# Function Basics

A **function** is a relation in which there is one output (y) for each input (x). In other words, each x-value is paired with only one y-value.

There are many ways to represent functions such as graph, mapping, tables, and table.

## EXAMPLE 1 Identify Functions

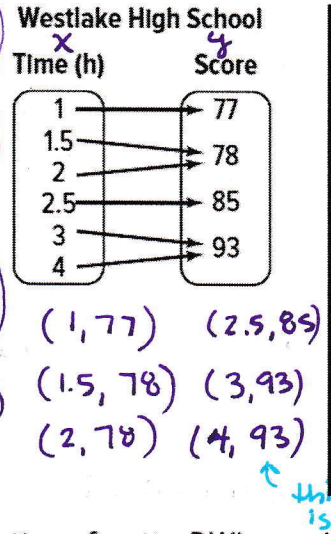
* Look for repeated x-values *

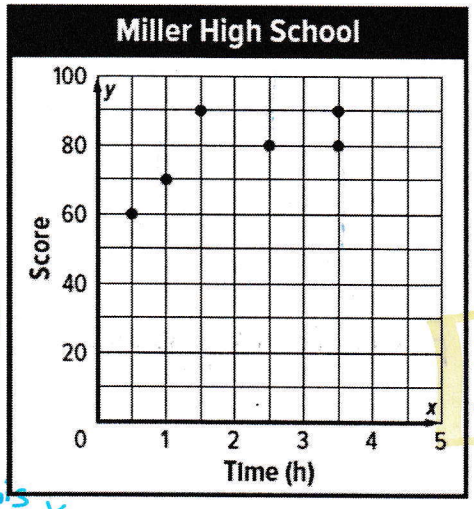
**EXPLORE** Tristan surveyed students at some local high schools. At each school, he asked six students how long they studied for their last exam and the score they received on the exam. His data is shown in the table, mapping, and graph below.

x

| Central High Score | |
|---|---|
| Time (h) | Score |
| 0.5 | 81 |
| 1 | 81 |
| 3 | 92 |
| 1.5 | 75 |
| 2 | 90 |
| 1.5 | 94 |

y




x | y
0.5, 60
1, 70
1.5, 90
2.5, 80
3.5, 80
3.5, 90

**a. USE A MODEL** For each school, is the relation a function? Why or why not?

Central: Not a Function, when x=1.5, it has two different y's.
Westlake: Function, each x has only 1 y.
Miller: Not a Function. X=3.5 has different y's

**b. CRITIQUE REASONING** Tristan surveyed six students at Chavez High School, and wrote the data as this set of ordered pairs: {(3, 87), (4, 98), (2.5, 70), (1.5, 70), (0.5, 67), (3, 81)}. He claimed that the relation is not a function, but he said that he could change just one input value or one output value and make it a function. Do you agree with Tristan? Explain. ↖ x ↖ y

If you change an x-value, it would be a function.
If you change y-value, you'd have to make it match.

*Checkpoint* **Tell whether the pairing is a function.**

| Input $x$ | 5 | 5 | 10 | 15 |
|---|---|---|---|---|
| Output $y$ | 3 | 4 | 6 | 8 |

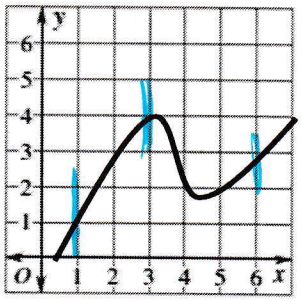
Not A Function

| Input $x$ | 0 | 4 | 12 | 20 |
|---|---|---|---|---|
| Output $y$ | 3 | 5 | 9 | 13 |

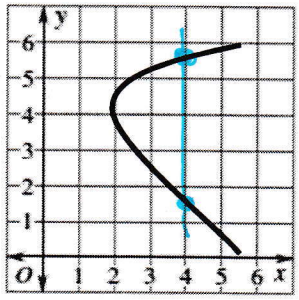
Function

The **vertical line test** is a way to check whether a graph represents a function. If there is a vertical line that intersects the graph in more than 1 point, then the graph is NOT a function. Otherwise, the relation is a function.

**Tell whether each graph is a function.**




Function: passes VLT




Not a Function: Failed VLT

A graph that consists of points that are not connected is a **discrete function**. A function with a graph that is Solid line or a smooth curve is a **continuous function**. Continuous does NOT mean that is has arrows.

## EXAMPLE 2 Graph a Function

Tickets to the county fair cost $5 each.

a. **USE A MODEL** Make a graph that shows the relationship between the number of tickets you buy and the total cost of the tickets.

b. **USE A MODEL** Is the relation a function? Explain.

Yes, passes VLT

c. **COMMUNICATE PRECISELY** Is the function a discrete or continuous function? Why? Use the real-world context to explain why your answer makes sense.

Discrete, you can only buy whole numbers of tickets.