## PERSONAL PAPER

## PANDEYPUR

## QUESTION BANK (SETS)

## Class 11 - Mathematics

1. The number of subsets (Improper) of a set containing $n$ elements is
a) $2^{n}$
b) $2^{\mathrm{n}}-1$
c) $2^{n}-2$
d) $n$
2. Two finite sets have $m$ and $n$ elements respectively. The total number of subsets of first set is 56 more than the total number of subsets of the second set. The values of $m$ and $n$ respectively are.
a) 5, 1
b) 7,6
c) 8,7
d) 6,3
3. If $A=\{x: x \neq x\}$ represents
a) $\{1\}$
b) $\}$
c) $\{x\}$
d) $\{0\}$
4. For any two sets $A$ and $B, A \cup B=A$ if
a) $A=B$
b) $\mathrm{B} \in \mathrm{A}$
c) $A \neq B$
d) $B \subseteq A$
5. For any two sets A and $\mathrm{B}, A \cap(A \cup B)=\ldots$
a) none of these
b) $B$
c) $\phi$
d) A
6. Let $F_{1}$ be the set of parallelograms, $F_{2}$ the set of rectangles, $F_{3}$ the set of rhombuses, $F_{4}$ the set of squares and $F_{5}$ the set of trapeziums in a plane. Then $\mathrm{F}_{1}$ may be equal to
a) $F_{2} \cap F_{3}$
b) $F_{3} \cap F_{4}$
c) $\mathrm{F}_{2} \cup \mathrm{~F}_{5}$
d) $F_{2} \cup F_{3} \cup F_{4} \cup F_{1}$
7. Let $\mathrm{A}=\{x: x \notin R, x \geqslant 4\}$ and $\mathrm{B}=\{x: x \notin R, x<5\}$ then $A \cap B$ is
a) $\{5,4\}$
b) $\{4,5\}$
c) $\{4\}$
d) $\{x: x \in R, 4 \leq x<5\}$
8. If sets A and B are defined as $\mathrm{A}=\left\{(x, y) \left\lvert\, y=\frac{1}{x}\right., 0 \neq x \in \mathbf{R}\right\}, \mathrm{B}=\{(\mathrm{x}, \mathrm{y}) \mid \mathrm{y}=-\mathrm{x}, \mathrm{x} \in \mathrm{R}\}$, then
a) $\mathrm{A} \cap \mathrm{B}=\mathrm{A}$
b) $\mathrm{A} \cup \mathrm{B}=\mathrm{A}$
c) $\mathrm{A} \cap \mathrm{B}=\phi$
d) $A \cap B=B$
9. If $\mathrm{A} \subset \mathrm{B}$, then
a) $A^{c} \subset B^{c}$
b) $B^{c} \not \subset A^{c}$
c) $A^{c}=B^{c}$
d) $B^{c} \subset A^{c}$
10. Suppose $A_{1}, A_{2}, \ldots, A_{30}$ are thirty sets each having 5 elements and $B_{1}, B_{2}, \ldots, B_{n}$ are $n$ sets each having 3
elements. Let $\bigcup_{i=1}^{30} A_{i}=\bigcup_{j=1}^{n} B_{j}=S$ and each element of $S$ belongs to exactly 10 of $A_{i}^{\prime s}$ and exactly 9 of $B_{i}^{\prime s}$. Then n is equal to.
a) 3
b) 15
c) 45
d) 35
11. If $A=\left\{(x, y): x^{2}+y^{2}=25\right\}$ and $B=\left\{(x, y): x^{2}+9 y^{2}=144\right\}$ then $A \cap B$ contains
a) three points
b) two points
c) one point
d) four points
12. Given the sets $A=\{1,2,3\}, B=\{3,4\}, C=\{4,5,6\}$, then $A \cup(B \cap C)$ is
a) $\{1,2,3\}$
b) $\{3\}$
c) $\{1,2,3,4,5,6\}$
d) $\{1,2,3,4\}$
13. Let $A=\{x: x \in R, x>4\}$ and $B=\{x \in R: x<5\}$. Then, $A \cap B=$
a) $[4,5)$
b) $[4,5]$
c) $(4,5]$
d) $(4,5)$
14. If $A=\{x: x$ is a multiple of 3 , $x$ natural no., $x<30\}$ and $B=\{x: x$ is a multiple of $5, x$ is natural no., $x<30\}$ then $\mathrm{A}-\mathrm{B}$ is
a) $\{3,6,9,12,15,18,21,24,27,30\}$
b) $\{3,6,9,12,18,21,24,27\}$
c) $\{3,5,6,9,10,12,15,18,20,21,25,27$,
d) $\{3,6,9,12,18,21,24,27,30\}$
30\}
15. The smallest set $A$ such that $A \cup\{1,2\}=\{1,2,3,5,9\}$ is
a) $\{1,2,5,9\}$
b) $\{4,5,6\}$
c) $\{3,5,9\}$
d) $\{2,3,5\}$
16. Let $A$ and $B$ be two non- empty subsets of a set $X$ such that $A$ is not a subset of $B$, then
a) A and the complement of B are always non-
b) none of these disjoint
d) B is always a subset of A
17. Two finite sets have $m$ and $n$ elements. The number of subsets of the first set is 112 more than that of the second set. The values of $m$ and $n$ are, respectively,
a) 7, 7
b) 4, 4
c) 7,4
d) 4,7
18. Each set $\mathrm{X}_{\mathrm{r}}$ contains 5 elements and each set $\mathrm{Y}_{\mathrm{r}}$ contains 2 elements and $\bigcup_{r=1}^{20} x_{r}=S=\bigcup_{r=1}^{n} Y_{r}$. If each element of $S$ belong to exactly 10 of the $X_{r}$ 's and to exactly 4 of the $Y_{r}$ 's, then $n$ is
a) 10
b) 20
c) 50
d) 100
19. In a set builder method the null set is represented by
a) $\{x: x=x\}$
b) $\phi$
c) $\}$
d) $(x: x \neq x)$.
20. The set of all prime numbers is
a) an infinite set
b) a singleton set
c) none of these
d) a finite set
21. Write the set in the roster form: $\mathrm{A}=\{$ set of all factors of 24$\}$.
22. If $A=\{3,5,7,9,11\}, B=\{7,9,11,13\}, C=\{11,13,15\}$ and $D=\{15,17\}$ find: $B \cap D$
23. Write the correct form if the statement is incorrect: $\{x: x+3=3\}=\phi$.
24. Express the set as an interval: $\mathrm{D}=\{\mathrm{x}: \mathrm{x} \in \mathrm{R},-5 \leq \mathrm{x} \leq 2\}$
25. Write the subsets of $R$ as an interval: $C=\{x: x \in R,-2 \leq x<0\}$
26. State whether $A \subset B$ or $A \not \subset B: A=\{x: x$ is a real number $\}, B=\{x: x$ is a complex number $\}$
27. Write the interval $[6,12]$ in set builder form.
28. Write the set in roster form: $\mathrm{C}=\{\mathrm{x}: \mathrm{x}$ is a two-digit natural number such that the sum of its digits is 8$\}$
29. If X and Y are subsets of the universal set U , then show that $X \subset Y \Rightarrow X \cap Y=X$
30. Write the interval $(-7,0)$ in set-builder form.
31. If $\mathrm{X}=\{\mathrm{a}, \mathrm{b}, \mathrm{c}, \mathrm{d}\}$ and $\mathrm{Y}=\{\mathrm{f}, \mathrm{b}, \mathrm{d}, \mathrm{g}\}$ find: $Y-X$
32. If $\mathrm{A}=\{3,5,7,9,11\}, \mathrm{B}=\{7,9,11,13\}, \mathrm{C}=\{11,13,15\}$ and $\mathrm{D}=\{15,17\}$ find: $A \cap B$ ?
33. List element of the given set: $C=\left\{x: x\right.$ is an integer, $\left.X^{2} \leqslant 4\right\}$
34. State whether $C=\{x: 4<x<5, x \in N\}$ set is empty set or not?
35. Write the subsets of $R$ as intervals: $\{x: x \in R,-12<x<-10\}$ Also, find the length of interval.
36. If $A=\{1,3,5,7,9\}$ and $B=\{2,3,5,7,11\}$, then find $A \Delta B$.
37. $A, B$ and $C$ are subsets of Universal Set $U$. If $A=\{2,4,6,8,12,20\}, B=\{3,6,9,12,15\}, C=\{5,10,15,20\}$ and $U$ is the set of all whole numbers, draw a Venn diagram showing the relation of $\mathrm{U}, \mathrm{A}, \mathrm{B}$ and C .
38. Write down all possible subsets of $A=(1,\{2,3\})$.
39. In a group of students, 100 students know Hindi, 50 know English and 25 know both. Each of the students knows either Hindi or English. How many students are there in the group?
40. If $A=\{a, b, c, d, e\}, B=\{a, c, e, g\}$ and $C=\{b, e, f, g\}$, verify that: $A-(B \cap C)=(A-B)-(A-C)$
41. Let $X=\{1,2,3,4,5,6\}$. If $n$ represent any member of $X$, express the set $n+5=8$
42. Two finite sets have $m$ and $n$ elements. The number of subsets of the first set is 112 more than that of the second set. Find the values of $m$ and $n$.
43. Let $\mathrm{T}=\left\{x: \frac{x+5}{x-7}-5=\frac{4 x-40}{13-x}\right\}$. Is T an empty set? Justify your answer.
44. Show that $A \cap B=A \cap C$ need not imply B $=\mathrm{C}$.
45. Let $A=\{a, b, c, d\}, B=\{a, b, c\}$ and $C=\{b, d\}$. Find all sets $X$ such that: $X \subset A$ and $X \not \subset B$.
46. If $A=\{a, b, c, d, e\}, B=\{a, c, e, g\}$ and $C=\{b, e, f, g\}$, verify that: $A \cup C=C \cup A$
47. If $A$ and $B$ are subsets of the universal set $U$, then show that

$$
(\mathrm{A} \cap \mathrm{~B}) \subset \mathrm{A}
$$

48. For sets $A$, $B$ and $C$ using properties of sets, prove that: $A \cap(B-C)=(A \cap B)-(A \cap C)$.
49. Is $B=\{x: x \in N, 2 x+3=4\}$ null set?
50. Given $L=\{1,2,3,4\}, M=\{3,4,5,6\}$ and $N=\{1,3,5\}$ Verify that $L-(M \cup N)=(L-M) \cap(L-N)$
51. Let A and B be two sets. Then, prove that $\mathrm{A}=\mathrm{B} \Leftrightarrow A \subseteq B$ and $B \subseteq A$.
52. If $A=\{x: x \in N, x \leq 7], B=\{x: x$ is prime, $x<8\}$ and $C=[x: x \in N, x$ is odd and $x<10\}$, verify that: $A \cap$
$(B \cup C)=(A \cap B) \cup(A \cap C)$
53. Write the set $A=\left\{a_{n}: n \in N, a_{n+1}=3 a_{n}\right.$ and $\left.a_{1}=1\right\}$ in the roster form.
54. Is the pair of set $A=\{2,3\}$ and $B=\left\{x: x\right.$ is solution of $\left.x^{2}+5 x+6=0\right\}$ equal? Give reason.
55. Write the set in roster form: $\mathrm{D}=\left\{\mathrm{x}: \mathrm{x}\right.$ is an integer, $\left.\mathrm{x}^{2} \leq 9\right\}$
56. Let A, B and C be three sets, then prove that: $A-(B-C)=(A-B) \cap(A \cap C)$
57. List element of the given set: $\mathrm{A}=\{\mathrm{x}: \mathrm{x}$ is an odd natural number $\}$
58. For all sets A, B and C

Is $(A-B) \cap(C-B)=(A \cap C)-B$ ?
Justify your answer.
59. Using properties of set prove the statement. For all sets A and B , prove that $A \cup(B-A)=A \cup B$.
60. In a survey of 60 people, it was found that 25 people read newspaper $H, 26$ read newspaper T, 26 read newspaper I, 9 read both H and I, 11 read both H and T, 8 read both T and I, 3 read all three newspapers.

Find the number of people who read exactly one newspaper.
61. Let A and B be two sets. If $A \cap X=B \cap X=\phi$ and $A \cup X=B \cup X$ for some set X , prove that $\mathrm{A}=\mathrm{B}$.
62. If $\mathrm{A} \subset \mathrm{B}$, show that $\left(\mathrm{B}^{\prime}-\mathrm{A}^{\prime}\right)=\phi$.

Hint $\mathrm{A} \subset \mathrm{B} \Rightarrow \mathrm{B}^{\prime} \subset \mathrm{A}^{\prime} \Rightarrow \mathrm{B}^{\prime}-\mathrm{A}^{\prime}=\phi$.
63. Is the set of lines which are parallel to the x-axis finite or infinite?
64. Let A and B be two sets. Using properties of sets prove that:

$$
\begin{aligned}
& \text { i. } \mathrm{A} \cap \mathrm{~B}^{\prime}=\phi \Rightarrow \mathrm{A} \subset \mathrm{~B} \\
& \text { ii. } \mathrm{A}^{\prime} \cup \mathrm{B}=\mathrm{U} \Rightarrow \mathrm{~A} \subset \mathrm{~B}
\end{aligned}
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65. List all the element of the sets: $\mathrm{H}=\{\mathrm{x}: \mathrm{x} \in \mathrm{Z},|\mathrm{x}| \leq 2\}$
66. State whether the statements is true or false: $\{2,3,4,5\}$ and $\{3,6\}$ are disjoint sets.
67. If $U=\{2,3,5,7,9\}$ is the universal set and $\mathrm{A}=\{3,7\}, \mathrm{B}=\{2,5,7,9\}$, then prove that: $(A \cap B)^{\prime}=A^{\prime} \cup B^{\prime}$.
68. Let A, B and C be sets. Then show that
$A \cap(B \cup C)=(A \cap B) \cup(A \cap C)$
69. In a survey of 60 people, it was found that 25 people read newspaper $H, 26$ read newspaper T, 26 read newspaper I, 9 read both H and I, 11 read both H and T, 8 read both T and I, 3 read all three newspapers. Find the number of people who read at least one of the newspaper.
70. Assume that $\mathrm{P}(\mathrm{A})=\mathrm{P}(\mathrm{B})$ show that $\mathrm{A}=\mathrm{B}$.
71. 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 the three. Find how many passed
i. in English and Mathematics but not in Science
ii. in Mathematics and Science but not in English
iii. in Mathematics only
iv. in more than one subject only
72. Let $A=\{a, e, i, o, u\}, B=\{a, d, e, o, v)$ and $C=\{e, o, t, m]$. Using Venn diagrams, verify that: $A \cup(B \cap C)=$ $(A \cup B) \cap(A \cup C)$
73. Let $A=\{2,4,6,8,10\}, B=\{4,8,12,16\}$ and $C=\{6,12,18,24\}$. Using Venn diagrams, verify that: $(A \cup B) \cup$ $C=A \cup(B \cup C)$
74. If $U=\{1,2,3,4,5,6,7,8,9\}, A=\{2,4,6,8\}$ and $B=\{2,3,5,7\}$, verify that: $(A \cap B)^{\prime}=A^{\prime} \cup B^{\prime}$.
75. Let A, B and C be three sets such that $A \cup B=C$ and $A \cap B=\phi$ then prove that A $=\mathrm{C}-\mathrm{B}$.

