MATHS

BOOKS - RS AGGARWAL MATHS (HINGLISH)

SETS

Illustrations Example

1. Write the following sets in the roster form B= set of all prime numbers between 50 and 70

    A. B = { 53 , 61 , 67 } .

    B. B = {51, 53 , 59 , 61 , 67 ,69} .

    C. B = { 53 , 59 , 61 , 67 } .

    D. B = {51, 53 , 59 , 61 , 67 } .

Answer: C

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

3. Write the set $B = \{1, 2, 4, 7, 14, 28\}$ in the set builder form.

A. $B = \{x : x \in N \text{ and } x \text{ is a multiple of } 1\}$

B. $B = \{x : x \in N \text{ and } x \text{ is a natural number}\}$

C. $B = \{x : x \in N \text{ and } x \text{ is a factor of } 21\}$

D. $B = \{x : x \in N \text{ and } x \text{ is a factor of } 28\}$

Answer: D

4. Write the set $C = \{2, 4, 8, 16, 32\}$ in the set -builder form.

5. Write the set $D = \{-6, -4, -2, 0, 2, 4, 6\}$ in the set- builder form.

6. Write the set $E = \{3, 6, 9, 12, 15, 18\}$ in the set -bulider form.

7. Write the set $F = \left\{ \dfrac{1}{2}, \dfrac{2}{3}, \dfrac{3}{4}, \dfrac{4}{5}, \dfrac{5}{6}, \dfrac{6}{7}, \dfrac{7}{8}, \dfrac{8}{9} \right\}$ in the set- builder form.

8. Write the ser $G = \{1, 3, 5, 7, 9, 11, \ldots \}$ in the set- builder form.

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9. Write the set $H = \{1, 4, 9, 16, 25, 36, \ldots . \}$ in the set- builder form.

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10. Match each of the sets on the left in the roster form with the same set on the right given in set-builder form:

(i) $\{23, 29\}$ (a) $\{x : x = 3^n, n \in N \text{ and } 1 \leq n \leq 5\}$
(ii) $\{B, E, T, R\}$ (b) $\{x : x = n^3, n \in N \text{ and } 2 \leq n \leq 6\}$
(iii) $\{3, 9, 27, 81, 243\}$ (c) $\{x : x \text{ is prime}, 20 < x < 30\}$
(iv) $\{8, 27, 64, 125, 216\}$ (d) $\{x : x \text{ is a letter of the word 'BETTER'}\}$

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Some Examples Of Equal Sets Example

1. Let A = set of letters in the word 'follow', and B= set of letters in the word 'wolf'.

Show that $A = B$.

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2. Let $A = \{p, q, r, s\}$ and $B = \{q, r, p, s\}$, Are A and B equal ?

A. Yes

B. No

C. May be

D. None

Answer: A

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3. Show that ϕ, $\{0\}$ and 0 are all different.

4. Let $A = \{x : x \in N, x^2 - 9 = 0\}$ and $B = \{x : x \in Z, x^2 - 9 = 0\}$.

Show that $A \neq B$.

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

6. Sets $\{0\}$ and ϕ are

A. Not equivalent sets.

B. Equal Sets

C. Equivalent sets.

D. None

Answer: A

Example

1. Let $A = \{1, \{2, 3\}, 4\}$.

Then, which of the following statements is true ?

(i) $\{2, 3\} \in A$ (ii) $\{2, 3\} \subset A$

Rectify the wrong statement.

Solved Examples On Subsets Power Set And Intervals

1. Write down all possible subsets of $A = \{4\}$.

2. Write down all possible subsets of $A = \{2, 3\}$

3. Total number of subsets of $A = \{-1, 0, 1\}$.

A. 1

B. 3

C. 4

D. 8

Answer: D

4. Write down number of all possible subsets of $A = \{1, \{2, 3\}\}$.

5. Write down all possible subsets of ϕ.

6. Write each of the following subsets of R as an inteval :

7. Write each of the following intevals in the set- builder form :

8. Let $A = \{1, \{2\}, \{3, 4\}, 5\}$. Which of the following are incorrect statements? Rectify each :

(i) $2 \in A$

(ii) $\{2\} \subset A$

(iii) $\{1, 2\} \subset A$

(iv) $\{3, 4\} \subset A$

(v) $\{1, 5\} \subset A$

(vi) $\{\phi\} \subset A$

(vii) $1 \subset A$

(viii) $\{1, 2, 3, 4\} \subset A.$

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Operations On Sets Example

1. If $A = \{3, 4, 5, 6\}$ and $B = \{4, 6, 8, 10\}$, find $A \cup B$.

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2. Let $A = \{x : x$ is a prime number less than $10\}$ and $B = \{x : x \in N, x$ is a factor of $12\}$. Find $A \cup B$.

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3.   Let $A = \{x : x \text{ is a positive integer }\}$ and   let

$B = \{x : x \text{ is a negative intger }\}$. Find $A \cup B$.

4. If $A = \{x : x = 2n + 1, \ n \in Z\}$ and $B = \{x : x = 2n, \ n \in Z\}$,

then $A \cup B = ?$

A. Z

B. R

C. Q

D. None

Answer: A

5. Let $A = \{1, 3, 5, 7, 9)\}$ and $B = \{2, 3, 5, 7, 11, 13\}$. Find $A \cap B$.

A. $\{3, 5, 7\}$

B. $\{3, 5, 11, 7\}$

C. $\{3, 1, 9, 2, 11, 13, 5, 7\}$

D. None of the above

Answer: A

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6. if $A = \{x : x \in N,$ x is a factor of 12 $\}$ and B={x:x in N , $xis\,a\,fac \rightarrow rof18\}, F \in d$A cap B`.

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7. If $A = \{x : x = 3n, n \in N\}$ and $B = \{x : x = 4n, n \in N\}$, then find $A \cap B$.

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8. If $A = (2, 4]$ and $B = [3, 5)$, find $A \cap B$.

A. $[3, 4]$

B. $(3, 4)$

C. $(2, 4]$

D. None of these

Answer: A

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9. If $A = \{1, 3, 5, 7, 9\}$, $B = \{2, 4, 6, 8\}$ and $C = \{2, 3, 5, 7, 11\}$, find $(A \cap B)$ and $(A \cap C)$. What do you conclude ?

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10. Give examples of three sets, A, B, C such that $A \cap B \neq \phi, (B \cap C) \neq \phi, (A \cap C) \neq \phi$ and $(A \cap B \cap C) = \phi$.

11. Given an example sets, A, B, C such that $A \cap B = A \cap C$ but $B \neq C$.

12. If A= {x:$x \in N$, x is a factor of 6} and B = {$x \in N$: x is a factor of 8} then Find

(i)$A \cap B$, (ii) $A \cap B$, (iii) A-B, (iv) B-A`.

13. Let $A = \{a, b, c, d\}$ and $B = \{b, d, f, g\}$. Find $A\Delta B$.

14. If $U = \{1, 2, 3, 4, 5, 6, 7, 8\}$ and $A = \{2, 4, 6, 8\}$, Find (i) $A\,'$ (ii) $(A\,')\,'$

.

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15. Let N be the universal set.

(i) If $A = \{x : x \in N$ and $x$is not odd$\}=\{$x:x in N   and $x is even\}$.

(ii) $B' = \{x : x \in N, x$ is not divisible by 3 or x is not divisible by 5$\}$

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16. If $A \subset U$, prove that :

(i) $U' = \phi$ (ii) $\phi' = U$ (iii) $(A')' = A$ (iv) $A \cup A' = U$ (v) $A \cap A' = \phi$

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Solved Examples

1. If A and B are two sets such that $n(A) = 27, n(B) = 35$ and $n(A \cup B) = 50$. Find $n(A \cap B)$.

A. 10

B. 13

C. 12

D. 15

Answer: C

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2. 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 minimum number of elements in $A \cup B$.

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3. A survey shows that 73% of the Indians like apples, whereas 65% like oranges. What percentage of Indians like both apples and oranges, if every indians like atleast one of the Juice ?

A. 18

B. 28

C. 38

D. 48

Answer: C

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4. In a survey of 425 students in a school, it was found that 115 drink apple juice, 160 drink orange juice and 80 drink both apple as well as orange juice. How many drinks neither apple juice nor orange juice ?

A. 195

B. 230

C. 235

D. None of these

Answer: B

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5. In a group of 850 persons, 600 can speak Hindi and 340 can speak Tamil. Find (i) how many can speak both Hindi and Tamil,

(ii) how many can speak Hindi only,

(iii) how many can speak Tamil only.

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6. A market research group conducted a survey of 1000 consumers and reported that 745 consumers like product A and 430 consumers like product B. What is the least number that must have liked both products ?

7. Out of 600 car owners investigated, 500 owned car A, 200 owned car B and 50 owned both A and B cars. Verify whether the given data is correct or not.

8. In a group of 52 persons, 16 drinks tea but not coffee and 33 drink tea.

Find (i) how many drink tea and coffee both,

(ii) how many drink coffee but not tea.

9. 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 ?

10. 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 products A and B, 15 people like products B and C, 12 people like products C and A, and 8 people like all the three products, find

(i) how many people are surveyed in all,

(ii) how many like product C only.

11. In a survey of 25 students, it was found that 12 have taken physics, 11 have taken chemistry and 15 have taken mathematics; 4 have taken physics and chemistry; 9 have taken physics and mathematics; 5 have taken chemistry and mathematics while 3 have taken all the three subjects. Find the number of students who have taken (i) physics only (ii) chemistry only; (iii) mathematics only (iv) physics and chemistry but not mathematics; (v) physics and mathematics but not chemistry; (vi) only

one of the subjects; (vii) at least one of the three subjects; (vii) none of the three subjects.

Exercise 1 A

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

(i) The collection of all whole numbers less than 10.

(ii) The collection of good hockey players in India.

(iii) The collection of all questions in this chapter.

(iv) The collection of all difficult chapters in this book.

(v) A collection of Hindi novels written by Manshi Prem Chand.

(vi) A team of 11 best cricket players of India.

(vii) The collection of all the months of the year whose names begin with the letter M.

(viii) The collection of all interesting books.

(ix)The collection of all short boys of your class.

(x) The collection of all those students of your class whose ages exceed 15

years.

(xi) The collection of all rich persons of Kolkata.

(xii) The collection of all persons of Kolkata whose assessed annual incomes exceed (say) ₹20 lakh in the financial year 2016-17.

(xiii) The collection of all interesting drams written by Shakespeare.

2. Let A be the set of all even whole numbers less than 10.

(a) Write A in roster form.

(b) Fill in the blanks with the approximate symbol $\in$ or $l \in$:

(i) $0......A$

(ii) $10....... . A$

(iii) $3.........A$

(iv) $6............A.$

3. Write the following sets in roster form: $A = \{x : x^2 \leq 16 : X \in Z\}$

4. List all the elements of each of the sets given below:

(i) $A = \{x : x = 2n, n \in N \text{ and } n \leq 5\}$.

(ii) $B = \{x : x = 2n + 1, n \in W \text{ and } n < 5\}$.

(iii) $C = \left\{ x : x = \dfrac{n}{n}, n \in N \text{ and } n < 6 \right\}$.

(iv) $D = \{x : x = n^2, n \in N \text{ and } 2 \leq n \leq 5\}$.

(v) $E = \{x : x \in Z \text{ and } x^2 = x\}$.

(vi) $F = \left\{ x : x \in Z \text{ and } \dfrac{1}{2} < x \dfrac{13}{2} \right\}$.

(vii) $G = \left\{ x : x = \dfrac{1}{(2n - 1)}, n \in N \text{ and } 1 \leq n \leq 5 \right\}$.

(viii) $H = \{x : x \in Z, |x| \leq 2\}$.

5. Write each of the following beleow in set- builder form:

(i) $A = \left\{ 1, \dfrac{1}{4}, \dfrac{1}{9}, \dfrac{1}{16}, \dfrac{1}{25}, \dfrac{1}{36}, \dfrac{1}{49} \right\}$

(ii) $B = \left\{ \dfrac{1}{2}, \dfrac{2}{5}, \dfrac{3}{10}, \dfrac{4}{17}, \dfrac{5}{26}, \dfrac{6}{37}, \dfrac{7}{50} \right\}$

(iii) $B = \{53, 59, 61, 71, 79\}$

(iv) $D = \{-1, 1\}$

(v) $E = \{14, 21, 28, 35, 42, ..., 98\}$

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6. Match each of the sets on the left described in roster form with the

same set on the right described in the set- builder form :

(i)	$\{-5,5\}$	(a)	$\{x : x \in Z \text{ and } x^2 < 16)$
(ii)	$\{1, 2, 3, 6, 9, 18\}$	(b)	$\{x : x \in N \text{ and } x^2 = x\}$
(iii)	$\{-3, -2, -1, 0, 1, 2, 3\}$	(b)	$\{x : x \in Z \text{ and } x^2 = 25\}$
(iv)	$\{P, R, I, N, C, A, L\}$	(b)	$\{x : x \in N \text{ and } x \text{ is a factor of } 1$
(v)	$\{1\}$	(b)	$\{x : x \text{ is a letter int he word 'PRI}$

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Exercise 1 B

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

(i) Set of odd numbers divisible by 2.

(ii) Set of even prime numbers.

(iii) $A = \{x : x \in N, 1 < x \leq 2\}$

(iv) $B = \{x : x \in N, 2x + 3 = 4\}$

(v) $C = \{x : x \text{ is prime}, 90 < x < 96\}$

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

(vii) $E = \{x : x \in W, x + 3 \leq 3\}$

(viii) $F = \{x : x \in Q, 1 < x < 2\}$

(ix) $G = \{0\}$

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2. Which of the following are examples of the singleton set?

A. $\{x : x \in Z, x^2 = 4\}$

B. $\{x : x \in Z, |x| = 1\}$

C. $\{x : x \text{ is an even prime number }\}$

D. $\{x : x \in R, x^2 - x = 4\}$

Answer: C

3. Which of the following are pairs to equal sets ?

(i)$A =$ Set of letters in the word 'ALLOY'.

$B =$ Set of letters in the word 'LOYAL'

(ii) $C =$ Set of letters in the word,'CATARACT'

$D =$ Set of letters in the word,' TRACT'

4. Which of the following are pairs of equivalent sets ?

$(i)A = \{ - 2, \ - 1, 0)$ and $B = \{1, 2, 3\}$

$(ii)C = \{x : x \in N, x < 3\}$ and $D = \{x : x \in W, x < 3\}$

$(iii)E = \{a, e, i, o, u\}$ and $F = \{p, q, r, s, t\}$

A. i only

B. i & ii

C. ii & iii

D. i & iii

Answer: D

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5. State whether the given set is finite or infinite.

(i) $A = $ Set of all triangles in a plane.

(ii) $B = $ set of all points on the circumference

(iii) $C = $ set of all lines parallel to the y-axis.

(iv) $D = $ set of all leaves on a tree

(v) $E = $ set of all positive integers greater than 500

(vi) $F = \{x \in R, 0 < x < 1\}$

(vii) $G = \{x \in Z : x < 1\}$

(viii) $H = \{x \in Z : -15 < x < 15\}$

(ix) $J = \{x : \in N \text{ and } x \text{ is prime}\}$

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

(xi) $L = $ set of all circles passing through the origin $(0, 0)$.

A. 2

B. 3

C. 4

D. 1

Answer: A

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6. Rewrite the following statements using set notation :

(i) a is an element of set A.

(ii) b is not a element of A.

A is a empty set and B is a nonemepty set.

(iv) Number of elements is A is 6.

(v) 0 is a whole number but not a natual number.

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1. State in each case whehter $A \subset B$ or $A \not\subset B$.

(i) $A = \{0, 1, 2, 3\}, B = \{1, 2, 3, 4, 5\}$

$(ii) A = \phi, B = \{0\}$

$(iii) A = \{1, 2, 3\}, B = \{1, 2, 4\}$

$(iv) A = \{x : x \in Z, x^2 = 1\}, B = \{x : x \in NX^2 = 1\}$

(v) $A = \{x : x \text{ is a even natural number } \}, B = \{x : x \text{ is a integer } \}$

(vii) $A = \{x : x \text{ is a real number } \}, B = \{x : x \text{ is a complex number}\}$

$(viii) A = \{x : x \text{ is an isosceles triangle in a planel,}$

$B = \{x : x \text{ is an equilateral triangle in the same plane } \}$

$(ix) A = \{x : x \text{ is a square in a plane } \}$

$B = \{x : x \text{ is a rectangle in the same plane } \}$

$(x) A = \{x : x \text{ is a triangle in a plane } \},$

$B = (x : x \text{ is a rectangle in the same plane}\},$

$(\xi) A = \{x : x \text{ is an even natural number less than } 8\}$

$B = \{x : x \text{ is a natural number which divides} 32\}.$

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2. Esamine whether the following statements are true or false :

(i)$\{a, b\} \not\subset \{b, c\}$ (ii)$\{a\} \in \{a, b, c\}$ (iii) {phi} sub {a, b, c } (iv){a,e} sub

{x:x " is a vowel in the English alphabet "} (v) {x:x in W, x+5 =5}=phi(vi) a in

{{a} , b}(vii) $\{a\} \subset \{\{a\}, b\}$

(viii)$\{b, c\} \subset \{a, c\}\}$

(ix)$\{a, a, b, b\} = \{a, b\}$

(x) {a,b,a, b,a,b...} is an infinte set. $(\xi) If A=$

$set of all \circ \leq s of unit radius \in a pla \neq$ and $B = set of all \circ \leq s \in the sa$

A sub B`.

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3. If $A = \{1\}$ and $B = \{\{1\}, 2\}$then show that $A \not\subset B.$

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4. Write down all subsets of each of the following sets:

(i)$A = \{a\}$

$(ii)B = \{a, b\}$

$(iii)C = \{-2, 3\}$

$(iv)D = \{-1, 0, 1\}$

$(v)E = \phi$

$(vi)F = \{2, \{3\}\}$

$(vii)G = \{3, 4, \{5, 6\}\}$

5. Express each of the following sts as an interval :

$(i)A = \{x : x \in R, -4, < x < 0\}$

$(ii)B = \{x : x \in R, 0 \le x < 3\}$

$(iii)C = \{x : x \in R, 2 < x \le 6\}$

$(iv)D = \{x : x \in R, -5 \le x \le 2\}$

$(v)E = \{x : x \in R, -3 \le x < 2)$

$(vi)F = \{x : x \in R, -2, \le x < 0\}$

6. Write each of the following intervals in the set- builder form :

(i) $A = (-2, 3)$

(ii) $B = [4, 10]$

(iii) $C = [-1, 8]$

(iv) $D = (4, 9]$

(v) $E = [-10, 0)$

(vi) $F = (0, 5]$

7. If $A = \{3, \{4, 5\}, 6\}$, find which of the following statements are true.

(i) $\{4, 5\} \subseteq A$

(ii) $\{4, 5\} \in A$

(iii) $\{\{4, 5\}\} \subseteq A$

(iv) $4 \in A$

(v) $\{3\} \subseteq A$

(vi) $\{\phi\} \subseteq A$

(vii) $\phi \subseteq A$

(viii) {3,4,5} sube A (ix) $\{3, 6\} \subseteq A$

8. If $A = \{a, b, c\}$, find $P(A)$ and $n\{P(A)\}$.

9. IF $A = \{1, \{2, 3\}\}$, find $P(A)$ and $n\{P(A)\}$.

10. If $A = \phi$ then write $P(A)$.

11. If the sets $A = \{1, 3, 5\}$, $B = \{2, 4, 6\}$ and $C = \{0, 2, 4, 6, 8\}$. Then, the universal set of all the three sets A, B and C can be . . . .

12. Prove that $A \subseteq B, B \subseteq C$ and $C \subseteq A \Rightarrow A = C$.

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13. For any set A, prove that $A \subseteq \phi \Leftrightarrow A = \phi$.

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14. State whether the given statement is true or false :

(i) if $A \subset B$ and $xl \in$ then x lin A. $(ii) If$A sube phi$then A = \phi$

(iii)   If A, B and C are   three   sets   such   that $\in B$ and $B \subset C then A \subset C.$

(iv) If A, B and C are three sets such that $A \subset B$ and $B \in C$" then " $A \in C.$

(v) If A, B and C are three sets such taht $A \not\subset B$ and $B \not\subset C$ " then " A cancel(sub)C. $(vi) If A, B are sets such that$ ^ x in A and A in B then x in B`.

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Exercise 1 D

1. If $A = \{a, b, c, d, e, f\}$, $B = \{c, e, g, h\}$ and $C = \{a, e, m, n\}$, find.

(i) $A \cup B$

(ii) $B \cup C$

(iii) $A \cup C$

(iv) $B \cap C$

(v) $C \cap A$

(vi) $A \cap B$

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2. If

$A = \{1, 2, 3, 4, 5\}$, $B = \{4, 5, 6, 7, 8\}$, $C = \{7, 8, 9, 10, 11\}$ and $D = \{10,$

, find : $(i) A \cup B$, $(ii) B \cup C$, $(iii) A \cup C$, $(iv) B \cup D$,

$(v)(A \cup B) \cup C$, $(vi)(A \cup B) \cap C$, $(vii)(A \cap B) \cup D$,

$(viii)(A \cap B) \cup (B \cap C)$, $(ix)(A \cup C) \cap (C \cup D)$

3. if

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

, Find : $(i) A \cap B, (ii) A \cap C, (iii) B \cap C, (iv) B \cap D.$

4. 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 :

(i) $A \cap B$

(ii) $A \cap C$

(iii) $A \cap D$

(iv) $B \cap C$

(v) $B \cap D$

(vi) $C \cap D.$

5.

$A = \{2x : x \in N \text{ and } 1 \le x < 4\}, B = \{(x + 2) : x \in N \text{ and } 2 \le x < 5\}$

} and $C = \{x : x \in N \text{ and } 4 < x < 8\}$, find : (i) $A \cap B$ (ii)$A \cup B$ (iii)

$(A \cup B) \cap C$

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6. If $A = \{2, 4, 6, 8, 10, 12\}$ and $B = \{3, 4, 5, 6, 7, 8, 10\}$, find:

(i) $A - B)$

(ii) $(B - A)$

(iii) $(A - B) \cup (B - A)$.

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7. If $A = \{a, b, c, d, e\}, B = \{a, c, e, g\}$ and $C = \{b, e, f, g\}$, find : (i)

$A \cap (B - C)$ (ii) $A - (B \cup C)$ (iii) $A - (B \cap C)$.

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8. If

$$A = \left\{ \frac{1}{x} : x \in N \text{ and } x < 8 \right\} \text{ and } B = \left\{ \frac{1}{2x} : x \in N \text{ and } x \leq 4 \right\},$$

find :

(i) $A \cup B$

(ii) $A \cup B$

(iii) $A - B$

(iv) $B - A$

9. If R is the set of real numbers and Q is the set of rational numbers, then what is RQ?

10. If $A = \{2, 3, 5, 7, 11\}$ and $B = \phi$, find :

(i) $A \cup B$

(ii) $A \cap B$

11. If A and B are two sets such that $A(\subset)B$ then find : (i) $A \cup B$ (ii) $A \cap B$ (iii) $A - B$

12. Which of the following sets are pairs of disjoint sets? Justify yours answer :

(i) $A = \{3, 4, 5, 6\}$ and $B = \{2, 5, 7, 9\}$

(ii)$C = \{1, 2, 3, 4, 5\}$ and $D = \{6, 7, 9\}$

(iii) $E = \{x : x \in N, ix \text{is even and} x < 8\}$

$F = \{x : x = 3n, n \in N \text{ and } n < 4\}$

(iv) $G = \{x : x \in N, x \text{ is even}\}$ and $H = \{x : x \in N, x \text{ is a prime}\}$

(v) $J = \{x : x \in N, x \text{ is a even}\}$ and K=$\{x : x \text{ in N, x } is odd\}$

13. If U={1,2,3,4,5,6,7,8,9}   A={1,2,3,4,}   B={2,4,6,8}   and   C={1,4,5,6}, find

: $(i)A'(ii)B'(iii)C'(iv)(B')'(v)(A \cup B)'$ (vi) $(A \cap C)'$ (vii) $(B - C)'$.

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14. If $U = \{a, b, c, d, e\}$, $A = (a, b, c\}$ and $B = \{a, b, c, d, e\}$ then

verify that:

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

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

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15. If u is the universal set and $A \subset U$ then fill in the blanks :

(i)$A \cup A' = $ ....

(ii) $A \cap A' = $.......$(iii)$phi' $\cap A = $ .... .

(iv) $U' \cap A = $..........`

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1. If $A = \{a, b, c, d, e\}$, $B = \{a, c, e, g\}$ and $C = \{b, e, f, g\}$, verify that:

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

(ii) $A \cup C = C \cup A$

(iii) $B \cup C = C \cup B$

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

(v) $B \cap C = C \cap B$

(vi) $A \cap C = C \cap A$

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

(viii) $A \cap C = C \cap A$.

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2. If $A = \{a, b, c, d, e\}$, $B = \{a, c, e, g\}$ and $C = \{b, e, f, g\}$ verify that :

(i) $A \cap (B - C) = (A \cap B) - (A \cap C)$

(ii) $A - (B \cap C) = (A - B) \cup (A - C)$

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3. If

$A = \{x : x \in N, x \leq 7\}, B = \{x : x\text{is prime}, x < 8\}$ and $C = \{x : x \in N,$

, verify that :

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

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

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

verify that :

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

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

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5. Let $A = \{a, b, c\}, B = \{b, c, d, e\}$ and $C = \{c, d, e, f\}$ be subsets of

$U = \{a, b, c, d, e, f\}.$ Then,verify   that: (i)$(A')' = A$ (ii)

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

6. Given examples of three sets, A, B, C such that $A \cap B \neq \phi, (B \cap C) \neq \phi, (A \cap C) \neq \phi$ and $(A \cap B \cap C) = \phi$.

7. For any sets A and B, prove that :

(i) $(A - B) \cap B = \phi$

(ii) $A \cup (B - A) = A \cup B$

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

(iv) $(A \cup B) - B = A - B$

(v) $A - (A \cap B) = A - B$

8. For any sets A and B, prove that :

(i) $A \cap B' = \phi \Rightarrow A \subset B$

(ii) $A' \cup B = U \Rightarrow A \subset B.$

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Exercise 1 F

1. Let A={a,b,c,d,e,f}, B={c,d,e,g} and C ={b,c,f,g} be subsets of the set U= {a,b,c,d,e,f,g,h}. Draw Venn diagrams to represent the following sets: (i) $A \cap B$ (ii)$A \cup (B \cap C)$ (iiI) $A - B$ (iv) $B - A$ (v) $A - (B \cap C)$ (vi) $(B - C) \cup (C - B)$

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2. Let $A = \{2, 4, 6, 8, 10\}, B = \{4, 8, 12, 16\}$ and $C = \{6, 12, 18, 24\}.$

Using Venn diagrams, verify that:

(i) $(A \cup B) \cup C = A \cup (B \cup C)$

(ii) $(A \cap B) \cap C = A \cap (B \cap C)$

3. Let $A = (a, e, i, o, u)$, $B = \{a, d, e, o, v\}$ and $C\{e, o, t, m\}$.

Using Venn diagrams, verify the following :

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

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

4. Let $A \subset B \subset U$. Exhibit it in a Venn diagram.

5. Let $A = \{2, 3, 5, 7, 11, 13, \}$ and $B = \{5, 7, 9, 11, 15\}$ be subsets of

$U = \{2, 3, 5, 7, 9, 11, 13, 15\}$.

Using Venn diagrams, verify that :

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

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

6. Using Venn diagrams, show that $(A - B), (A \cap B)$ and $(B - A)$are disjoint sets, taking $A = \{2, 4, 6, 8, 10, 12\}$ and $B = \{3, 6, 9, 12, 15\}$.

Exercise 1 G

1. If A and B are two sets such that $n(A) = 37, n(B) = 26$ and $n(A \cup B) = 51,$ find $n(A \cap B)$.

2. If P and Q are two sets such that

$n(P \cup Q) = 75, n(P \cap Q) = 17,$ and $n(P) = 49$, find $n(Q)$.

3. If A and B are two sets such that

$n(A) = 24, n(B) = 22$ and $n(A \cap B) = 8$, find:

(i) $n(A \cup B)$

(ii) $n(B)$

(iii) $n(B - A)$

4. If A and B are two sets such that

$n(A - B) = 24, n(B - A) = 19$ and $n(A \cap B) = 11$, find :

$(i) n(A)$

(ii) $n(B)$

(iii) $n(A \cup B)$

5. In a committee, 50 people speak Hindi, 20 speak English and 10 speak both Hindi and English . How many speak at least one of these two languages ?

6. In a group of 50 persons, 30 like tea, 25 like cofffee and 16 like both, how many like.

(i) either tea or coffee ?

(ii) neither tea nor coffee?

7. 200 persons have a skin disease, out of which 120 persons are effected with chemical C_1, 50 with chemical C_2 and 30 with chemical C_1 and C_2 both. Find the number of persons who

(i) are effected with C_1 or C_2

(ii) are effected with C_1 but not C_2

(iii) are effected with C_2 but not C_1.

8. In a class of a certain school, 50 stduents offered mathematics , 42 offered biology and 24 offered both the subjets. Find the number of students offfereing.

(i) mathematics only,

(ii) biology only,

(iii) any of the two subjects.

9. In an examination 56% of the candidates failed in English and 48% failed in science. If 18% failed in both English and science, find the percentage of those who passed in both the subjects.

10. 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?

11. A school awarded 42 medals in hockey, 18 in basketball and 23 in cricket. If these medals were bagged by a total of 65 students and only 4 students got medals in all the three sports, how many students received medals in exactly two of the three sports ?

12. In a survey of 60 people, it was found that 2 5 people read newspaper H. 26 read newspaper T, 26 read newspaper 1, 9 read both H and I.11 read both H and T, 8 read both T and I, 3 read all three newspapers. Find: (i) the number of people who read

13. In a survey of 100 students, how many of students studying the various languages were found to study: English only 18, English but not Hindi 23, English and Sanskrit 8, English 26, Sanskrit 48, Sanskrit and Hindi 8, no language 24 Find:(i) how many students were studying Hindi (ii) how many students were studying English and Hindi

14. In a town of $10,000$ families, it was found that 40% of the families buy newspaper A, 20% buy newspaper B, 10% buy newspaper C, 5% buy A and B, 30% buy B and C and 4% buy A and C. If 2% buy all the three newspapers, find the number of families which buy.

(i) A only,

(ii) B only,

(iii) none of A, B and C.

15. A class has 175 students, The following description gives the number of students studying one or more of the subjects in this class, Mathematics 100, physics 70, chemistry 46, Mathematics and physics 30, mathematics and chemistry 28, physics and chemistry 23, mathematics, physics and chemistry alone 18,

(i) how many students are enrolled in mathematics alone, physics alone and children alone,

(ii) the number of students who have not offered any of these subjects.

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Exercise 1 H

1. If a set A has n elements then find the number of elements in its power set $P(A)$.

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2. If $A = \phi$ then write $P(A)$.

3. If $n(A) = 3$ and $n(B) = 5$, find :

(i) the maximum number of elements in $A \cup B$.

(ii) the maximum number of elements in $A \cup B$.

4. If A and B are two sets such that $n(A) = 8, n(B) = 11$ and $n(A \cup B) = 14$ then find $n(A \cap B)$.

5. If A and B are two sets such that $n(A) = 23, n(B) = 37$ and $n(A - B) = 8$ then find $n(A \cup B)$.

6. If A and B are two sets such that $n(A) = 54, n(B) = 39$ and $n(B - A) = 13$ then find $n(A \cup B)$.

7. If $A \subset B$, prove that $B' \subset A'$.

8. If $A \subset B$, show that $(B' - A') = \phi$.

9. Let $A = \{x : x = 6n, n \in N\}$ and $B = \{x : x = 9n, n \in N\}$, find $A \cap B$.

10. If $A = \{5, 6, 7\}$,find $P(A)$.

11. If $A = \{2, \{2\}\}$, find $P(A)$.

12. Prove that $A \cap (A \cup B)' = \phi$.

13. If $A = \{1, 2, 3\}$ and $B = \{2, 3, 4\}$, then the symmetric difference of A and B is :

14. Prove that $A - B = A \cap B'$.

15. If $A = \{x : x \in R, \, x < 5\}$ and $B = \{x : x \in R, \, x > 4\}$, find $A \cap B$.