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YEAR 11 MATHEMATICS

ADVANCED
FUNCTIONS

Level 5, Suite 7 / 11 The Boulevarde, Strathfield 2135
(02) 8012 8488
enquiry@skyedu-hsc.com

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Chapter 1. Introduction to Functions

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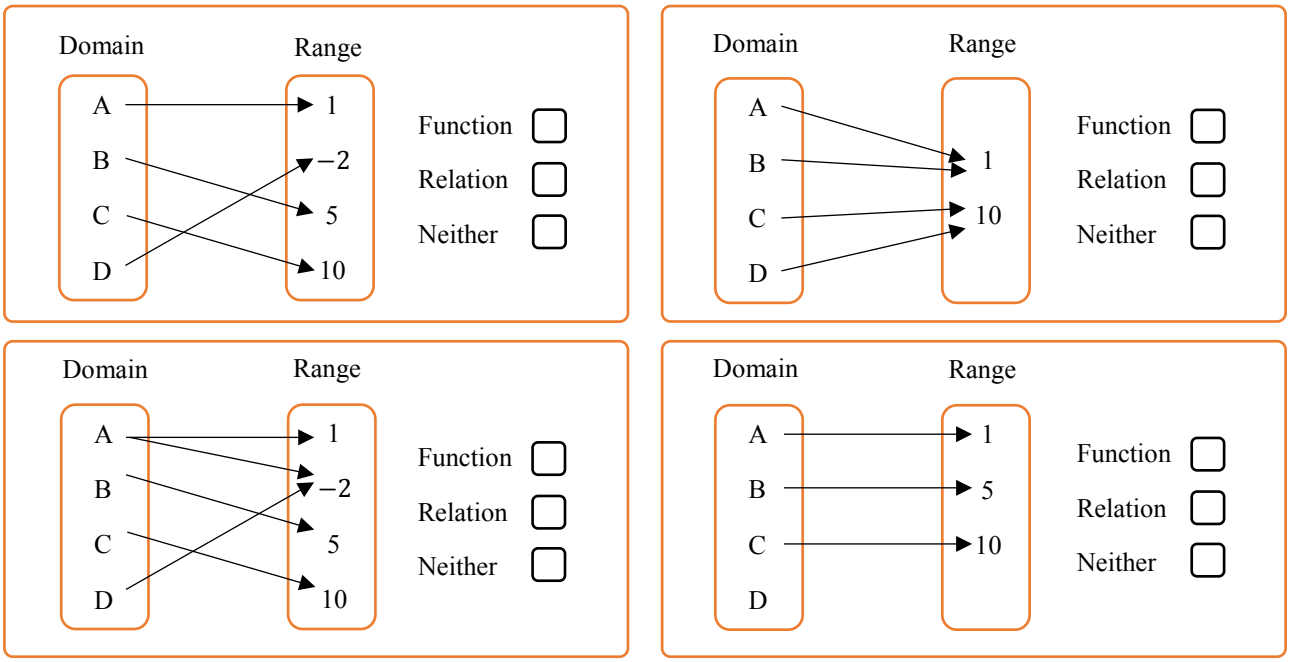
1.1 Functions and Relations

The mathematical language, notation and functionality concepts that will be introduced in this chapter will continue to be used throughout all subsequent chapters.

A "relation" is just a relationship between sets of information. Think of all the people in a class, and think of their test marks. The pairing of names and marks is a relation. In relations and functions, the pairs of names and marks are "ordered", which means if names come first then marks come second and vice versa. To put it another way, we could set up this pairing so that either you give me a name, and then I give you that person's mark, or else you give me a mark, and I give you the names of all the people who have that mark. The set of all the starting points is called "the domain" and the set of all the ending points is called "the range." The domain is what you start with; the range is what you end up with. The domain is the x's; the range is the y's. (We will learn more on the subject of determining domains and ranges later.)

A function is a "well-behaved" relation. When we say that a function is "a well-behaved relation", we mean that, given a starting point, we know exactly where to go; given an x, we get only and exactly one y.

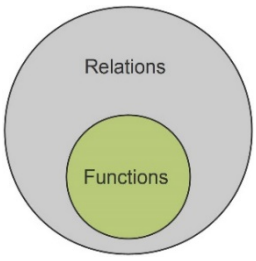
The relation "mark indicates name" is not well-behaved. It is not a function. Given the relationship (x, y) = (mark, name), there might be different possibilities for y= "name". For a relation to be a function, there must be *only and exactly* one y that corresponds to a given x. Here are some mappings of this:



In summary

- An ordered pair is a set of inputs and outputs and represents a relationship between the two values.
- A function is a set of ordered pairs in which every x values is paired to a unique y value.
- A relation is any set of ordered pairs.

So all functions are relations.



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