DELHI PUBLIC SCHOOL, RANCHI

Question Bank (2016-17)

Class:-X **Subject:- Mathematics**

POLYNOMIALS

1. If zeroes of polynomial : x^3-3x^2+x+1 are a-b, a, a+b. Find a .
2. If zeroes of polynomial $\frac{1}{3}x^2 + (k-2) + 2x$ are reciprocal of each other. Find K.
3. α, β, γ *are* zeros of polynomial :
   $2x^3+ 3x^2 + 4x + 8$. Find $\frac{1}{\alpha} + \frac{1}{\beta} + \frac{1}{\gamma}$.
4. If the polynomial : $x^4 +2x^3 + 8x^2 +12x + 8$ is divided by another polynomial (x^2+5), the remainder is ax+b. Find a-b.
5. The zeros of $p(x) = 3x^2 -4x + 1$ are $\propto and\ \beta$. Find a cubic polynomial whose zeroes are θ , $\frac{\alpha^2}{\beta}$, $and \frac{\beta^2}{\alpha}$.
6. What must be added to $f(x) = x^4 +2x^3-2x^2 +x-1$ so that the resulting polynomial is exactly divisible by $x^2 +2x-3$?
7. If the remainder on division of $x^3 +2x^2 +kx+ 3$ by x-3 is 21. Find the quotient and the value of k. Hence find the zeros of the cubic polynomial $x^3 +2x^2 +kx-18$.
8. If α, β are the zeros of $p(x) = x^2-2x -8$ then form a quadratic polynomial whose zeroes are $(\frac{1}{\alpha} + \frac{1}{\beta})$ and $(\frac{1}{\alpha} - \frac{1}{\beta})$
9. Give examples of polynomial p(x), g(x) and r(x) which satisfy the division algorithm and

   (i) deg p (x) = deg q (x)

   (ii) deg q(x) = deg r (x)

   (iii) deg g(x) = 0
10. The zeroe of $p(x) = ax^2bx+c$.

    Find the p value of

    (i) $\sqrt{\frac{\alpha}{\beta} +} \sqrt{\frac{\beta}{\gamma}}$

    (ii) $\frac{1}{\alpha^2} + \frac{1}{\beta^2}$

    (iii) $\frac{1}{\alpha^4} + \frac{1}{\beta^4}$

    (iv) $\alpha^{-1} + \beta^{-1}$

STATISTICS

1. **The median of the following data is 52.5. Find the value of x and y if the total frequency is 100.**

C.I	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100
Frequency	2	5	x	12	17	20	y	9	7	4

2. **If the mean of following distribution is 50, find the value of f.**

Class	0-20	20-40	40-60	60-80	80-100
Frequency	17	28	32	f	19

3. **Find the missing frequency if the mean of frequency table is 50.**

Age	0-20	20-40	40-60	60-80	80-100
People	17	f_1	32	f_2	19

4. **The median of the following data is 525. Find the value of x and y if total frequency is 100.**

C.I	Frequency
0-100	2
100-200	5
200-300	x
300-400	12
400-500	17
500-600	20
600-700	y
700-800	9
800-900	7
900-1000	4
	100

5. **Draw a 'less than type ogive' and more than type ogive ' for the given data and obtain the median weight from the graph.**

Weight (kg)	No. of Students
Less than 38	0
Less than 40	3
Less than 42	5
Less than 44	9
Less than 46	14
Less than 48	28
Less than 50	32
Less than 52	35

6. If the mean of the data is 18, find the missing frequency.

Marks	10	15	20	25
No. of students	5	10	p	8

7. Change the distribution to a 'more than type distribution' and draw its ogive.

Production	40-45	45-50	50-55	55-60	60-65	65-70
No. of farms	4	6	16	20	30	34

8. Find the modal class

Marks	Frequency
Less than 20	4
Less than 40	12
Less than 60	25
Less than 80	56
Less than 100	74
Less than 120	80

9. Find the mean , median and mode of the following data :-

Classes	0-20	20-40	40-60	60-80	80-100
Frequency	6	8	10	12	6

10. If the mean of six numbers:
x-5, x-1, x, x+2, x+4 and x+12 is 15, then find the mean of the first four numbers.

LINEAR EQUATION IN 2 VARIABLES

(1) It takes 12 hours to fill a swimming pool using 2 pipes. If the larger pipe is used for 4 hours and the smaller pipe for 9 hours, only half the pool is filled. How long would it take for each pipe alone to fill the pool?

(2) After covering a distance of 30 km with a uniform speed, there is some defect in a rail engine and therefore , its speed is reduced to 4/5 of its original speed Consequently the train reaches its destination late by 45 minutes. Had it happened after covering 18 km more , the train would have reached 9 minutes earlier. Find the speed of the train and distance of the journey.

(3) In a bag containing only white and black balls, half the number of white ball is equal to one third of the number of black balls. Twice the total number of balls exceeds three times the number of black balls by 4. How many balls of each type does the bag contain?

(4) A man has certain no. of oranges. He divides them into two lots A and B. He sells the first lot at the rate of Rs. 2 for 3 oranges and the second lot at the rate of Rs. 1 per orange and gets a total of Rs. 400. If he had sold the Ist lot at the rate of Rs. 1 per orange and the second lot at the rate of Rs. 4 for 5 oranges, his total collection would have been Rs. 460. Find the number of oranges he had .

(5) Find real values of x and y which will make

$$(2x-3y-13)^2 + (3x + 5y + 9)^2 = 0$$

(6) Solve for x and y

$$\frac{7}{4x+3y} + \frac{4}{4x-3y} = \frac{5}{4}$$

$$\frac{8}{4x-3y} - \frac{14}{4x+3y} = \frac{3}{2}$$

(7) A says to B" I am five times old as you were, when I was as old as you are" The sum of their present ages is 64 years. Find their ages.

(8) A two digit number is obtained by either multiplying the sum of the digits by 8 and adding 1 or by multiplying the difference of the digits by 13 and adding 2. Find the number. How many such numbers are there?

(9) A cyclist after riding a certain distance stopped for half an hour to repair his machine after which he complete the whole journey of 30 km at half speed in 5 hours. If the breakdown has occurred 10 km further he would have done the whole journey in 4 hours .Find where the breakdown occurred and his original speed.

(10) A train overtakes two persons who are walking in the same direction in which the train is going at the speed of 2 km per hour and 4 km per hour and passes them completely in 9 and 10 seconds respectively. Find the length and speed of train.

(11) If two liquids are mixed in the ratio 3:2, a mixture is obtained weighing 1.04 g per c.c while if they are mixed in the ratio 5:3, the resulting mixtures weighs 1.05 g per c.c. Find the weight of one cc of each of the original liquids.

(12) A milkman has a smaller drum half full of milk and a larger one of twice the capacity of the smaller one with ¼ full of milk. He adds water to the two drum so that both of them are full. The milk in both the drums are emptied into a tube. What is the fraction of milk in the contents of the tube.

(13) A number consists of three digits whole sum is 17. The middle one exceeds the sum of the other two by 1. If the digits be reversed the number is diminished by 396. Find the number.

(14) The sum total of the ages of father and son is 55 years. If the father was to live till his son's age equals his present age , the total of their ages would be 93 years. Find their present ages.

(15) A man wished to give Rs. 12 to each person and found that he fell short of Rs. 6 when he wanted to give to all the persons present. He therefore , distributed Rs. 9 to each person and found that Rs. 9 was left over. How much money did he have and how many persons were there?

(16) The expenses of a lunch are partly constant and partly proportions to the number of guests. The expenses amount to Rs. 65 for 7guests and Rs. 97 for 11 guests then the expenses for 18 guests will amount to?

(17) **The incomes of X and Y are in the ratio of 8:7 and their expenditures and in the ratio 19:16 If each saves Rs. 1250. Find their income.**

(18) **A and B each has a certain number of mangoes. A says to B" If you give 30 of your mangoes. I will have twice as many as left with you. " B replied "if you give 10 , I will have thrice as many as left with you" How many mangoes does each have?**

(19) **There are two examination rooms A and B. If 10 candidates are sent from A to B the number of students in each room is same. If 20 candidates are sent from B to A, the number of students in A is double the number of students in B. Find the number of students in each room.**

(20) **Draw the graph of x-y+1 =0 and 3x+2x-12= 0**
Calculate the area bounded by these lines and X axis.

(21) **Solve for x and y**

$$149x - 330y = -511$$
$$-330x + 149y = -32$$

(22) **A man when asked how many hens and buffaloes he has, told that his animals have 120 eyes and 180 legs. How many hens and buffaloes has he?**

(23) **One kilogram of tea and 4 kg of sugar together cost Rs. 220. If the price of sugar increases by 50% and prices of tea increases by 10 % the cost would be Rs. 266. Find the original cost per Kilogram of each.**

(24) **Ten years ago, the sum of the ages of two sons was one third of their father'age. One son is two years old that the other and sum of their present ages in 14 years less than the father's present age. Find the present ages of all.**

(25) **I am three times as old as my son. Five years later, I shall be two and a half times as old as my son. How old am I and how old is my son?**

REAL NUMBERS

1. **Show that 5 - $\sqrt{7}$ is an irrational number.**
2. **Examine whether the following numbers are rational or irrational**

   (i) $(\sqrt{2}+\sqrt{3})^2$ **(ii)** $\frac{2\sqrt{3}}{3}$
3. **Use Euclid's algorithm to find H.C.F. of 4052 and 12576**
4. **Prove that one and only one out of every three consecutive positive integers is divisible by 3.**
5. **Using Euclid's lemma show that square of any positive integer is either of the form 3m or 3m+1 for some integer m.**
6. **Check whether the number 15^n where n is a natural number, ends with the digit 0, justify your answer.**

7. **An army contingent of 616 members is to march behind an army band of 32 members in a parade. The 2 groups are to march in the columns. What is the maximum number of columns in such a way that each column has equal number of members.**
8. **If n be any positive integer, then by using Euclid's division lemma, show that $n^3 + 1$ can be expressed in the form 9m,9m+1 or 9m+2 for some integer m.**
9. **Is 2 x 3 x 5 x 13 x 17 + 13 a composite number? Justify your answer.**
10. **If $\frac{2-\sqrt{3}}{2+\sqrt{3}} = \frac{x}{\sqrt{3}}$, then determine whether x is rational or irrational.**
11. **If H.C.F. of 408 and 1032 is expressible in the form 1032m – 408 $\times$ 5.**
    Find m.
12. **Show that square of an odd positive integer is of the form 8m +1, for some integer m.**
13. **A person had a number of toys to distribute among children. At first he gave 2 toys to each child, then 3, then 4, then 5 and then 6, but was always left with one. But if he had given 7 toys to each child, no toys would have been left with him.**
    (i)What is the smallest number of toys that he had?
    (ii)Which concept has been used to solve the above problem?
    (iii)Which values of the person have been depicted here?
14. **Ram and Shyam go for morning daily. They run in a circular track in park and take 180 seconds and 150 seconds respectively to complete one cycle. They start together at 6 a.m. from the same point and in the same direction.**
    (i)How long would it take for them to meet again for the next time?
    (ii)At what time will they meet the first time after they start?
    (iii)Which concept has been used here?
    (iv)Which values of Ram and Shyam have been depicted in this activity?

X

Question Bank X (SIMILAR TRIANGLES)

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

2. ABCD is quadrilateral in which AB=AD the bisectors of <ABC and <CAD intersect the sides BC and CD respectively at the points E and F. Prove that the segment EF is parallel to diagonal BD.

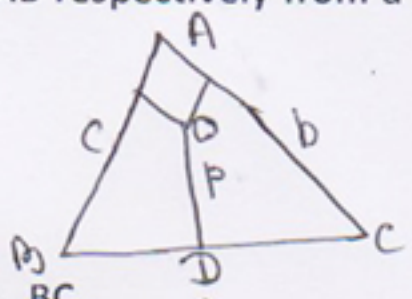
3. A point O in the interior of a rectangle ABCD is joined with each of the vertices A, B,C,D. Prove that $OA^2 + OC^2 = OB^2 + OD^2$

4. In an equilateral triangle ABC , D is a point on the side BC such that BD= $\frac{1}{3}$ BC prove that $9AD^2 = 7\ AB^2$

5. Two poles of heights a and b (b>a) are 'c' mts. apart. Prove that the height 'h' in mts of the point of intersection of the lines joining the top of each pole to the foot of the opposite pole is $\frac{ab}{a+b}$.

6. L and M are the mid points of AB and BC respectively of $\triangle$ABC right angled at B. Prove that $4\ LC^2 = AB^2 + 4\ BC^2$

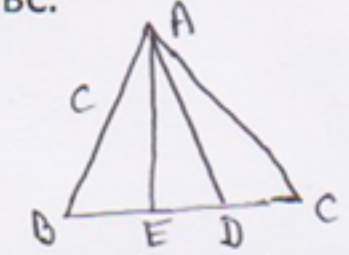
7. Perpendicular OD, OE and OF are drawn to sides BC, CA and AB respectively from a point O in the interior of $\triangle$ ABC. Prove that



(i) $AF^2 + BD^2 + CE^2 = OA^2+OB^2+ OC^2- OD^2 – OE^2- OF^2$

(ii) $AF^2 + BD^2 + CE^2 = AE^2+CD^2+ BF^2$

8. D is the mid point of the side BC of a $\triangle$ ABC and segment AE $\perp$ BC.



Prove that $b^2+ C^2 = 2\ P^2 + \left(\frac{a^2}{4}\right)$

9. ABCD is a trapezium
in which AB is parallel to DC and the diagonal AC, BD cut at X. A line is drawn through C parallel to DA to cut DB, produced if necessary at y prove that:-

(i) $\triangle$A X D, $\triangle$B X C, are equal in area

(ii) $\triangle$ A X D $\sim\triangle$ C X Y

(iii) $\frac{XB}{XY} = \frac{XA^2}{XC^2}$

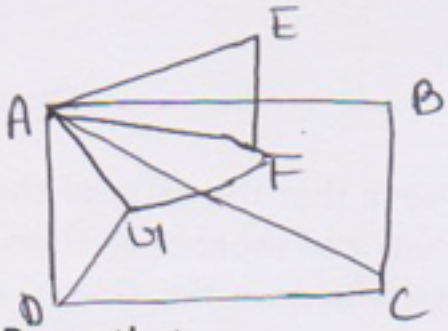
10. A point D is on the side BC of an equilateral triangle ABC such that DC= $\frac{1}{4}$ BC.
Prove that $AD^2 = B\ (CD)^2$

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

12. In the given figure ABCD and AEFG are squares prove that

(i) $\frac{AF}{AG} = \frac{AC}{AD}$

(ii) $\triangle$ ACF ~ $\triangle$ ADG



13. ABC is a right angled triangle at A. BL and CM are its two median , Prove that $4(BL^2 + CM^2) = 5\,BC^2$

14. In a quadrilateral ABCD, given that $\angle A + \angle D = 90°$, Prove that $AC^2 + BD^2 = (AD)^2 + (BC)^2$

15. ABCD is a $||^{gm}$. AB is divided at Pand CD at Q so that AP:PB = 3:2 and CQ:QD = 4:1 If PQ Meets AC at R, then prove that AR= $\frac{3}{7}$ AC