Class 6

EXERCISE 5.1 - SETS (Class 6)

1. List the elements of each of the following sets:

(a) The set of first 5 natural numbers: {1, 2, 3, 4, 5}
(b) The set of first 5 prime numbers: {2, 3, 5, 7, 11}
(c) The set of first 3 even natural numbers: {2, 4, 6}
(d) The set of days of a week starting with letter 'S': {Saturday, Sunday}
(e) The set of vowels of the English alphabets: {a, e, i, o, u}
(f) The set of odd numbers less than 12: {1, 3, 5, 7, 9, 11}
(g) The set of 2-digit numbers, the sum of whose digits is 7: {16, 25, 34, 43, 52, 61, 70}
(h) The set of multiples of 5 which are less than 30: {5, 10, 15, 20, 25}
(i) The set of squares of first five natural numbers: {1, 4, 9, 16, 25}
(j) The set of the names of the months having 31 days: {January, March, May, July, August, October, December}

2. Describe the following sets:

(a) A = {a, e, i, o, u} → Set of vowels
(b) B = {1, 2, 3, ...} → Set of natural numbers
(c) C = {2, 3, 5, 7, 11} → Set of first 5 prime numbers
(d) D = {0, 1, 2, 3, 4, 5, 6} → Set of whole numbers less than 7
(e) E = {obtuse angle, right angle} → Set of angles
(f) F = {acute triangle, obtuse triangle, right triangle} → Set of types of triangles based on angles
(g) G = {scalene triangle, isosceles triangle, equilateral triangle} → Set of types of triangles based on sides
(h) H = {Jan, June, July} → Set of months starting with J
(i) I = {Tuesday, Thursday} → Set of days of the week
(j) J = {1, 4, 9, 25, 36} → Set of squares
(k) K = {1, 8, 27, 125, 216} → Set of cubes

3. Which of the following collections are sets?

(i) Brilliant students of your class → Not a set
(ii) Odd numbers divisible by 3 → Set
(iii) Difficult questions in your mathematics book → Not a set
(iv) Last 4 months of the year → Set
(v) Clever persons of Kolkata → Not a set

(vi) All colours in a rainbow → Set
(vii) All consonants in the word 'collection' → Set
(viii) Good schools of Kolkata → Not a set
(ix) Tasty fruits → Not a set
(x) Teachers in your school → Set

4. If A = {3, 6, 9, 12, 15}, say True or False:

(i) $12 \in A$ → True
(ii) $15 \in A$ → True
(iii) $1 \notin A$ → True
(iv) $9 \notin A$ → False
(v) $2 \in A$ → False
(vi) $6 \in A$ → True

5. If A is the set of letters of the word "teacher":

(i) $e \in A$ → True
(ii) $r \in A$ → True
(iii) $m \in A$ → False
(iv) $t \notin A$ → False
(v) $a \in A$ → True
(vi) $c \in A$ → True
(vii) $h \notin A$ → False
(viii) $h \in A$ → True
(ix) $r \in A$ → True

6. Say True or False:

(i) Letters of DALDA = {D, A, L} → True
(ii) Letters of ALLAHABAD = {A, L, H, B, D} → True
(iii) {1, 2, 2, 3, 5, 7} = {1, 2, 3, 5, 7} → True
(iv) {1, 2, 3, 4} = {4, 2, 1, 3} → True
(v) $\{5, 4\} \neq \{5, 4, 2\}$ → True
(vi) {a, e, i, o, u} = {a, e, i, o, u} → True

7. Let A = {3, 5, 6, 7, 10, 11}, insert appropriate symbols:

(i) $3 \in A$
(ii) $4 \notin A$
(iii) $11 \in A$
(iv) $7 \in A$

(v) 15 ∉ A
(vi) 2 ∉ A
(vii) 6 ∈ A
(viii) 10 ∈ A
(ix) 1 ∉ A

8. If A = {3, 6, 9, ..., 24, 27, 30}:

(i) 9 ∈ A
(ii) 10 ∉ A
(iii) 15 ∈ A
(iv) 21 ∈ A
(v) 12 ∈ A
(vi) 1 ∉ A
(vii) 20 ∉ A
(viii) 18 ∈ A
(ix) 27 ∈ A
(x) 30 ∈ A

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EXERCISE 5.2 - SETS (Class 6)

1. Write each of the following sets in Roster form (Tabular form):

(i) Natural numbers between 10 and 20: {11, 12, 13, 14, 15, 16, 17, 18, 19}
(ii) Natural numbers less than 15: {1, 2, 3, ..., 14}
(iii) Natural numbers greater than 100: {101, 102, 103, ...}
(iv) Prime factors of 15: {3, 5}
(v) Prime factors of 54: {2, 3}
(vi) Different colours of a rainbow: {Red, Orange, Yellow, Green, Blue, Indigo, Violet}
(vii) Vowels in the word 'Chennai': {a, e, i}
(viii) Vowels in the word 'delhi': {e, i}
(ix) Even numbers between 10 and 20: {10, 12, 14, 16, 18, 20}
(x) Even numbers divisible by 3: {6, 12, 18, 24, ...}
(xi) Integers less than 12: {..., -2, -1, 0, 1, 2, ..., 11}
(xii) Integers between -3 and 3: {-2, -1, 0, 1, 2, 3}
(xiii) Whole numbers between 5 and 15: {5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15}
(xiv) Whole numbers greater than 101: {102, 103, 104, ...}

2. Write each of the following sets in Tabular form or Roster-form:

(i) Whole numbers less than 7: {0, 1, 2, 3, 4, 5, 6}

(ii) Prime-factors of 24: {2, 3}
(iii) Consonants in the word 'calcutta': {c, l, t}
(iv) Even numbers divisible by 5 and less than 20: {10}

3. Write each of the following sets in set-builder form:

(i) Natural numbers less than 100: {x | x ∈ N, x < 100}
(ii) Natural numbers greater than 20: {x | x ∈ N, x > 20}
(iii) Natural numbers between 5 and 50: {x | x ∈ N, 5 < x < 50}
(iv) Multiples of 3 less than 20: {x | x ∈ N, x % 3 = 0, x < 20}
(v) Multiples of 7 greater than 10: {x | x ∈ N, x % 7 = 0, x > 10}
(vi) Multiples of 9 between 20 and 100: {x | x ∈ N, x % 9 = 0, 20 < x < 100}
(vii) Squares of first 10 natural numbers: {x | x = n^2, n ∈ N, 1 ≤ n ≤ 10}
(viii) Cubes of first 5 natural numbers: {x | x = n^3, n ∈ N, 1 ≤ n ≤ 5}
(ix) Integers greater than -5 and less than 10: {x | x ∈ I, -5 < x < 10}

4. Rewrite each of the following sets from roster-form to set-builder form:

(i) A = {3, 4, 5, 6, 7, 8, 9} → {x | x ∈ N, 3 ≤ x ≤ 9}
(ii) B = {5, 6, 7, ..., 10} → {x | x ∈ N, 5 ≤ x ≤ 10}
(iii) C = {101, 102, 103, ...} → {x | x ∈ N, x ≥ 101}
(iv) D = {1, 4, 9, 16, 25} → {x | x = n^2, n ∈ N, 1 ≤ n ≤ 5}
(v) E = {5, 10, 15, 20} → {x | x = 5n, n ∈ N, 1 ≤ n ≤ 4}
(vi) F = {1, 2, 3, 4, 6, 12} → {x | x divides 12, x ∈ N}
(vii) G = {a, e, i, o, u} → {x | x is a vowel, x ∈ English alphabet}
(viii) H = {January, June, July} → {x | x is a month starting with J}
(ix) I = {Tuesday, Thursday} → {x | x is a day of the week starting with T}
(x) J = {2, 3, 5, 7, 11, 13, 17, 19} → {x | x is a prime number, 2 ≤ x ≤ 19}

5. Give roster-form of each of the following sets:

(i) A = {x | x ∈ N, x < 20} → {1, 2, 3, ..., 19}
(ii) B = {x | x ∈ N, 5 ≤ x ≤ 10} → {5, 6, 7, 8, 9, 10}
(iii) C = {x | x ∈ N, 5 < x < 10} → {6, 7, 8, 9}
(iv) D = {x | x ∈ I, -4 < x < 4} → {-3, -2, -1, 0, 1, 2, 3}
(v) E = {x | x ∈ I, x > -5} → {-4, -3, ..., }
(vi) F = {x | x ∈ W, x < 10} → {0, 1, 2, 3, 4, 5, 6, 7, 8, 9}
(vii) G = {x | x is an even prime number} → {2}
(viii) H = {x | 3x - 6 = 0} → {2}
(ix) I = {x | 5x - 15 = 0} → {3}
(x) J = {x | 7x > 21, x ∈ N} → {4, 5, 6, ...}

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EXERCISE 5.2 - SETS (Class 6)

1. Write each of the following sets in Roster form (Tabular form):

(i) Natural numbers between 10 and 20: {11, 12, 13, 14, 15, 16, 17, 18, 19}
(ii) Natural numbers less than 15: {1, 2, 3, ..., 14}
(iii) Natural numbers greater than 100: {101, 102, 103, ...}
(iv) Prime factors of 15: {3, 5}
(v) Prime factors of 54: {2, 3}
(vi) Different colours of a rainbow: {Red, Orange, Yellow, Green, Blue, Indigo, Violet}
(vii) Vowels in the word 'Chennai': {a, e, i}
(viii) Vowels in the word 'delhi': {e, i}
(ix) Even numbers between 10 and 20: {10, 12, 14, 16, 18, 20}
(x) Even numbers divisible by 3: {6, 12, 18, 24, ...}
(xi) Integers less than 12: {..., -2, -1, 0, 1, 2, ..., 11}
(xii) Integers between -3 and 3: {-2, -1, 0, 1, 2, 3}
(xiii) Whole numbers between 5 and 15: {5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15}
(xiv) Whole numbers greater than 101: {102, 103, 104, ...}

2. Write each of the following sets in Tabular form or Roster-form:

(i) Whole numbers less than 7: {0, 1, 2, 3, 4, 5, 6}
(ii) Prime-factors of 24: {2, 3}
(iii) Consonants in the word 'calcutta': {c, l, t}
(iv) Even numbers divisible by 5 and less than 20: {10}

3. Write each of the following sets in set-builder form:

(i) Natural numbers less than 100: {x | x ∈ N, x < 100}
(ii) Natural numbers greater than 20: {x | x ∈ N, x > 20}
(iii) Natural numbers between 5 and 50: {x | x ∈ N, 5 < x < 50}
(iv) Multiples of 3 less than 20: {x | x ∈ N, x % 3 = 0, x < 20}
(v) Multiples of 7 greater than 10: {x | x ∈ N, x % 7 = 0, x > 10}
(vi) Multiples of 9 between 20 and 100: {x | x ∈ N, x % 9 = 0, 20 < x < 100}
(vii) Squares of first 10 natural numbers: {x | x = n^2, n ∈ N, 1 ≤ n ≤ 10}
(viii) Cubes of first 5 natural numbers: {x | x = n^3, n ∈ N, 1 ≤ n ≤ 5}
(ix) Integers greater than -5 and less than 10: {x | x ∈ I, -5 < x < 10}

4. Rewrite each of the following sets from roster-form to set-builder form:

(i) A = {3, 4, 5, 6, 7, 8, 9} → {x | x ∈ N, 3 ≤ x ≤ 9}
(ii) B = {5, 6, 7, ..., 10} → {x | x ∈ N, 5 ≤ x ≤ 10}
(iii) C = {101, 102, 103, ...} → {x | x ∈ N, x ≥ 101}
(iv) D = {1, 4, 9, 16, 25} → {x | x = n^2, n ∈ N, 1 ≤ n ≤ 5}
(v) E = {5, 10, 15, 20} → {x | x = 5n, n ∈ N, 1 ≤ n ≤ 4}
(vi) F = {1, 2, 3, 4, 6, 12} → {x | x divides 12, x ∈ N}
(vii) G = {a, e, i, o, u} → {x | x is a vowel, x ∈ English alphabet}
(viii) H = {January, June, July} → {x | x is a month starting with J}
(ix) I = {Tuesday, Thursday} → {x | x is a day of the week starting with T}
(x) J = {2, 3, 5, 7, 11, 13, 17, 19} → {x | x is a prime number, 2 ≤ x ≤ 19}

5. Give roster-form of each of the following sets:

(i) A = {x | x ∈ N, x < 20} → {1, 2, 3, ..., 19}
(ii) B = {x | x ∈ N, 5 ≤ x ≤ 10} → {5, 6, 7, 8, 9, 10}
(iii) C = {x | x ∈ N, 5 < x < 10} → {6, 7, 8, 9}
(iv) D = {x | x ∈ I, -4 < x < 4} → {-3, -2, -1, 0, 1, 2, 3}
(v) E = {x | x ∈ I, x > -5} → {-4, -3, ..., }
(vi) F = {x | x ∈ W, x < 10} → {0, 1, 2, 3, 4, 5, 6, 7, 8, 9}
(vii) G = {x | x is an even prime number} → {2}
(viii) H = {x | 3x - 6 = 0} → {2}
(ix) I = {x | 5x - 15 = 0} → {3}
(x) J = {x | 7x > 21, x ∈ N} → {4, 5, 6, ...}

Continuation: Questions 6 to 11

6. Write each of the following sets in Tabular-form:

(i) A = {x | x = 2n, n ∈ N} → {2, 4, 6, 8, ...}
(ii) B = {x | x = n^2, n ∈ N, n < 10} → {1, 4, 9, 16, 25, 36, 49, 64, 81}
(iii) C = {x | x = 4n, n ∈ N, n < 5} → {4, 8, 12, 16}
(iv) D = {x | x = n^3, n ∈ N, n < 6} → {1, 8, 27, 64, 125}
(v) E = {x | x = 5n + 2, n ∈ N, n ≤ 5} → {7, 12, 17, 22, 27, 32}
(vi) F = {x | x = 3n - 4, n ∈ N, n ≤ 4} → { -1, 2, 5, 8}
(vii) G = {x | x < 18} → {..., 15, 16, 17}
(viii) H = {x | x is a consonant in the word 'public'} → {p, b, l, c}
(ix) I = {x | x is less than 5 and x ∈ W} → {0, 1, 2, 3, 4}
(x) J = {x | x is less than 6 and greater than -4 and x ∈ I} → {-3, -2, -1, 0, 1, 2, 3, 4, 5}

7. Write each of the following sets in (i) roster-form and (ii) set-builder-form:

(a) Natural numbers greater than 100 → Roster: {101, 102, 103, ...}, Set-builder: {x | x ∈ N, x > 100}
(b) Natural numbers less than 51 → Roster: {1, 2, ..., 50}, Set-builder: {x | x ∈ N, x < 51}
(c) Natural numbers between 20 and 40 → Roster: {21, 22, ..., 39}, Set-builder: {x | x ∈ N, 20 < x < 40}
(d) Natural numbers divisible by 7 → Roster: {7, 14, 21, ...}, Set-builder: {x | x ∈ N, x % 7 = 0}
(e) Integers less than 10 and greater than -10 → Roster: {-9, -8, ..., 9}, Set-builder: {x | x ∈ I, -10 < x < 10}
(f) Integers greater than 11 and divisible by 3 → Roster: {12, 15, 18, ...}, Set-builder: {x | x ∈ I, x > 11, x % 3 = 0}
(g) Natural numbers which if divided by 3 leave remainder 1 → Roster: {1, 4, 7, 10, ...}, Set-builder: {x | x ∈ N, x % 3 = 1}
(h) Natural numbers less than 25, if divided by 4 leave remainder 3 → Roster: {3, 7, 11, 15, 19, 23}, Set-builder: {x | x ∈ N, x < 25, x % 4 = 3}
(i) Odd natural numbers → Roster: {1, 3, 5, ...}, Set-builder: {x | x ∈ N, x % 2 ≠ 0}

8. Write True or False:

(i) If A = {x | x ∈ N, 3 < x ≤ 5} → 5 ∈ A → True
(ii) If B = {x | x ∈ N, 3 < x ≤ 71} → 8 ∈ B → True
(iii) If C = {x | x ∈ I, x < 3} → -3 ∈ C → False
(iv) If D = {x | x ∈ W, 0 ≤ x < 5} → 0 ∈ D → True
(v) If E = {x | x ∈ N, 5 < x ≤ 10} → 5 ∈ E → False
(vi) If F = {x | x = 3n, n ∈ Z, -5 ≤ n ≤ 5} → 5 ∈ F → False
(vii) If G = {x | x = n^2, n ∈ N, 1 ≤ n < 31} → 4 ∈ G → True
(viii) If H = {x | x = 3n + 1, n ∈ N} → 5 ∈ H → True
(ix) If I = {x | x = 5n - 2, n ∈ W} → -7 ∈ I → False
(x) If J = {x | x = n^3, n ∈ N, n ≤ 5} → 64 ∈ J → False

9. A = {1, 2, 3, 4, 5} → Set B (elements multiplied by 3): {3, 6, 9, 12, 15}, Set-builder: {x | x = 3n, n ∈ A}

10. A = {3, 6, 9, 12, 15} → Add 7 to each element: {10, 13, 16, 19, 22}

11. A = {5, 10, 15, 20, 25} → Set B (elements added together element-wise): {10, 20, 30, 40, 50}, Set-builder: {x | x = a + a, a ∈ A}

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EXERCISE 5.3 - SETS (Class 6)

1. Which of the following sets are finite?

(i) A set of natural numbers → Infinite
(ii) A set of integers less than 20 → Finite
(iii) A set of integers between 10 and 10 → Finite
(iv) A set of schools in India → Finite
(v) A set of multiples of 5 → Infinite
(vi) A set of even numbers → Infinite
(vii) A set of children in all the schools of India → Finite
(viii) A set of natural numbers multiples of 7 less than 100 → Finite
(ix) {10, 20, 30, 40, 50} → Finite
(x) A set of leaves on a tree → Finite

2. Which of the following sets are empty?

(i) A set of natural numbers satisfying $2x = 1$ → Empty
(ii) A set of natural numbers between 7 and 9 → {8}, Not Empty
(iii) A set of even numbers between 2 and 4 → Empty
(iv) A set of all negative whole numbers → Empty
(v) A set of all even prime numbers → {2}, Not Empty
(vi) A set of natural numbers greater than 5 but less than 2 → Empty
(vii) $\{x \mid x \text{ is a prime number and } x < 3\}$ → {2}, Not Empty
(viii) $\{x \mid x \text{ is a prime number divisible by } 2\}$ → {2}, Not Empty
(ix) A set of odd numbers divisible by 2 → Empty
(x) A set of triangles having two obtuse angles → Empty

3. Which of the following sets are infinite?

(i) A set of points lying on a straight line → Infinite
(ii) A set of all children in India → Finite
(iii) {1, 2, 3, ..., 15} → Finite
(iv) {2, 4, 6, ...} → Infinite
(v) {..., -2, -1, 0} → Infinite
(vi) {0, 5, 10, 15, ..., 1000} → Finite
(vii) less than 100000 → Infinite
(viii) Students in I.C.S.E. schools in India → Finite
(ix) Natural numbers greater than 1000 and less than 100000000 → Finite
(x) Integers less than 200 and greater than -700 → Finite

4. State whether the following sets are empty:

(i) Odd numbers divisible by 6 → Empty
(ii) Natural numbers less than 2 → {1}, Not Empty
(iii) Even natural numbers divisible by 4 → {4, 8, 12, ...}, Not Empty

(iv) Triangles with 4 sides → Empty
(v) Quadrilaterals with 3 sides → Empty
(vi) Multiples of 5 lying between 0 and 20 → {5, 10, 15}, Not Empty
(vii) Points lying on a plane → Infinite
(viii) Boys of 6 metres tall → Empty
(ix) Girls with 3 hands → Empty

5. Write down the next 4 elements of the following infinite sets:

(i) 1, 2, 3, ... → 4, 5, 6, 7
(ii) 5, 10, 15, ... → 20, 25, 30, 35
(iii) 6, 11, 16, ... → 21, 26, 31, 36
(iv) 20, 13, 6, ... → -1, -8, -15, -22
(v) 1, 10, 19, ... → 28, 37, 46, 55

6. Classify the following as finite or infinite sets:

(i) $\{x \mid x \in N, x > 10\}$ → Infinite
(ii) $\{x \mid x = n^2, n \in N \text{ and } n < 20\}$ → Finite
(iii) $\{x \mid x = 4n, n \in N, n \geq 5\}$ → Infinite
(iv) $\{x \mid x = 3n + 4, n \in N, 5 < n \leq 12\}$ → Finite
(v) $\{x \mid x \in I, x > 4\}$ → Infinite

7. Which of the following sets are empty?

(i) $\{x \mid x \in N, 2 \leq x \leq 3\}$ → {2, 3}, Not Empty
(ii) $\{x \mid x \in I, x < 1\}$ → {..., -2, -1, 0}, Not Empty
(iii) $\{x \mid 2x + 9 = 0, x \in N\}$ → Empty
(iv) {x | x is an even prime number} → {2}, Not Empty
(v) {x | x is a two-digit natural number less than 10} → Empty

8. Which of the following are true statements?

(i) $\{x \mid x + 7 = 8, x \in N\}$ is an empty set → False
(ii) [x | x is a consonant in the word "engineer"] → {n, g, r}, True
(iii) $\varphi = \{0\}$ → False (φ is empty set)
(iv) The set of integers less than 0 is an infinite set → True
(v) $\{x \mid x \text{ a natural number}, 1 < x < 5\} = \varphi$ → False

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EXERCISE 5.4 - SETS (Class 6)

1. Write each of the following sets in tabular form and write cardinal number of each set:

(i) A = set of months having less than 30 days → {February}, n(A) = 1
(ii) B = set of letters in the word 'equation' → {e, q, u, a, t, i, o, n}, n(B) = 8
(iii) C = set of vowels in the word 'examination' → {a, e, i, o}, n(C) = 4
(iv) D = set of consonants in the word 'education' → {d, c, t, n}, n(D) = 4
(v) E = {x | x is an even prime number} → {2}, n(E) = 1
(vi) F = {x | x = 5n, n ∈ N, n < 7} → {5, 10, 15, 20, 25, 30}, n(F) = 6
(vii) G = {x | x is a prime factor of 30} → {2, 3, 5}, n(G) = 3
(viii) H = {x | x is a month having 31 days} → {January, March, May, July, August, October, December}, n(H) = 7
(ix) I = {x | x is a day of the week starting with 'S'} → {Saturday, Sunday}, n(I) = 2
(x) J = {x | x is a prime number less than 20} → {2, 3, 5, 7, 11, 13, 17, 19}, n(J) = 8

2. Write cardinal number for each of the following sets:

(i) A = {1, 2, 3, ..., 10} → n(A) = 10
(ii) B = {11, 12, ..., 30} → n(B) = 20
(iii) C = {11} → n(C) = 1
(iv) D = {2, 4, 6, 8, 10} → n(D) = 5
(v) E = {x | x ∈ N, x ≤ 10} → n(E) = 10
(vi) F = {x | x ∈ I, -3 ≤ x ≤ 5} → n(F) = 9
(vii) G = {x | x = 3n, n ∈ N, n ≤ 7} → {3, 6, 9, 12, 15, 18, 21}, n(G) = 7
(viii) H = {x | x = n^2, n ≤ 10} → n(H) = 10
(ix) I = {x | x - 4 < 0, x ∈ N} → {1, 2, 3}, n(I) = 3
(x) J = {x | 2x - 5 ≤ 0, x ∈ W} → {0, 1, 2}, n(J) = 3

3. Let A = {1, 2, 3, 4, 5}, B = {2, 4, 6}, C = {1, 3, 5, 7, 9}, D (not given), E = {a, b, c}. Say True or False:

(i) n(A) = 5 → True
(ii) n(B) = 6 → False
(iii) n(C) = 9 → False
(iv) n(D) = 1 → False
(v) n(E) = 3 → True
(vi) n(A) = n(C) → True
(vii) n(A) = n(D) → False
(viii) n(B) = n(E) → True
(ix) n(C) = n(D) → False
(x) n(A) = n(C) → True

4. Write cardinal number for each of the following sets:

(i) A = letters in the word 'dalda' → {d, a, l}, n(A) = 3
(ii) B = letters in the word 'school' → {s, c, h, o, l}, n(B) = 5
(iii) C = letters in the word 'Calcutta' → {c, a, l, u, t}, n(C) = 5
(iv) D = vowels in the word 'women' → {o, e}, n(D) = 2
(v) E = consonants in the word 'animal' → {n, m, l}, n(E) = 3
(vi) F = consonants in the word 'horse' → {h, r, s}, n(F) = 3
(vii) G = vowels in the word 'common' → {o}, n(G) = 1
(viii) H = two-digit numbers having 7 in their ones place → {17, 27, 37, 47, 57, 67, 77, 87, 97}, n(H) = 9
(ix) I = natural numbers divisible by 7 and less than 50 → {7, 14, 21, 28, 35, 42, 49}, n(I) = 7
(x) J = letters in the word 'puppet' → {p, u, e, t}, n(J) = 4

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MISCELLANEOUS EXERCISE - SETS (Class 6)

1. Which of the following collections are sets?

(i) A collection of good teachers of your school → Not a set
(ii) A collection of multiples of 5 → Set
(iii) A collection of tall boys of your class → Not a set
(iv) A collection of vowels of the word 'picture' → Set ({i, u, e})
(v) A collection of intelligent students of your class → Not a set

2. Let A = {x | x is a letter of the word 'tree'}. Write True or False:

(a) $c \in A$ → False
(b) $m \in A$ → False
(c) $r \notin A$ → False
(d) n(A) = 4 → False
(e) n(A) = 3 → True

3. Write True or False:

(i) A set of the vowels of the word 'member' = {m, c, b, r} → False
(ii) A set of the consonants of the word 'meera' = {m, r} → True
(iii) {1, 2, 3, 4, 5} = {4, 1, 3, 2, 5} → True
(iv) {a, b, c, d, d, c} = {b, a, c, d, e} → False

(v) $\{5, 4, 3\} = \{3, 4, 4, 5, 5\} \rightarrow$ True

4. Write in roster-form:

(i) Natural numbers greater than 50 → {51, 52, 53, 54, ...}
(ii) Whole numbers between 7 and 15 → {8, 9, 10, 11, 12, 13, 14}
(iii) Integers less than 3 → {..., -3, -2, -1, 0, 1, 2}
(iv) Consonants in the word 'animal' → {n, m, l}
(v) Even natural numbers → {2, 4, 6, 8, 10, ...}

5. Write in set-builder form:

(i) Prime numbers less than 15 → $\{x \mid x \in N, x \text{ is prime}, x < 15\}$
(ii) Natural numbers between 10 and 20 → $\{x \mid x \in N, 10 < x < 20\}$
(iii) {1, 4, 9, 16, ...} → $\{x \mid x = n^2, n \in N\}$
(iv) {Tuesday, Thursday} → {x | x is a weekday starting with 'T'}
(v) Cubes of first 5 natural numbers → $\{x \mid x = n^3, n \in N, 1 \leq n \leq 5\}$

6. Give tabular-form:

(i) $\{x \in N \mid x > 100\} \rightarrow \{101, 102, 103, ...\}$
(ii) $\{x \in W \mid x < 10\} \rightarrow \{0, 1, 2, 3, 4, 5, 6, 7, 8, 9\}$
(iii) $\{x \in I \mid -4 < x \leq 3\} \rightarrow \{-3, -2, -1, 0, 1, 2, 3\}$
(iv) $\{x \in N \mid 3x - 9 > 0\} \rightarrow \{4, 5, 6, ...\}$
(v) $\{x \in N \mid 2x - 7 < 0\} \rightarrow \{1, 2, 3\}$

7. Which of the following sets are finite?

(i) {7, 14, 21, ..., 49} → Finite
(ii) {2, 4, 6, ...} → Infinite
(iii) $\{x \mid x \in N, x > 5\} \rightarrow$ Infinite
(iv) $\{x \mid x \in N, x < 51\} \rightarrow$ Finite
(v) $\{x \mid x \in N, x \leq 5\} \rightarrow$ Finite

8. If A = {4, 8, 12, 16}, write another set B whose elements are obtained by subtracting 3 from each element of set A.
B = {1, 5, 9, 13}
Set-builder form: $\{x \mid x = a - 3, a \in A\}$

9. Write the elements of a set A whose elements lie between 5 and 30, are multiples of 7 and not divisible by 2.
A = {7, 21}

10. State True or False:

(i) If A = {x ∈ I | -1 < x ≤ 4} then -1 ∈ A → False
(ii) If A = {x ∈ W | x ≤ 5} then 0 ∈ A → True
(iii) If C = {x ∈ I | -5 ≤ x < 5} then 0 ∈ C → True
(iv) If D = {x ∈ I | 3x - 9 < 0} then 0 ∈ D → True
(v) If E = {x ∈ W | 5x - 3 < 0} then 0 ∈ E → True

11. Which of the following sets are empty?

(i) A = set of natural numbers which are even as well as odd → Empty
(ii) B = set of all even prime numbers → Not Empty ({2})
(iii) C = {x | x is a vowel in the word 'natural'} → {a, u}, Not Empty
(iv) D = set of natural numbers greater than 4 and less than 3 → Empty
(v) E = set of all negative natural numbers → Empty

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CHAPTER TEST 5 - SETS (Class 6)

1. Which of the following collections are sets?

(i) A collection of brilliant students of your class → Not a set
(ii) A collection of mathematics teachers of your school → Set
(iii) A collection of letters of the word 'student' → Set ({s, t, u, d, e, n})
(iv) A collection of natural numbers between 10 and 50 → Set ({11, 12, ..., 49})
(v) A collection of smart boys of your class → Not a set

2. Say True or False:

(i) {3, 4, 5, 6} = {6, 5, 5, 3, 1} → False
(ii) {1, 5, 7, 9} = {9, 7, 1, 5} → True
(iii) {5, 7, 1} = {1, 5, 5, 7, 7} → True
(iv) A set of letters of the word 'again' = {a, g, i, n} → True

3. Insert the appropriate symbol (∈ or ∉):

Let A = {5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29}

(i) $11 \in A$
(ii) $19 \in A$
(iii) $28 \notin A$
(iv) $3 \notin A$
(v) $25 \in A$
(vi) $22 \notin A$

4. Write each of the following sets in roster form:

(i) Natural numbers between 7 and 15 → {8, 9, 10, 11, 12, 13, 14}
(ii) Even natural numbers greater than 50 → {52, 54, 56, 58, 60, ...}
(iii) Prime factors of 48 → {2, 3}
(iv) Vowels in the word 'punctual' → {u, a}

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

(i) Even natural numbers divisible by 5 → $\{x \mid x \in N, x = 10n, n \in N\}$
(ii) Consonants in the word 'Raymond' → {x | x is a consonant in 'Raymond'}
(iii) Prime numbers between 20 and 40 → $\{x \mid x \in N, x \text{ is prime}, 20 < x < 40\}$
(iv) Natural numbers between 15 and 30 → $\{x \mid x \in N, 15 < x < 30\}$

6. Write each of the following sets in roster form:

(i) $\{x \mid x \in N, 3x = 9\} \rightarrow \{3\}$
(ii) $\{x \mid x = 2n, n \in N\} \rightarrow \{2, 4, 6, 8, ...\}$
(iii) $\{x \mid x \in I, x \geq -3\} \rightarrow \{-3, -2, -1, 0, 1, 2, 3, ...\}$
(iv) $\{x \mid x \in W, x < 5\} \rightarrow \{0, 1, 2, 3, 4\}$

7. Write in set-builder form:

(i) $A = \{3, 5, 7, ..., 19\} \rightarrow \{x \mid x \in N, x \text{ is odd}, 3 \leq x \leq 19\}$
(ii) $B = \{..., -2, -1, 0, 1\} \rightarrow \{x \mid x \in I, -2 \leq x \leq 1\}$
(iii) C = Odd numbers less than 11 → $\{x \mid x \in N, x \text{ is odd}, x < 11\}$
(iv) D = Prime factors of 102 → $\{x \mid x \in N, x \text{ is prime}, x \text{ divides } 102\}$

8. Which of the following are empty sets?

(i) Persons who can swim at 100 km/h → Empty
(ii) Natural numbers satisfying $2x - 1 > 0$ → Not Empty
(iii) Integers between 11 and 12 → Empty
(iv) Odd numbers divisible by 7 → Not Empty ({7, 21, 35, ...})
(v) Prime numbers less than 3 → Not Empty ({2})

9. Which of the following sets are infinite?

(i) A = {11, 22, 33, ..., 220} → Finite
(ii) B = {3, 6, 9, ...} → Infinite
(iii) C = {x | x = 2n, n ∈ N} → Infinite
(iv) D = Set of points on a line → Infinite
(v) E = Set of living beings on this earth → Finite

10. Which of the following sets are finite?

(i) A = Set of all children of India → Finite
(ii) B = {x | x ∈ I, x < 10} → Infinite
(iii) C = {x | x ∈ N, 3x ≤ 102} → Finite
(iv) D = Set of ex-prime ministers of India → Finite