RELATION

A WHAT IS A RELATION?

Definition Relation

A **relation** describes how two variables (quantities) are connected.

In mathematics, we often use the letters x and y to represent variables. A *variable* is a quantity that can take different values.
In other contexts, we often use the first letter of the name of the quantity. For example, the variable time is represented by the letter t.

Ex: We study the height of a child at different ages.
State the two variables.

Answer:

- Time in years: this is the variable t. It changes as the child gets older.
- Height of the child in cm: this is the variable h. It tells us how tall the child is.

B TABLES

Definition Table

A **table** is used to organize data so that it is easier to display and study the relationship between variables. Usually, one row (or column) is used for the first variable and another row (or column) for the second variable.

Ex: Hugo's height as a function of age is given by the following table:

t (years)	0	1	2	3	4	5	6
h (cm)	52	67	78	86	98	106	115

What is Hugo's height at 4 years old?

Answer: Hugo's height at 4 years old is 98 centimeters.

C GRAPHS

Definition Graph

A **graph** of a relation is the set of points (x, y) in a coordinate plane. The first coordinate x is placed on the horizontal axis, and the second coordinate y on the vertical axis.

Definition Line Graph

A **line graph** of a relation is a graph where the points (x, y) are connected by straight line segments, usually from left to right.

Method Plotting a Line Graph from a Table

In a coordinate plane:

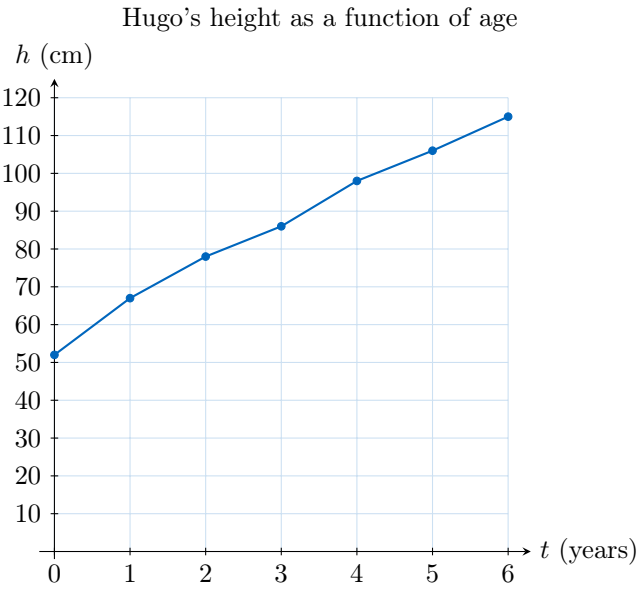
- we plot each point (x, y) from the table,
- we connect the points in order with straight line segments.

Ex: Plot the line graph of Hugo's height as a function of age, using the data below:

t (years)	0	1	2	3	4	5	6
h (cm)	52	67	78	86	98	106	115

Answer:

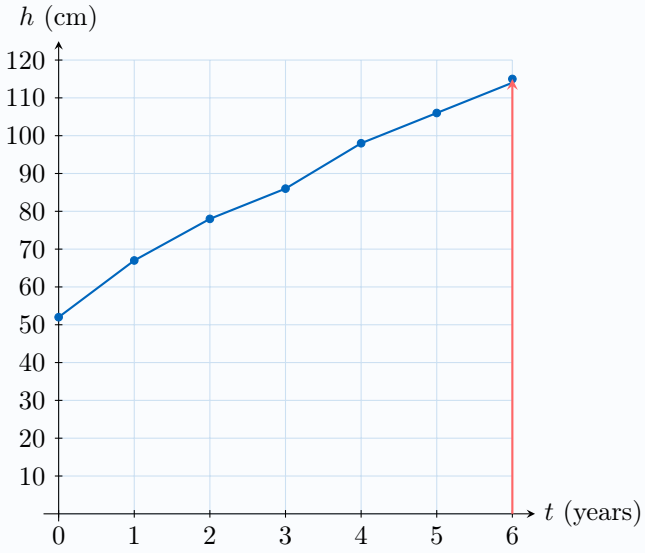
- First, plot the points $(0, 52)$, $(1, 67)$, $(2, 78)$, $(3, 86)$, $(4, 98)$, $(5, 106)$, $(6, 115)$ in a coordinate plane.
- Then, connect the points in order with straight line segments to form the line graph.



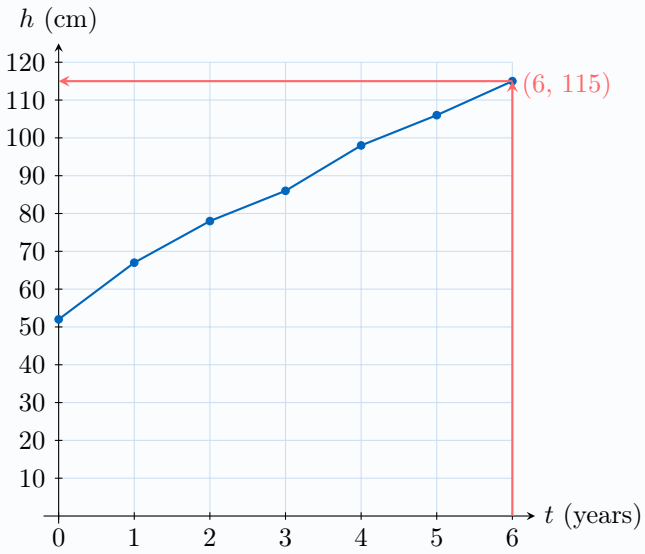
Method **Finding the value of h using a line graph**

To find Hugo's height at $t = 6$ years on the graph, follow these steps:

1. **Locate the t-value:** Find $t = 6$ on the t-axis (horizontal axis).



2. **Move vertically to the graph:** Draw a vertical line upward from $t = 6$ until it meets the line graph.
3. **Read the h-value:** At the intersection point, read the corresponding height h on the vertical axis.



The point you reach is $(6, 115)$, so Hugo's height at 6 years is $h = 115$ cm.