MATHS

NCERT - NCERT MATHEMATICS(BENGALI)

SETS

Example Solution

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

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

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

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4. Write the set $\left\{\frac{1}{2}, \frac{2}{3}, \frac{3}{4}, \frac{4}{5}, \frac{5}{6}, \frac{6}{7}\right\}$ in the set-builder form.

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

(i) {P, R, I, N, C, A, L} (a) { x : x is a positive integer and is a divisor of 18}

(ii) { 0 } (b) { x : x is an integer and $x^2 - 9 = 0$}

(iii) {1, 2, 3, 6, 9, 18} (c) {x : x is an integer and $x + 1 = 1$}

(iv) $\{3, -3\}$ (d) {x : x is a letter of the word PRINCIPAL}

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6. State which of the following sets are finite or infinite :

(i) $\{x : x \in N \text{ and } (x-1)(x-2) = 0\}$

(ii) $\{x : x \in N \text{ and } x^2 = 4\}$

(iii) $\{x : x \in N \text{ and } 2x-1 = 0\}$

(iv) $\{x : x \in N \text{ and } x \text{ is prime}\}$

(v) $\{x : x \in N \text{ and } x \text{ is odd}\}$

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7. Find the pairs of equal sets, if any, give reasons:

$A = \{0\}, B = \{x : x > 15 \text{ and } x < 5\},$

$C = \{x : x-5 = 0\}, D = \{x : x^2 = 25\},$

E = {x : x is an integral positive root of the equation $x^2-2x-15 = 0$}.

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8. 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)

$A = \{n : n \in Z \text{ and } n^2 \leq 4\}, B = \{x : x \in R \text{ and } x^2 - 3x + 2 = 0\}.$

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9. Consider the sets

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

Insert the symbol $\subset$ or $\not\subset$ between each of the following pair of sets:

(i) $\varphi \ldots B$ (ii) $A \ldots B$ (iii) $A \ldots C$ (iv) $B \ldots C$

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10. 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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11. Let A, B and C be three sets. If $A \in B$ and $B \subset C$, is it true that $A \subset C$?. If not, give an example.

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

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13. Let $A = \{a, e, i, o, u\}$ and $B = \{a, i, u\}$. Show that $A \cup B = A$

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14. Let X = {Ram, Geeta, Akbar} be the set of students of Class XI, who are in school hockey team. Let Y = {Geeta, David, Ashok} be the set of students from Class XI who are in the school football team. Find $X \cup Y$ and interpret the set.

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15. Consider the sets A and B of Example 12. Find $A \cap B$.

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16. Consider the sets X and Y of Example 14. Find $X \cap Y$.

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17. Let $A = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$ and $B = \{2, 3, 5, 7\}$. Find $A \cap B$ and hence show that $A \cap B = B$.

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18. Let $A = \{1, 2, 3, 4, 5, 6\}$, $B = \{2, 4, 6, 8\}$. Find $A - B$ and $B - A$.

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

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20. Let $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$ and $A = \{1, 3, 5, 7, 9\}$. Find A'.

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21. 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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22. Let $U = \{1, 2, 3, 4, 5, 6\}$, $A = \{2, 3\}$ and $B = \{3, 4, 5\}$.

Find A', B', $A' \cap B'$, $A \cup B$ and hence show that $(A \cup B)' = A' \cap B'$.

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23. 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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24. 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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25. In a class of 35 students, 24 like to play cricket and 16 like to play football. Also, each student likes to play at least one of the two games. How many students like to play both cricket and football ?

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26. 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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27. There are 200 individuals with a skin disorder, 120 had been exposed to the chemical C_1, 50 to chemical C_2, and 30 to both the chemicals C_1 and C_2. Find the number of individuals exposed to

(i) Chemical C_1 but not chemical C_2

(ii) Chemical C_2 but not chemical C_1

(iii) Chemical C_1 or chemical C_2

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28. 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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29. List all the subsets of the set $\{-1, 0, 1\}$.

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

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31. For any sets A and B, show that

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

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32. A market research group conducted a survey of 1000 consumers and reported that 720 consumers like product A and 450 consumers like

product B, what is the least number that must have liked both products?

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33. Out of 500 car owners investigated, 400 owned car A and 200 owned car B, 50 owned both A and B cars. Is this data correct?

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34. A college awarded 38 medals in football, 15 in basketball and 20 in cricket. If these medals went to a total of 58 men and only three men got medals in all the three sports, how many received medals in exactly two of the three sports ?

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Exercise 1 1

1. 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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2. Which of the following are sets ? Justify your answer.

The collection of ten most talented writers of India.

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

A team of eleven best-cricket batsmen of the world.

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

The collection of all boys in your class.

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

The collection of all natural numbers less than 100.

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

A collection of novels written by the writer Munshi Prem Chand.

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

The collection of all even integers.

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

The collection of questions in this Chapter.

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

A collection of most dangerous animals of the world.

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

$5 \ldots A$

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

$8 \ldots A$

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

$0 \ldots A$

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

$4 \ldots A$

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

$2 \ldots A$

Watch Video Solution

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

$10 \ldots A$

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16. Write the following sets in roster form:

A = {x : x is an integer and $-3 \leq x < 7$}

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17. Write the following sets in roster form:

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

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18. Write the following sets in roster form:

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

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19. Write the following sets in roster form:

D = {x : x is a prime number which is divisor of 60}

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20. Write the following sets in roster form:

E = The set of all letters in the word TRIGONOMETRY

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21. Write the following sets in roster form:

F = The set of all letters in the word BETTER

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22. Write the following sets in the set-builder form :

$\{3, 6, 9, 12\}$

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23. Write the following sets in the set-builder form :

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

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24. Write the following sets in the set-builder form :

$\{5, 25, 125, 625\}$

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25. Write the following sets in the set-builder form :

$\{2, 4, 6, \ldots\}$

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26. Write the following sets in the set-builder form :

$\{1, 4, 9, \ldots, 100\}$

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27. List all the elements of the following sets :

A = {x : x is an odd natural number}

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28. List all the elements of the following sets :

B = {x : x is an integer, $-\frac{1}{2} < x < \frac{9}{2}$}

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29. List all the elements of the following sets :

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

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30. List all the elements of the following sets :

D = {x : x is a letter in the word “LOYAL”}

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31. List all the elements of the following sets :

E = {x : x is a month of a year not having 31 days}

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32. List all the elements of the following sets :

F = {x : x is a consonant in the English alphabet which precedes k }.

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

(i) $\{1, 2, 3, 6\}$ (a) {x : x is a prime number and a divisor of 6}

(ii) $\{2, 3\}$ (b) {x : x is an odd natural number less than 10}

(iii) $\{M, A, T, H, E, I, C, S\}$ (c) {x : x is natural number and divisor of 6}

(iv) $\{1, 3, 5, 7, 9\}$ (d) {x : x is a letter of the word MATHEMATICS}.

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Exercise 1 2

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

Set of odd natural numbers divisible by 2

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

Set of even prime numbers

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

{ x : x is a natural numbers, $x < 5$ and $x > 7$ }

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

{ y : y is a point common to any two parallel lines}

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5. Which of the following sets are finite or infinite

The set of months of a year

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6. Which of the following sets are finite or infinite

$\{1, 2, 3, \ldots\}$

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7. Which of the following sets are finite or infinite

$\{1, 2, 3, \ldots 99, 100\}$

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8. Which of the following sets are finite or infinite

The set of positive integers greater than 100

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9. Which of the following sets are finite or infinite

The set of prime numbers less than 99

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

The set of lines which are parallel to the x-axis

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

The set of letters in the English alphabet

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

The set of numbers which are multiple of 5

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

The set of animals living on the earth

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

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

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15. In the following, state whether A = B or not:

$A = \{a, b, c, d\} B = \{d, c, b, a\}$

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16. In the following, state whether A = B or not:

$A = \{4, 8, 12, 16\} B = \{8, 4, 16, 18\}$

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17. In the following, state whether A = B or not:

$A = \{2, 4, 6, 8, 10\}$ B = { x : x is positive even integer and $x \leq 10$}

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18. In the following, state whether A = B or not:

A = { $x : x$ is a multiple of 10}, $B = \{10, 15, 20, 25, 30, \ldots\}$

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

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

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

A = { x : x is a letter in the word FOLLOW}

B = { y : y is a letter in the word WOLF}

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21. 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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Exercise 1 3

1. Make correct statements by filling in the symbols $\subset$ or $\not\subset$ in the blank spaces :

$\{2, 3, 4\} \ldots \{1, 2, 3, 4, 5\}$

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2. Make correct statements by filling in the symbols $\subset$ or $\not\subset$ in the blank spaces :

$\{a, b, c\} \ldots \{b, c, d\}$

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3. Make correct statements by filling in the symbols $\subset$ or $\not\subset$ in the blank spaces :

$\{x : x$ is a student of Class XI of your school$\}$. . .$\{x : x$ student of your school$\}$

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4. Make correct statements by filling in the symbols $\subset$ or $\not\subset$ in the blank spaces :

$\{x : x$ is a circle in the plane$\}$ . . .$\{x : x$ is a circle in the same plane with radius 1 unit$\}$

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5. Make correct statements by filling in the symbols $\subset$ or $\not\subset$ in the blank spaces :

$\{x : x$ is a triangle in a plane$\} \ldots \{x : x$ is a rectangle in the plane$\}$

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6. Make correct statements by filling in the symbols $\subset$ or $\not\subset$ in the blank spaces :

$\{x : x$ is an equilateral triangle in a plane$\} \ldots \{x : x$ is a triangle in the same plane$\}$

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7. Make correct statements by filling in the symbols $\subset$ or $\not\subset$ in the blank spaces :

$\{x : x$ is an even natural number$\} \ldots \{x : x$ is an integer$\}$

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

$\{a, b\} \not\subset \{b, c, a\}$

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

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

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

$\{1, 2, 3\} \subset \{1, 3, 5\}$

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

$\{a\} \subset \{a, b, c\}$

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

$\{a\} \in \{a, b, c\}$

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

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

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

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

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

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

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

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

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

$1 \in A$

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

$1 \subset A$

Watch Video Solution

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

$\{1, 2, 5\} \subset A$

Watch Video Solution

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

$\{1, 2, 5\} \in A$

Watch Video Solution

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

$\{1, 2, 3\} \subset A$

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

$\varphi \in A$

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

$\varphi \subset A$

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

$\{\varphi\} \subset A$

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25. Write down all the subsets of the following sets

$\{a\}$

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26. Write down all the subsets of the following sets

$\{a, b\}$

Watch Video Solution

27. Write down all the subsets of the following sets

$\{1, 2, 3\}$

Watch Video Solution

28. Write down all the subsets of the following sets

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

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30. Write the following as intervals :

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

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31. Write the following as intervals :

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

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32. Write the following as intervals :

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

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33. Write the following as intervals :

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

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34. Write the following intervals in set-builder form :

$(-3, 0)$

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35. Write the following intervals in set-builder form :

$[6, 12]$

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36. Write the following intervals in set-builder form :

$(6, 12]$

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37. Write the following intervals in set-builder form :

$[-23, 5)$

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

The set of right triangles.

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

The set of isosceles triangles.

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40. Given the sets $A = \{1, 3, 5\}, B = \{2, 4, 6\}$ 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

$\{0, 1, 2, 3, 4, 5, 6\}$

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41. Given the sets $A = \{1, 3, 5\}, B = \{2, 4, 6\}$ 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

ϕ

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42. Given the sets $A = \{1, 3, 5\}, B = \{2, 4, 6\}$ 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

$\{0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$

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43. Given the sets $A = \{1, 3, 5\}, B = \{2, 4, 6\}$ 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

$\{1, 2, 3, 4, 5, 6, 7, 8\}$

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Exercise 1 4

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

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

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

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

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

A = $\{x : x$ is a natural number and multiple of 3$\}$

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

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

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

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

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

$A = \{1, 2, 3\}, B = \varphi$

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6. Let $A = \{a, b\}, B = \{a, b, c\}$. Is $A \subset B$? What is $A \cup B$?

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7. If A and B are two sets such that $A \subset B$, then what is $A \cup B$?

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

$A \cup B$

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

$A \cup C$

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10. 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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11. If

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

, find

$B \cup D$

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12. If

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

, find

$A \cup B \cup C$

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13. If

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

, find

$A \cup B \cup D$

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14. 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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15. Find the intersection of each pair of sets of question 1 above.

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16. 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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17. If

$A = \{3, 5, 7, 9, 11\}, B = \{7, 9, 11, 13\}, C = \{11, 13, 15\}$ and $D = \{15, 17\}$

, find

$B \cap C$

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18. If

$A = \{3, 5, 7, 9, 11\}, B = \{7, 9, 11, 13\}, C = \{11, 13, 15\}$ and $D = \{15, 17\}$

, find

$A \cap C \cap D$

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19. If

$A = \{3, 5, 7, 9, 11\}, B = \{7, 9, 11, 13\}, C = \{11, 13, 15\}$ and $D = \{15, 17\}$

, find

$A \cap C$

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20. If

$A = \{3, 5, 7, 9, 11\}, B = \{7, 9, 11, 13\}, C = \{11, 13, 15\}$ and $D = \{15, 17\}$

, find

$B \cap D$

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21. If

$A = \{3, 5, 7, 9, 11\}, B = \{7, 9, 11, 13\}, C = \{11, 13, 15\}$ and $D = \{15, 17\}$

, find

$A \cap (B \cup C)$

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22. If

$A = \{3, 5, 7, 9, 11\}, B = \{7, 9, 11, 13\}, C = \{11, 13, 15\}$ and $D = \{15, 17\}$

, find

$A \cap D$

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23. If

$A = \{3, 5, 7, 9, 11\}, B = \{7, 9, 11, 13\}, C = \{11, 13, 15\}$ and $D = \{15, 17\}$

, find

$A \cap (B \cup D)$

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24. If

$A = \{3, 5, 7, 9, 11\}, B = \{7, 9, 11, 13\}, C = \{11, 13, 15\}$ and $D = \{15, 17\}$

, find

$(A \cap B) \cap (B \cup C)$

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25. If

$A = \{3, 5, 7, 9, 11\}, B = \{7, 9, 11, 13\}, C = \{11, 13, 15\}$ and $D = \{15, 17\}$

, find

$(A \cup D) \cap (B \cup C)$

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26. If A = $\{x : x$ is a natural number $\}$, B = $\{x : x$ is an even natural number$\}$

C = $\{x : x$ is an odd natural number$\}$ and D = $\{x : x$ is a prime number $\}$, find

$A \cap B$

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27. If A = $\{x : x$ is a natural number $\}$, B = $\{x : x$ is an even natural number$\}$

C = $\{x : x$ is an odd natural number$\}$ and D = $\{x : x$ is a prime number $\}$, find

$A \cap C$

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28. If A = $\{x : x$ is a natural number $\}$, B = $\{x : x$ is an even natural number$\}$

C = $\{x : x$ is an odd natural number$\}$ and D = $\{x : x$ is a prime number $\}$, find

$A \cap D$

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29. If A = $\{x : x$ is a natural number $\}$, B = $\{x : x$ is an even natural number$\}$

C = $\{x : x$ is an odd natural number$\}$ and D = $\{x : x$ is a prime number $\}$, find

$B \cap C$

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30. If A = $\{x : x$ is a natural number $\}$, B = $\{x : x$ is an even natural number$\}$

C = $\{x : x$ is an odd natural number$\}$ and D = $\{x : x$ is a prime number $\}$, find

$B \cap D$

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31. If A = $\{x : x$ is a natural number $\}$, B = $\{x : x$ is an even natural number$\}$

C = $\{x : x$ is an odd natural number$\}$ and D = $\{x : x$ is a prime number $\}$, find

$C \cap D$

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32. Which of the following pairs of sets are disjoint

$\{1, 2, 3, 4\}$ and $\{x : x$ is a natural number and $4 \leq x \leq 6\}$

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33. Which of the following pairs of sets are disjoint

$\{a, e, i, o, u\}$ and $\{c, d, e, f\}$

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34. Which of the following pairs of sets are disjoint

$\{x : x$ is an even integer $\}$ and $\{x : x$ is an odd integer$\}$

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35. If $A = \{3, 6, 9, 12, 15, 18, 21\}$, $B = \{4, 8, 12, 16, 20\}$,

$C = \{2, 4, 6, 8, 10, 12, 14, 16\}$, $D = \{5, 10, 15, 20\}$, find

$A - B$

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36. If $A = \{3, 6, 9, 12, 15, 18, 21\}$, $B = \{4, 8, 12, 16, 20\}$,

$C = \{2, 4, 6, 8, 10, 12, 14, 16\}$, $D = \{5, 10, 15, 20\}$, find

$A - C$

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37. If $A = \{3, 6, 9, 12, 15, 18, 21\}$, $B = \{4, 8, 12, 16, 20\}$,

$C = \{2, 4, 6, 8, 10, 12, 14, 16\}$, $D = \{5, 10, 15, 20\}$, find

$A - D$

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38. If $A = \{3, 6, 9, 12, 15, 18, 21\}$, $B = \{4, 8, 12, 16, 20\}$,

$C = \{2, 4, 6, 8, 10, 12, 14, 16\}$, $D = \{5, 10, 15, 20\}$, find

$B - A$

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39. If $A = \{3, 6, 9, 12, 15, 18, 21\}$, $B = \{4, 8, 12, 16, 20\}$,

$C = \{2, 4, 6, 8, 10, 12, 14, 16\}$, $D = \{5, 10, 15, 20\}$, find

$C - A$

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40. If $A = \{3, 6, 9, 12, 15, 18, 21\}$, $B = \{4, 8, 12, 16, 20\}$,

$C = \{2, 4, 6, 8, 10, 12, 14, 16\}$, $D = \{5, 10, 15, 20\}$, find

$D - A$

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41. If $A = \{3, 6, 9, 12, 15, 18, 21\}$, $B = \{4, 8, 12, 16, 20\}$,

$C = \{2, 4, 6, 8, 10, 12, 14, 16\}$, $D = \{5, 10, 15, 20\}$, find

$B - C$

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42. If $A = \{3, 6, 9, 12, 15, 18, 21\}$, $B = \{4, 8, 12, 16, 20\}$,

$C = \{2, 4, 6, 8, 10, 12, 14, 16\}$, $D = \{5, 10, 15, 20\}$, find

$B - D$

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43. If $A = \{3, 6, 9, 12, 15, 18, 21\}$, $B = \{4, 8, 12, 16, 20\}$,

$C = \{2, 4, 6, 8, 10, 12, 14, 16\}$, $D = \{5, 10, 15, 20\}$, find

$C - B$

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44. If $A = \{3, 6, 9, 12, 15, 18, 21\}$, $B = \{4, 8, 12, 16, 20\}$,

$C = \{2, 4, 6, 8, 10, 12, 14, 16\}$, $D = \{5, 10, 15, 20\}$, find

$D - B$

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45. If $A = \{3, 6, 9, 12, 15, 18, 21\}$, $B = \{4, 8, 12, 16, 20\}$,

$C = \{2, 4, 6, 8, 10, 12, 14, 16\}$, $D = \{5, 10, 15, 20\}$, find

$C - D$

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46. If $A = \{3, 6, 9, 12, 15, 18, 21\}$, $B = \{4, 8, 12, 16, 20\}$,

$C = \{2, 4, 6, 8, 10, 12, 14, 16\}$, $D = \{5, 10, 15, 20\}$, find

$D - C$

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47. If $X = \{a, b, c, d\}$ and $Y = \{f, b, d, g\}$, find

$X - Y$

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48. If $X = \{a, b, c, d\}$ and $Y = \{f, b, d, g\}$, find

$Y - X$

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49. If $X = \{a, b, c, d\}$ and $Y = \{f, b, d, g\}$, find

$X \cap Y$

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50. If R is the set of real numbers and Q is the set of rational numbers, then what is $R - Q$?

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51. State whether each of the following statement is true or false. Justify your answer.

$\{2, 3, 4, 5\}$ and $\{3, 6\}$ are disjoint sets.

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52. State whether each of the following statement is true or false. Justify your answer.

$\{a, e, i, o, u\}$ and $\{a, b, c, d\}$ are disjoint sets.

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53. State whether each of the following statement is true or false. Justify your answer.

$\{2, 6, 10, 14\}$ and $\{3, 7, 11, 15\}$ are disjoint sets.

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54. State whether each of the following statement is true or false. Justify your answer.

$\{2, 6, 10\}$ and $\{3, 7, 11\}$ are disjoint sets.

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Exercise 1 5

1. Let

$U = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}, A = \{1, 2, 3, 4\}, B = \{2, 4, 6, 8\}$ and $C = \{3,$

.

Find A'

Watch Video Solution

2. Let

$U = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}, A = \{1, 2, 3, 4\}, B = \{2, 4, 6, 8\}$ and $C = \{3,$

.

Find B'

Watch Video Solution

3. Let

$U = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}, A = \{1, 2, 3, 4\}, B = \{2, 4, 6, 8\}$ and $C = \{3,$

.

Find $(A \cup C)'$

Watch Video Solution

4. Let

$U = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}, A = \{1, 2, 3, 4\}, B = \{2, 4, 6, 8\}$ and $C = \{3,$

.

Find $(A \cup B)'$

Watch Video Solution

5. Let

$U = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}, A = \{1, 2, 3, 4\}, B = \{2, 4, 6, 8\}$ and $C = \{3,$

.

Find $(A')'$

Watch Video Solution

6. Let

$U = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}, A = \{1, 2, 3, 4\}, B = \{2, 4, 6, 8\}$ and $C = \{3,$

.

Find $(B - C)'$

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7. If $U = \{a, b, c, d, e, f, g, h\}$, find the complements of the following sets :

$A = \{a, b, c\}$

Watch Video Solution

8. If $U = \{a, b, c, d, e, f, g, h\}$, find the complements of the following sets :

$B = \{d, e, f, g\}$

Watch Video Solution

9. If $U = \{a, b, c, d, e, f, g, h\}$, find the complements of the following sets :

$C = \{a, c, e, g\}$

Watch Video Solution

10. If $U = \{a, b, c, d, e, f, g, h\}$, find the complements of the following sets :

$D = \{f, g, h, a\}$

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11. Taking the set of natural numbers as the universal set, write down the complements of the following sets:

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

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12. Taking the set of natural numbers as the universal set, write down the complements of the following sets:

$\{x : x$ is an odd natural number $\}$

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13. Taking the set of natural numbers as the universal set, write down the complements of the following sets:

$\{x : x$ is a positive multiple of 3$\}$

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14. Taking the set of natural numbers as the universal set, write down the complements of the following sets:

$\{x : x$ is a prime number $\}$

Watch Video Solution

15. Taking the set of natural numbers as the universal set, write down the complements of the following sets:

$\{x : x$ is a natural number divisible by 3 and 5$\}$

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16. Taking the set of natural numbers as the universal set, write down the complements of the following sets:

$\{x : x$ is a perfect square $\}$

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17. Taking the set of natural numbers as the universal set, write down the complements of the following sets:

$\{x : x$ is a perfect cube$\}$

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18. Taking the set of natural numbers as the universal set, write down the complements of the following sets:

$\{x : x + 5 = 8\}$

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19. Taking the set of natural numbers as the universal set, write down the complements of the following sets:

$\{x : 2x + 5 = 9\}$

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20. Taking the set of natural numbers as the universal set, write down the complements of the following sets:

$\{x : x \geq 7\}$

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21. Taking the set of natural numbers as the universal set, write down the complements of the following sets:

$\{x : x \in N \text{ and } 2x + 1 > 10\}$

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22. If $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}$, $A = \{2, 4, 6, 8\}$ and $B = \{2, 3, 5, 7\}$. Verify that

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

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23. If $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}$, $A = \{2, 4, 6, 8\}$ and $B = \{2, 3, 5, 7\}$.

Verify that

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

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24. Draw appropriate Venn diagram for each of the following :

$(A \cup B)'$

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25. Draw appropriate Venn diagram for each of the following :

$A' \cap B'$

Watch Video Solution

26. Draw appropriate Venn diagram for each of the following :

$(A \cap B)'$

Watch Video Solution

27. Draw appropriate Venn diagram for each of the following :

$A' \cup B'$

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28. 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^{o}, what is A'?

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29. Fill in the blanks to make each of the following a true statement :

$A \cup A' = \ldots$

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30. Fill in the blanks to make each of the following a true statement :

$\varphi' \cap A = \ldots$

Watch Video Solution

31. Fill in the blanks to make each of the following a true statement :

$A \cap A' = \ldots$

Watch Video Solution

32. Fill in the blanks to make each of the following a true statement :

$U' \cap A = \ldots$

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Exercise 1 6

1. 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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2. 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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3. 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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4. 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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5. 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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6. 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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7. 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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8. 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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Miscellaneous Exercise On Chapter 1

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

A = $\{ x : x \in R \text{ and } x \text{ satisfy } x^2 - 8x + 12 = 0 \}$,

$B = \{2, 4, 6\}, C = \{2, 4, 6, 8, \ldots\}, D = \{6\}.$

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2. 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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3. 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 $B \in C$, then $A \in C$

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4. 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 $A \subset C$

Watch Video Solution

5. 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 $A \not\subset B$ and $B \not\subset C$, then $A \not\subset C$

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6. 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 $A \not\subset B$, then $x \in B$

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7. 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 $x \notin B$, then $x \notin A$

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8. 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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9. Show that the following four conditions are equivalent :

$A \subset B$

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10. Show that the following four conditions are equivalent :

$A - B = \varphi$

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11. Show that the following four conditions are equivalent :

$A \cup B = B$

Watch Video Solution

12. Show that the following four conditions are equivalent :

$A \cap B = A$

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

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

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15. 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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16. 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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Watch Video Solution

17. Using properties of sets, show that

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

Watch Video Solution

18. Using properties of sets, show that

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

Watch Video Solution

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

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20. Let A and B be sets. If $A \cap X = B \cap X = \varphi$ and $A \cup X = B \cup X$

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

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

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

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23. 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?

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24. 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.

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25. 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.

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26. 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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