

Exercise: 1.3

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Question 1:

Solution:

(i) All natural numbers that end with 0 are even & divisible by 5. Therefore, the given set is not an example of empty set.

(ii) 2 is an even prime number. Therefore, the given set is not an example of empty set.

(iii) There is no rational number whose square is 2 such that $x^2 - 2$. Therefore, it is example of empty set.

(iv) It is not possible that $x < 8$ and, at the same time, $x > 12$. Therefore, it is an example of empty set.

(v) There is no common point in two parallel lines. Therefore, it is an example of empty set.

Question 2.

Solution:

(i) There can be infinite concentric circles in a plane. Therefore, it is an infinite set.

(ii) There are 26 letters in the set of English alphabet. Therefore, it is a finite set.

(iii) $\{x \in N : x > 5\} = \{6, 7, 8, 9, \dots\}$. There will be infinite numbers. So, it an infinite set.

(iv) There are finite elements in the set $\{x \in N : x < 200\}$. Therefore, it is a finite set.

(v) In this set, $x \in Z$, so there would be infinite elements in the set $\{x \in Z : x < 5\}$. Therefore, it is an infinite set.

(vi) In this set, $x \in R$. We know real numbers include all numbers, i.e., decimal numbers, rational numbers and irrational numbers.

So, there would be infinite elements in the set $\{x \in R : 0 < x < 1\}$. Therefore, it is an infinite set.

Question 3.

Solution:

Two sets A & B are equal if every element of A is a member of B & every element of B is a member of A.

(i) $A = \{1, 2, 3\}$

(ii) $B = \{x \in R : x^2 - 2x + 1 = 0\}$ set B would be $\{1\}$.

(iii) $C = \{1, 2, 2, 3\}$

It can be written as $\{1, 2, 3\}$ because we do not repeat the elements while writing the elements of a set.

$$C = \{1, 2, 3\}$$

(iv) $D = \{x \in R : x^3 - 6 \times 2 + 11x - 6 = 0\}$ includes elements $\{1, 2, 3\}$.

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

Hence, we can say that $A = C = D$.

Question 4.

Solution:

Here, $A = B$ because every element of A is a member of B & every element of B is a member of A .

But every element of C is not a member of A and B .

Also, every element of A and B is not a member of C .

Therefore, we can say that these sets are not equal.

Question 5.

Solution:

Two sets A and B are equivalent if their cardinal numbers are equal,

That is,

$$n(A) = n(B) \quad n(A)$$

$$= 3n(B)$$

$$= 5n(C)$$

$$= 3n(D)$$

$$= 5$$

Therefore, equivalent sets are (A and C) and (B and D).

Question 6.

Solution:

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

A is not equal to B because every element of A is not a member of B and every element of B is not a member of A .

$$(ii) A = \{W, O, L, F\}$$

$$\text{And, } B = \{F, O, L, W\}$$

Here, $A = B$ because every element of A is a member of B and every element of B is a member of A .

Question 7.

Solution:

Equal sets:

(a) B and D , because every element of B is a member of D and every element of D is a member of B .

(b) C and F , because every element of C is a member of F and every element of F is a member of C

Equivalent sets:

(a) A , E and H

Since,

$$n(A) = n(E) = n(H) = 2$$

(b) B , D and G

Since,

$$n(B) = n(D) = n(G) = 4$$

(c) C and F

Since,

$$n(C) = n(F) = 3$$

Question 8.

Solution:

$$A = \{1, 2\}$$

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

$$C = \{3, 1\}$$

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

$$E = \{1, 2, 1, 1\} = \{1, 2\}$$

$$F = \{1, 1, 3\} = \{1, 3\}$$

Therefore, $A = B = E$ and $C = D = F$

Question 9.

Solution:

Letters required to spell CATARACT are $\{C, A, T, R\}$. Let this set be denoted as E .

$$E = \{C, A, T, R\}$$

Letters required to spell TRACT are $\{T, R, A, C\}$. Let this set be denoted as F .

$$F = \{T, R, A, C\}$$

The two sets E & F are equal because every element of E is a member of F & every element of F is a member of E .