

MATHS

BOOKS - V PUBLICATION

SETS

Question Bank

1. Find the set of the equation $x^2 + x - 2 = 0$
in roster form.



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2. Write the set $\{x: x \text{ is a positive integer and } x^2 = 40\}$ in the roster form.



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3. Consider the set $A = \{1, 4, 9, 16, 25, \dots\}$. Write A in set-builder form



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4. Write the following sets in Set builder form.

$$C = \left\{ \frac{1}{2}, \frac{2}{3}, \frac{3}{4}, \frac{4}{5}, \frac{5}{6}, \frac{6}{7} \right\}$$



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5. Match each of the set on the described in the roster form with the same set on the described in the set-builder form :



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6. Which of the following are sets? Justify your answer.

The collection of all the months of a year beginning with the letter J



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7. Let $A = \{1,2,3,4,5,6\}$. Insert the appropriate symbol \in or \notin in the blank spaces

8---A



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8. Write the following sets in roster form

$C = \{x : x \text{ is a two-digit natural number such that the sum of its digits is } 8\}$



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9. Write the following sets in Set builder form.

$B = \{2, 4, 8, 16, 32\}$



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10. List all the elements of the following sets :

(i) $A = \{x: x \text{ is an odd natural number}\}$

(ii) $B = \{x, x \text{ is an integer, } -\frac{1}{2} < x < \frac{9}{2}\}$

(iii) $C = \{x: x \text{ is an integer, } x^2 \leq 4\}$

(iv) $D = \{x: x \text{ is a letter in the word 'LOYAL'}\}$

(v) $E = \{x: x \text{ is a month of a year not having 31 days}\}$

(vi) $F = \{x: x \text{ is a consonant in the English alphabet which precedes } k\}$.



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11. Match each of the set in the roster form with the same set described in set-builder form:

i) $\{1,2,3,6\}$

a) $\{x : x \text{ is a prime number and a divisor of } 6\}$

ii) $\{2,3\}$

b) $\{x : x \text{ is an odd natural number less than } 10\}$

iii) $\{M,A,T,H,E,I,C,S\}$

c) $\{x : x \text{ is a natural number and divisor of } 6\}$

iv) $\{1,3,5,7,9\}$

d) $\{x : x \text{ is a letter of the word MATHEMATICS}\}$

i) c, ii) a,

iii) d,

iv) b



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12. Which of the following sets are null sets. (i)

The set 'A' of all prime numbers lying between 15 and 19.

(ii) 'A' = $\{x : x < 5, x > 6\}$ (iii) 'A' = $\{x :$

$$x^2=16, x \in \mathbb{N}$$

(iv) 'A={x: |x|<-4, x in N}'



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13. State which of the following sets are finite or infinite

$$\{x: x \in \mathbb{N} \text{ and } x^2 - 3x + 2 = 0\}$$



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14. Write the following sets in roster form and identify equal sets (if any)

$$A = \{x : x \in \mathbb{R} \text{ and } x^2 = 25\}$$

$$B = \{x : x \in \mathbb{N} \text{ and } x^2 = 25\}$$

$$C = \{x : x \in \mathbb{R} \text{ and } x^2 - 10x + 25 = 0\}$$

$$D = \{x : x \in \mathbb{N} \text{ and } x^2 - 8x + 15 = 0\}$$



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15. Which of the following pairs of sets are equal? Justify your answer. (i) 'X', the set of

letters in "ALLOY" and 'B', the set of letters in 'LOYAL"

(ii) 'A={n: dotn in Z and n^2 le 4} and 'B={x: x in R. and x^2-3 x+2=0}



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16. Which of the following are examples of the null set

Set of odd natural number divisible by 2



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17. Which of the following sets are finite or infinite

i) The set of months of a year

ii) $\{1,2,3, \dots\}$

iii) $\{1,2,3, \dots, 99,100\}$

iv) The set of positive integers greater than 100

v) The set of prime numbers less than 99



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18. State whether each of the following set is finite or infinite:

i) The set of lines which are parallel to the 'x' - axis.

ii) The set of letters in the English alphabet

iii) The set of numbers which are multiple of 5

iv) The set of animals living on the earth

v). The set of circles passing through the origin '(0,0)'



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19. Are the following pair of sets equal? Give reasons.

i) $A=\{2,3\}$, $B=\{x: x \text{ is a solution of } x^2 + 5x + 6 = 0\}$

ii) $A=\{x: x \text{ is a letter in the word FOLLOW}\}$, $B=\{y: y \text{ is a letter in the word WOLF "})$



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20. From the sets given below, select equal sets:

$A=\{2,4,8,12\}$,

$$B = \{1, 2, 3, 4\},$$

$$C = \{4, 8, 12, 14\},$$

$$D = \{3, 1, 4, 2\},$$

$$E = \{-1, 1\},$$

$$F = \{0, a\},$$

$$G = \{1, -1\},$$

$$H = \{0, 1\}$$



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21. Which of the following are true?

(i) If $A = \{3, 6, 7\}$, $B = \{2, 3, 7, 8, 10\}$, then $A \subset B$

(ii) If $A = \{1, 5, 5, 5\}$, $B = \{1, 3, 5\}$, then $A \subset B$.
(iii) If $A = \{x : x^2 + 4x - 21 = 0, x \in \mathbb{N}\}$, $B = \{-7, 3\}$ then $A \subset B$.
(iv) If $A = \{x : x^3 - 1 = 0, x \in \mathbb{N}\}$, $B = \{x : x^2 - 4x + 3 = 0, x \in \mathbb{N}\}$, then $A \subset B$.



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22. Consider the sets

ϕ , $A = \{1, 3\}$, $B = \{1, 5, 9\}$, $C = \{1, 3, 5, 7, 9\}$

Insert the symbol subset and not subset between each of the following pair of sets.

(i) $\phi \dots B$

' (ii) $A \dots B$

(iii) $A \dots C$

(iv) $B \dots C$



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23. Let $A = \{a, e, i, o, u\}$ and $B = \{a, b, c, d\}$. Is A a subset of ' B ' ? No. (Why?). Is B a subset of A ? No. (Why?)



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24. In each of the following , determine whether the statement is true or false. If it is true, prove it. If it is false, give an example.

If $A \subset B$ and $B \subset C$, then $A \subset C$



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25. Make correct statements by filling in the symbols 'subset' or 'not a subset' in the blank spaces:

i) $\{2,3,4\} \dots \{1,2,3,4,5\}$

ii) '{a, b, c}, {b,c, d}' iii) '{x: x' is a student of Class XI of, your school}' . '{x: x' is a student of your school}'

iv) '{x: x' is a circle in the plane}' ' ...{x: x' is a circle in the same plane with radius 1 unit}'

v) '{x: x' is a triangle in a plane}' ' ...{x: x' is a rectangle in the plane}'

vi) '{x: x' is an equilateral triangle in a plane}'
'.....{x: x' is a triangle in the same plane)



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26. Examine whether the following statements are true or false:

i) $\{a, b\}$ not a subset of $\{b, c, a\}$ '

ii) $\{a, e\}$ is a subset of $\{x: x \text{ is a vowel in the English alphabet}\}$

iii) $\{1, 2, 3\}$ is a subset of $\{1, 3, 5\}$ '

iv) $\{a\}$ is a subset of $\{b, c\}$ '

v) $\{a\}$ is a subset of $\{a, b, c\}$ '

vi) $\{x: x \text{ is an even natural number less than } 6\}$ is a subset of $\{x: x \text{ is a natural number which divides } 36\}$



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27. Let $A = \{1, 2, \{3, 4\}, 5\}$. Which of the following statements are incorrect and why?

$$\{3, 4\} \subset A$$



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28. Write down all the subsets of the following sets

$$\{a\}$$



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29. How many elements has $P(A)$, if $A=\phi$?



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30. Write the following as intervals i)

$$\{x : x \in R, -4 < x \leq 6\}$$

$$\text{ii) } \{x : x \in R, -12 < x < -10\}$$

$$\text{iii) } \{x : x \in R, 0 \leq x < 7\}$$

$$\text{iv) } \{x : x \in R, 3 \leq x \leq 4\}$$



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31. Write the following intervals in set-builder

form: (i) $'(-3,0)'$

(ii) $'[6,12]'$

(iii) $'(6,12]'$

(iv) $'[-23,5)'$



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32. Write the following intervals in set-builder

form: (i) $(-3,0)$

(ii) $[6,12]$

(iii) $(6,12]$

(iv) $[-23,5)$



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33. What universal set(s) would you propose for each of the following.

(i) The set of triangles:

(ii) The set of isosceles triangles.



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34. Given the set $A=\{1,3,5\}$, $B=\{2,4,6\}$ and $C=\{0,2,4,6,8\}$, which of the following may be considered as universal set(s) for all the three sets A,B and C

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35. Let $A=\{2,4,6,8\}$ and $B=\{6,8,10,12\}$. Find $A \cup B$.



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36. Let $A = \{a, e, i, o, u\}$ and $B = \{a, i, u\}$.

Show that $A \cup B = A$



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37. Let $A = \{\text{Ram, Geeta, Akbar}\}$ be the set of students of class XI, who are in school hockey team. Let $B = \{\text{Geeta, David, Ashok}\}$ be the set of students from class XI who are in the school foot ball team. Find $A \cup B$ and interpret the set.



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38. Consider the sets 'A' and 'B' of Example 12.

Find 'A \cap B'.



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39. Consider the sets 'X' and 'Y' of. Find 'X \cap Y'



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40. Let $U = \{1,2,3,4,5,6,7\}$, $A = \{1,5,6\}$ and $B = \{1,2,6,7\}$ Find $A \cap B$



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41. Let ' $V=\{a, e, i, o, u\}$ ' and ' $B=\{a, i, k, u\}$.' Find ' $V-B$ ' and ' $B-V$ '



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42. Find the union of each of the following pairs of sets:

i) $X=\{1,3,5\}$ $Y=\{1,2,3\}$

ii) $A=\{a, e, i, o, u\}$, $B=\{a, b, c\}$

'iii) $A=\{x: x \text{ is-a natural number and multiple of } 3\}$

$B=\{x: x \text{ is a natural number less than } 6\}$

iv) ' $A=\{x: x \text{ is a natural number and } '1 < x \leq 6\}$

$B=\{x: x \text{ is a natural number and } '6 < x < 10\}$ '

v) ' $A=\{1, 2,3\}$, $B=\{\phi\}$



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43. Let $A = \{a, b\}$, $B = \{a, b, c\}$.

'Is $A \subset B$?' What is $A \cup B$?'.



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44. If A and B are two sets such that $A \subset B$,

$A \cup B$ is.....



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45. If $A = \{1,2,3,4\}$, $B = \{3,4,5,6\}$, $C = \{5,6,7,8\}$ and $D = \{7,8,9,10\}$, find

$$B \cup C$$



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46. If $A = \{1,2,3,4\}$, $B = \{3,4,5,6\}$, $C = \{5,6,7,8\}$ and $D = \{7,8,9,10\}$, find

$$B \cup C \cup D$$



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47. If $A = \{3,5,7,9,11\}$, $B = \{7,9,11,13\}$, $C = \{11,13,15\}$

and $D = \{15,17\}$, find

$A \cap B$



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48. Let U be universal set of all the students of Class XI of a coeducational school and ' A ' be the set of all girls in Class XI. Find A'



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49. Let U be universal set of all the students of Class, XI of a coeducational school and 'A' be the set of all girls in Class XI. Find A' .



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50. Taking the set of natural number as the universal set, write down the complements of the following sets:

$\{x: x \text{ is an even natural number} \}$



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51. If $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}$,

$A = \{2, 4, 6, 8\}$, $B = \{2, 3, 5, 7\}$. Verify

$$(A \cup B)' = A' \cap B'$$



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52. Draw appropriate Venn diagram for each of the following

$$(A \cup B)'$$



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53. Let U be the set of all triangles in a plane. If A is the set of all triangles with at least one angle different from 60° , what is A' ?



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54. Fill in the blanks to make each of the following a true statement: $A \cup A' =$



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55. If X and Y are two sets such that $X \cup Y$ has 50 elements, X has 28 elements and Y has 32 elements, how many elements does $X \cap Y$ have?



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56. 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?





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57. In a class of 35 students , 24 likes to play cricket ,16 likes to play football. Also each student like to play at least one of the two game . How many likes to play both cricket and football?



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58. In a survey of 400 students in a school 100 were listed as taking apple juice, 150 as taking

orange juice and 75 were listed as taking both apple as well as orange juice. Find how many students were taking neither apple juice nor orange juice.



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59. There are 200 individuals with a skin disorder, 120 had been exposed to the chemical A, 50 to chemical B and 30 to both chemical A and B, Find the number of

individuals exposed to

Chemical A but not chemical B.



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60. If X and Y are two sets such that $n(X) = 17$,
 $n(Y) = 23$ and $n(X \cup Y) = 38$, find $n(X \cap Y)$



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61. If X and Y are two sets such that $X \cup Y$ has
18 elements, X has 8 elements and Y has 15

elements, how many elements does $X \cap Y$ have?



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62. In a group of 400 people, 250 can speak Hindi and 200 can speak English. How many people can speak both Hindi and English?



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63. If S and T are two sets such that S has 21 elements, T has 32 elements, and $S \cap T$ has 11 elements, how many elements does $S \cup T$ have?



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64. If X and Y are two sets such that X has 40 elements, $X \cup Y$ has 60 elements and $X \cap Y$ has 10 elements, how many elements does Y have?





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65. 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?



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66. In a group of 65 people, 40 like cricket, 10 like both cricket and tennis. How many like

tennis only and not cricket? How many like tennis?



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67. 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?



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68. Show that the set of letters needed to spell "CATARACT" and the set of letters needed to spell "TRACT" are equal.



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69. Write down all the subsets of the following sets

$\{1,2,3\}$



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70. Show that $A \cup B = A \cap B$ implies $A = B$



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71. For any sets 'A' and 'B', show that

$$P(A \cap B) = P(A) \cap P(B)$$



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72. Decide, among the following sets, which, sets are subsets of one and another.

$A = \{x : x \in R\}$ and x satisfy

$$\{x^2 - 8x + 12 = 0\} \quad B = \{2, 4, 6, \}$$

$$C = \{2, 4, 6, 8, \dots\dots\dots\}, D = \{6\}$$



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73. In each of the following , determine whether the statement is true or false. If it is true, prove it. If it is false, give an example.

If $x \in A$ and $A \in B$ then $x \in B$



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74. 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 $B = C$.



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75. Show that if $A \subset B$, then $C - B \subset C - A$



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76. Show that the following four conditions

are equivalent: i) $A \subset B$

ii) $A - B = \phi$

iii) $A \cup B = B$

iv) $A \cap B = A$



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77. Assume that $P(A) = P(B)$. Show that $A = B$



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78. Is it true that for any sets A and B , $P(A) \cup P(B) = P(A \cup B)$? Justify your answer



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79. Show that for any sets A and B . $A = (A \cap B) \cup (A - B)$ and $A \cup (B - A) = (A \cup B)$



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80. Using properties of sets, show that i) ' A

$\cup(A \cap B) = A$ ' ii) ' $A \cap (A \cup B) = A$ '



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81. Show that $A \cap B = A \cap C$ need not imply

$B = C$



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82. Let A and B be sets. If

$A \cap X = B \cap X = \phi$ and $A \cup X = B \cup X$

for some set X , show that $A = B$



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83. Find sets A, B and C such that $A \cap B, B \cap C$ and $A \cap C$ are non-empty sets and $A \cap B \cap C = \phi$



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84. In a survey of 600 students in a school, 150 students were found to be taking tea and 225

students were taking coffee. 100 were taking both tea and coffee. Find how many students were taking neither tea nor coffee.



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85. In a group of students, 100 students know Hindi, 50 know English and 33 know both. Each of the students knows either Hindi or English. How many students are there in the group?



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86. 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 newspapers.
- the number of people who read exactly one newspaper.



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87. In a survey it was found that 21 people liked product A, 26 liked product B and 29 liked product C. If 14 people liked products A and B, 12 people liked products C and A. 14 people liked products B and C and 8 liked all the three products. Find how many liked product C only.



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88. In a class of 35 students, 17 have taken mathematics, 10 have taken mathematics but

not economics. Find the number of students who have 'taken both mathematics and economics and the number of students who have taken economics but not mathematics, if it is given that each student has taken either mathematics or economics or both,



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89. In a group of 800 people, 550 can speak Hindi and 450 can speak English. How many can 'speak both Hindi and English?



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90. If 'A' and 'B' be two sets containing 3 and 6 elements respectively, what can be the minimum number of elements in 'A U B'.



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91. If $U = \{1, 3, 5, 7, 9, 11, 13, 15\}$, $A = \{1, 5, 11, 13, 15\}$, Find A' .



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92. If $A=\{1,2,3\}$, $B=\{3,4,-5\}$, $C=\{1,8,9\}$ '. Construct a universal set 'U'



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93. Which of the following sets are empty sets?

i) $A = \{x: x^2 - 3 = 0. \text{ and } x \text{ is rational}\}$

ii) $B = \{x: x \text{ is an even prime number}\}$

iii) $C = \{x: 4 < x < 5, x \in N\}$

iv) $D = \{x: x^2 = 25 \text{ and 'x' is an odd integer.}\}$



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94. Write the following sets in roster form and identify equal sets (if any)

$$A = \{x : x \in \mathbb{R} \text{ and } x^2 = 25\}$$

$$B = \{x : x \in \mathbb{N} \text{ and } x^2 = 25\}$$

$$C = \{x : x \in \mathbb{R} \text{ and } x^2 - 10x + 25 = 0\}$$

$$D = \{x : x \in \mathbb{N} \text{ and } x^2 - 8x + 15 = 0\}$$



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95. State which of the following sets are finite and which are infinite:

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

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

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

iv) $D = \{x: x \in \mathbb{Z} \text{ and } x > 10\}$



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



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97. Write the set $X = \{1, 1/4, 1/9, 1/16, 1/25, \dots\}$ in the set builder form.



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98. Match each of the set in A described in the roster form with the same set in 'B' described in the set builder form

- | | |
|-------------------------------|--|
| (i) {P, R, I, N, C, A, L} | (a) $\{x: x \text{ is a positive integer and is a divisor of } 18\}$ |
| (ii) $\{0\}$ | (b) $\{x: x \text{ is an integer and } x^2 - 9 = 0\}$ |
| (iii) $\{1, 2, 3, 6, 9, 18\}$ | (c) $\{x: x \text{ is an integer and } x + 1 = 1\}$ |
| (iv) $\{-3, 3\}$ | (d) $\{x: x \text{ is a letter of the word 'PRINCIPAL'}\}$ |



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99. A town has total population. 25000 out of which 13000 read "The Hindustan times" and 10500 read "The Indian Express" and 2500 read both papers. Find the percentage of population who read neither of these newspapers.



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100. In a class of 60 boys, there are 45 boys who play cards and 30 boys play carrom. Using

set theory, find:

(i) How many boys play both games.

(ii) How many boys play cards only.

(iii) How many boys play carroms only.



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101. Match each of the set in the roster form with the same set described in set-builder form:

i) {1,2,3,6}

ii) {2,3}

iii) {M,A,T,H,E,I,C,S}

iv) {1,3,5,7,9}

a) {x : x is a prime number and a divisor of 6}

b) {x : x is an odd natural number less than 10}

c) {x : x is a natural number and divisor of 6}

d) {x : x is a letter of the word MATHEMATICS}.

i) c, ii) a,

iii) d,

iv) b



102. Describe the following sets by roster method:

(i) $\{x : x^2 + 5x + 6 = 0, x \in N\}$

(ii) $\{x : x^2 + 6x + 8 = 0, x \in Z\}$

(iii) $\{x : 4x + 7 < 25, x \in N\}$

(iv) $\{x, x^3 + 1 = 0, x \in N\}$

(v) the set of all letters in the word
TRIGONOMETRY.



103. Assume that $P(A) = P(B)$. Show that $A = B$



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104. Find the smallest set 'Y' such that $Y \cup \{1,2\} = \{1,2,3,5,9\}$



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105. If $A = \{1,2,3,4\}$, $B = \{1,4,5,6\}$, $C = \{4,5,7,8,9\}$ verify that $(A \cup B) \cup C = A \cup (B \cup C)$





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106. Show that if $A \subset B$, then
 $C - B \subset C - A$



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107. Show that $A \cap B = A \cap C$ need not
imply $B = C$



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108. If $A=\{4,5,8,12\}$, $B=\{1,4,6,9\}$ and $C=\{1,2,4,7,8,10\}$,

then find

(i) $A - (B - A)$

(ii) $A - (C - B)$



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109. Let $U = \{1, 2, 3, \dots, 10\}$ be the

universal set. If $A = \{3, 4, 6, 8\}$, find A' and

show that $A \cup A' = U$, $A \cap A' = \phi$ and

$$(A')' = A$$



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110. Find A' for $A=\{3,6,7,8\}$, where universal set

' U ' is given by :

(i) ' $U=\{1,2, \dots,10\}$ '.

(ii) ' $U=\{1, 2, \dots, 15\}$ '.



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111.

Let

$X = \{1, 2, 3, \dots, 12\}$, $A = \{4, 5, 9, 11\}$,

$B = \{1, 2, 4, 5, 8, 9, 10, 11, 12\}$ Verify that B'

is a subset of A' .



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112. Show the following by Venn diagrams: (i)

$A \cup B, A \cap B, A - B, B - A,$ where

$A = \{1, 3, 4, 6, 9\}$ and

$B = \{3, 4, 5, 8, 11, 12\}$ (ii) A' , where $U =$

$\{1, 2, \dots, 10\}$ and $A = \{2, 3, 6\}$



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113. Prove that $A \cup B = A \cap B$ if $A = B$.



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114. Let 'A' and 'B' be two finite set such 'that $n(A-B)=15$, $n(A \cup B)=90$, $n(A \cap B)=30$ '. Find $n(B)$.



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115. In a survey of 600 students in a school,150 students were found to be taking tea and 225 students were taking coffee.100 were taking both tea and coffee. Find how many students were taking neither tea nor coffee.



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116. Of the number of three athletic teams in a school, 21 are in the basket ball team , 26 in hockey team and 20 in the football team, 14 play hockey and basket ball , 15 play hockey and football, 12 play football and basket ball and 8 play all the games. How many members are there in all?



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