

## NCERT Solutions Class 12 Maths Chapter 1 Relations and Functions

### Question 1:

Determine whether each of the following relations are reflexive, symmetric and transitive.

- (i) Relation  $R$  in the set  $A = \{1, 2, 3, \dots, 13, 14\}$  defined as  
 $R = \{(x, y) : 3x - y = 0\}$
- (ii) Relation  $R$  in the set of  $\mathbb{N}$  natural numbers defined as  
 $R = \{(x, y) : y = x + 5 \text{ and } x < 4\}$
- (iii) Relation  $R$  in the set  $A = \{1, 2, 3, 4, 5, 6\}$  defined as  
 $R = \{(x, y) : y \text{ is divisible by } x\}$
- (iv) Relation  $R$  in the set of  $\mathbb{Z}$  integers defined as  
 $R = \{(x, y) : x - y \text{ is an integer}\}$
- (v) Relation  $R$  in the set of human beings in a town at a particular time given by
- $R = \{(x, y) : x \text{ and } y \text{ work at the same place}\}$
  - $R = \{(x, y) : x \text{ and } y \text{ live in the same locality}\}$
  - $R = \{(x, y) : x \text{ is exactly } 7\text{cm taller than } y\}$
  - $R = \{(x, y) : x \text{ is wife of } y\}$
  - $R = \{(x, y) : x \text{ is father of } y\}$

### Solution:

(i)  $R = \{(1, 3), (2, 6), (3, 9), (4, 12)\}$

$R$  is not reflexive because  $(1, 1), (2, 2), \dots$  and  $(14, 14) \notin R$ .

$R$  is not symmetric because  $(1, 3) \in R$ , but  $(3, 1) \notin R$ . [since  $3(3) \neq 0$ ].

$R$  is not transitive because  $(1, 3), (3, 9) \in R$ , but  $(1, 9) \notin R$ . [ $3(1) - 9 \neq 0$ ].

Hence,  $R$  is neither reflexive nor symmetric nor transitive.

(ii)  $R = \{(1, 6), (2, 7), (3, 8)\}$

$R$  is not reflexive because  $(1, 1) \notin R$ .

$R$  is not symmetric because  $(1, 6) \in R$  but  $(6, 1) \notin R$ .

$R$  is not transitive because there isn't any ordered pair in  $R$  such that  $(x, y), (y, z) \in R$ , so  $(x, z) \notin R$ .

Hence,  $R$  is neither reflexive nor symmetric nor transitive.

(iii)  $R = \{(x, y) : y \text{ is divisible by } x\}$

We know that any number other than 0 is divisible by itself.

Thus,  $(x, x) \in R$

So,  $R$  is reflexive.

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## **Table of Contents 12th Class Elements Math Solution Thebcn**

1. Understanding the eBook 12th Class Elements Math Solution Thebcn
  - The Rise of Digital Reading 12th Class Elements Math Solution Thebcn
  - Advantages of eBooks Over Traditional Books
2. Identifying 12th Class Elements Math Solution Thebcn
  - Exploring Different Genres
  - Considering Fiction vs. Non-Fiction
  - Determining Your Reading Goals
3. Choosing the Right eBook Platform
  - Popular eBook Platforms
  - Features to Look for in an 12th Class Elements Math Solution Thebcn
  - User-Friendly Interface
4. Exploring eBook Recommendations from 12th Class Elements Math Solution Thebcn
  - Personalized Recommendations
  - 12th Class Elements Math Solution Thebcn User Reviews and Ratings
  - 12th Class Elements Math Solution Thebcn and Bestseller Lists
5. Accessing 12th Class Elements Math Solution Thebcn Free and Paid eBooks

- 12th Class Elements Math Solution Thebcn Public Domain eBooks
  - 12th Class Elements Math Solution Thebcn eBook Subscription Services
  - 12th Class Elements Math Solution Thebcn Budget-Friendly Options
6. Navigating 12th Class Elements Math Solution Thebcn eBook Formats
- ePub, PDF, MOBI, and More
  - 12th Class Elements Math Solution Thebcn Compatibility with Devices
  - 12th Class Elements Math Solution Thebcn Enhanced eBook Features
7. Enhancing Your Reading Experience
- Adjustable Fonts and Text Sizes of 12th Class Elements Math Solution Thebcn
  - Highlighting and Note-Taking 12th Class Elements Math Solution Thebcn
  - Interactive Elements 12th Class Elements Math Solution Thebcn
8. Staying Engaged with 12th Class Elements Math Solution Thebcn
- Joining Online Reading Communities
  - Participating in Virtual Book Clubs
  - Following Authors and Publishers 12th Class Elements Math Solution Thebcn
9. Balancing eBooks and Physical Books 12th Class Elements Math Solution Thebcn
- Benefits of a Digital Library
  - Creating a Diverse Reading Collection 12th Class Elements Math Solution Thebcn
10. Overcoming Reading Challenges
- Dealing with Digital Eye Strain
  - Minimizing Distractions
  - Managing Screen Time
11. Cultivating a Reading Routine 12th Class Elements Math Solution Thebcn
- Setting Reading Goals 12th Class Elements Math Solution Thebcn
  - Carving Out Dedicated Reading Time
12. Sourcing Reliable Information of 12th Class Elements Math Solution Thebcn
- Fact-Checking eBook Content of 12th Class Elements Math Solution Thebcn
  - Distinguishing Credible Sources
13. Promoting Lifelong Learning
- Utilizing eBooks for Skill Development

- Exploring Educational eBooks
14. Embracing eBook Trends
- Integration of Multimedia Elements
  - Interactive and Gamified eBooks

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