

## Chapter 1: Relations and Functions (I) – Lesson Plan [TMA]

### Objectives:

- Understand the definition of relation and function and the various terms associated with these two concepts
- Recognise various types of functions and their graphical representations
- Perform operations on real functions

### Why do we need to learn Relations and Functions?

In earlier grades, we have mapped real-world scenarios onto mathematical functions and then solved these functions to arrive at solutions for these real-world problems. We have learnt about and used functions in different forms: through graphs (e.g. finding speed from the slope of a distance-time graph), through equations (e.g. finding the cost of an item, given the relationship between number of items and total cost) and through formulae (e.g. finding the final velocity of a body, given its initial velocity, acceleration and time taken)

In this chapter, we take a step back and understand the mathematical definition and representation of these concepts of relation and function. We learn to identify a specific kind of relation that can actually be called a function, get familiar with some special functions and also learn to perform arithmetic operations on functions.

### Before we begin:

Terms	Methods
<ul style="list-style-type: none"><li>• Cartesian coordinates</li><li>• Sets</li></ul>	<ul style="list-style-type: none"><li>• Roster and Set Builder Notation for sets</li><li>• Plotting a given function in the Cartesian Coordinate system</li></ul>

Lesson:

Content	Teacher	Student	Assignments
2.1 Cartesian product of two sets	<ul style="list-style-type: none"> <li>• Introduce the concept of an ordered pair <math>(x, y)</math> with reference to the representation of Cartesian coordinates</li> <li>• Explain how to find the Cartesian product of two sets and calculate the number of elements in the product</li> <li>• Show how the cartesian product <math>R \times R</math> represents all the points on a 2-D plane and <math>R \times R \times R</math> represents all the points in 3-D space.</li> </ul>	<ul style="list-style-type: none"> <li>• Calculate the cartesian product of two sets</li> </ul>	Worked Examples, Ex 2.1
2.2 Relations	<ul style="list-style-type: none"> <li>• Introduce the idea of a Relation and provide a mathematical definition and representation for a Relation</li> <li>• Through examples, introduce the terms: domain, range and co-domain</li> </ul>	<ul style="list-style-type: none"> <li>• Find the elements of a defined relation, its domain, range and co-domain</li> </ul>	Worked Examples, Ex 2.1
2.3, 2.4 Functions	<ul style="list-style-type: none"> <li>• Introduce the definition of a function as a special type of relation</li> <li>• Define real valued functions through examples and help the student identify real valued functions, their domain, range and co-domain</li> <li>• Illustrate the pictorial representation of functions</li> </ul>	<ul style="list-style-type: none"> <li>• Identify functions represented both pictorially and in Set notation</li> </ul>	Worked Examples, Ex 2.2
	<ul style="list-style-type: none"> <li>• Revisit function notation <i>e.g.</i> <math>f(x) = 2x + 7</math> and explain how the domain and range of a given function can be determined</li> <li>• Explain how functions can be identified from their graphical representation (vertical line test)</li> </ul>	<ul style="list-style-type: none"> <li>• Determine the domain and range of a given real valued function</li> <li>• Determine if a given graph represents a function</li> </ul>	Worked Examples, Ex 2.3, Ex 2.4

2.5 Special Functions	<ul style="list-style-type: none"> <li>• Through examples and graphical representations using Geogebra, help students plot and identify some special functions</li> <li>• Explain the applications of some special functions</li> </ul>	<ul style="list-style-type: none"> <li>• Identify, plot and understand the applications of some special functions</li> </ul>	Worked Examples, Ex 2.5
2.6 Operations on real functions	<ul style="list-style-type: none"> <li>• Explain how real functions can be added, subtracted, multiplied and divided</li> <li>• Provide a few real-world examples of such operations on functions</li> </ul>	<ul style="list-style-type: none"> <li>• Add, subtract, multiply and divide two real functions</li> </ul>	Worked Examples, Ex 2.6
Review Terminal Exercise questions and past TMA questions			
Test and Error Analysis			Combine "Sets" with this topic for the test