

# KERALA PUBLIC SCHOOL, JAITRAWAS (REWARI)

## Holiday Homework

### Mathematics

#### Class-XI

- A. Revise all the chapters done in school.**  
**B. Do all the questions given below in your Maths notebook.**

### SETS

- Let  $A = \{p, q, r, s\}$  and  $B = \{q, r, p, s\}$ . Are A and B equal?
- Write down all possible subsets of  $A = \{2, 3\}$ .
- If  $A = \{x : x = 3n, n \in \mathbb{Z}\}$  and  $B = \{x : x = 4n, n \in \mathbb{Z}\}$ , then find  $A \cap B$ .
- If  $A = \{x : x \in \mathbb{N}, x \leq 7\}$ ,  $B = \{x : x \text{ is prime, } x < 8\}$  and  $C = \{x : x \in \mathbb{N}, x \text{ is odd and } x < 10\}$   
Verify that :
  - $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$
  - $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$
- The set  $A = \{x : x \in \mathbb{R}, x^2 = 16 \text{ and } 2x = 6\}$  equal -
  - $\phi$
  - $[14, 3, 4]$
  - $[3]$
  - $[4]$
- Two finite sets have m and n elements respectively the total number of elements in power set of first set is 56 more than the total number of elements in power set of the second set find the value of m and n respectively.
- Let  $A = \{x : x \in \mathbb{R}, |x| < 1\}$ ;  $B = \{x : x \in \mathbb{R}, |x-1| \geq 1\}$  and  $A \cup B = \mathbb{R} - D$ , then the set D is -
  - $[x: 1 < x \leq 2]$
  - $[x: 1 \leq x < 2]$
  - $[x: 1 \leq x \leq 2]$
  - none of these
- In a group of 1000 people, there are 750 who can speak Hindi and 400 who can speak Bengali. How many can speak Hindi only? How many can speak Bengali? How many can speak both Hindi and Bengali?
- If A and B are two sets containing 3 and 6 elements respectively, what can be the maximum number of elements in  $A \cup B$ ? Find also the maximum number of elements in  $A \cap B$ .
- In a group of 850 persons, 600 can speak Hindi and 340 can speak Tamil. Find -
  - How many can speak both Hindi and Tamil?
  - How many can speak Hindi only?
  - How many can speak Tamil only?
- In a group of 52 persons, 16 drink tea but not coffee and 33 drink tea. Find -
  - How many drink tea and coffee both?
  - How many drink coffee but not tea?
- A school awarded 58 medals in three sports namely 38 in football, 15 in basketball and 20 in cricket. If 3 students got medals in all the three sports, how many received medals in exactly two sports?

13. In a survey it is found that 21 people like product A, 26 people like product B and 29 like product C. if 14 people like product A and B, 15 people like product B and C, 12 people like product C and A and 8 people like all the three product, find -
- How many people are surveyed in all?
  - How many like product C only?
14. In a survey of 25 students, it was found that 15 had taken Mathematics, 12 had taken Physics and 11 had taken Chemistry, 5 had taken Mathematics and Chemistry, 9 had taken Mathematics and Physics, 4 had taken Physics and Chemistry and 3 had taken all three subjects. Find the numbers of students who had taken -
- only Chemistry
  - only Mathematics
  - only Physics
  - Physics and Chemistry but not Mathematics
  - Mathematics and Physics but not Chemistry
  - only one of the subjects
  - at least one of three subjects
  - none of three subjects.
15. A survey shows that 63% of Indians like cheese whereas 76% like apples. If  $x\%$  of Indians like both cheese and apples and each Indians likes at least one of these, find the value of  $x$ .
16. In a group of people, 50 speak both English and Hindi and 30 people speak English but not Hindi. All the people speak at least one of the two languages. How many people speak English?
17. In a school there are 20 teachers who teach Mathematics or Physics. Of these 12 teach Mathematics and 4 teach both Physics and Mathematics. How many teach Physics?
18. If  $A =$  set of all rational numbers and  $B = \{x : x^2 - 4x + 2 = 0\}$  then write down  $A \cap B$ ,  $A - B$  and  $B - A$ .
19. If  $X$  and  $Y$  are subsets of the universal set  $U$ , then show that -
- $Y \subset X \cup Y$
  - $X \cap Y \subset X$
  - $X \subset Y \Rightarrow X \cap Y = X$ .
20. In a committee, 50 people speak French, 20 speak Spanish and 10 speak both Spanish and French. How many speak at least one of these two languages?

### Principle of Mathematical Induction (PMI)

- Using the principles of mathematical induction prove that  

$$1 + 4 + 7 + 10 + \dots + (3n - 2) = \frac{1}{2}n(3n - 1)$$
 for all  $n \in \mathbb{N}$ .
- Using the principles of mathematical induction prove that  

$$1^2 + 2^2 + 3^2 + \dots + n^2 = \frac{1}{6}n(n + 1)(2n + 1)$$
 for all  $n \in \mathbb{N}$ .
- Using the principles of mathematical induction prove that



10. Reduce  $(\frac{\sqrt{5+12i} + \sqrt{5-12i}}{\sqrt{5+12i} - \sqrt{5-12i}})$  to the form  $(a+ib)$  and hence find its conjugate.
11. Express the complex numbers  $(-\sqrt{3} - i)$  in polar form.
12. Convert the complex numbers  $\frac{1+2i}{1-3i}$  into polar form.
13. Express the complex numbers  $\sin\frac{\pi}{5} + i(1 - \cos\frac{\pi}{5})$  in polar form.
14. Solve :  $9x^2 + 10x + 3 = 0$
15. Solve :  $\sqrt{3}x^2 - \sqrt{2}x + 3\sqrt{3} = 0$
16. Solve :  $x^2 + 3ix + 10 = 0$
17. Solve :  $2x^2 - \sqrt{3}x + 1 = 0$
18. Find the square root :  $\sqrt{6+8i}$ .
19. Write  $z = (-1 + i\sqrt{3})$  in polar form.
20. Write the principle argument of  $(1 + i\sqrt{3})^2$ .

### LINEAR INEQUALITIES

1. Solve:  $12 + 1\frac{5}{6}x \leq 5 + 3x$  when
  - a).  $x \in N$
  - b).  $x \in R$
2. Solve:  $\frac{x-3}{x+4} < 0$  and draw the graph of the solution set.
3. Solve:  $|3x - 2| \leq \frac{1}{2}, x \in R$ .
4. Solve  $\frac{|x-2|-1}{|x-2|-2} \leq 0, x \in R$ .
5. Solve the inequalities  $-3 \leq 3 - 2x < 9, x \in R$ . Represent the solution set on the real line.
6. The longest side of a triangle is 3 times the shortest side and the third side is 2 cm shorter than the longest side. If the perimeter of the triangle is at least 61 cm, find the minimum length of the shortest side.
7. The cost and revenue functions of a product are given by  $C(x) = 20x + 4000$  and  $R(x) = 60x + 2000$  respectively where  $x$  is the number of items produced and sold. How many items must be sold to realise some profit?
8. In drilling world's deepest hole it was found that the temperature  $T(x)$  in degree Celsius  $x$  km below the earth's surface was given by  $T(x) = 30 + 25(x - 3), 3 \leq x \leq 15$ . At what depth will the temperature be between  $155^\circ\text{C}$  and  $205^\circ\text{C}$ ?
9. A solution is to be kept between  $40^\circ\text{C}$  and  $45^\circ\text{C}$ . What is the range of temperature in degree Fahrenheit, if the conversion formula is
 
$$F = \frac{9}{5}C + 32$$
10. Solve:  $\frac{4}{x+1} \leq 3 \leq \frac{6}{x+1}, x > 0$ .
11. Solve:  $\frac{7x-1}{2} < -3, \frac{3x+8}{5} + 11 < 0$ .
12. Solve:  $\frac{|x|-1}{|x|-2} \geq 0, x \in R - \{-2, 2\}$ .
13. Solve:  $5x - 7 < 3(x + 3), 1 - \frac{3x}{2} \geq x - 4$ .
14. How many litres of water will have to be added to 600 litres of the 45% solution of acid so that the resulting mixture will contain more than 25% but less than 30% acid content.

15. A manufacturer has 640 litres of a 8% solution of boric acid. How many litres of a 2% boric acid solution to be added to it so that the boric acid content in the resulting mixture will be more than 4% but less than 6%?