MATHEMATICS (WORKSHEET), CLASS - XI

Chapter – **Sets**

01. Write the set $A=\{x:x\in Z, x^2<20\}$ in the roster form.

02. Write the set of all vowels in the English alphabet which precedes 'q'.

03. Write set A = { 3, 6, 9, 12, 15} in set builder form.

04. Write set $D=\left\{\frac{1}{2},\frac{2}{5},\frac{3}{10},\frac{4}{17},\frac{5}{26},\frac{6}{37},\frac{7}{50}\right\}$ in set- builder form.

05. Use the listing method to express the set $A=\{x:x=n^3, n\in N \text{ and } x<80\}$.

06. Describe the following sets in the roster form.

(a) The set of all letters in the word, ALGEBRA.

(b) The set of all-natural numbers less than 7.

(c) The set of squares of integers.

(d) The set of all letters in the word "TRIGONOMETRY"

07. Describe the following sets in set builder form.

(a) The set of all letters in the word PROBABILITY

(b) The set of all even natural numbers

(c) {5, 25, 125, 625}

08. Which of the following sets are empty sets?

(a) $A=\{x:4<x<5, x\in N\}$

(b) $D=\{x:x^2=25 \text{ and } x \text{ is an odd integer}\}$

(c) $\{x:x\in N \text{ and } x^2=9\}$

(d) $\{x:x^2-3=0, x \text{ is rational}\}$

(e) A = Set of odd natural numbers divisible by 2.

(f) B = set of odd prime numbers

09. Show that the following sets are equal

A = {2, 1}, B = {2, 1, 1, 2, 1, 2} and C = $\{x:x^2-3x+2+0\}$

10. From the sets given below, select equal sets and equivalent sets

$A=\{0,a\}, B=\{1,2,3,4\}, C=\{4,8,12\}, D=\{3,1,2,4\}$ $E=\{1,0\}, F=\{8,4,12\}, G=\{1,5,7,11\}, H=\{a,b\}$

11. State which of the following sets are finite and which are infinite?

(a) $A=\{x:x\in Z \text{ and } x^2-5x+6=0\}$

(b) $B=\{x:x\in Z \text{ and } x^2 \text{ is even}\}$

(c) $C=\{x:x\in Z \text{ and } x^2=36\}$

(d) $D=\{x:x\in Z \text{ and } x>-10\}$

12. From the sets given below, select empty set, singleton set, infinite set, and equal sets.

(a) $A=\{x:x<1 \text{ and } x>3\}$

(b) $B=\{x:x^3-1=0, x\in R\}$

(c) $C=\{x:x\in N \text{ and } x \text{ is a prime number}\}$

(d) $D=\{2,4,6,8,10\}$

(e) $E=\{x:x \text{ is a positive even integers and } x\le 110\}$

13. Which of the following sets are singleton/ non-singleton?

(a) $A=\{x:|x|=7, x\in N\}$

(b) $B=\{x:x^2+2x+1=0, x\in N\}$

(c) $C=\{x:x^2=9, |x|\le 3, x\in N\}$

14. Which of the following pairs of sets are equal?

(a) $A=\{1,3,3,1\}, B=\{1,4\}$

(b) $A=\{x:x+2=2\}, B=\{0\}$

(c) $A=\left\{1,\frac{1}{2},\frac{1}{3}.....\right\}, B=\left\{\frac{1}{n}, n\in N\right\}$

(d) $A=\{x:x\in W\}, B=\{x:x\in N\}$

15. Let A = {1, 3, 5} and B = {x : x is an odd natural number < 6}.

(a) Is $A\subseteq B$? (b) Is A = B ?

16. If A = {3, {4, 5}, then find which of the following statements are true?

(a) $\{4,5\}\subset A$ (b) $\{4,5\}\in A$ (c) $\phi\subset A$ (d) $\{3,6\}\subset A$

17. Write the following as intervals

(a) $\{x;x\in R, -4<x\le 6\}$ (b) $\{x:x\in R, -12<x<-10\}$

(c) $\{x:x\in R, 0\le x<7\}$ (d) $\{x:x\in R, 3\le x\le 4\}$

18. Write down the subsets of the following sets

(a) {1, 2, 3} (b) $\{\phi\}$

19. If set A = {1, 2, 5} then find the number of elements in $P(P(A))$.

20. If $A=\left[x:x=n^2, n=1,2,3\right]$ then find the number of proper subsets.

21. Write the following as intervals and also represent on the real line

(a) $\{x:x\in R,-3<x\le 7\}$ (b) $\{x:x\in R,-11<x<-7\}$

(c) $\{x:x\in R,0\le x<11\}$ (d) $\{x:x\in R,2\le x\le 9\}$

22. Let $A=\{a,b,c,d\}, B=\{a,b,c\}$ and $C=\{b,d\}$. Find all set X such that

(a) $X\subset B$ and $X\subset C$ (b) $X\subset A$ and $X\not\subset B$

23. Find $A-B$ and $B-A$, when $A=\{1,2,3,4,5,6\}$ and $B=\{2,4,6,8,10\}$

24. Find the smallest set such that $A\cup\{1,2\}=\{1,2,3,5,9\}$

25. Let $U=\{1,2,3,4,5,6,7,8,9,10\}, A=\{1,2,3\}, B=\{2,4,6,7\}$ and $C=\{2,3,4,8\}$, then find $(B\cup C)', (A\cup B)'$

26. If A = {x : x is a positive multiple of 3} and U = {x : x is a natural number}, then find 'A'.

27. Represent the following sets in the Venn diagram.

(a) $A'\cap(B\cup C)$ (b) $A'\cap(C-B)$

28. If $B'\subseteq A'$, then show that $A\subseteq B$

29. If A and B are two sets such that $A\subset B$, then show that $A\cup B=B$

30. If A= {a, b, c, d, e}, b = {a, c, e, g} and C = {b, e, f, g} then verify that.

(a) $A\cap(B-C)=(A\cap B)-(A\cap C)$ (b) $A-(B\cap C)=(A-B)\cup(A-C)$

31. If U = {1, 2, 3, 4, 5, 6, 7,8, 9,10}, a = {1, 3, 4} and B = {5, 6}, verify that $A-B=A\cap B'=B'-A'$

32. If U = {2, 3, 4, 5, 6, 7, 8, 9, 10, 11}, A = {2, 4, 7}, b = {3, 5, 7, 9, 11} and C = {7, 8, 9, 10, 11}, then compute

(a) $(A\cap U)\cap(B\cup C)$ (b) $C-B$ (c) $B-C$

33. Let $A=\{x:x\in N \text{ and } x \text{ is a multiple of } 2\}$, $B=\{x:x\in N \text{ and } x \text{ is a multiple of } 5\}$ and $C=\{x:x\in N \text{ and } x \text{ is a multiple of } 10\}$. Describe the sets

(a) $(A\cap B)\cap C$ (b) $A\cup(B\cap C)$ (c) $A\cap(B\cup C)$

34. Let A and B be two sets. Using properties of the set, prove that

(a) $A \cap B = \phi \Rightarrow A \subseteq B'$ (b) $A' \cap B = U \Rightarrow A \subseteq B$

35. Let A, B, and C be the sets such that $A \cup B = A \cup C$ and $A \cap B = A \cap C$. Show that $B = C$.

36. In a town with a population of 5000, 3200 people are egg-eaters, 2500 meat-eaters and 1500 eat both egg and meat. How many are pure vegetarians?

37. In school, 20 teachers teach Maths or Physics. Out of these, 12 teach Maths, and 4 teach Physics and Maths. How many teach Physics?

39. In a group of 70 people, 37 like coffee, 52 like tea, and each person likes at least one of the two drinks. How many people like both coffee and tea?

40. In a survey of 400 movie viewers, 150 were listed as liking Veer Zaara, 100 were listed as liking Aitraaz, and 75 were listed as both liking Aitraaz as well as Veer Zaara. Find how many people were liking neither Aitraaz nor Veer Zaara?

41. In a survey of 400 students in a school, 100 were listed as taking apple juice, 150 as taking the orange juice, and 75 were listed as taking both apples as well as orange juice. Find how many students were taking neither apple juice nor orange juice.

42. Out of 100 students, 15 passed in English, 12 passed in Mathematics, 8 in Science, 6 in English and Mathematics, 7 in Mathematics and Science, 4 in English and Science, 4 in all three. Fin how many students passed in

(a) English and Mathematics but not in science?

(b) Mathematics and Science but not in English?

43. In a group of 100 people, 65 like to play Cricket, 40 like to play Tennis and 55 like to play Volleyball. All of the people to play at least one of the three games. If 25 likes to play both Cricket and Tennis, 24 like to play both Tennis and Volleyball and 22 like to play both Cricket and Volleyball, then.

(a) How many like to play all three games?

(b) How many like to play cricket only?

(c) How many like to play Tennis only?

Represent the above information in a Venn diagram.

44. In a class of 140 students, 60 play Football, 48 play Hockey and 75 play cricket, 30 play Hockey and Cricket, 18 play Football and Cricket, 42 play Football and Hockey, and 8 play all three games. Use the Venn diagram to find?

(a) Students who do not play any of these three games

(b) Students who play only Cricket

(c) Students who play Football and Hockey, but not cricket.

45. In a survey, it is found that 21 people like product A, 26 people like product b, and 29 people like product C. If 14 people like products A and B, 12 people like products C and A, 14 people like products B and C, 8 people like all the three products. Find how many like product C only?