,000	Nil
(ii) Rs 1,00,001 to Rs 1,50,000	10% of income exceeding Rs 1,00,000
(iii) Rs 1,50,001 to Rs 2,50,000	Rs 5000 + 20% of income exceeding Rs 1,50,000
(iv) More than Rs 2,50,000	Rs 25000 + 30% of income exceeding Rs 2,50,000

(c) Surcharge: If taxable income exceeding Rs 10 lakh, a surcharge of 10% is levied on the amount of tax payable.

(d) Education cess: 2% of income tax.

Guess Paper – 2007 Class – X Mathematics

GRADE 10

MARKS: 80

Time allowed: 3 hours

General Instructions:-

- All questions are compulsory
- The question paper consists of 25 question divided into three sections A, B and C. Section A contains 7 question of 2 marks each, Section B is 12 questions of 3 marks each and Section C is of 6 questions of 5 marks each..
- There is no overall choice. However, internal choice has been provided in two questions in each section.
- In question on construction, the drawing should be neat and exactly as per the given measurements
- Use of calculators is not permitted. However you may ask for mathematical tables.

Section A

51. Solve the following system of equations
- $$\frac{10}{x+y} - \frac{4}{x-y} = -2$$
- $$\frac{15}{x+y} + \frac{7}{x-y} = 10$$

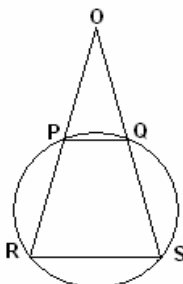
OR

Solve for x and y

$$\frac{xy}{x+y} = \frac{6}{5}$$

$$\frac{xy}{y-x} = 6$$

52. A bag contains 5 red balls and some blue balls. If the probability of drawing a blue ball is double that of the red ball find the number of blue balls in the bag.
53. PQ and RS are two parallel chords of a circle and the lines RP and SQ meet at O on producing. Prove that OP = OQ



OR

The perimeters of two similar triangles are 36 cm and 48 cm respectively. If one side of the first triangle is 9 cm. What is the corresponding side of the other triangle?

54. Reduce to the lowest terms:

$$\frac{2x^2 + x - 3}{(x-1)^2} \div \frac{2x^2 + 5x + 3}{x^2 - 1}$$

55. Solve the quadratic equation: $\frac{x+1}{x-1} + \frac{x-2}{x+2} = 3$; ($x \neq 1, -2$)
56. Which term of the A.P: 3, 15, 27, 39, .. will be 132 more than the 5th term
57. A mixi is available for Rs 1500 cash payment or for Rs 360 cash down payment followed by three equal monthly instalments of Rs 390 each. Compute the rate of interest charged under instalment scheme?

Section B

58. Solve following system of linear equations graphically.

$$4x - 5y - 20 = 0$$

$$3x + 5y - 15 = 0$$

Determine the vertices of the triangle formed by the lines, representing the above equations and y-axis

59. The H.C.F and L.C.M of two polynomials $P(x)$ and $q(x)$ are $x(x+a)$ and $12x^2(x+a)(x^2-a^2)$ respectively. If $p(x) = 4x(x+a)^2$ find $q(x)$

60. If $S_n = n(5n-3)$, find the A.P

61. The sum of the ages (in years) of a son and his father is 35 and the product of their ages is 150. Find their ages.

OR

A passenger train takes 2 hours less for a journey of 300 km. if its speed is increased by 5 km/hr from its usual speed. What is its usual speed?

62. A T.V set is available for Rs 19650 cash payment or for Rs 3100 cash down payment and three equal annual instalments. If the shopkeeper charges interest at the rate of 10% p.a. compounded annually, calculate the amount of each instalment.
63. Draw a triangle PQR in which $PQ = 5\text{cm}$, $\angle Q = 45^\circ$ and $QR = 5.4\text{ cm}$. Construct the incircle of ΔPQR . Write steps of construction.
64. An isosceles triangle ABC is inscribed in a circle. If $AB = AC = 13\text{ cm}$ and $BC = 10\text{ cm}$, find the radius of the circle.
65. A rocket is in the form of a cylinder closed at the lower end with a cone of the same radius attached to the top. The cylinder is of the radius 2.5m and height 21m and the cone has the slant height 8m. Calculate the total surface area of the rocket.

66. Prove that $\frac{\sin A}{1 - \cos A} + \frac{\tan A}{1 + \cos A} = \sec A \cdot \csc A + \cot A$

OR

Without using tables evaluate $3\cos 68^\circ \csc 22^\circ - \frac{1}{2} \tan 43^\circ \tan 47^\circ \tan 12^\circ \tan 60^\circ \tan 78^\circ$.

67. Show that the points $(0,-1), (2,1), (0,3), (-2,1)$ are the vertices of a square
68. If $(-2, -1); (a, 0); (4, b)$ and $(1, 2)$ are the vertices of a parallelogram, find the values of a and b
69. The data on mode of transport used by students to come to school are given below:

Mode of transport	Bus	Cycle	Train	Car	Scooter
No of students	1000	1200	450	650	300

Draw a pie chart to represent the above information

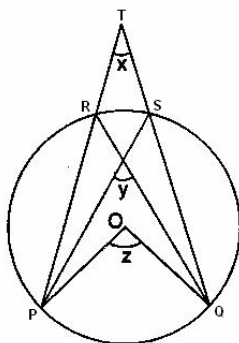
Section C

70. Find the missing frequencies in the following frequency table, if the mean is 57.6

Class interval	0 -20	20- 40	40 - 60	60- 80	80 - 100	100 - 120	Total
Frequency	7	f_1	12	f_2	8	5	50

71. Prove that degree measure of an arc of a circle is twice the angle subtended by it at any point on the alternate segment of the circle

In the following O is centre of the circle, prove that $x + y = z$

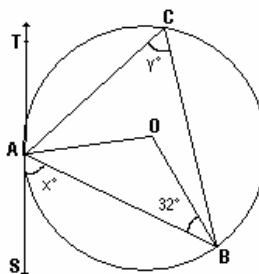


OR

Prove that if a chord is drawn through the point of contact of a tangent to a circle, then prove that the angles which this chord makes with the given tangent are equal respectively to the angles found in the corresponding alternate segments.

Using the above theorem do the following

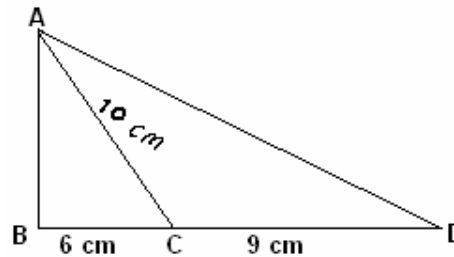
In the given O is centre of the circle and $\angle OBA = 32^\circ$. Find the values of x and y



72. Prove that in a right triangle, the square on the hypotenuse is equal to the sum of the squares on the other two sides.

Using the above do the following

In triangle ABC, $\angle B = 90^\circ$, $BC = 6$ cm, $AC = 10$ cm and $CD = 9$ cm. Find the length AD



73. A man in a boat rowing away from light house 100m high takes 2 minutes to change the angle of elevation of the top of the light house from 60° to 45° . Find the speed of the boat.

OR

From the top of a building 15 m high, the angle of elevation of the top of a tower is found to be 30° . From the bottom of the same building, the angle of elevation of the top of the tower is found to be 60° . Find the height of the tower and the distance of between the tower and the building.

74. A cylindrical bucket of diameter 28 cm and height 12 cm is full of water. The water is emptied in to rectangular tub of length 66cm and breadth 28 cm. Find the height to which the water rise in the tub.
75. The Annual income of Mrs. Shah is Rs 200,000 exclusive of H.R.A. She contributes Rs 500 per month to her P.F and Rs 8000 as annual premium for her LIC. Calculate her annual income tax liability.

For women (below 65 years)

Assume the following for calculating the income tax:

Rate of income tax

Taxable income

Income tax

i) Up to Rs 135,000	No tax
ii) From Rs 135,001 to Rs 150,000	10% of the amount exceeding Rs 135,000
iii) From 150,001 to Rs 2,50,000	1500 + 20% of the amount exceeding Rs 150,000
iv) Above Rs 250,000	Rs 21,500 + 30% of the amount exceeding Rs 250,000

Education Cess 2% on the payable tax

GUESS PAPER - 2007
Class: X
MATHEMATICS

Time: 3 hrs

Marks: 80

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.

SECTION A

(Qns 1 – 7 carry 2 marks each)

1. Solve for x and y:

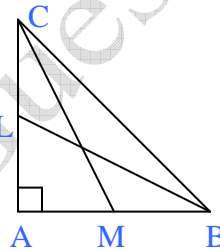
$$bx + ay = a + b$$

$$ax \left(\frac{1}{a-b} - \frac{1}{a+b} \right) + ay \left(\frac{1}{b-a} - \frac{1}{b+a} \right) = \frac{2a}{a+b}$$

OR

The difference between two numbers is 15 and the difference between their squares is 465. Find the numbers.

2. If $(x-2)(x+1)$ is the H.C.F of the polynomials $P(x) = (x^2 + 2x - 8)(x^2 + 4x + a)$ and $Q(x) = (x^2 + 2x + 1)(x^2 + 3x - b)$, then find a and b.
3. Using quadratic formula, solve the quadratic equation:
 $9x^2 - 9(a+b)x + (2a^2 + 5ab + 2b^2) = 0$
4. Which term of the sequence 20, $19\frac{1}{4}$, $18\frac{1}{2}$ is the first negative term?
5. A ceiling fan is marked at Rs 485 cash or Rs 105 cash down payment followed by 3 equal monthly instalments. If the rate of interest charged under this instalment plan is 16% p.a, find the monthly instalment.
6. BL and CM are the medians of a triangle ABC right-angled at A. Prove that $4(BL^2 + CM^2) = 5BC^2$.



OR

In an equilateral triangle of side 'a', prove that altitude $= \frac{\sqrt{3}}{2} a$ and area $= \frac{\sqrt{3}}{4} a^2$

7. Two black kings are removed from a pack of 52 cards and a card is drawn. Find the probability of getting (i) a spade. (ii) a king.

SECTION B

(Qns 8 – 19 carry 3 marks each)

8. Determine graphically the co-ordinates of vertices of a triangle formed by the lines whose equations are $x + y = 6$, $y = 2x$ and $y = x$. Also find the area of the triangle so formed.

9. Simplify:

$$\frac{\frac{3}{x^2 - x - 2} - \frac{4}{x^2 + x - 6}}{\frac{5}{x^2 + 4x + 3}}$$

10. Rs 6500 were divided equally among a certain number of persons. Had there been 15 more persons, each would have got Rs 30 less. Find the original number of persons.

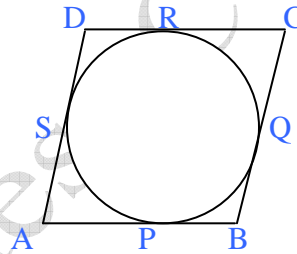
11. Find the sum of all three digit numbers leave the remainder 1 when divided by 4.

OR

The sum of n terms of an A.P is $3n^2 - 2n$, find the A.P and its 19th term.

12. A computer is available for Rs 39300 or for Rs 12820 cash down payment and 3 equal half yearly instalments. If the dealer charges interest at the rate of 20% p.a. compounded half yearly, calculate each instalments.

13. If all sides of a parallelogram touch a circle, show that parallelogram is a rhombus.



14. Construct a quadrilateral ABCD with AB = 3cm, AD = 2.7cm, BD = 3.6cm, $\angle B = 120^\circ$ and BC = 4.2cm. Construct another quadrilateral A'BC'D' similar to quadrilateral ABCD so that diagonal BD' = 4.8cm.

15. A right circular cylinder of diameter 12cm and height 15cm is full of ice-cream. The ice-cream is to be filled in cones of height 12cm and diameter 6cm having a hemi-spherical top. Find the number of such cones which can be filled with ice-cream.

16. Prove the following identity:

$$(1 + \tan A \tan B)^2 + (\tan A - \tan B)^2 = \sec^2 A \sec^2 B$$

OR

If $\frac{\sin 24^\circ}{\cos 66^\circ} + \frac{\tan 63^\circ \tan 27^\circ}{\sin 30^\circ} + 3 \tan^2 60^\circ + x = \cos^2 0^\circ$, find the value of x.

17. The number of students admitted in different faculties of a college are given below:

Faculty	Science	Arts	Commerce	Law	Education	Total
Number of	1000	1200	650	450	300	3600

students						
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Draw a pie-chart to represent the above information.

18. Show that the line segment joining the points $(-5, 8)$ and $(10, -4)$ is trisected by the coordinate axes.
19. Prove that the quadrilateral with vertices $(2, -1)$, $(3, 4)$, $(-2, 3)$ and $(-3, -2)$ is a rhombus.

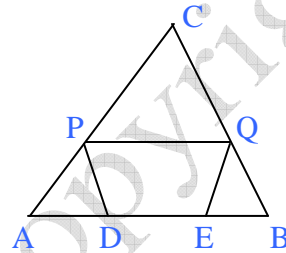
SECTION C

(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 and its converse do the following:

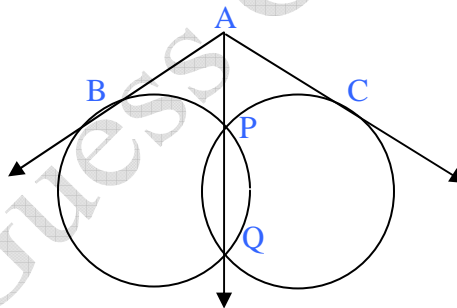
In triangle ABC, D and E are points on side AB such that $AD = BE$. If $DP \parallel BC$ and $EQ \parallel AC$, then prove that $PQ \parallel AB$.



21. If PAB is a secant to a circle intersecting the circle at A and B and PT is the tangent at T, then prove that $PA \cdot PB = PT^2$.

Using the above do the following:

In fig. two circles intersect each other at P and Q. If AB and AC are tangents to the two circles from a point A on the line joining P and Q, then show that $AB = AC$.



22. A bucket is in the form of a frustum of a cone and holds 28.490 litres of water. The radii of the top and bottom are 28cm and 21cm respectively. Find the height of the bucket.
(1 litre = 1000cm³, take $\pi = 22/7$)

OR

A cone of base radius 10cm is divided into two parts by drawing a plane through the mid-point of its axis, parallel to its base. Compare the volumes of two parts.

23. A person standing on the bank of the river observes that the angle of elevation of the top of the tree standing on the opposite bank is 60° . When he moves 40m away from the bank, he finds the angle of elevation to be 30° . Find the height of the tree and the width of the river.

OR

If the angle of elevation of the 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 height of the cloud is

$$h (\tan \beta + \tan \alpha)$$

$$\tan \beta - \tan \alpha$$

24. Find the missing frequencies in the following frequency distribution table, it is given that the mean of the distribution is 56.

C.I	0 - 20	20 - 40	40 - 60	60 - 80	80 - 100	100 - 120	Total
f	16	f_1	25	f_2	12	10	90

25. The annual income of Virender (excluding HRA) is Rs 3,40,000. He contributes Rs 3,000 per month in his provident fund account and pays an annual premium of Rs 28,000 towards his Life Insurance Policy. He also purchases NSC for Rs 50,000. Calculate the income tax paid by him in the last month of the year if his earlier deduction for the first 11 months for income tax were at the rate of Rs 2,000 per month.

Rates of Income tax for male persons (Below 65 years)

Taxable income	Income tax
(I) Upto Rs 1,00,000	Nil
(ii) Rs 1,00,001 to Rs 1,50,000	10% of income exceeding Rs 1,00,000
(iii) Rs 1,50,001 to Rs 2,50,000	Rs 5000 + 20% of income exceeding Rs 1,50,000
(iv) More than Rs 2,50,000	Rs 25000 + 30% of income exceeding Rs 2,50,000

- (a) Savings: 100% exemption for permissible savings upto Rs 1,00,000.
 (b) Education cess: 2% of the income tax.

Sample Paper – 2007

Class – X

Mathematics

MAXIMUM MARKS: 80

TIMES: 3 HR.

All questions are compulsory.

- The question paper consists of 25 questions divided into three sections A, B and C. Section A contains 10 questions of 3 marks each. Section B is of 10 questions of 4 marks each and Section C is of 5 questions of 6 marks each.
- Internal choices have been provided in some questions. You have to attempt only one of the choices in such questions.
- In questions on construction, the drawing should be neat and exactly as per the given measurements.
- Use of calculators is not permitted. However, you may ask for Mathematical tables.

(SECTION – A)

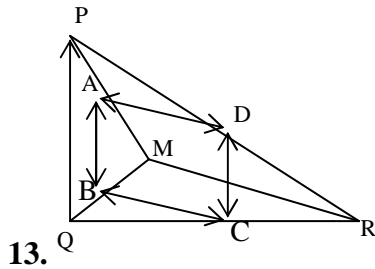
1. Solve for x and y : $3x + 2y = 2x + y + 3 = 4x + 3y - 3$
2. Find the L.C.M of the following: $24(2x - 1)^3 (x^2 - 1)^2$; $18(4x^2 - 1)^2 (x + 1)^2 (x - 1)^2$. **OR** Find the values of a and b so that the polynomials P(x) and Q(x) have H.C.F = $(x + 1) (x + 3)$; $P(x) = (x^2 + 3x + 2) (x^2 + 2x + a)$; $Q(x) = (x^2 + 7x + 12) x^2 + 7x + b$
3. A pocket transistor is sold for Rs. 500 cash or Rs. 200 cash down payment followed by 6 monthly installments of Rs. 55 each. Find the rate of interest (in nearest whole number) charged under the installment plan.
4. A sum of money is borrowed at 5% p.a. compound interest compounded annually. It is paid back in two years equal installments. If each annual installment is Rs 8,820, find the sum borrowed.
5. Find the volume of the largest right circular cone that can be cut out of a cube whose edge is 9 cm.
6. The radii of two right circular cylinders are in the ratio 2 : 3 and their heights are in the ratio 5 : 4. Calculate the ratio of their curved surface areas and also the ratio of their volumes.
7. A solid cube is cut into two cuboids of equal volumes. Find the ratio of the total surface area to the given cube and that of one of the cuboids.

(SECTION -B)

8. Calculate the mean of the following frequency distribution:

Class Interval	0 – 80	80 – 160	160 – 240	240 – 320	320 – 400
Frequency	22	35	44	25	24

9. if one card is drawn from a deck of 52 cards, find the probability of drawing a: (i)queen (ii)club (iii) jack red in colour (iv)black card
10. X and Y are centers of circles of radius 9 cm and 2 cm $XY = 17$ cm, Z is the centre of a circle of radius r cm, which touches the above circles externally. Given that $\angle XZY = 90^\circ$, write an equation in r and solve it for r.
11. A rocket is in the form of a cylinder closed at the lower end with a cone of the same radius attached to the top. The cylinder is of the radius 2.5 m and height 21 m and the cone has the slant height 8 m. Calculate the total surface area.
12. Draw a graph of the equations $x - y + 1 = 0$ and $3x + 2y - 12 = 0$. Shade the region bounded by these lines and x = axis.



13. ABCD is a parallelogram and $AB \parallel PQ$. Prove that $MR \parallel BC$.

14. The following data gives the monthly expenditure of a student residing in a hostel:

Items of expenditure	Expenditure (in Rs.)
Mess Charges	1200
College fees	400
Coaching	900
Books and Stationary	800
Miscellaneous	300

Represent the data by a pie chart.

15. If $a \cos \beta - b \sin \beta = c$, prove that $a \sin \beta + b \cos \beta = \pm \sqrt{a^2 + b^2 - c^2}$
16. Prove that the points (0, -1), (2, 1) (0, 3) and (-2, 1) are the vertices of a square.
17. Determine the ratio in which the line $2x + 3y - 30 = 0$ divides the line segment joining the points (3, 4) and (7, 8). Find also the coordinates of the point of division.
18. Construct a triangle ABC with base $BC = 4$ cm, $\angle A = 60^\circ$ and altitude through A is 2.8 cm.
19. Derive SECTION FORMULA in co- ordinate geometry.
(SECTION- C)
20. A boy is standing on the ground and flying a kite with a string of 150 m, at an angle of elevation of 30° . Another boy is standing on the roof of a 25 m high building and is flying his kite at an elevation of 45° . Both the boys are on opposite sides of both the kites. Find the length of the string (in meters), correct to two decimal places, that the second boy must have so that the two kites meet.
21. A ladder rests against a wall at angle ' α ' to the horizontal. Its foot is pulled away from the wall through a distance ' a ' so that it slides a distance ' b ' down the wall making an angle ' β ' with the horizontal. Show $a/b = \cos \alpha - \cos \beta / \sin \beta - \sin \alpha$.
22. Mrs. ANJU Kapoor has total annual income of Rs. 1, 35, 000 exclusive of H.R.A. She pays Rs. 8, 000 towards L.I.C. premium half – yearly and contributes Rs. 1, 750 p.m. towards provident fund.

- Calculate the income tax she has to pay on her income during the financial year if she pays Rs. 200 p.m. as income tax for the first eleven months, find the tax she has to pay in the last month of the year.
23. In the right – angled triangle, prove that the square of the hypotenuse is equal to the sum of the squares of the other two sides. Using this Two poles of heights 6m and 11m stand vertically on a playground. If the distance between their feet is 12 m, find the distance between their tops using the above theorem.
24. The diameter of the cross-section of water pipe is 5cm. Water flows through it @10km/hr into a cistern which is in the form of cylinder. If the radius of the base of cistern is 2.5m. Find the height to which the water will rise in cistern in 24 minutes.
- OR** A cylindrical container of diameter 12 cm is filled with ice cream. The height of the container is 15 cm. The whole ice cream is distributed among 10 customers in equal cones having hemispherical tops. If the height of the conical portion is twice the diameter of the base, find the diameter of the ice cream cone.
25. ΔABC is a triangle and G is its centroid. Prove that
 $(AB^2 + BC^2 + CA^2 = 3(GA^2 + GB^2 + GC^2))$
- OR** If a chord is drawn through the point of contact of a tangent to a circle, then the angles which this chord makes with the given tangent are equal respectively to the angles formed in the corresponding alternate segments. Prove it Also use the above result to find $\angle ABC$ when PQ is a tangent to the circle at A, $\angle BAQ = 50^\circ$ and $\angle BAC = 35^\circ$.

Guess Paper – 2007
Class – X
MATHEMATICS

TIME:3HR

M.MARKS: 100

General Instructions

- (i) All questions are compulsory.
- (ii) This question paper consists of 25 questions divided into three sections. Section A (Q. 1 to 10), Section B (Q. 11 to 20) and Section C (Q. 21 to 25).
- (iii) As far as possible answer questions in serial order. When you are not sure of answering the question, you may leave it for the time being and proceed further without wasting your time.
- (iv) When you wish to re-answer any question, please cancel the first one.
- (v) Use of a calculator is not permitted.
- (vi) Keep some time for revision.
- (vii) Please, write down the serial number of the question before attempting it.
- (viii) Use of calculator is not allowed. However, you can use Mathematical Tables.

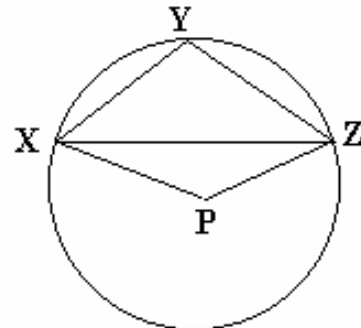
SECTION A

(Question numbers 1 to 10 carry three marks each).

1. Find the value of k for which the system of equations have a unique solution:
 $x - ky = 2, \quad 3x + 2y = -5$
2. Find the GCD (HCF) of the polynomial $2x^4 - 2y^4, 3x^3 + 6x^2y - 3xy^2 - 6y^3$
3. Simplify : $\frac{x}{x-y} - \frac{y}{x+y} - \frac{2xy}{x^2 - y^2}$
4. Solve using quadratic formula, for x : $a(x^2 + 1) = x(a^2 + 1)$
5. Which term of A.P. 3, 15, 27, 39 is 132 more than 54th term.
6. Find the sum of the following A.P. 1 + 3+ 5+ 7 -----199
7. A cooler is sold for Rs.4000 cash or for Rs.1600 cash down payment and two installments of Rs.1300 paid monthly. Find the rate of interest.
8. A loan of Rs.12,000 is obtained by Shiela to repair her house. The amount is to be paid back in equal 2 annual instalments. How much is each instalment, if the interest is compounded annually on balance at 5% p. a.
9. Show that the diagonals of a trapezium divide each other proportionally.

10. In the given figure P is the centre of the circle. Prove that

$$\angle XPZ = 2(\angle XZY + \angle YXZ)$$



Question numbers 11 to 20 carry four marks each.

11. Solve graphically the equation $x - y = 10, 2x - 3y = -10$.
12. Simplify: $\frac{2x^2 + 7x - 4}{3x^2 - 13x + 4} \div \frac{4x^2 - 1}{6x^2 + x - 1}$
13. What point on the X- axis is equidistant from the points (7,6) and (-3,4)

14. Prove that $\left(\frac{1}{\sec^2 \theta - \cos^2 \theta} + \frac{1}{\operatorname{cosec}^2 \theta - \sin^2 \theta} \right) \sin^2 \theta \cdot \cos^2 \theta = \frac{1 - \sin^2 \theta \cdot \cos^2 \theta}{2 + \sin^2 \theta \cdot \cos^2 \theta}$

15. An agricultural field is in the form of a rectangle of length 20m and width 14m. A 10m deep well of diameter 7m is dug in a corner of the field and the earth taken out of the well is spread evenly over the remaining part of the field. Find the rise in its level.

16. Draw a pie chart representing the following data showing the number of Students who like different subjects:

Subject	No. of Students
Physics	45
Chemistry	20
English	60
Maths	30
Biology	10
Punjabi	15

17. A die is thrown once. Find the probability of getting: (i) an even no. (ii) a prime no. (iii) a no. greater than 4 (iv) a no. greater than 3.

18. Find the ratio in which the point $(-3, p)$ divides the line segment joining the points $(-5, -4)$ and $(-2, 3)$. Find also the value of p .

19. The weekly observations of cost of living index in a certain city for the year 2000-01 are given alongside. Compute the mean weekly cost of living index by using Step Deviation Method.

Cost of Living Index	No. of Weeks
140 - 150	5
150 - 160	10
160 - 170	20
170 - 180	9
180 - 190	6
190 - 200	2
Total	52

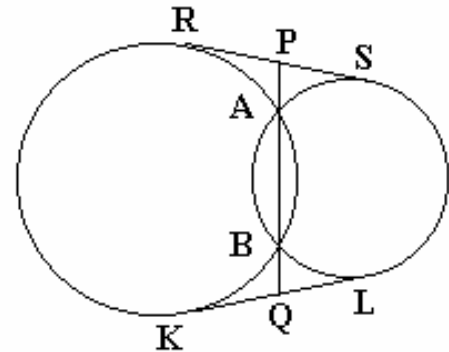
20. Draw a $\triangle ABC$ with base $BC = 4.1$ cm $\angle B = 60^\circ$ and side $AB = 5$ cm. Draw its incircle.

SECTION C

Question numbers 21 to 25 carry 6 marks each.

21. Prove that the ratio of the areas of two similar triangles is equal to the ratio of the squares of their corresponding sides. Using the above : prove that area of an equilateral triangle described on the side of a square is half the area of an equilateral triangle described on its diagonal.

23. If PAB is a secant to a circle intersecting it at A and B and PT is a tangent then. Prove that $PA \cdot PB = PT^2$. Using this theorem prove $PA = QB$ if KL and RS are two common tangents to the 2 intersecting circles as shown.



24. From the top of a house the angles of depression of two ships on the opposite sides of it are observed to be α and β . If the height of the house be h meters and the line joining the ships passes through the foot of the house, show that the distance between ships is $h [\tan \alpha + \tan \beta]$ metres.
25. A container made up of a metal sheet is in the form of a frustum of cone of height 16 cm with radii of its lower and upper ends as 8 cm and 20 cm respectively. Find the cost of milk which can completely fill the container at the rate of Rs.15 per litre.

GUESS PAPER - 2007

MATHEMATICS

CLASS - X

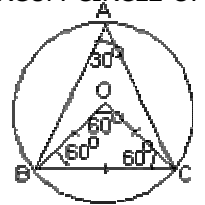
TNO:	NQ: 25	MM: 100	TA: 3.00+15 HRS	DT: 18.11.06
TC: C1				

SECTION: A (3 marks each)

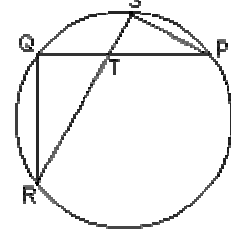
- Q1. Solve the equations:
 $3x + 7y = 15$, $5x - 23y = 129$
- Q2. Solve for x : $\sqrt{\frac{x}{1-x}} + \sqrt{\frac{1-x}{x}} = 2\frac{1}{6}$
- Q3. Find the G.C.D. of $x^3 + 7x^2 + 12$ and $x^3 - 2x^2 - 15x$

- Q4. Reduce in simplest term: $\sqrt{\frac{(x^2 + 3x + 2)(x^2 + 5x + 6)}{x^2(x^2 + 4x + 3)}}$
- Q5. A Motor bike is available for Rs. 44200 and Cash down payment of 30,000/- following with 3000/- monthly instalments of 5 months. Find the rate of interest calculated.
- Q6. How many terms of the A.P. where first term is -3 and sum of four consecutive terms is 6 and last term is twice of 6th term.
- Q7. A sum of Rs. 30,000 is to be paid back in 3 annual instalments. How much is each instalment, if the interest is compounded annually on the balance at 22% p.a. and is to be included in each instalment.
- Q8. Simplify $\frac{x+3}{x^2-3x+2} + \frac{x+2}{x^2-4x+3} + \frac{x+1}{x^2-5x+4}$.
- Q9. IN THE FIGURE $\angle BAC = 30^\circ$. SHOW THAT BC IS EQUAL TO THE RADIUS OF THE CIRCUM-CIRCLE OF ΔABC WHOSE CENTRE IS O.

OR



- P AND Q ARE POINTS ON SIDES AB AND AC RESPECTIVELY OF TRIANGLE ABC. IF PB IS TWICE OF THE AP, AND QC IS TWICE OF AQ THEN PROVE THAT BC IS THRIE OF PQ.
- Q10. IN THE GIVEN FIGURE CHORD PQ AND RS OF A CIRCLE INTERSECT AT T. IF RS = 18 CM, ST = 6 CM AND PT = 18 CM, FIND THE LENGTH OF TQ.



SECTION: B

(4 marks each)

- Q11. SOLVE FOR X AND Y $ax - y = a^2$, $x + a^2 y = -a$

OR

SOLVE THE EQUATION BY GRAPH $2x - 3y = 1$, $x + 3y = 2$

- Q12. A DIE IS THROWN TWICE FIND THE PROBABILITY OF THE SUM OF OUTCOME BE (A) EVEN (B) NOT LESS THAN 5.

- Q13. THE VOLUME A CYLINDER IS TWICE OF VOLUME OF A SPHERE. IF THE CURVED SURFACE AREA CYLINDER IS 14π TIMES THAT OF SPHERE. THE RATIO OF HEIGHT AND RADIUS OF CYLINDER IS 2:3. FIND THE VOLUME AND TOTAL SURFACE AREA OF CYLINDER.

OR

FIND THE COST OF MATERIAL USED IN A CONICAL HEAD AND HEMISPHERICAL BASED CYLINDER, HEIGHT IS $\frac{4}{3}$ TIMES OF RADIUS OF BASE ? THE TOTAL HEIGHT IS 14 CM. AND SLANT HEIGHT OF THE CONE IS 4CM. THE COST OF MATERIAL IS 4.5 /SQ. CM.

- Q14. RS 500 DIVIDED INTO TWO PARTS SUCH THAT THE WE ADDED ONE IN SQUARE OF THE RATIO OF LARGER PART TO SMALLER PART, IS $\frac{1}{50}$ TH PART. FIND THE DISTRIBUTION.

- Q15. CONSTRUCT A QUAD. ABCD IN WHICH AB = 2.5 CM BC = 3.5 CM, AC = 4.2 CM, CD = 3.5 CM AND AD = 2.5 CM. CONSTRUCT ANOTHER QUAD. AB'C'D' WITH DIAGONAL AC' = 6.3 CM SUCH THAT IT IS SIMILAR TO QUAD ABCD.

- Q16. THE VERTICES OF A TRIANGLE ARE (-2,1), (2,3) AND (1,-3). IS THE TRIANGLE EQUILATERAL, ISOSCELES OR SCALENE ?

- Q17. FIND THE RATIO IN WHICH THE POINT (11,15) DIVIDES THE LINE-SEGMENT JOINING THE POINTS (15,5) AND (9,2).

OR

FIND THE THIRD VERTEX OF A TRIANGLE, IF TWO OF ITS VERTICES ARE (-3,1) AND (0,-2) AND THE CENTROID IS AT THE ORIGIN.

- Q18. THE MEAN OF THE DISTRIBUTION IS 12, FIND THE VALUE OF X AND F. $\sum f_i \bar{u}_i = -70$:

MARKS	0-10	11-20	21-30	31-40	41-50	51-60	61-70	TOTAL
FREQUENCY	12	8	F	15	5	4	6	X

- Q19. PROVE THAT $\tan^2 A - \tan^2 B = \frac{\sin^2 A - \sin^2 B}{\cos^2 A \cos^2 B}$

OR

WITHOUT USING TRIGONOMETRIC TABLE, SHOW THAT:

$$\tan 7^\circ \cdot \tan 23^\circ \cdot \tan 60^\circ \cdot \tan 67^\circ \cdot \tan 83^\circ = \sqrt{3}$$

Q20 THE PERCENTAGE OF VARIOUS CATEGORIES OF WORKERS IN A STATE IS GIVEN BELOW:

CATEGORY OF WORKERS	PERCENTAGE
RESEARCH	20
MEDICAL	25
ENGINEERING	30
CONSTRUCTION	15
OTHERS	10
TOTAL	100

SECTION: C

(6 marks each)

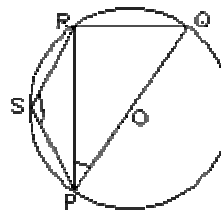
Q21 PROVE THAT THE RATIO OF THE AREAS OF SIMILAR TRIANGLE S IS EQUAL TO THE RATIO OF THE SQUARES ON THEIR CORRESPONDING SIDES

USING THE ABOVE, DO THE FOLLOWING

THE AREA OF TWO SIMILAR TRIANGLES ABC AND PQR ARE 25 SQ CM AND 81 SQ. CM RESPECTIVELY. IF $BC = 2.5\text{CM}$, FIND THE LENGTH QR

Q22 PROVE THAT SUM OF EITHER PAIR OF OPPOSITE ANGLES OF A CYCLIC QUADRILATERAL IS 180° . USING THE ABOVE SOLVE THE FOLLOWING:

IN FIG POQ IS A DIAMETER AND PQRS IS A CYCLIC QUADRILATERAL. IF $\angle PSR = 150^\circ$, FIND $\angle RPQ$.



Q23 A BUCKET IN THE FORM OF A FRUSTUM OF A CONE. ITS DEPT IS 24CM AND THE DIAMETER OF THE TOP AND BOTTOM ENDS ARE 3:1. FIND THE CAPACITY OF THE BUCKET IF THE SLANT LENGTH OF THE BUCKET IS $10\sqrt{5}$.

OR

50 PERSONS TOOK DIP SIMULTANEOUSLY IN A HEMISPHERICAL PIT WHICH HAS RADIUS OF 14M. WHAT IS THE RISE IN THE LEVEL OF WATER IN THE PIT IF THE AVERAGE DISPLACEMENT OF WATER BY A PERSON IS 4000 CUBIC CM.

- Q24 A BIRD IS SITTING ON THE TOP OF A TREE, WHICH IS 80M HIGH. THE ANGLE OF ELEVATION OF THE BIRD, FROM A POINT ON THE GROUND IS 45. THE BIRD FLIES AWAY FROM THE POINT OF THE OBSERVATION HORIZONTALLY AND REMAINS AT A CONSTANT HEIGHT. AFTER 2 SECONDS, THE ANGLE OF ELEVATION OF THE BIRD FROM THE POINT OF OBSERVATION BECOMES 30. FIND THE SPEED OF THE FLYING OF THE BIRD.

OR

A MAN ON THE ROOF OF A HOME, WHICH IS 10 M HIGH, OBSERVES THE ANGLE OF ELEVATION OF THE TOP OF A BUILDING AS 42° AND ANGLE OF DEPRESSION OF THE BASE OF THE BUILDING AS 40°. FIND THE HEIGHT OF THE BUILDING AND ITS DISTANCE FROM THE HOME

- Q25 Dr. Salim is a senior citizen aged 67 years. He earns Rs. 21000 per month. He donates Rs. 6000 to PM Relief Fund and 4000 to an education institution. He contributes Rs. 60,000 towards PPF and purchase NSC worth Rs. 15000. He pays income tax of Rs. 600 per month for the first 11 month of the year. Find the income tax to be paid by him in the last month of the year.

a) **Standard deduction:** NIL

b) **Rate of income tax :**

Slab

i) Up to Rs. 1,35,000

ii) From Rs. 1,35,001 to Rs. 2,00,000

iii) Upto 2,00,000

Income tax

No tax

10% of the amount exceeding Rs. 1,35,000

Rs. 1500 + 20% of the amount exceeding Rs. 2 lakh

c) **Rebate in income tax :**

i) 100% of the amount of saving subject to maximum Rs. 1 lakh

ii) 50% rebate on donations

D) **CESS 2% OF THE NET INCOME TAX PAID**

Guess Paper - 2007

Class X

Mathematics

Time: 3 Hours Max.

Marks: 80

General Instructions:

- All questions are compulsory.
- 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.
- There is no overall choice. However, internal choice has been provided in two questions of two marks each, two questions of three marks each and two questions of five

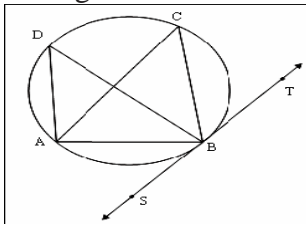
- marks each.
- In question on construction, the drawing should be neat and exactly as per the given measurement.
 - Use of calculators is not permitted. However, you may ask for Mathematical tables.

SECTION A

- Solve the following system of linear equations : $62x + 37y = 13$, $37x + 62y = -112$
- Reduce the following to a rational expression in lowest

terms: $\frac{x+2}{x^2+2x-15} \times \frac{x^2+4x-5}{2x^2-3x-2} \div \frac{x+1}{2x^2-7x+3}$

- Solve for x : $\frac{p}{x-q} + \frac{q}{x-p} = 2$ ($x \neq p, q$)
- Determine the sum of first 10 terms of an A.P. if its third term is 8 and 11th term is 20.
OR The nth term t_n of an A.P. is given by $t_n = 5 - 2n$, Find the sum of first 25 terms of the A.P.
- A room cooler is available for Rs 1500.00 cash payment or for Rs 360.00 cash down payment followed by three equal monthly installments of Rs 390 each. Find the rate of interest charged under the installments plan.



- In fig. ST is a tangent to the circle at B. If $\angle ABS = 45^\circ$ and $\angle DAB = 50^\circ$, find $\angle DBA$.
- Two coins are tossed simultaneously. Find the probability of getting at most one head.
OR A bag contains 7 red balls, 8 white balls and 5 green balls. A ball is drawn from the bag at random. Find the probability that the drawn ball is not of green colour.

SECTION B

- Solve the following system of linear equations graphically:
 $x + y = 4$, $3x - 2y = -3$ Shade the region bounded by the lines representing the above equations and x-axis.
- If $(x-1)(x+2)$ is the HCF of the polynomials $p(x) = (x^2 + 3x - 4)(2x^2 + x + a)$, $q(x) = (x^2 - 3x - 10)(3x^2 - bx + 2)$, find the values of a and b.
- If the sum of first five terms of an A.P. is 25 and its second term is 2, find the sum of its first 25 terms.
- The sum of the squares of two positive integers is 117. If the square of the smaller number equals four times the larger number, find the integers. **OR**
A passenger train takes one hour less when its speed is increased by 15 km/hour than its usual speed for a journey of 300km. Find the usual speed of the train.
- Construct a $\triangle ABC$ in which $AB = 4\text{cm}$, $\angle C = 60^\circ$ and the length of altitude from the vertex C on AB is 3cm. How many such triangles are possible?

13. ΔPQR is right angled at P and PM is perpendicular QR. The internal bisector of $\angle MQP$ meets MP at A and the internal bisector of $\angle MPR$ meets at B. Prove that $AB \parallel PR$.
14. A person borrowed some money and returned it in three equal annual installments, the rate of interest is 20% per annum, compounded annually. If the annual installment is Rs 21,600, find the sum borrowed.
15. Prove that $\left(\frac{1 + \sin A - \cos A}{1 + \sin A + \cos A} \right)^2 = \frac{1 - \cos A}{1 + \cos A}$
OR Without using trigonometrical tables, evaluate:

$$\frac{\operatorname{cosec}^2(90^\circ - \theta) - \tan^2 \theta}{4(\cos^2 48^\circ + \cos^2 42^\circ)} - \frac{2 \tan^2 30^\circ \sec^2 52^\circ \sin^2 38^\circ}{\operatorname{cosec}^2 70^\circ - \tan^2 20^\circ}$$
16. A right circular conical vessel of internal radius 15cm and height 27cm is full of water. This water is poured into a right cylindrical vessel with internal radius 5cm. Find the height to which the water rises in the cylindrical vessel.
17. The following data shows expenditure of a family on different items during a month.
- | Item | Rent | Education | Food | Others |
|-----------------------------|------|-----------|------|--------|
| Monthly Expenditure (in Rs) | 2400 | 1200 | 2700 | 900 |
- Represent the above data by a Pie-chart.
18. Find the ratio in which the line joining the points (2, .6) and (8, 4) is divided by x -axis. Also find the coordinates of the point of division.
19. Show that the points (1, 2), (2,0) and (3, .2) are collinear.
- SECTION C**
20. The angle of elevation of the top of a tower at a point on the horizontal line through the foot of the tower is 45° . After walking a distance of 80m towards the foot of the tower along the same horizontal line, the angle of elevation of the top of the tower changes to 60° . Find the height of the tower. **OR**
 If the angle of the elevation of a cloud from a point 'h' meters 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 the observation is $2h \sec \alpha / \tan \beta - \tan \alpha$.
21. Mrs. Krishena Kapur has an annual income of Rs 3,90,000 (exclusive of HRA). She contributes Rs. 8,000 per month in her GPF account and pays Rs 5,000 per annum as LIC premium. She donates Rs 12,000 to National Defence Fund (100% exemption). If she has been paying Rs 2,600 per month as income tax for the first 11 months of the year, find her tax liability for the last month of the year. Use the following for calculating income tax:

The rates of income tax for Women Employees are as under :

Slab	Rate of Tax
1. Taxable income upto Rs.1,35,000	NIL
2. Taxable income from Rs.1,35,001 - Rs. 1,50,000	10% of the amount by which taxable income exceeds Rs.

3. Taxable income from Rs.1,50,001 - Rs. 250,000 1,35,000.
Rs. 1500 + 20% of the amount by which taxable income exceeds Rs. 1,50,000
4. Taxable income above Rs.2,50,000 Rs. 21500 + 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. 1000,000
6. Education Cess 2% of the amount of tax payable.

22.

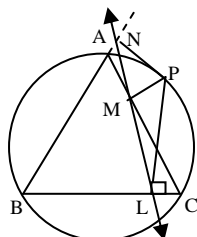
EXPENDITURE (RS)	100-150	150-200	200-250	250-300	300-350	350-400	400-450	450-500
FREQUENCY	244	400	333	288	300	222	166	077

23. A

right triangle whose sides are 15cm and 20cm, is made to revolve about its hypotenuse. Find the volume and surface area of the double cone so formed [Use $\pi = 3.14$]

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. Use it to prove that the angle formed by a chord in the major segment is acute. **OR** If two circles touch each other externally, then prove that their point of contact lies on the line joining their centers.

25.



In the fig. Prove that feet of the perpendicular drawn from point on the circumcircle of a Δ to its sides are Collinear. **Or** A toy has hemispherical base, cylindrical middle portion & conical top. The radius of hemisphere, cone & cylinder and height of all three portions are equal. If no. of units in the volume of toy is same as the no. of units in its surface area, find total height of the toy.

- All Questions are compulsory.
- 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 11 questions of 3 marks each and section C is of 6 questions of 5 marks each.
- Internal choices have been provided in some questions. You have to attempt only one of the choices in such questions.
- Write the serial number of the question before attempting it.
- In question on construction the drawing should be neat and exactly as per the given measurements.
- Use of calculator is not permitted. However you may ask for mathematical table.

Guess Paper - 2007

Class X

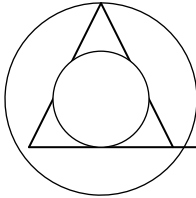
Mathematics

(Section A)

- Find the value of p and q so that the polynomials $F(x)$ and $G(x)$ have $(x-3)(x-4)$ as their H.C.F.
 $F(x) = (x^2 - 4x + 3)(x^2 + 5x + p)$ $G(x) = (x^2 - 5x + 4)(2x^2 - 3x + q)$
- A man gets Rs. 6 per day if he works but he is fined by Rs. 2 if he is absent. If in the whole month of April, he received Rs 100 only how many days, he worked.
- Bharati's** annual income (excluding H.R.A.) is Rs.172306. She contributes Rs.1200 per month in her provident fund and pays Rs. 8411 as premium for an insurance policy twice a year. She buys NSCs worth Rs.13, 000. If her employer deducted Rs. 500 per month at source, what refund will she get from the Income Tax Department?
- Reduce to the lowest terms: $(x^3 + 3x^2 - 4x) / (7x^3 - 18x^2 + 6x + 5)$
- Kiran borrows a sum of money on compound interest 10% p.a. compounded annually. She returns the money in two equal annual instalments of Rs. 1815 each. Find the sum borrowed by Kiran.
- A says to B, "I am now thrice as old as you were when I was your age and if you and I both live till you are $5/6$ ths of my present age, I shall be 84". Find their present ages.
- The sum of first four terms of an A.P. is 16 and the sum of their squares is 84. Find the terms.

SECTION B

- If $x \sin^3 \alpha + y \cos^3 \alpha = \sin \alpha \cos \alpha$ and $x \sin \alpha = y \cos \alpha$, prove that $x^2 + y^2 = 1$

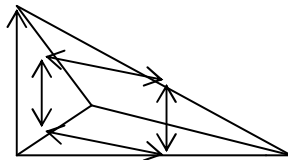


- In the figure, if ΔABC is an equilateral Δ of side 6cm find the difference of the area of the circumcircle and incircle of the triangle.
- If the roots of equation $a(b-c)x^2 + b(c-a)x + (a-b) = 0$ are equal, show that $2/b = 1/a + 1/c$
- Water flows out through a circular pipe whose internal diameter is 2 cm at the rate of 7 meters per second into a cylindrical tank the radius of whose base is 40 cm. By how much will the level of water rise in half an hour?
- Construct a ΔABC in which $AB = 5.6$ cm, $\angle B = 70^\circ$ and altitude $CD = 3.2$ cm. Construct a ΔAQR similar to ΔABC such that each side of ΔAQR is 1.5 times that of the corresponding side of the ΔABC

BY: R.KAPOOR

- Determine graphically the coordinates of the vertices of a Δ , the equations of whose sides are:
 $y - x = 0$, $y = 2x$ and $x + y = 6$
- If the points (x, y) be equidistant from the points $(a + b, b - a)$ and $(a - b, a + b)$. Prove that $bx = ay$.

15. Eliminate θ from the following: $a \sec\theta + b \tan\theta + c = 0$ $p \sec\theta + q \tan\theta + r = 0$
16. The ratios of the areas of two similar triangles are equal to the ratio of the squares on any two corresponding sides—prove it. Use it to solve the following: “In a $\triangle ABC$, D and E are points on AB and AC respectively such that $DE \parallel BC$. If $AB = 3AD$ and the area of $\triangle ABC$ is 72 cm^2 . find the area of the quadrilateral DBCE
17. Find the probability of getting more than 10 in a single throw of 2 dice.
18. A man has a certain number of oranges. He divides them into two lots A & B. He sells the first lot @ Rs. 2 for 3 oranges and the second lot @ Re 1 per orange and gets a total of Rs 400. If he had sold the first lot @ Re 1 per orange and the second lot @ Rs. 4 for 5 oranges, his total collection would have been Rs 460. Find the total number of oranges he had.



19. ABCD is a parallelogram and $AB \parallel PQ$. Prove that $MR \parallel BC$.

SECTION C

20. point A is 45° . After going up a distance of 600 meters towards the top of the cliff at an inclination of 30° , it is found that the angle of elevation is 60° . Find the height of the cliff.
21. ABCD is a quadrilateral in which L and M are the middle points of the diagonals AC and BD respectively. Prove that $AB^2 + BC^2 + CD^2 + DA^2 = AC^2 + BD^2 + 4LM^2$
22. $\sqrt{2x^2 + 3x - 14} + \sqrt{3x^2 - 24x + 36} = \sqrt{7x^2 - 13x - 2}$
23. A house-holder used to spend Rs.600 per month on the purchase of the wheat at the prevailing price. When the price rose by 50 paise per kg, he found that, for the same amount he could purchase 5 kg less. Find the new price of the wheat.
24. An inverted conical vessel of radius 6cm and height 8cm is completely filled with water. A sphere is lowered into the water and its size is such that when it touches the sides it is just immersed. What fraction of water over flows.
25. Suraj's salary is Rs 26,000 per month. He contributes Rs 54,000 towards GPF and PPF during the year. He also purchases NSC's worth Rs 16,000. He donates Rs 8,000 to a charitable trust, thus earning a deduction of 50% on the donation. Calculate income tax to be paid by him.

SAMPLE QUESTION MATHEMATICS

Class: X

Time : 3 hrs

Marks :80

General Instructions

1. All questions are compulsory

2. The question paper consists of 25 questions divided in to 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 of 6 Questions of 5 marks each
3. There is no overall choice .However ,internal choice has been provided in two questions of two marks each, two questions of three marks each, two questions of five marks each
4. In question on construction ,drawing should be neat exactly as per the given measurements.
5. Use of calculators is not permitted.

SECTION - A

Q1. If $x+3$ is a factor of $x^3 + ax^2 + bx + 9$ and $a + b = 14$ find a and b

Q2. Reduce the following rational expression into lowest terms

$$\frac{4(a^2 + a - 2)}{6(a^3 + 2a^2 - a - 2)}$$

Q3. Solve for x

$$4x^2 + 2(a - b)x - ab = 0$$

OR

Solve for x :

$$x^2 - 4ax + 4a^2 - b^2 = 0$$

Q4. What is the difference between the 20th terms of two AP with same common difference and first terms 3 and 8 ?, justify your answer .

OR

Find the number of terms of the AP 54, 51,48,.... so that their sum is 513.

Q5. If the diagonal BD of a quadrilateral ABCD bisects both $\angle B$ and $\angle D$,show that $\frac{AB}{BC} = \frac{AD}{CD}$

- Q6.** A mixi is available for Rs 5,400 cash or Rs 1,400 cash down payment followed by Rs 4,240 after 6 months .Find the rate of interest charged under this instalment scheme
- Q7.** Two coins are tossed simultaneously. find the probability of getting
1. Two heads
 2. at least one head

SECTION - B

- Q8.** Find the common root(s) of the equations

$$x^3 - 7x + 6 = 0 \text{ and } x^3 + 2x^2 - 5x - 6$$

- Q9.** The hypotenuse of a right angles triangle is 4 more than three times the shortest side .If the third side is 4 less than four times the shortest side ,find the sides of the triangle

- Q10.** If a, b , c are p^{th} , q^{th} , r^{th} terms of an AP then prove that

$$a(q - r) + b(r - p) + c(p - q) = 0$$

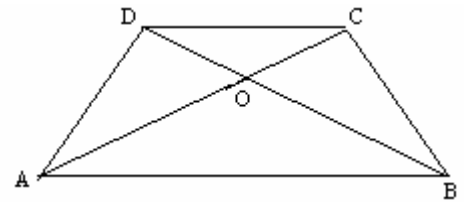
- Q11.** A loan of Rs 48,800 is to be paid back in 3 equal annual instalment .If the rate of interest is 25% per annum compounded annually .Find the instalment

- Q12.** The areas of two similar triangles are 81 Cm^2 and 49Cm^2 respectively .If the altitude of the bigger triangle is 4.5Cm find the corresponding altitude of the smaller triangle

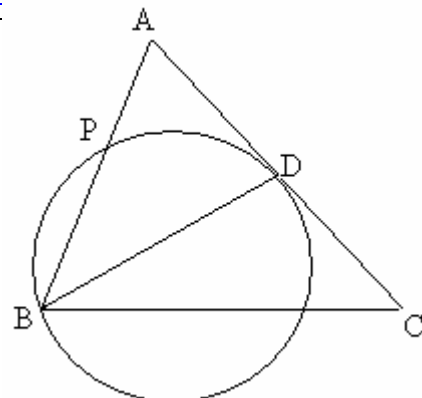
OR

In the trapezium ABCD AB parallel to CD and $AB = 2CD$

If $\text{ar}(\triangle AOB) = 84\text{Cm}^2$, ,find $\text{ar}(\triangle COD)$



- Q13.** In the given figure ABC is a triangle in which $AB = AC$
A circle through B touches AC at D and intersect AB at P. If D is the mid point of AC, show that $4AP = AB$



- Q14.** Construct ΔABC having perimeter 14 Cm and $\angle B = 60^\circ$, $\angle A = 30^\circ$. Then construct the circum circle of the triangle
- Q15.** The radius and height of a solid right circular Cylinder are 10 Cm and 30 Cm respectively. It is melted and solid cones are prepared with diameter of the base 2 Cm and height 10 Cm. Find how many such cones are prepared from the Cylinder

- Q16.** Prove that $\frac{1 + \cos \theta}{1 - \cos \theta} = \frac{\tan^2 \theta}{(\sec \theta - 1)^2}$

OR

Without using trigonometric table evaluate

$$\frac{\cos 58^\circ}{\sin 32^\circ} + \frac{\sin 22^\circ}{\cos 68^\circ} - \frac{\cos 38^\circ \csc 52^\circ}{\tan 18^\circ \tan 35^\circ \tan 60^\circ \tan 72^\circ \tan 55^\circ}$$

- Q17.** Marks of 40 students in 10^{th} examination is represented by a frequency distribution. And their mean marks is 40.5 find the missing frequencies.

Class	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80
Frequency	5	3	4	F_1	7	F_2	6	3

- Q18.** The co-ordinates of one end of the diameter of a circle are (3,5) and the co-ordinates of its centre are (7,4). Find out the co-ordinates of the other end of the diameter
- Q19.** Find the third vertex of a triangle, if two of its vertices are at (-3,1) and (0,-2) and the centroid is at the origin

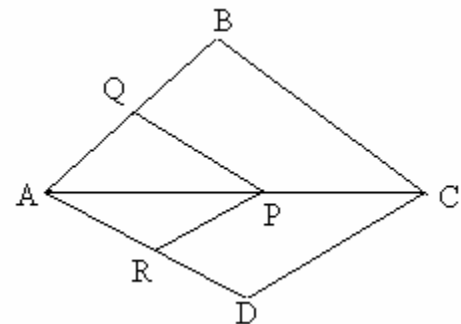
Q20. Anuradha's salary is Rs 15,000 per month and she contributes Rs 2,000 per month towards PF and pays Rs 8,000 as annual LIC premium. She invests Rs 4,000 in NSC and she donates Rs 2,000 towards PM's National Relief Fund. Find the income tax to be paid by her for the financial year

Use the following for calculating income tax

- i) Savings upto 1,00,000 are exempted from income tax
- ii) Rates of income tax

<u>Slab</u>	<u>Rate</u>
a) Taxable income up to 1,35,000	No tax
b) Taxable income from Rs 1,35,001 to 1,50,000	10% of the amount exceeding Rs 1,35,000
c) Taxable income from Rs 1,50,001 to 2,50,000	Rs 1,500 + 20% of the amount exceeding Rs 1,50,000
d) Taxable income above Rs 2,50,000	Rs 21,500 + 30% of the amount exceeding Rs 2,50,000

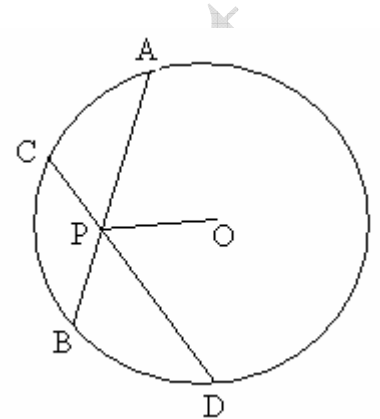
Q21. a) "In a triangle a line drawn parallel to one side to intersect the other sides in distinct points, divides the two sides in the same ratio". Prove



b) In the figure If PQ parallel to BC and PR parallel to

CD , Prove that $\frac{AR}{RD} = \frac{AQ}{BQ}$

Q22. In the given figure O is the centre of the circle and OP bisects angle APD prove that $AB = CD$



Q23. A cone of height 15 Cm and diameter 7 Cm is mounted on a hemisphere of the same diameter .Determine the volume of the solid thus formed .(use $\pi = \frac{22}{7}$)

OR

Find the number of bricks each measuring $25\text{Cm} \times 16\text{Cm} \times 10\text{Cm}$ required to construct a

wall 24m long ,6m high and 0.4m thick The mortar occupies $\frac{1}{10}$ of the volume of the wall

Q24. A person standing on the bank of a river observes that the angle of elevation of the top a tree standing on the opposite bank is 60° . When he moves 40m away from the bank ,he finds the angle of elevation to be 30° . Find the height of the tree and the width of the river

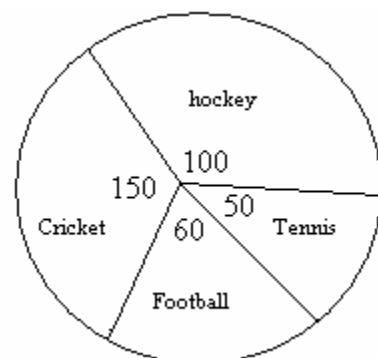
OR

From the top of a building AB, 60 m high, the angles of depression of the top and bottom of a vertical lamp post CD are observed to be 30° and 60° respectively Find

(i) the horizontal distance between AD and CD.

(ii) the difference between the heights of the building and the lamp post.

Q25. The pie chart (as shown in the figure) represents the amount spent on different sports by a sports club in a year .If the amount spent by the club for hockey is 30,000 .Find the total amount spent and amount spent on each sports



A Suresh's Sample paper for Class 10 :Ph 00965-749617
For Blue print and Marking scheme sureshr@tandemkuwait.com

Mathematics – 2007

Guess Paper

Class - X

Time: 3 hrs

Marks :80

General Instructions

- All questions are compulsory
- The question paper consists of 25 questions divided in to 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 of 6 Questions of 5 marks each
- There is no overall choice .However ,internal choice has been provided in two questions of two marks each, two questions of three marks each, two questions of five marks each
- In question on construction ,drawing should be neat exactly as per the given measurements.
- Use of calculators is not permitted.

SECTION - A

Q1. If $x+3$ is a factor of $x^3 + ax^2 + bx + 9$ and $a + b = 14$ find a and b

Q2. Reduce the following rational expression into lowest terms $\frac{4(a^2 + a - 2)}{6(a^3 + 2a^2 - a - 2)}$

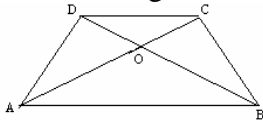
Q3. Solve for x : $4x^2 + 2(a - b)x - ab = 0$ OR Solve for x : $x^2 - 4ax + 4a^2 - b^2 = 0$

Q4. What is the difference between the 20th terms of two AP with same common difference and first terms 3 and 8 ?, justify your answer .OR Find the number of terms of the AP 54, 51,48,... so that their sum is 513.

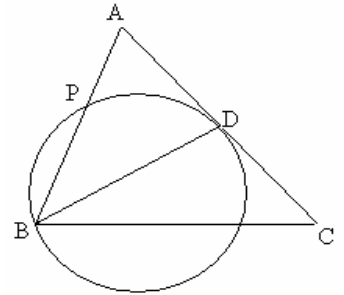
- Q5.** If the diagonal BD of a quadrilateral ABCD bisects both $\angle B$ and $\angle D$, show that $\frac{AB}{BC} = \frac{AD}{CD}$
- Q6.** A mixi is available for Rs 5,400 cash or Rs 1,400 cash down payment followed by Rs 4,240 after 6 months. Find the rate of interest charged under this installments scheme
- Q7.** Two coins are tossed simultaneously. find the probability of getting 1. Two heads 2. at least one head

SECTION - B

- Q8.** Find the common root(s) of the equations $x^3 - 7x + 6 = 0$ and $x^3 + 2x^2 - 5x - 6 = 0$
- Q9.** The hypotenuse of a right angles triangle is 4 more than three times the shortest side. If the third side is 4 less than four times the shortest side, find the sides of the triangle
- Q10.** If a, b, c are p^{th} , q^{th} , r^{th} terms of an AP then prove that $a(q - r) + b(r - p) + c(p - q) = 0$
- Q11.** A loan of Rs 48,800 is to be paid back in 3 equal annual installments. If the rate of interest is 25% per annum compounded annually. Find the installments
- Q12.** The areas of two similar triangles are 81 cm^2 and 49 cm^2 respectively. If the altitude of the bigger triangle is 4.5Cm find the corresponding altitude of the smaller triangle



OR In the trapezium ABCD AB parallel to CD and $AB = 2CD$. If $\text{ar}(\triangle AOB) = 84 \text{ cm}^2$, find $\text{ar}(\triangle COD)$



- Q13.** In the given figure ABC is a triangle in which $AB = AC$. A circle through B touches AC at D and intersects AB at P. If D is the mid point of AC, show that $4AP = AB$

- Q14.** Construct $\triangle ABC$ having perimeter 14 cm and $\angle B = 60^\circ$, $\angle A = 30^\circ$. Then construct the circum circle of the triangle
- Q15.** The radius and height of a solid right circular Cylinder are 10 cm and 30 cm respectively. It is melted and solid cones are prepared with diameter of the base 2 cm and height 10 cm. Find how many such cones are prepared from the Cylinder

- Q16.** Prove that $\frac{1 + \cos \theta}{1 - \cos \theta} = \frac{\tan^2 \theta}{(\sec \theta - 1)^2}$ **OR** Without using trigonometric table evaluate

$$\frac{\cos 58^\circ}{\sin 32^\circ} + \frac{\sin 22^\circ}{\cos 68^\circ} - \frac{\cos 38^\circ \csc 52^\circ}{\tan 18^\circ \tan 35^\circ \tan 60^\circ \tan 72^\circ \tan 55^\circ}$$

- Q17.** Marks of 40 students in 10^{th} examination is represented by a frequency distribution. And their mean marks is 40.5 find the missing frequencies.

Class	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80
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Frequency	5	3	4	F_1	7	F_2	6	3
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Q18. The co-ordinates of one end of the diameter of a circle are (3,5) and the co-ordinates of its centre are (7,4). Find out the co-ordinates of the other end of the diameter

Q19. Find the third vertex of a triangle, if two of its vertices are at (-3,1) and (0,-2) and the centroid is at the origin

Q20. Mrs. Kapoor's salary is Rs 15,000 per month and she contributes Rs 2,000 per month towards PF and pays Rs 8,000 as annual LIC premium. She invests Rs 4,000 in NSC and she donates Rs 2,000 towards PM's National Relief Fund. Find the income tax to be paid by her for the financial year : Use the following for calculating income tax

i) Savings upto 1,00,000 are exempted from income tax

Slab

- a) Taxable income up to 1,35,000
- b) Taxable income from Rs 1,35,001 - 1,50,000
- c) Taxable income from Rs 1,50,001 - 2,50,000
- d) Taxable income above Rs 2,50,000

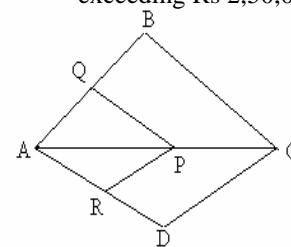
Rate

- No tax
- 10% of the amount exceeding Rs 1,35,000
- Rs 1,500 + 20% of the amount exceeding Rs 1,50,000
- Rs 21,500 + 30% of the amount exceeding Rs 2,50,000

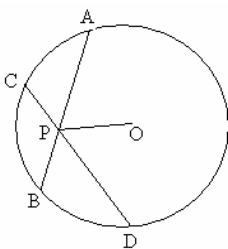
Q21. a) "In a triangle a line drawn parallel to one side to intersect the other sides in distinct points, divides the two sides in the same ratio". Prove

b) In the figure If PQ parallel to BC and PR parallel to

CD, Prove that $\frac{AR}{RD} = \frac{AQ}{BQ}$



Q22. In the given figure O is the centre of the circle and OP



bisects angle APD prove that $AB = CD$

Q23. A cone of height 15 Cm and diameter 7 cm is mounted on a hemisphere of the same diameter.

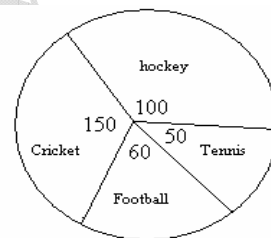
Determine the volume of the solid thus formed. (Use $\pi = \frac{22}{7}$) **OR**

Find the number of bricks each measuring $25\text{Cm} \times 16\text{Cm} \times 10\text{Cm}$ required to construct a wall 24m long, 6m high and 0.4m thick. The mortar occupies $\frac{1}{10}$ of the volume of the wall.

Q24. A person standing on the bank of a river observes that the angle of elevation of the top of a tree standing on the opposite bank is 60° . When he moves 40m away from the bank, he finds the angle of elevation to be 30° . Find the height of the tree and the width of the river. **OR**

From the top of a building AB, 60 m high, the angles of depression of the top and bottom of a vertical lamp post CD are observed to be 30° and 60° respectively. Find (i) the horizontal distance between AD and CD. (ii) the difference between the heights of the building and the lamp post.

Q25. The pie chart (as shown in the figure) represents the amount spent on different sports by a sports club in a year. If the amount spent by the club for hockey is 30,000. Find the total amount spent and amount spent on each sports



CBSE GUESS PAPER – 2007
MATHEMATICS
Class – X

TIME 3 Hrs

Max. Marks 80

SECTION – A

(QUESTION NUMBERS 1 TO 7 CARRY 2 MARKS EACH)

1. Solve the following system of linear equations $62x + 37y = 13$, $37x + 62y = -112$.

(Or)

$$ax + by = 2ab$$

$$bx + ay = a^2 + b^2$$

2. If $(x-1)(x+2)$ is the HCF of the polynomials

$$p(x) = (x^2 + 3x - 4) \quad (2x^2 + x + a) \text{ and}$$

$q(x) = (x^2 - 3x - 10) (3x^2 - bx + 2)$, find the value of ab

3. The n^{th} term t_n of an AP is given by $t_n = 5 - 2n$. Find the sum of first 25 terms of the A.P.

4. Solve for x : $\frac{p}{x-q} + \frac{q}{x-p} = 2$; ($x \neq p, q$)
(or)

$10ax^2 - 6x + 15ax - 9 = 0$ $a \neq 0$: ($x \neq 2, 4$)

5. A loan has to be returned in two equal semi-annual instalments. If the rate of interest is 16% per annum, compound semi-annually and each instalment is Rs. 1458, find the sum borrowed.
6. The areas of two similar triangles are 36cm and 49cm respectively. If one side of the First triangle is 9 cm. What is the length of the corresponding side of the other triangle?
7. From a well shuffled pack of 52 cards, black aces and black kings are removed. From the remaining cards, a card is drawn at random. Find the probability of drawing a king or a queen.

(2)

SECTION - B

QUESTION NUMBERS 8 TO 19 CARRY 3 MARKS EACH

8. Solve the following equations graphically

$3x - 2y = 1$; $4x - 3y = 2$

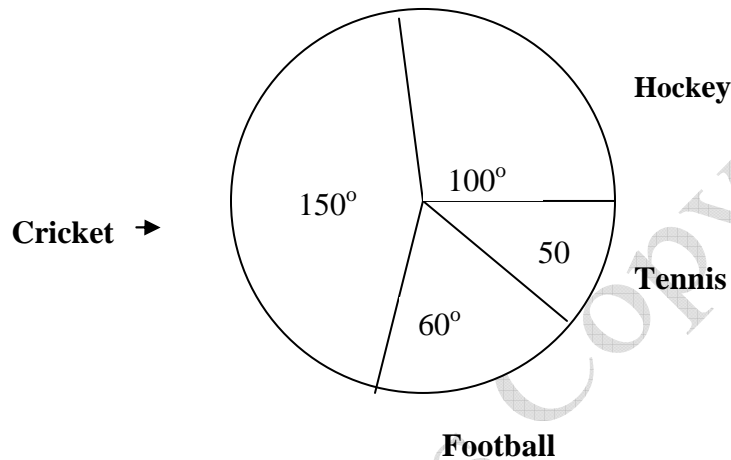
9. Reduce the following to a rational expression in lowest form

$$\frac{x+2}{x^2+2x-15} \times \frac{x^2+4x-5}{2x^2+3x-2} \div \frac{x+1}{2x^2-7x+3}$$

10. Find the sum of all two digit numbers each of which leave the remainder 3 when divided by 5.
11. Rs. 1,200 were distributed equally among certain number of students. Had there been 5 more students, each would have received Rs12 less. Find the number of students.
12. A bicycle is available for Rs. 1425 cash or for 20 % of the cash value as cash down payment followed by three equal monthly instalments. If the rate of interest charged under the instalment scheme is 6%, find each instalment.
13. Construct a ΔABC in which $BC = 5\text{cm}$, Angle $A = 60^\circ$ and the length of Median from the Vertex A on BC is 3cm. How many such triangles are possible?
14. ΔABC and ΔDBC are two triangles on the same base BC and the diagonals BD and AC are intersecting at O. Prove that $\frac{\text{Area of } \Delta ABC}{\text{Area of } \Delta DBC} = \frac{AO}{DO}$
15. Prove that $\frac{1 - \sin A}{1 + \sin A} = (\sec A - \tan A)^2$
- (3)**
16. The radius of a solid iron sphere is 3cm. It is melted and recast into a solid right circular cylinder of diameter 2 cm. Find the height of the cylinder so formed, assuming that there is no wastage of metal in the process.
17. Three consecutive vertices of a parallelogram ABCD are A (1,2) B (1,0) and C (4,0). Find the fourth vertex D.
18. Find the value of k for which the point A (-5, 1), B (1, k) and C (4,-2) are collinear.

Also find the ratio in which B divides AC.

19. The pie chart (as shown in the figure) represents the amount spent on different sports by a sports club in a year. If the total money spent by the club on sports is Rs. 108000, find the amount spent on each sport.



SECTION - C

QUESTION NUMBERS 20 TO 25 CARRY 5 MARKS EACH:

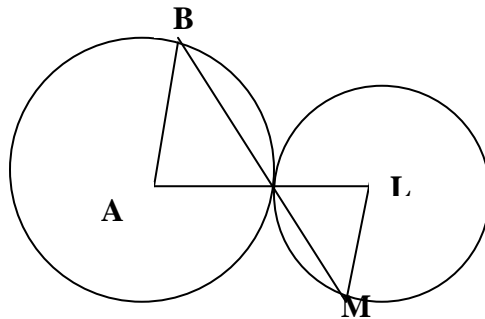
20. The mean of the following data is 38.7. Find the missing frequencies f_1 and f_2 .

Class interval	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60	60 - 70	Total
Frequencies	5	7	f_1	3	f_2	9	6	100

(4)

21. The internal radius of the ends of a bucket, full of milk and of internal height 16cm are 14cm and 7cm. If this milk is poured in to a hemispherical vessel, the vessel is completely filled. Find the internal diameter of the hemispherical vessel.

22. A vertical flagstaff stands on the top of a building. The height of the flagstaff above the buildings is 6m. The angles of elevation of the top and bottom of the flagstaff at a point on the level ground are 45° and 30° respectively. Find the height of the building.
23. If two circles touch each other externally, then prove that their point of contact lies on the line joining their centres. Use it to prove the following. In fig, two circles touch each other externally at P, show that $AB \parallel LM$, where A & L are the centres of two circles



24. Prove that the ratio of the areas of two similar triangles is equal to the ratio of the squares of their corresponding sides. Using the above, prove the following
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.
25. Mrs Mani has an annual income of Rs. 3,90,000 (exclusive of HRA). She contributes Rs. 8000 per month in her GPF account and pays Rs. 5000 per annum as LIC premium. She donates Rs. 12000 to National Defence Fund (100% exemption). If she has been paying Rs. 2,500 per month as income tax for the first 11 months of the year, find her tax liability for the last month of the year.

(5)

Use the following for calculating income tax:

- a) Savings : 100% exemption for savings upto Rs. 1,00,000
- b) Rates of income tax : Income Tax
- (i) Upto Rs. 1,35,000 No tax
- (ii) From Rs. 1,35,001 to Rs. 1,50,000 10% of the amount exceeding Rs. 1,35,000
- (iii) From Rs. 1,50,001 to Rs. 2,50,000 Rs. 1500 + 20% of the amount exceeding Rs. 1,50,000.
- (iv) above Rs. 2,50,000 Rs. 21, 500 + 30% of the amount exceeding Rs. 2,50,000.
- c) Education less : 2 % of the Tax payable.

Mathematics Guess Paper Class - X

Topic –HCF and LCM

Q1 . Find the HCF and LCM

- i) $12(9x^2 - 4)$ and $18(6x^2 - 5x - 6)$
- ii) $(18x^3 + 45x^2 - 27x)$ and $(15x^4 - 135x^2)$
- iii) $18(x^3 - x^2 + x - 1)$ and $12(x^4 - 1)$
- iv) $42(2x^3 - 5x^2 - 3x)$ and $60(8x^4 + x)$
- v) $8(x^4 - 16)$ and $12(x^3 - 8)$
- vi) $(2x^4 - 2y^4)$ and $(3x^3 + 6x^2 - 3xy^2 - 6y^3)$
- vii) $(x^4 - 1)$ and $(x^3 + x^2 + x + 1)$
- viii) $36(3x^4 + 5x^3 - 2x^2)$ and $54(27x^4 - x)$
- ix) $(x^3 - 1)$ and $(x^4 + x^2 + 1)$
- x) $(x^2 + x - 2)$ and $(x^3 + 4x^2 + x - 6)$
- xi) $(x^4 - y^4)$ and $(x^6 - y^6)$
- xii) $(6x^4 - 13x^3 + 6x^2)$ and $(8x^4 - 36x^3 + 54x^2 - 27x)$

- Q2.** For what value of k , the HCF of $x^2+x-2(k+1)$ and $(2x^2+kx-12)$ is $(x+4)$.
- Q3.** If $(x-k)$ is the HCF of (x^2+x-12) and $(2x^2-kx-9)$ find the value of k .
- Q4.** Find the value of a and b so that x^3+ax^2+bx-6 is completely divisible by x^2-4x+3 .
- Q5.** If $(x-3)$ is the HCF of (x^3-2x^2+px+6) and (x^2-5x+q) find the value of $(6p+5q)$.
- Q6.** Find the value of a and b so that $f(x)=3x^3+ax^2-13x+b$ is divisible by (x^2-2x-3) .
- Q7.** If $(x+1)(x-4)$ is the HCF of the polynomial $(x-4)(2x^2+x-a)$ and $(x+1)(2x^2+bx-12)$, find a and b .
- Q8.** The HCF and LCM of two polynomial $p(x)$ and $q(x)$ are $56(x^4+x)$ and $4(x^2-x+1)$ respectively. If $p(x)=28(x^3+1)$ find $q(x)$.
- Q9.** The HCF and LCM of the polynomial $P(x)$ and $Q(x)$ are respectively $5(x+3)(x-1)$ and $20x(x^2-9)(x^2-3x+2)$. If $P(x)=10(x^2-9)(x-1)$ find $q(x)$.
- Q10.** The HCF of the polynomial $P(x)=(x-3)(x^2+x-2)$ and $Q(x)=(x^2-5x+6)$, find the LCM of $P(x)$ and $Q(x)$.
- Q11.** (x^2+x-2) is the HCF of the expression $(x-1)(2x^2+ax+2)$ and $(x+2)(3x^2+bx+1)$. Find the value of a and b .
- Q12.** If $(x+3)(x-2)$ is the G.C.D of $f(x)=(x+3)(2x^2-3x+a)$ and $g(x)=(x-2)(3x^2+10x-b)$ Find the value of a and b .
- Q13.** Find the L.C.M of the polynomials: $x(8x^3+27)$ and $2x^2(2x^2+9x+9)$.
- Q14.** If $(x-1)(x+4)$ is the HCF of the polynomials
 $P(x)=(x^2+2x-3)(2x^2+5x+a)$ and $Q(x)=(x^2+x-12)(3x^2-x+b)$ find the value of a and b
- Q15.** If the HCF of $P(x)=(2x^2-x-1)(px^2+8x-3)$ and $Q(x)=(x^2+x-6)(3x^2+qx-1)$ is (x^2+2x-3) , find the values of p and q .

INSTITUTE OF MATHEMATICS- OOTY

MATHEMATICS

STD. X/ MODEL EXAMINATION-I-/MAX MARKS-80/TIME-3HOURS.

SECTION – A

(7 X 2 = 14 Marks)

1. Solve $\frac{x}{a} + \frac{y}{b} = 2$; $ax - by = a^2 - b^2$
2. If $x-3$ is the G.C.D of $x^3 - 2x^2 + px + 6$ and $x^2 - 5x + q$, find $6p + 5q$
3. Find the value of k for which the quadratic equation $(k+1)x^2 - 2(k-1)x + 1 = 0$ has real and equal roots.
4. If 8^{th} and 15^{th} terms of an AP are 5 and 33 respectively, find its 5^{th} term and n^{th} term.
5. Deepak borrowed a sum of money and returned it in two equal annual instalments of Rs. 4410 each. If the interest is compounded annually at 5 % p.a, find the sum borrowed.
6. Show that a line drawn parallel to the parallel sides of a trapezium divided the non parallel Sides proportionally.
7. A bag contains 11 white, 13 red and 12 black balls. A ball is drawn from the bag. Find the probability that
 - (i) it is a black ball.
 - (ii) It is not a red ball.

SECTION – B

12 X 3 = 36

8. Solve the following system of linear equations graphically $3x + y - 12 = 0$,
 $x - 3y + 6 = 0$. Also find the coordinates of the points where the lines meet x - axis.

9. Simplify $\frac{x}{(x+y)^2 - 2xy} \times \frac{x^4 - y^4}{(x+y)^3 - 3xy(x+y)} \times \frac{(x+y)^2 - 3xy}{(x+y)^2 - 4xy}.$

10. Solve $\frac{1}{x+1} + \frac{2}{x+2} = \frac{4}{x+4} \quad x \neq -1, -2, -4$

(or)

A passenger train takes one hour less when its speed is increased by 15 km / hour than its usual speed for a journey of 300 km, find the usual speed of the train.

(1)

11. Construct a triangle ABC in which $AB = 4$ cm , $C = 60^\circ$ and the length of altitude from the vertex C on AB is 3 cm. How many such triangles are possible.

12. If the sum of first five terms of an AP is 25 and its second term is 2, Find the sum of the its first 25 terms.

13. An article is sold for Rs. 500 cash or for Rs150 cash down payment followed by 5 equal monthly instalments. If the rate of simple interest charges is 18 % p.a. Find the amount of monthly instalment.

14. A circle touches the side BC of triangle ABC at P and touches AB and AC produced at Q and R respectively. Show that $AR = \frac{1}{2}$ (perimeter of $\triangle ABC$).

15. The following data shows the expenditure of a family on different items during a month.

Item	Rent	Education	Food	Others
Expenditure (in Rs)	2400	1200	2700	900

Represent the above data by a pie chart.

16. A metallic sphere of radius 10.5 is melted and recast into small cones, each of radius 3.5 cm And height 3 cm. Find how many cones are obtained.

17. Prove $\frac{\tan A + \sec A - 1}{\tan A + \sec A + 1} = \frac{1 + \sin A}{\cos A}$

(or)

Evaluate without using tables:

$$\frac{\cos 70^\circ}{\sin 20^\circ} + \frac{\cos 55^\circ \operatorname{cosec} 35^\circ}{\tan 5^\circ \tan 25^\circ \tan 45^\circ \tan 65^\circ \tan 85^\circ}$$

18. Find the co- ordinate of a point P on Y- axis equidistant from two points A (-3 , 4) and B (3,6) on the same plane.

19. A point P is at a distance of $\sqrt{10}$ from the point (2,3). Find the co-ordinates of the point P if its ordinate is twice of the abscissa.

(Or)

The points A(0,3), B (-2,a) and C(-1,4) are the vertices of triangle ABC right angled at A. Find the value of 'a'.

(2)

SECTION C

6 x 5 = 30 Marks

20. Annual income of Mrs Sivan who is a senior citizen is Rs 4,10,000. She donates Rs 30,000 to Prime Ministers Relief Fund (100 % exemption) and Rs 20,000 to a charitable society (50 % exemption). She contributes Rs 60,000 towards P.F annually and pays a quarterly premium of Rs. 4,500 towards life insurance. She also purchases NSC for Rs. 30,000. Find the amount she has to pay towards income tare for the financial year.

Use the following for calculating income tax.

- a) Savings : 100 % exemption for savings up to Rs. 1,00,000
- b) Rate of income tax for senior citizens.

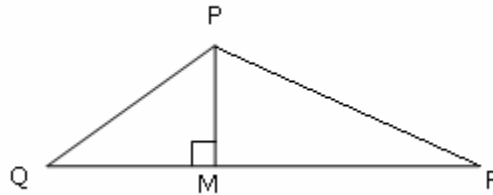
	Slab	Income Tax
1.	Up to Rs 1,85,000	:No Tax
2.	From Rs 1,85,001	: 20 % of the taxable income

3. Above Rs 2,50,000 : above Rs 1,85,000
: Rs 13,000 + 30 % of the
income exceeding Rs
2,50,000.

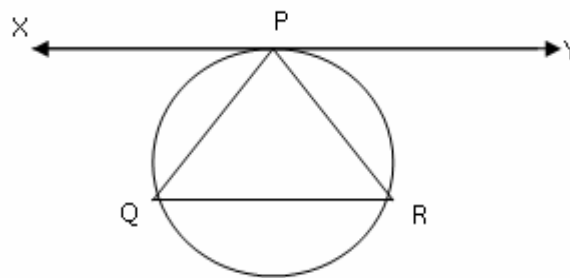
c. Education cess : 2 % of the income tax.

21. Prove that in a right triangle, the square of the hypotenuse is equal to the sum of the square of the other two sides.

Use the above theorem in figure, to prove that $PR^2 = PQ^2 + QR^2 - 2QM \cdot QR$.



22. If a line touches a circle and from the point of contact, a chord is drawn, show that the angles which the chord makes with the given line are respectively equal to the angles formed in the corresponding alternate segments. Use the above theorem, prove that in figure, $XY \parallel QR$, given that XY is a tangent to the Circle at P and $PQ = PR$.



(3)

23. Find the mean marks of the following data

Marks	Below 20	Below 40	Below 60	Below 80	Below 100
Number of students	15	31	55	70	80

(or)

If the mean of the following distribution is 188, find the missing frequencies

Class	0 - 80	80 – 160	160 – 240	240 – 320	320 – 400	Total
Number of students	20	25	f_1	f_2	10	100

24. A bucket has top and bottom diameter of 40 cm and 20 cm respectively. Find the volume of the bucket if its depth is 12cm. Also find the cost of tin sheet used for making the bucket at the rate of Rs. 1.20 per dm^2

(or)

A right triangle whose sides are 15cm and 20cm, is made to revolve about its hypotenuse. Find the volume and surface area of the double cone so formed.
[Use $\pi = 3.14$]

25. From an aeroplane vertically above a straight horizontal road, the angles of depression of two consecutive mile stones on opposite sides of the aeroplane are observed to be α and β show that the height in miles of the aeroplane above the road is given by $\frac{\tan \alpha \cdot \tan \beta}{\tan \alpha + \tan \beta}$

(or)

The angle of elevation of a jet plane from a point A on the ground is 60° . After a flight of 15 Seconds, the angle of elevation changes to 30° . If the jet plane is flying at a constant height of $1500\sqrt{3}$ m, find the speed of the jet plane.

(4)

Class: X
MATHEMATICS

Time: 3 hrs

Marks: 80

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.

SECTION A

(Qns 1 – 7 carry 2 marks each)

1. Solve the following system of linear equations:
 $(a - b)x + (a + b)y = a^2 - 2b - b^2$
 $(a + b)(x + y) = a^2 + b^2$
or
Find the LCM of the polynomials $p(x) = 12(x^4 - x^3)$ and $q(x) = 8(x^4 - 3x^3 + 2x^2)$.
2. Find the LCM and HCF of the given polynomials. Verify that the product of these LCM and HCF differs from the product of the polynomials, if at all, by a factor of -1 .
3. If the price of a book is reduced by Rs 5, a person can buy 5 more books for Rs. 300. Find the original list price of the book.
4. Write the expression $a_n - a_k$ for the AP: $a, a + d, a + 2d, a + 3d, \dots$. Hence find the common difference of the AP for which 20th term is 10 more than 18th term.
5. A person deposits in a bank Rs 10,000 after every six months. If the interest is 10% per annum compounded half yearly, what would be the sum standing to his credit at the end of 2 years? [Given $(1.05)^4 = 1.2155$]
6. Two dice are thrown simultaneously. Find the probability of getting :
(i) an even number as the sum (ii) a total of at least 10.
7. D, E and F are respectively the mid-points of the sides BC, CA and AB respectively of a ΔABC . Determine the ratio of the areas of the triangles DEF and ABC.

OR

A vertical tower stands on a horizontal plane and is surmounted by a flag-staff of height 7 m. From a point on the plane, the angle of elevation of the bottom of the flag-staff is 30° and the top of the flag-staff is 45° . Find the height of the tower.

SECTION B

(Q Nos. 8 – 19 carry 3 marks each)

8. If three times the larger of the two numbers is divided by the smaller one, we get 4 as quotient and 3 as remainder. Also, if seven times the smaller number is divided by the larger number, we get 5 as quotient and 1 as remainder. Find the numbers.

9. Express the following as a rational expression:

$$\left[\frac{(2x-1)}{(x-1)} - \frac{(x+1)}{(2x+1)} \right] + \left[\frac{(x-1)}{(x+2)} - \frac{(x+1)}{(x-2)} \right]$$

10. Find the number of terms in the series $20, 19 \frac{1}{3}, 18 \frac{2}{3}, \dots$ of which the sum is 300, explain the double answer.

OR

Show that the sequence $a_n = 2n^2 + 1$ is not an AP.

11. Prove that the either pair of opposite angles of a cyclic quadrilateral are supplementary. Using this state and prove the converse of above theorem.
12. A journey of 192 km from Mumbai to Pune takes 2 hours less by a super fast train than by an ordinary train. If the average speed of the slower train is 16 km / h less than that of the faster train, determine their average speeds.
13. A TV set is available for Rs 19,650 cash payment or for Rs 3,100 cash down payment and three equal annual installments. If the shop keeper charges interest at the rate of 10% per annum compounded annually, calculate the amount of each installment.
14. Construct an isosceles triangle whose base is 8 cm and altitude 4 cm. Draw its in circle and measure its radius.
15. A spherical cannon ball, 28 cm in diameter is melted and cast into right circular conical mould, the base of which is 35 cm id diameter. Find the height of the cone, correct to one place of decimal.

16. If $\sec\theta + \tan\theta = x$, obtain the values of $\sec\theta$, $\tan\theta$ and $\sin\theta$.

OR

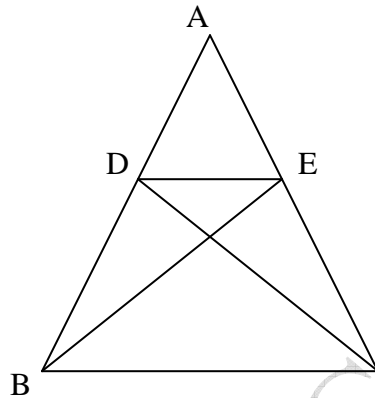
If $\operatorname{cosec} A = \sqrt{2}$, find the value of $\left[\frac{(2 \sin^2 A + 3 \cot^2 A)}{(4 \tan^2 A - \cos^2 A)} \right]$

17. The percentages of various categories of workers in a state are given in the following table. Present the information in the form of a pie chart.

Category of Workers	%
---------------------	---

Cultivators	40
Agricultural labourers	25
Industrial workers	12.5
Commercial workers	10
Others	12.5

18. In the given figure, if $\triangle ABE \cong \triangle ACD$, prove that $\triangle ADE \sim \triangle ABC$.



19. Find the distance of the point $(1, 2)$ from the mid-point of the line segment joining the points $(6, 8)$ and $(2, 4)$.

SECTION C

(Qns 20 - 25 carry 5 marks each)

20. If two chords of a circle intersect inside or outside the circle, then the rectangle formed by the two parts of one chord is equal in area to the rectangle formed by the two parts of the other. Using the result prove that in $\triangle ABC$, $AB = AC$, a circle through B touches AC at D and intersects AB in P. If D is midpoint of AC then show that $4 AP = AB$.
21. If two circles touch each other internally or externally, the point of contact lies on the line joining their centres. Using this result prove the following: AB is a line segment and M is its midpoint. Semicircles are drawn with AM, MB and AB as diameters on the same side of AB. A circle is drawn to touch all the three semicircles. Prove that its radius r is given by $r = AB / 6$.
22. A well of diameter 2 m is dug 14 m deep. The earth taken out is spread evenly all round it to a width of 5 m to form an embankment. Find the height of the embankment.

OR

The height of a cone is 30 cm. A small cone is cut off at the top by a plane parallel to the base. If its volume be $1/27$ of the volume of the given cone, at what height above the base is the section made.

23. A round balloon of radius r subtends an angle α at the eye of the observer while the angle of elevation of its centre is β . Prove that the height of the centre of the balloon is $r \sin \beta \operatorname{cosec} \alpha / 2$.

OR

Two stations due south of a leaning tower which leans towards north are at a distance a and b from its foot. If α, β be the elevations of the top of the tower from these stations, prove that the inclination θ to the horizontal is given by

$$\cot \theta = (b \cot \alpha - a \cot \beta) / (b - a)$$

24. Find the mean of the following data:

**Age in years (greater that
or equal to)**

Number of persons

0	100
10	90
20	75
30	50
40	25
50	15
60	5
70	0

25. Ramesh has a monthly salary of Rs 31,250 (Excluding HRA). He contributes Rs. 7,000 per month towards GPF during the year and pays a quarterly premium of Rs 2,500 for his LIC policy. He invests Rs 10,000 in NSC's. He donates Rs 16,000 to a charitable trust (50 % deduction for income tax). Calculate the income tax liability of Ramesh if he has paid Rs 2,500 per month as income tax for the first 11 months of the year.

Rates of Income tax for male persons (Below 65 years)

Taxable income	Income tax
(I) Upto Rs 1,00,000	Nil
(ii) Rs 1,00,001 to Rs 1,50,000	10% of income exceeding Rs 1,00,000
(iii) Rs 1,50,001 to Rs 2,50,000	Rs 5000 + 20% of income exceeding Rs 1,50,000
(iv) More than Rs 2,50,000	Rs 25000 + 30% of income exceeding Rs 2,50,000

- (a) Savings: 100% exemption for permissible savings up to Rs 1,00,000.
(b) Education Cess: 2% of the income tax.

TIME: 3:00 hrs.

CLASS X MATHEMATICS

M.M:80

SECTION – A

1. Solve for x and y: $\frac{x}{6} + \frac{y}{4} = 1$, $\frac{3x}{4} - \frac{x-y}{2} = \frac{7}{4}$.

OR

Solve the following system of equations: $\frac{bx}{a} - \frac{ay}{b} + a + b = 0$ and $bx - ay + 2ab = 0$

2. If $(x^2 - x - 2)$ is the HCF of the expression $(x - 2)(2x^2 + ax + 1)$ and $(x + 1)(3x^2 + bx + 2)$, find the value of a and b..
3. Find the value of k so that the sum of roots of a quadratic equation $(k + 1)x^2 + 2kx + 4 = 0$ is equal to product of roots.
4. Sum of first five and twenty-one terms of an A.P. is 320 and -168 respectively. Find the sum up to 12 th term of the sequence.
5. Anil got a loan of Rs 3000 for minor repairs of his house. The loan is to be paid back in 3 annual installments. How much is each installment if the interest is compounded annually on the balance at 5% per annum and is included in each installment. (Ans. Rs.1150,Rs1100,Rs1050)
6. In a $\triangle ABC$, $LM \parallel AB$. If $AL = x - 3$, $AC = 2x$, $BM = x - 2$ and $BC = 2x + 3$, find the value of x..
- OR
- Prove that a cyclic parallelogram is a rectangle.
7. In a single throw of two dice, find the probability of getting : (i) both odd digits, (b) a multiple of 3 on one die and a multiple of 2 on the other die.

SECTION B

8. Draw the graph of $2x + y = 6$ and $2x - y + 2 = 0$. Shade the region bounded by these lines and x-axis.

Find the area of the shaded region.

9. Express the following as a rational expression in its lowest terms:

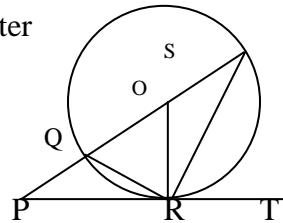
$$\frac{x^2 + 3x + 9}{x^2 - 25} \div \frac{x^3 - 27}{x^2 + 3x - 10}$$

10. A car covers a distance of 648 km. The number of hours taken for journey is one-half the number representing the speed in km per hour. Find the time taken to cover the distance.
11. Find the sum of all three digit numbers each of which leaves the remainder 3 when divided by 5.

OR

For what value of n, the nth terms of sequences 3, 10, 17 and 63, 65, 67, are equal.

12. An electric cooker is available for Rs 970 cash payment or Rs 210 cash down payment followed by three equal monthly installments of Rs 260 each. Compute the rate of interest charged under the installment scheme.
13. In the adjoining figure, PT touches the circle whose centre is O, at R. Diameter SQ produced meets PT at P. Given $\angle SPR = x^\circ$ and $\angle QRP = y^\circ$, prove
(a) $\angle OSR = y^\circ$
(b) Write down the expression connecting x and y.



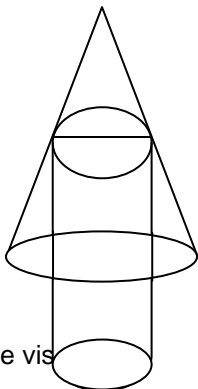
14. Construct a quadrilateral ABCD with $\angle A = 60^\circ$, AB = 5.2 cm, AC = 6.3 cm, AD = 4.3 cm and BC = 3.7 cm. Construct a quadrilateral AB'C'D' similar to quadrilateral ABCD such that its diagonal AC' = 8.1 cm..
15. Show that : $\sec^4 A (1 - \sin^4 A) - 2\tan^2 A = 1$

OR

Evaluate without using trigonometrical tables:

$$\sin (50^\circ + \phi) - \cos (40^\circ - \phi) + \tan 1^\circ \tan 10^\circ \tan 20^\circ \tan 70^\circ \tan 80^\circ \tan 89^\circ$$

16. Coordinates of A and B are (-3, a) and (1, a + 4).
The mid point of AB is (-1, 1) Find the value of a.



17. An empty cylindrical container of radius 7 m and height 10 m is covered by a conical cap of radius 10.5 m and height 9 m. Calculate the volume of the air trapped inside. (Ans. 577.5 cubic m)
18. If $(10, 5)$, $(8, 4)$ and $(6, 6)$ be the mid points of the sides of a triangle, find the coordinates of its vertices.
19. Percentage of the different products of a village in a particular district is as follows:

Item	Wheat	Pulses	Jwar	Groundnuts	Vegetables
Percentage	125/3	125/6	25/2	50/3	25/3

Represent the above information by a pie chart.

SECTION C

20. Ms, Pooja is an executive in an export firm. Her annual income from salaries (excluding HRA) is

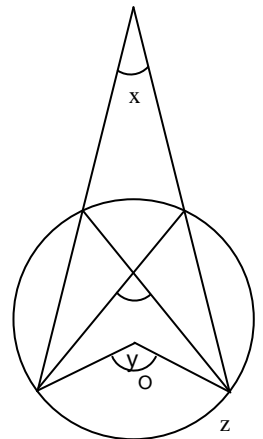
Rs 5,72,000. She contributes Rs 10,000 per month in her P.F. account, pays Rs 16,800 as L.I.C. premium and purchases NSCs worth Rs 14,000. She paid Rs 1,60,500 as advance tax. What refund, if any, she will get from Income Tax Department?

21. Prove that the degree measure of an arc of a circle is twice the angle subtended by it at any point of the alternate segment of the circle with respect to the arc.

In the given figure, O is the centre of the circle.

Prove that $\angle x + \angle y = \angle z$.

OR



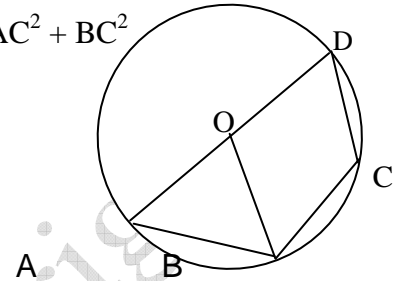
In a triangle, if the square of one side is equal to the sum of the squares of the other two sides, prove that the angle opposite to the first side is a right angle.

Use the above theorem and prove the following:

In a triangle ABC, $AD \perp BC$ and $BD = 3 CD$. Prove that $2AB^2 = 2AC^2 + BC^2$

22. Prove that the sum of either pair of opposite angles of a cyclic quadrilateral is 180° .

Use the above theorem to find $\angle BCD$ in the given figure, where O is the centre of the circle and $\angle DOB = 100^\circ$.



23. Given below is the sale (in Rupees) of 40 stationary shops per hour in a locality. Considering all the shops, the average sale per hour has been calculated to be Rs 21 . Find the missing frequencies given that $f_1 : f_2 = 3 : 4$

Sale in Rs per hour	Number of shops
Below 8	15
Below 16	14
Below 24	f_1
Below 32	f_2
Below 40	40

24. A tower subtends an angle of 30° at a point on the same level as its foot and at a second point h metres above the first, the depression of the foot of the tower is 60° . Find the height of the tower.

OR

A boy is standing on the ground and is flying a kite with 100 m of string at an elevation of 30° .

Another boy is standing on the roof of a 10 m high building and is flying his kite at an elevation of 45° .

Both the boys are on opposite sides of the kites. Find the length of the string that the second boy must

have so that the two kites meet.

25. The lower portion of a hay stock is an inverted cone frustum with base radius 2 m and the upper part is a cone of radius 3 m and height 7 m . The total height of the hay stock is 10.5 m . Find the total volume of the hay stock.

FIRST TERMINAL EXAMINATION 2006-07
MATHEMATICS CLASS X

TIME: 3 HOURS

M.MARKS: 80

General Instructions:

- (v) All questions are compulsory.
- (vi) 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.
- (vii) Internal choices have been provided in some questions. You have to attempt only one of the choices in such questions.
- (viii) In questions on construction, the drawing should be neat and exactly as per the given measurements.
- (ix) Use of calculators is not permitted. However, you may ask for Mathematical tables.

SECTION A

1. Solve the equation for x and y :
$$\begin{aligned} 11x - 7y &= xy \\ 9x - 4y &= 6xy \end{aligned}$$

OR

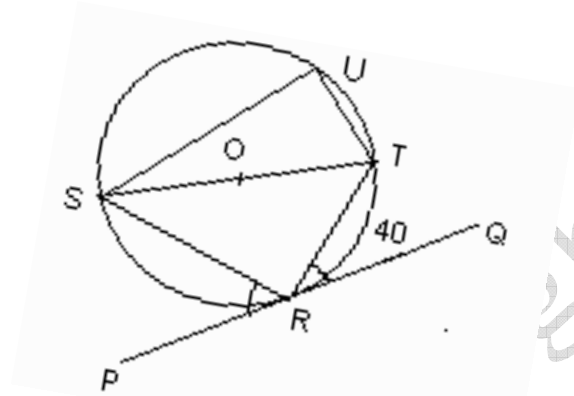
$$\frac{2x}{a} + \frac{y}{b} = 2 \quad ; \quad \frac{x}{a} - \frac{y}{b} = 4$$
2. Find the value of a and b so that equation has infinitely many solutions.
$$\begin{aligned} 2x + 3y &= 7 \\ (a-b)x + (a+b)y &= 3a + b - 2 \end{aligned}$$
3. A table is available for Rs 1500 cash or for Rs 360 cash down payment followed by three equal monthly instalments of Rs 390 each .Compute the rate of interest charged under this scheme
4. How many terms of the AP 17, 15, 13, 11... must be added to get the sum 72? Explain the double answer.

OR

Which term of the AP 24, 21, 18, 15... is the first negative term?

5. In the following figure ,XY parallel to BC ,find the length of XY

6. Find the values of angle x and y from the figure,
where PQ is a tangent to the circle at R and O is the centre of the circle.



7. Find the A.P. whose sum to n term is $3n^2 - 2n$. Find the 15th terms of this AP.

SECTION-B

8. Draw the graphs of the equations: $4x - y - 8 = 0$ and $2x - 3y + 6 = 0$
Also determine the vertices of the triangle formed by the lines and the x -axis.
9. In figure 1, S and T trisect the side QR of a right triangle PQR . Prove that $8PT^2 = 3PR^2 + 5PS^2$.

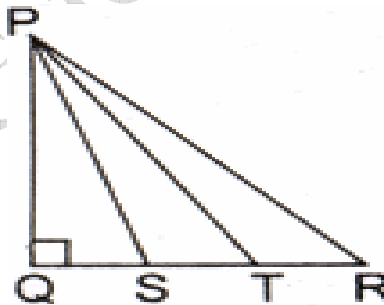


Fig. 1

10. Find the values of a and b , if $(x+3)(x-2)$ is the HCF of the polynomials
 $f(x) = (x+3)(4x^2 - 3x + a)$ and $g(x) = (x-2)(7x^2 + 10x - b)$
11. Find the value of $P \times Q \div R$, where

$$P = \frac{x+2}{x^3-1} - \frac{1}{x^2-1}, \quad Q = \frac{2x^2-3x+1}{x^3+1}, \quad R = \frac{4x^2-1}{x^4+x^2+1}$$

12. A person borrowed some of money on compound interest and returned it in three years in annual installments. If the rate of interest is 15 % per annum and annual is Rs 486680. Find the sum borrowed .

13. Solve for x: $12abx^2 - (9a^2 - 8b^2)x - 6ab = 0$

OR

A two-digit number is such that the product of its digits is 35. When 18 is added to the number, the digits interchange their places. Find the number.

14. In what ratio is the line segment joining the points (-2, -3) and (3, 7) divided by the y-axis ? Also, find the coordinates of the point of division.

Or

If A (5, -1), B (-3, -2) and C (-1, 8) are the vertices of triangle ABC, find the length of median through A and the coordinates of the centroid.

15. Evaluate without using trigonometric table :

$$\frac{\sin 59^\circ}{\cos 31^\circ} - \tan 10^\circ \tan 45^\circ \tan 80^\circ \frac{\cos(90^\circ - \theta)}{\sin \theta} + \frac{\sin^2 20^\circ + \sin^2 70^\circ}{\sin^2 15^\circ + \sin^2 75^\circ}$$

OR

Prove that :

$$\frac{\sin \theta + \cos \theta}{\sin \theta - \cos \theta} + \frac{\sin \theta - \cos \theta}{\sin \theta + \cos \theta} = \frac{2 \sec^2 \theta}{\tan^2 \theta - 1}$$

16. Find the probability that a number selected at random from the numbers 2, 3, 4 37 is a (i) prime number (ii) multiple of 7 (iii) multiple of 3 or 5.
17. Construct a triangle ABC in which AB = 6.3cm, $\angle C = 60^\circ$ and median CD = 5.1 cm . Write the steps of construction.
18. A right circular conical vessel of internal radius 15 cm and height 27 cm is full of water .is poured into a right cylindrical vessel with internal radius 5 cm .Find the height to which the water rises in the cylindrical vessel.
19. Find the mean of the frequency distribution :
- | Class interval: | 0-80 | 80-160 | 160 -240 | 240 -320 | 320 -400 |
|-----------------|------|--------|----------|----------|----------|
| Frequency | 22 | 35 | 44 | 25 | 24 |

SECTION-C

20. The population of some cities in lakhs is given below. Draw a pie-chart representing this information.

City	Delhi	Mumbai	Kolkata	Chennai	Bangalore	Hyderabad
Population(in lakhs)	175	250	200	150	125	100

21. A solid is composed of a cylinder with hemispherical ends. If the whole length of the solid is 104 cm and radius of each hemispherical end is 7cm, find the cost of polishing its surface at the rate of Rs. 10 per cm^2 .
22. If PAB is a secant to a circle intersecting the circle at A and B and PT is a tangent, prove that $PA \times PB = PT^2$

Using the above prove the following:

ABC is an isosceles triangle such that $AB = AC$ and the point D is the mid-point of AC. A circle is drawn taking BD as diameter, which intersects AB at E.

Prove that $AE = \frac{1}{4} AC$.

23. Prove that the ratio of the areas of two similar triangles is equal to the ratio of squares of their corresponding sides.
Use the above in the following:
In a trapezium ABCD, O is the point of intersection of AC and BD, $AB \parallel CD$ and $AB = 2 CD$. If the area of triangle AOB = 84 cm^2 , find the area of triangle COD.
24. On a horizontal plane there is a vertical tower with a flag pole on the top of the tower. At a point 9 metres away from the foot of the tower the angle of elevation of the top and bottom of the flag pole are 60° and 30° respectively. Find the height of the tower and flag pole mounted on it.
Or
From a building 60 metres high the angles of depression of the top and bottom of a lamppost are 30° and 60° respectively. Find the distance between the lamppost and building. Also find the difference of height between building and lamppost.
25. Mrs. Ruchi's salary is Rs. 32,250 per month exclusive of HRA. She donates Rs. 12,000 to Prime Minister's Relief Fund (100% exemption). She also donates Rs. 6,000 to a school and gets a relief of 50% on this donation. She contributes Rs. 5,000 per month towards her Provident Fund. She pays a quarterly premium of Rs. 2,500 towards her

LIC policy and invests Rs. 25,000 in NSCs. If Rs. 2,700 is the tax deducted each month from her salary for 11 months, find the tax deducted from her salary in the last month of the year.

INCOME TAX SLAB

1. (A) For men (below 65 years)

Taxable income	Rate
Up to Rs. 1,00,000	Nil
Rs. 1,00,001-1,50,000	10% of amount exceeding Rs. 1,00,000
Rs 1,50,001-2,50,000	Rs.5000+20% of the amount exceeding Rs.1,50,000
Exceeding Rs 2,50,000	Rs. 25,000+30% of the amount exceeding Rs 2,50,000

2. (B) Women (below 65 years)

Taxable income	Rate
Up to Rs. 1,35,000	Nil
Rs 1,35,001-Rs 1,50,000	10% of the amount exceeding Rs 1,35,000
Rs 1,50,001-Rs 2,50,000	Rs 1,500+20% of them amount exceeding Rs 1,50,000
Exceeding Rs 2,50,000	Rs 21,500+30% of the amount exceeding Rs 2,50,000

3. Surcharge: 10% of the amount of tax payable if the taxable income exceeds rs 10,00,000
4. Educational cess: 2% of the amount of tax payable.
5. Concession for saving: notified savings (PF, LIC, PPF, mutual fund etc) up to a maximum of Rs 1, 00,000 are exempted from payment of income tax.

SAMPLE PAPER MATHEMATICS
CLASS - X

Max. Marks- 80

Time – 3 1/4 hours

General Instruction

- I. All the question are compulsory.
- II. This question paper consists of 25 question divided into three sections A, B, and C.
Section A contains 7 questions of 2 marks each,
Section B contains 12 questions of 3 marks each,
Section C contains 6 questions of 5 marks each.
- III. Internal choices have been provided for some question .you have to attempt only one of the choices in such question
- IV. Write correct serial number of the question before attempting it.
- V. In the question on construction, the drawing should be neat and exactly as per given measurements.
- VI. Use of Calculators is not permissible. However you may ask for mathematical tables

1. Solve for x and y

$$x/a - y/b = 0 \quad \text{and} \quad ax + by = a^2 + b^2$$

OR

The sum of two numbers is 2. And the difference between its digits is 20. Find the numbers.

2. find the HCF of

$$2(x-7)(x+7)^2, \quad 4(x-7)^2(x=8) \quad \text{and} \quad 8(x^2-49)$$

3. if $A = (x+1)/(x-1)$ and $B = (x-1)/(x+1)$, find the value of $(A-B)/(A+B)$

4. solve for x

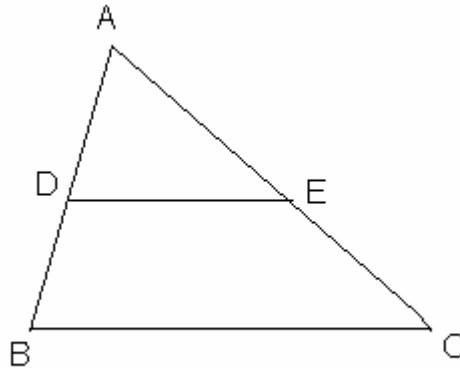
$$4\sqrt{3}x^2 + 5x - 2\sqrt{3} = 0$$

5. A laptop is available for Rs 59300 cash or for Rs 22820 cash down payment and three equal half yearly installments .If the dealer charges interest at the rate of 22% per annum compounded semi annually , Calculate each installment
6. What is the probability of selecting the red king in the set of cards if one card is chosen at random?

OR

If the probability of INDIA losing the match is one third the India winning the match. What is the probability of winning it.

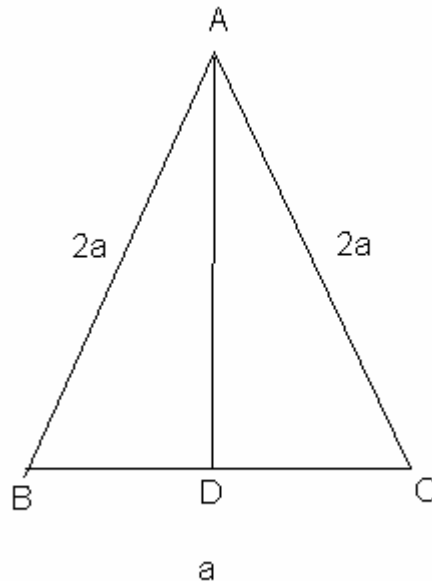
7. in the following triangle DE is parallel to BC. If AD=8 cm, DB=12 cm and AE= 10 cm find AC.



8. The area of two similar triangles is in ratio of 7:8. If the median of first triangle is 10 cm. what is the length of corresponding median of other.

OR

In the figure below find the length of the altitude AD of an isosceles triangle



9. If two chords of circles bisect each other, prove that these are diameters of the circle.
10. Draw an equilateral triangle of side 5 cm and also draw its circumcircle.
11. Find the sum of all two digit numbers.

OR

- In an AP $2+5+8+11+\dots$ how many terms make the sum of 155?
12. Determine K so that $K+2$, $4K-6$ and $3K-2$ are consecutive terms of an AP.
13. Find the centroid of the triangle whose vertices are $(2,-5)$, $(3,9)$ and $(-8,11)$.

- the mid point of the line joining the (a,2) and (3,6) is (2,b). Find the value of a and b.
14. Rs. 9000 were divided equally among a certain number of persons. Had there been 20 more persons, each would have got Rs. 160 less. Find the original number of persons.
15. Simplify: $\frac{1}{x-1} - \frac{1}{x+1} - \frac{2}{x^2+1} - \frac{4}{x-1}$
16. A loan was returned in three equal quarterly installments of Rs. 17576 each. If the rate of interest is 16% p.a. compounded quarterly find the loan and the total interest charged.
17. evaluate:- $\tan 5^\circ \tan 25^\circ \tan 30^\circ \tan 65^\circ \tan 85^\circ$
18. The circumference of the base of a 16 m high solid cone is 3m. Find the volume of the cone.
19. The following data relates to the cost of construction of a house in Delhi represent the data in the form of a pie-chart.

Items	Cement	Pricks	Labour	Timber	Misc.
Expen (in %)	25	10	20	20	25

20. A spherical shell of lead, whose external diameter is 18cm, is melted and recast into a right circular cylinder, whose height is 8cm and diameter 12cm. Determine the internal diameter of the shell.

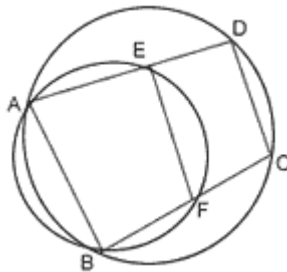
OR

A petrol tank is a cylinder of base diameter 21cm and 18cm fitted with conical ends each of axis length 9cm. determine the capacity of the tank.

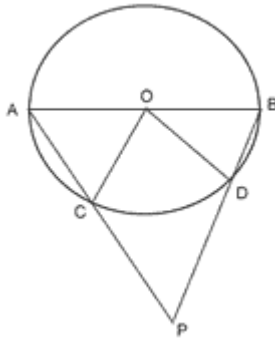
21. A tower is 50m high. Its shadow is x m shorter when the sun's altitude is 45° than when it is 30° . Find x.

OR

22. An aeroplane, when 3000m high, pass vertically above another aeroplane at an instance when the angles of elevation of the two aeroplanes from the same point on the ground are 60° and 45° respectively. Find the vertical distance between the two aeroplanes.
23. . If the angles of one triangles are respectively equal to the angles of another triangles. Prove that the ratio of their corresponding sides of the same as the ratio of their corresponding.
(i) medians (ii) altitudes (iii) angle bisectors.
24. (a) In the given figure, ABCD is a cyclic quadrilateral. A circle passing through A and B meets AD and BC in the points E and F, Respectively. Prove that EF || DC.



(b) In the given figure, AB is a diameter of the circle with centre O and Chord CD is equal to radius OC. AC and BD produced to meet at P. prove that $\angle CPD = 60^\circ$.



25. The annual income of Kapil (excluding HRA) is Rs. 1, 95,000. He contributes Rs. 4,000 per month in provident fund. How much should he pay annually towards LIC premium to get the maximum rebate? Find the income tax to be paid by Kapil in the last month of the year if he paid Rs. 1000 per month as income tax for the first eleven months.

INCOME TAX SLAB

6. Women (below 65 years)

Taxable income	Rate
Up to Rs. 1,35,000	Nil
Rs 1,35,001-Rs 1,50,000	10% of the amount exceeding Rs 1,35,000
Rs 1,50,001-Rs 2,50,000	Rs 1,500+20% of them amount exceeding Rs 1,50,000
Exceeding Rs 2,50,000	Rs 21,500+30% of the amount exceeding Rs 2,50,000

7. (C) For senior citizens (65 years or more)

Taxable income	Rate
Up to Rs 1,85,000	Nil
Rs 1,85,001-2,50,000	20% of the amount exceeding Rs 1,85,000
Above Rs 2,50,000	Rs 13,000+30% of amount exceeding Rs 2,50,000

8. Surcharge: 10% of the amount of tax payable if the taxable income exceeds rs 10,00,000

9. Educational cess: 2% of the amount of tax payable.
10. Concession for saving: notified savings (PF, LIC, PPF, mutual fund etc) up to a maximum of rs 1, 00,000 are exempted from payment of income tax.

**MATHEMATICS
CLASS X**

**Time allowed: 3¼ hours
80**

Maximum Marks:

Code number given on the right hand side of the question paper should be written on the title page of the answer- book by the candidate.

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 three marks each, two questions of three marks each and two questions of six 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.

SECTION - A

1. What is the probability of sure event and impossible event?
2. Find the sum of the first 10 terms of an AP whose first term is 3 and the last term is 102.
3. simplify $(x^6 - y^6) \div (x^8 - y^8)$
4. A scooter is sold for Rs.22800 cash or for Rs.11200 cash down payment followed by 4 equal monthly installments of Rs.2750 each. Compute the rate of interest under the installment scheme.
5. If $A = c + 1/c$, express $A + 1/A^2$ as a rational expression in c.

6. Determine the value of 'a' for which the quadratic equation $3x^2 - 5ax + 11 = 0$ has equal and real roots.

OR

The sum and reciprocal of two numbers is $10/3$. Find the numbers.

7. If two chords of a circle bisect each other. prove that these are diameters of the circle

OR

The ladder 13 m long reaches a window of a house 12 m above the ground. Determine the distance of the foot of the ladder from the house.

SECTION - B

8. The sum of first six terms of an AP is 42. The ratio of 10th term to 30th term is $1/3$. Find its 15 term.

OR

Find the sum of the numbers divisible by 4 but not by 5, between 1 to 100.

9. Draw the graph of following equations:-

$$2x + 3y + 8 = 0, \quad 3x + 8y - 12 = 0$$

OR

If $(x^2 + x - 12)$ divides $(x^3 + ax^2 + bx - 84)$ completely, find the values of 'a' and 'b'.

10. find the LCM and GCD of the following polynomials

$$(2x^2 - 3a^2)y + (2a^2 - 3y^2)x \quad \text{and} \quad (2a^2 + 3y^2)x + (2x^2 + 3a^2)y$$

11. A rectangular garden has dimensions 10mX16m is to be surrounded by a concrete walk of uniform width. If the area of walk is 120m², find the width of the walk.

12. Derive the relation to find the centroid of a triangle.

13. If the two vertices of equilateral triangle are (0, 0) and (3, 0). Find the third one.

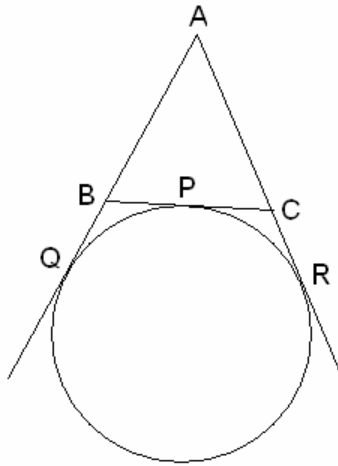
14. If the probability of Chandni to select non medical is 0.2, medical is 0.3 and the probability to choose commerce and arts is equal in eleventh. Find its probability of choosing commerce.

15. Two circles of radii 5 cm and 2.8 cm touch each other. Find the distance between their centers if they touch a) externally b) internally

OR

A circle is touching the sides BC of a triangle ABC at P and is touching AB and AC when produced at Q and R respectively. Prove that

$2AQ = \text{perimeter of triangle ABC.}$



16. The largest sphere is carved out of side 14cm. find the volume of the sphere.

OR

The radius and height of the cylinder are in the ratio of 2:7. If the volume of the cylinder is 704 cu cm. find the total surface area of the cylinder.

17. A housing society charges for a flat Rs. 16, 00,000 or Rs. 5, 85,999 cash down payment and three equal half yearly installments. If the society charged 16% p.a. compounded half yearly, calculate the value of each installment and the total interest charged.

18. Draw a circle of radius 5 cm. from a point P, 6 cm away from centre; draw a pair of tangents to the circle without using its centre.

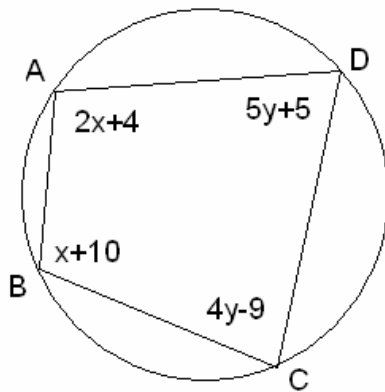
19. Evaluate

$$\operatorname{cosec}(65^\circ + \theta) = \sec(25^\circ - \theta) - \tan(55^\circ - \theta) + \cot(35^\circ + \theta)$$

20. prove that the angle subtended by an arc at a centre is double than the angle subtended by its at any point on the remaining part of the circle
OR

State and prove the basic proportionality theorem.

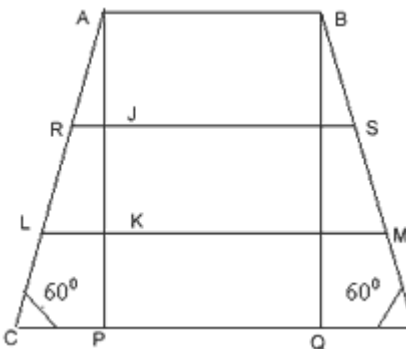
21. Prove that the quadrilateral formed by angle bisector of a cyclic quadrilateral is also cyclic. Using this find the angle of x and y .



22. The radii of circular ends of frustum of a cone are 33 cm and 27 cm. and the slant height is 8 cm. find its total surface area.
OR

A toy is the union of a right circular cone and a hemisphere that has the same (circular) base as the cone. Find the CSA of the toy if the height of the cone is 12 cm and the radius of its base is 3 cm.

23. In the adjoining figure, ABCD is a trapezium in which $AB \parallel CD$. Line segments RS and LM are drawn parallel to AB such that $AJ = JK = KP$. If $AB = 0.5\text{m}$ and $AP = BQ = 1.8\text{m}$, find the length of



AP, BQ, RS and LM.

OR

A man standing on the deck of a ship, which is 10m above water level, observes the angle of elevation of the top of a hill as 60° and angle of depression of the base of the hill is 30° . Find the distance of the hill from the ship and height of the hill.

24. The total number of marks scored by class in test is given below. find the mean by step deviation method:-

Below 20	4
Below 40	12
Below 60	30
Below 80	44
Below 100	50

25.. The annual income of RAM is Rs. 4, 80,000 (exclusive of HRA) He contributes Rs. 8,000 per month towards his provident fund and pays an annual premium of Rs. 28,000 for his LIC policy. If he pays Rs.7, 000 per month towards income tax liability for the last month of the year.

For male persons (below 65 yrs)		For female (below 65 yrs)		For senior citizen	
TAXABLE INCOME	INCOME TAX	TAXABLE INCOME	INCOME TAX	TAXABLE INCOME	INCOME TAX
Upto Rs. 100000	NIL	Upto Rs. 135000	NIL	Upto Rs. 185000	NIL
Rs. 1lac to Rs. 1.5 lac	10% of income exceeding Rs. 1 lac	Rs. 1.35 lac to Rs. 1.5 lac	10% of income exceeding Rs. 1.35 lac	Rs. 1.85 lac to Rs. 2.5 lac	20% of income exceeding Rs. 1.85 lac
Rs. 1.5 lac to Rs. 2.5 lac	Rs. 5000 + 20% of income exceeding Rs. 1.5 lac	Rs. 1.5 lac to Rs. 2.5 lac	Rs. 1500 + 20% of income exceeding Rs. 1.5 lac	More than 2.5 lac.	Rs. 13000+ 30% of income exceeding Rs. 2.5 lac.
More than 2.5 lac.	Rs. 25000+ 30% of income exceeding Rs. 2.5 lac.	More than 2.5 lac.	Rs. 21500+ 30% of income exceeding Rs. 2.5 lac.		
a. 10% of surcharge applicable if the taxable income exceed Rs. 10,00,000 b. Educational cess of 2% on the tax payable including surcharge wherever applicable.					

Guess Paper

Class : X

MATHEMATICS

Time: 3 hrs

Marks: 80

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.

Section A

(Qns 1 – 7 carry 2 marks each)

1. Solve for x and y.

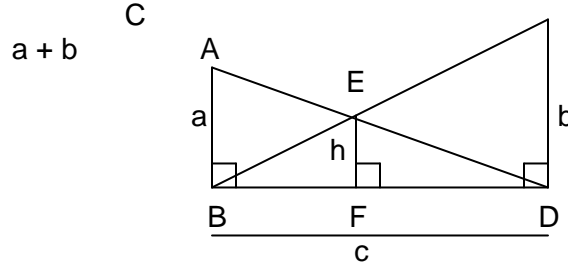
$$\begin{aligned} 101x + 99y &= 501 \\ 99x + 101y &= 499 \end{aligned}$$

or

$$\begin{aligned} bx + ay &= 2ab \\ ax - by &= a^2 - b^2 \end{aligned}$$

2. The L.C.M and H.C.F 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 $Q(x)$.
3. Using quadratic formula, solve the quadratic equation:
 $x^2 - (p^2 + q^2)x + p^2q^2 = 0$.
4. If seven times 7th term of an A.P is eleven times its 11th term, show that its 18th term is zero.
5. A mixi is available for Rs 1500 cash payment or for Rs 360 cash down payment followed by three equal monthly instalments of Rs 390 each. Compute the rate of interest charged under the instalment plan.

6. Two poles of height 'a' and 'b' ($b > a$) are 'c' metres apart. Prove that the height 'h' metres of the point of intersection of the lines joining the top of each pole to the foot of the opposite pole is $\frac{ab}{a+b}$.



or

ABC is a right angled triangle, right angled at C. If P is the length of the perpendicular from C to AB and $AC = b$, $BC = a$ and $AB = c$. Prove that

(i) $pc = ab$ (ii) $\frac{1}{p^2} = \frac{1}{a^2} + \frac{1}{b^2}$

7. From a group of 3 boys and 5 girls, a child is to be selected for the competition. Find the probability that the selected child is (i) a boy (ii) a girl.

SECTION B

(Qns 8 – 19 carry 3 marks each)

8. Show graphically that the following system of equations has no solution. Also find the area between these lines representing the equations in the first quadrant.

$$2x + 3y = 6$$

$$4x + 6y = 24$$

9. Simplify:

$$\left(\frac{x+1}{x-1} - \frac{x-1}{x+1} - \frac{4x}{x^2+1} \right) \div \frac{4x}{x^4-1}$$

10. A shopkeeper buys a number of books for Rs 80. If he had bought 4 more books for the same amount, each would have cost him Re 1 less. How many books did he buy?

11. Solve the equation:

$$1 + 6 + 11 + 16 + \dots + x = 148.$$

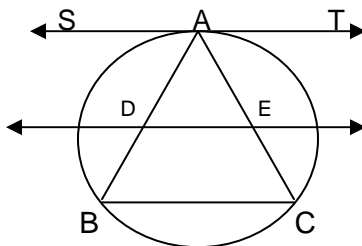
Or

How many terms of the sequence 18, 16, 14, should be taken so that their sum is zero.

12. A loan has to be returned in two equal annual instalments. If the rate of interest is 16% per annum compounded annually and each instalment is Rs 1682, find the sum (loan) borrowed and the total interest charged.

13. In fig. SAT is the tangent to the circumcircle of triangle ABC at A. A line parallel to SAT meet AB and AC at D and E respectively. Prove that (i) $\triangle ABC \sim \triangle AED$

(ii) $AB \times AD = AC \times AE$.



14. Construct a triangle ABC in which $BC = 6\text{cm}$, $\angle A = 60^\circ$ and the foot of the perpendicular D on BC from A is 4cm away from B.

15. The radii of the internal and external surfaces of a hollow spherical shell are 3cm and 5cm respectively. If it is melted and recast into a solid cylinder of height $2\frac{2}{3}\text{cm}$, find the diameter of the cylinder.

16. Prove the identity:

$$\frac{\tan \theta}{1 - \cot \theta} + \frac{\cot \theta}{1 - \tan \theta} = 1 + \sec \theta \operatorname{cosec} \theta$$

or

Evaluate:

$$\frac{\sin 39^\circ}{\cos 51^\circ} + 2 \tan 11^\circ \tan 31^\circ \tan 45^\circ \tan 59^\circ \tan 79^\circ - 3 (\sin^2 21^\circ + \sin^2 69^\circ)$$

17. The number of students admitted in different faculties of a college are given below:

Class	Science	Arts	Commerce	Law	Education	Total
Number of students	1000	1200	650	450	300	3600

Draw a pie chart to represent the above information.

18. The vertices of a triangle are A (1, 1), B (4, 5) and C (6, 13).

If $\cos A = \frac{b^2 + c^2 - a^2}{2bc}$, where $a = BC$, $b = CA$ and $c = AB$, find $\cos A$.

19. The point R (- 1, 2) divides the line segment joining the points P (2, 5) and Q (α , β) in the ratio 3: 4. Find the values of α and β , and hence the coordinates of Q.

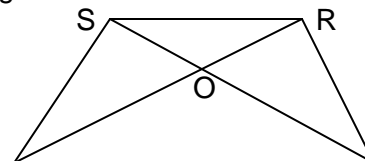
SECTION C

(Qns 20 – 25 carry 5 marks each)

20. Prove that the ratio of the areas of two similar triangles is same as the ratio of the squares of their corresponding sides.

Using the above do the following:

In fig. PQRS is a trapezium in which $PQ \parallel RS$ and $PQ = 3RS$. Find the ratio



of the areas of Δ s POQ and ROS.

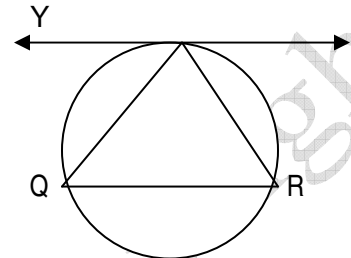
P_____Q

- 21 . 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 prove that the angle in a major segment is acute.

or

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

Using the above theorem prove that $XY \parallel QR$,
given that XY is a tangent to the circle at P and
 $PQ = PR$.



22. A man on a cliff observes a boat at an angle of depression of 30° which is approaching the shore to the point immediately beneath the observer with uniform speed. Six minutes later, the angle of depression of the boat found to be 60° . Find the time taken by the boat to reach the shore.

Or

A tower is surrounded by a flag staff of height h . At a point on the plane, the angle of elevation of the bottom and top of the flag staff are α and β respectively. Prove that the height of the tower is $\frac{h}{\tan \alpha}$.

$$\tan \beta - \tan \alpha$$

23. A toy is in the form of a cone mounted on a hemisphere with the same radius. The diameter of the base of the conical portion is 6cm and its height is 4cm. Determine the surface area of the toy. (Use $\pi = 3.14$)
24. Find the missing frequencies for the following frequency table, if the mean is 50.

C.I	0 - 20	20 - 40	40 - 60	60 - 80	80 - 100	Total
f	17	f_1	32	f_2	19	120

25. Mrs. Salini's salary is Rs 30,250 per month exclusive of H.R.A. She donates Rs 10,000 to Prime Minister's Relief Fund (100 % exemption). She also donates Rs 5,000 to a school and gets a relief of 50% On the donation. She contributes Rs 5,000 per month towards her provident fund. She pays quarterly premium of Rs 2,500 towards her LIC policy and invests Rs 25,000 in NSC. If Rs 2,300 is the tax deducted each month from her salary for 11 months, find the tax deducted from her salary in the last month of the year.

Use the following to calculate the income tax:

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

- (b) Rate of Income tax for ladies:

Slab	Income tax
(i) Upto Rs 1,35,000	No tax

(ii) From Rs 1,35,001 to Rs 1,50,000	10% of the taxable income exceeding Rs 1,35,000
(iii) From Rs 1,50,001 to Rs 2,50,000	Rs 1,500 + 20% of the amount exceeding Rs 1,50,000
(iv) Rs 2,50,001 and above	Rs 21,500 + 30% of the amount exceeding Rs 2,50,000

(c) Education Cess: 2% of the Income tax