DELHI PUBLIC SCHOOL, DURGAPUR

QUESTION BANK FOR MID TERM EXAMINATION (2017-18)

CLASS- X

SUBJECT: MATHEMATICS

1. In Euclid's division lemma , the value of r , when a positive integer a is divided by 3 , are 0 and 1 only . Is this statement true or false ? Justify your answer .
2. For what value of n ,$2^n x 5^n$ ends with 5 ?
3. Can a number 6^n , where n being a natural number , ends with digit 5 ? Give reason.
4. The HCF of 65 and 117 is expressible in the form 65m -117, then find the value of m .
5. The product of three consecutive positive integers is divisible by 6 . Is this statement true or false ? Justify your answer.
6. If q is a prime , then prove that $\sqrt{q}$ is an irrational number
7. Find the greatest number which on dividing 1657 and 2037 leaves remainder 6 and 5 respectively
8. If n is an odd integer , then show that $n^2 -1$ is divisible by 8
9. A forester wants to plant 66 mango tree s , 88 orange trees and 110 apple trees in equal rows(in terms of number of trees) . Also he wants to make distinct rows of trees (i.e only one type of trees in one row). Find the number of minimum rows .
10. If two positive integers a and b are written as $a = x^3 y^2$ and $b = xy^3$, where x,y are prime numbers . Find the HCF of a and b
11. If one zero of the polynomial $3x^2 -8x +2k +1$ is seven times the other , then find the zeros and the value of k
12. If zeros α and β of a polynomial $x^2 -7x +k$ are such that $\alpha-\beta=1$, then find the value of k .
13. If α and β are zeros of the quadratic polynomial $p(x) = 6x^2 +x - 1$, then find the value of

$$\frac{\alpha}{\beta}+\frac{\beta}{\alpha}+2\left(\frac{1}{\alpha}+\frac{1}{\beta}\right)+3\alpha\beta$$

14. Given that $\sqrt{2}$ is a zero of the cubic polynomial $6x^3 +\sqrt{2}x^2 -10x -4\sqrt{2}$.Find its other two zeros.
15. For which values of a and b the zeros of $q(x) = x^3 +2x^2 +a$ are also the zeros of the polynomial

    $P(x) = x^5 -x^4 -4x^3 +3x^2 +3x +b$?
16. What should be added in the polynomial $x^3 +2x^2 -9x +1$, so that it is completely divisible by x+4
17. If the polynomial $6x^4 +8x^3 +17x^2 +21x +7$ is divided by another polynomial $3x^2 +4x +1$, the remainder comes out to be ax+b , then find the values of a and b .
18. If the polynomial $f(x) = 3x^4 -9x^3 +x^2 +15x +k$ is completely divisible by $3x^2 - 5$, then find the value of k and hence the other two zeroes of the polynomial.

19.If α and β are the zeroes of the quadratic polynomial $f(x) = x^2 - px + q$, then prove that

$$\frac{\alpha^2}{\beta^2} + \frac{\beta^2}{\alpha^2} = \frac{p^4}{q^4} - \frac{4p^2}{q} + 2$$

20. If α and β are the zeroes of the quadratic polynomial $f(x) = px^2 + qx + r$, then evaluate

$$\frac{1}{p\alpha + q} + \frac{1}{p\beta + q}$$

21. A is walking along the line joining the points (1,4)and (0,6). B is walking along the line joining the points (3,4) and (1,0). Represent on graph and find the point where both of them cross each other.
22. Write a pair of linear equations which has the unique solution $x = -1$ and $y = 3$. How many such pairs can you write?
23. A railway half ticket cost half the full fare but the reservation charges are the same on a half ticket as on a full ticket. One reserved first class ticket from the stations A and B costs Rs 2530. Also one reserved first class ticket and one reserved first class half ticket from stations A to B cost Rs 3810 . Find the full first class fare from stations A to B and also the reservation charges for a ticket .

24. Solve : $7^x + 5^y = 74$, $7^{x+1} - 5^{y+1} = 218$

25. For what values of p and q will the following pair of linear equations have infinitely many solutions $4x+5y = 2$, $(2p+7q)x + (p+8q)y = 2q-p + 1$
26. Draw the graph of the pair of linear equations $x - y + 2 = 0$ and $4x - y - 4 = 0$ .calculate the area of the triangle formed by the lines so drawn and the X – axis .

27. Solve :
$$\frac{x}{a} + \frac{y}{b} = a + b$$
$$\frac{x}{a^2} + \frac{y}{b^2} = 2$$

28. A girl travels 14 Km to her home partly by rickshaw and partly by bus . She takes half an hour, if she travels 2 Km by rickshaw and the remaining distance by bus . If she travels 4 Km by rickshaw and the remaining distance by bus , she takes 9 min longer . Find the speed of rickshaw and of the bus .

29.Find the point of intersection of the lines $2ax - by = 2a^2 - b^2$, $ax + 2by = a^2 + 2b^2$ by eliminating the variables . Show that the system of equations is concurrent with the line represented by the equation $(a-b)x + (a+b)y = a^2 + b^2$
30. For what value(s)of λ does the pair of linear equations $\lambda x + y = \lambda^2$ and $x + \lambda y = 1$ have (i) no solution (ii) infinitely many solution (iii) a unique solution

31. If the equations $2x^2 - 7x + 3 = 0$ and $4x^2 + ax - 3 = 0$ have a common root then what is the value of a ?

32. Two pipes running together can fill a cistern in 11 1/9 min . If one pipe takes 5 min more than the other to fill it. Find the time in which each pipe would fill the cistern.

33. If the roots of the equation $x^2 + 2cx + ab = 0$ are real and unequal , then prove that the equation

$x^2 - 2(a+b)x + a^2 + b^2 + 2c^2 = 0$ has no real roots .

34. Solve: $\sqrt{2x+9} + x = 13$

35. A rectangular field is 20 m long and 14 m wide . There is a path of equal width all around it , having an area of 111 sq m . Find the width of the path.

36. Sum of the areas of two squares is 400 cm^2 . If the difference of their perimeters is 16 cm , then find the sides of the two squares .

37. Find the solution of the equation $\sqrt{x^2 - 16} - (x-4) = \sqrt{x^2 - 5x + 4}$

38. If $ax^2 + bx + c = 0$ has equal roots , then find the value of c

39. Check whether the equation $6x^2 - 7x + 2 = 0$ has real roots and if it has , then find them by the method of completing the squares .

40. A natural number , when increased by 12 , equals 160 times its reciprocal . Find the number .

41. The nth term of an AP is 6n+2 . Find the common difference.

42. Find the 6^{th} term from the end of the AP 17,14,11..... -40

43. Two AP 's have the same common difference. The difference between their 100^{th} terms is 111222333. What is the difference between their millionth terms.

44. A sum of Rs 1000 is invested at 8% simple interest per annum. Calculate the interest at the end of 1, 2, 3.....years. Is the sequence of interests in AP ? . Find the interest at the end of 30 years.

45. The sum of first 6 terms of an AP is 42. The ratio of its 10^{th} term to its 30^{th} term is 1:3 . Calculate the first and the thirteenth term of the AP .

46. The ratio of the sums of m and n terms of an AP is $m^2 : n^2$. Show that the ratio of the mth and nth terms is (2m-1) : (2n-1)

47. 200 logs are stacked in the following manner : 20 logs in the bottom row , 19 in the next row , 18 in the row next to it and so on . In how many rows 200 logs are placed and how many logs are there in the top row.

48. In an AP , the sum of the first ten terms is -150 and the sum of its next ten terms is -550 . Find the AP

49. If the sum of first n terms of an AP is $4n - n^2$, what is the first term ? What is the sum of the first two terms ? What is the second term ? Similarly find the third, the tenth ,and the nth terms.

50. The sum of first p,q,r terms of an AP are a,b,c respectively . Show that

$$\frac{a}{p}(q-r)+\frac{b}{q}(r-p)+\frac{c}{r}(p-q)=0$$

51. 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

$$\frac{\tan\alpha\tan\beta}{\tan\alpha+\tan\beta}$$

52. From the top of the light house , the angles of depression of two ships on the opposite sides of it are observed to be α and β. If the the height of the light house be h metres and the line joining the ships passes through the foot of the light house , show that the distance between the ships is

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

53. The angles of elevation of the top of a tower from two points at a distance of 4 m and 9 m from the base of the tower and in the same straight line with it are complementary . Prove that the height of the tower is 6 m .

54. If the angle of elevation of a cloud from a point h metres above a lake is α and the angle of depression of its reflection in lake is β, prove that the height of the cloud is

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

55. At a point on level ground , the angle of elevation of a vertical tower is found to be such that its tangent is 5/12. On walking 192 metres towards the tower , the tangent of the angles of elevation is $\frac{3}{4}$. Find the height of the tower.

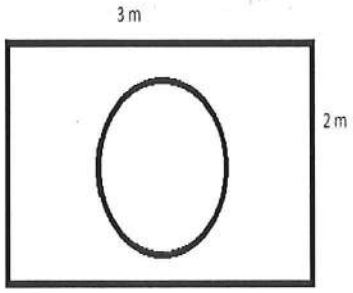
56. The king ,queen and jack of clubs are removed from a deck of 52 playing cards and the remaining cards are shuffled . A card is drawn from the remaining cards . Find the probability of getting a card of (i)heart (ii) queen (iii) clubs

57. Two customers are visiting a particular shop in the same week (Monday to Saturday) . Each is equally likely to visit the shop on any one day as on another . What is the probability that both will visit the shop on (i) the same day (ii) different days (iii) consecutive days .

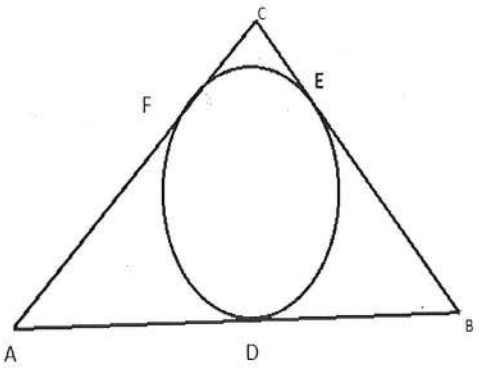
58. A piggy bank contains hundred 50 paise coins, fifty Rs 1 coins, twenty Rs 2 coins and 10 Rs 5 coins . If it is equally likely that one of the coins will fallout when the bank is turned upside down , what is the probability that the coin (i) will be a 50 paise coin (ii) will not be a Rs 5 coins?

59. A bag contains 12 balls out of which x are white . (i) If one ball is drawn at random , what is the probability that it will be a white ball (ii) If 6 more white balls are put into the bag , the probability of drawing a white ball will be double that in (i) . Find x .

60. Suppose you drop a tie at random on the rectangular region shown in figure . What is the probability that it will land inside the circle with diameter 1 m ?



61. PQ is a chord of length 8 cm of a circle of radius 5 cm . The tangent at P and Q intersect at a point T. Find the length TP .
62. A circle is inscribed in a triangle ABC having sides 8 cm , 10 cm and 12 cm . Find AD, BE and CF



63. The radius of the incircle of a triangle is 4 cm and the segments into which one side is divided by the point of contact are 6 cm and 8 cm . Determine the other two sides of the triangle.
64. Two circles with centres A and B of radii 3 cm and 4 cm respectively intersect at two points C and D such that AC and BC are tangents to the two circles . Find the length of the common chord CD .
65. O is the centre of a circle of radius 5 cm . T is a point such that OT = 13 cm and OT intersects the circle at E . If AB is the tangent to the circle at E , find the length of AB.

Value based question

In a primary school in a village, number of girls enrolled has tripled this year as compared to last year.

a. Form a linear equation by taking number of enrollment of this year as x and of previous year as y.

b. If the total number of students enrolled this year is 60, out of which 15 are boys. Find the number of enrollment of girls of the previous year.

c. Which value is depicted in the question

Syllabus : Real numbers , Polynomials, Linear equations in two variables, trigonometry, Statistics, Triangles, Quadratic equation , Arithmetic Progression, circles, Construction , Height and Distance, Probability