

DELHI PUBLIC SCHOOL,JAMMU

CLASS 11TH,SUBJECT- MATHS

ASSIGNMENT FOR HALF YEARLY

CHAPTERS:

- SETS
- RELATIONS AND FUNCTIONS
- TRIGONOMETRY
- PRINCIPLE OF MATHEMATICAL INDUCTION
- COMPLEX NUMBER
- PERMUTATION AND COMBINATION
- LINEAR INEQUALITIES
- BINOMIAL THEOREM
- SEQUENCE AND SERIES

1.SETS:

Q1. Write the set $A = \{x: x \in \mathbb{Z}, x^2 < 20\}$

Q2. Two finite sets have m and n elements. The total number of subsets of the first set is 56 more than the total number of subsets of the second set. Find m and n .

Q3. Show that $n\{P[P(P(\emptyset))]\} = 4$

Q4. If A, B and C are three sets, then: a) $(A \cup B) \cup C = A \cup (B \cup C)$ b) $A \cap (B \cap C) = (A \cap B) \cap C$

c) $A - (B \cap C) = (A - B) \cup (A - C)$ d) $A \cap (B \Delta C) = (A \cap B) \Delta (A \cap C)$

Q5. If A and B are two sets such that $n(A) = 35$, $n(B) = 30$, $n(U) = 50$, Find the greatest value of $n(A \cup B)$ and the least value of $n(A \cap B)$

Q6. A survey shows that 63% of the Americans like cheese whereas 76% like apples. If $x\%$ of the Americans like both, find the value of x .

2. RELATIONS AND FUNCTIONS:

Q1. For any three sets A, B, C, prove that i) $A \times (B \cup C) = (A \times B) \cup (A \times C)$ ii) $A \times (B - C) = (A \times B) - (A \times C)$

Q2. If A and B are two sets having 3 elements in common. If $n(A) = 5, n(B) = 4$, find $n(A \times B)$ and $n[(A \times B) \cap (B \times A)]$

Q3. If A and B are finite sets having m and n elements resp.. Then find the number of relations A to B

Q4. Find the domain of the function:

$$\text{i) } f(x) = \sqrt{4-x} + \frac{1}{\sqrt{x^2-1}} \quad \text{ii) } f(x) = \frac{1}{\sqrt{x-|x|}} \quad \text{iii) } f(x) = \frac{1}{\sqrt{x+|x|}}$$

$$\text{iv) } f(x) = \log_4 \{ \log_5 (\log_3 |18x - x^2 - 77|) \} \quad \text{v) } f(x) = \frac{1}{\sqrt{[x]^2 - [x] - 6}}$$

Q5. Find the range of the functions below:

$$\text{i) } f(x) = |x - 3| \quad \text{ii) } f(x) = 1 - |x - 2| \quad \text{iii) } f(x) = \frac{x}{1+x^2}$$

$$\text{iv) } f(x) = \frac{1}{2 - \sin 3x} \quad \text{v) } f(x) = \frac{1}{1-x^2}$$

3. TRIGONOMETRY:

Q1. Convert to degree measure: $15^\circ 34' 33''$

Q2. Convert into radian measure: $5^\circ 37' 30''$

Q3. Find the angle between hour hand and minute hand of a clock at 3:30 a.m

Q4. Find the value of $\sin 18^\circ$

Q5. If $\tan A - \tan B = x$, Prove that $\cot B - \cot A = y$

Q6 If $\cos(a+b) = 4/5$, $\sin(a-b) = 5/13$. and a, b lies between 0 and 45° ,. Prove that: $\tan 2a = 56/23$

Q7. Prove that : $\sin 20 \sin 40 \sin 60 \sin 80 = 3/16$

Q8. Show that $\sqrt{3} \operatorname{cosec} 20^\circ - \sec 20^\circ = 4$

Q9. Prove that $\sin \frac{\pi}{10} = \frac{\sqrt{5}-1}{4}$

Q10. A lamp post is situated at the middle point M of the side AC of a triangular plot ABC with $BC = 7\text{m}$, $CA = 8\text{m}$ and $AB = 9\text{m}$. Lamp post subtends an angle of 15° at the point B . Determine height of the lamp post.

Q11. Solve the equation: $\sin mx + \sin nx = 0$

4. PRINCIPLE OF MATHEMATICAL INDUCTION:

Q1. Use PMI, prove that: $(2 \cdot 3^n - 1)$ is divisible by 7 , for all $n \in \mathbb{N}$.

Q2 Use PMI, prove that: $2 \cdot 7^n + 3 \cdot 5^n - 5$ is divisible by 24 .

Q3. $1+2+3+\dots+n < \frac{(2n+1)^2}{8}$

Q4. $\sin a + \sin 2a + \dots + \sin na = \frac{\sin(n+\frac{1}{2})a \sin na / 2}{\sin a / 2}$

5. COMPLEX NUMBER:

Q1. Find real values of x and y for which equalities hold: $(x^4 + 2xi)^{-1} (3x^2 + iy) = (3-5i) + (1+2iy)$

Q2. Find real value of x and y for which complex numbers $-3+ix$ and x^2+y+4i are conjugate to each other.

Q3. Find a complex number satisfying equation : $z + \sqrt{2}|z + 1| + i = 0$

Q4. Find the square root of i

Q5. Solve the equation $25x^2 - 30x + 11 = 0$

Q6. Represent in polar form: $z = \frac{2+6\sqrt{3}i}{5+\sqrt{3}i}$

6. LINEAR INEQUALITIES:

Q1. Show that the solution is empty for :

a) $x-2y \geq 0, 2x-y \leq -2, x, y \geq 0$

b) $x+2y \leq 3, 3x+4y \geq 12, y \geq 1, x, y \geq 0$

Q2. Solve for real x : $|x+1| + |x| > 3$

Q3. In drilling world's deepest hole it was found that the temperature T in degree Celsius, x km below the earth surface was given by $T = 30 + 25(x-3), 3 \leq x \leq 15$. At what depth will the temperature be between 155 degree to 205 degree Celsius.

7. BINOMIAL THEOREM

Q1. Expand the binomial: $(1+x+x^2)^3$

Q2. Find the number of terms in the expansion of $(1+2x+x^2)^{15}$

Q3. Using binomial theorem, show that $2^{4n+4} - 15n - 16$ is divisible by 225, where $n \in \mathbb{N}$

Q4. If the seventh term from the starting and the end of expansion $\left(\sqrt[3]{2} + \frac{1}{\sqrt[3]{3}}\right)^n$ are equal, then find the value of n .

8. SEQUENCE AND SERIES:

Q1. If the sum of first m terms of an A.P. is equal to the sum of either the next n terms or the next p terms, then prove that: $(m+n)(1/m - 1/p) = (m+p)(1/m - 1/n)$

Q2. If there are $(2n+1)$ terms in an A.P., then prove that the ratio of the sum of odd terms and the sum of even terms is $(n+1):n$

Q3. If a, b, c, d are in G.P., prove that $a^2 - b^2, b^2 - c^2, c^2 - d^2$ are also in G.P.

Q4.The sum of first three terms of G.P is 16 and the sum of next three terms is 128.Find the first term,ratio,and to n terms of the G.P

A5.A person has two parents ,4 grand parents ,8 great grand parents and so on. Find the number of his ancestors in the tenth generation and during the ten generations preceding his own.

Q6. Find the sum to n terms of the series of cubes of natural number.

8.PERMUTATION AND COMBINATION

Q1.In how many ways 4 men and 3 women be seated along a round table if no women sit together.

Q2.The English alphabet has 5 vowels and 21 consonants .How many words with 2 different vowels and 2 consonants can be formed from the alphabet?

Q3.A boy has 3 library tickets and 8 books of his interest in the library. Of these 8,he does not want to borrow maths part 2,unless part 1 is also borrowed.in how many ways can he choose the 3 books to be borrowed.

Q4.How many numbers greater than 1000000 can be formed by using the digits 1,2,0,2,4,2,4.

Q5.If the letters of the word,RACHIT are arranged in all possible ways as listed in the dictionary, then what is the rank of the word RACHIT