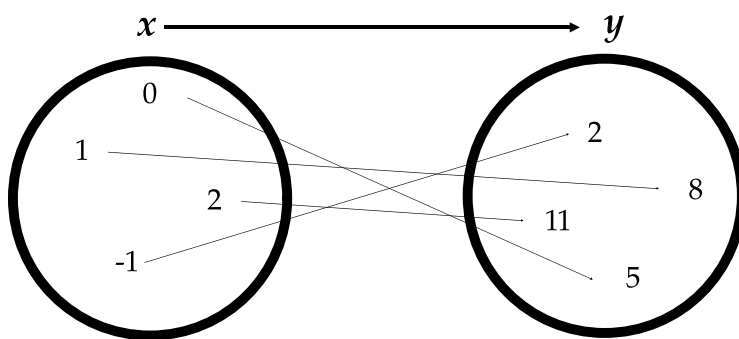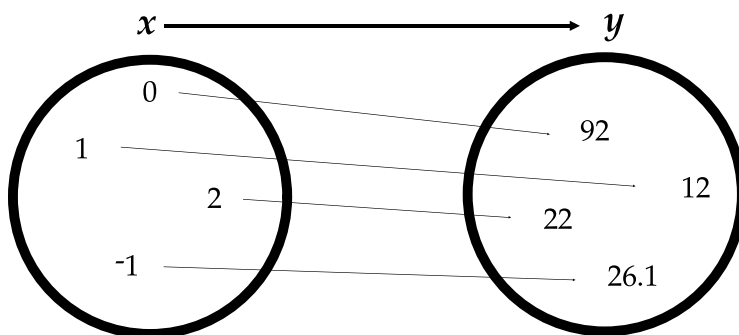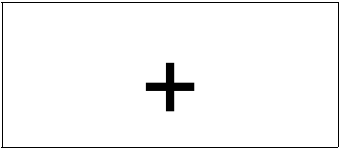# Appendix **4**
Functions and Maps

Maps

We can illustrate a function with a **map.** A map is a diagram of the x's and y's with each x connected to its correct y. The connection is shown by an arrow to remind you that x is first and y is the answer. The rule determines which x goes to which y.

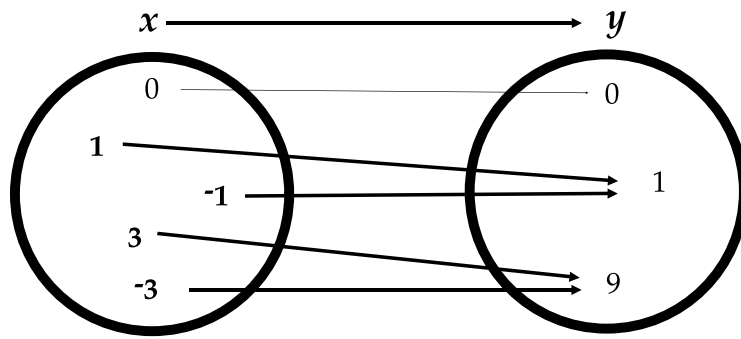We can draw a map from a list of pairs, even if we do not know the rule:

Pairs are: (0, 92), (1, 12), (2, 22), and (-1, 26.1)

Here is a map of the function x^2:

$x \longrightarrow y$

x		y
0		0
1		
-1		1
3		
-3		9

With some functions, different x's are mapped to the same y.

Maps that are Not Functions

Not all maps or lists of pairs are functions. By our previous definition, *the rule had to give the same answer for x each time.* In the game, this means that if 1 is given as x once or several times, the answer will always be the same. *Each x can have only one y as an answer.* We must understand, however, that the chart may have two x's which share the same y.

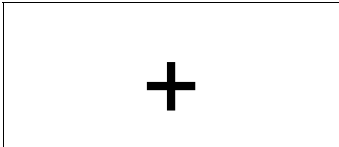The following chart does *not* represent a function because 0 has two *different* answers:

x	y
0	5
1	8
0	11
2	2

The corresponding map looks like this:

$x \longrightarrow y$

x		y
2		2
1		8
0		11
		5
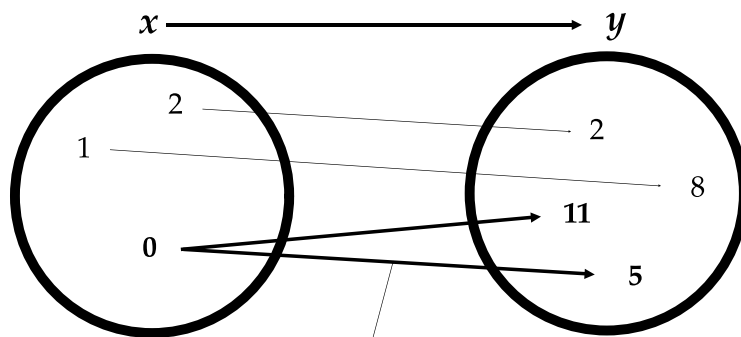
Cannot be a function

Here is an illustration of what is *not a function*:

- A *table*, **where an** x **has more than one** y**:**

x	y
0	5
1	**8**
2	11
1	**17**

These are *not* functions.

- **A list of** *ordered pairs***, where an** x **has more than one** y**:**

$(0, 5)$, **(1, 8)**, $(2, 11)$, **(1, 17)**

- **A** *map***, where an** x **is paired with more than one** y**:**
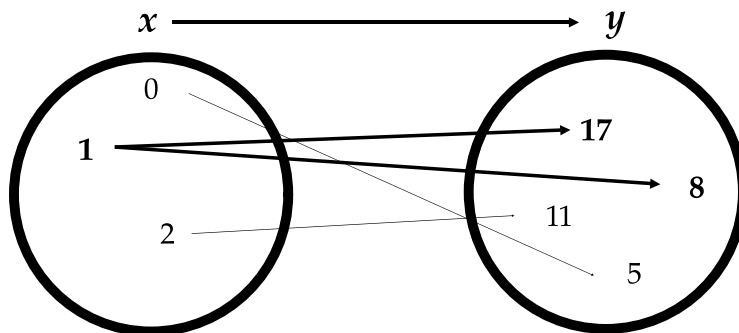
- **A machine, where the rule is not the same every time:**

Rule:

$x + 1$

or

$-x + 2$

+
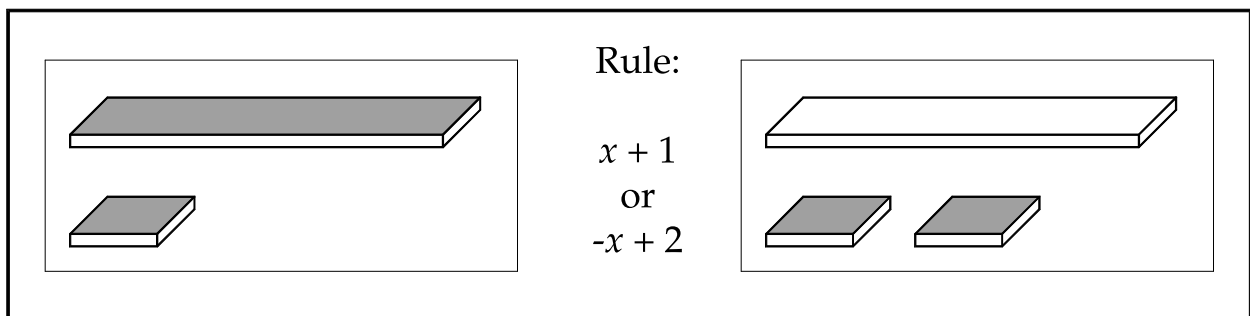
Finish the tables:

1. $y = 3x^2$

x	y
-5	75
5	?
10	?
3	?
1	?
-1	?

2. $y = x + 2x + 1$

x	y
-1	-2
0	1
1	?
3	?
2	?
-5	?

3. $y = -x + x$

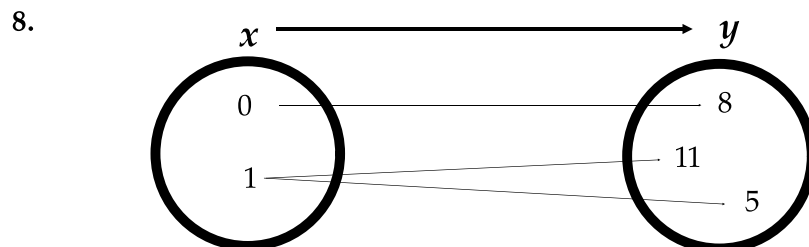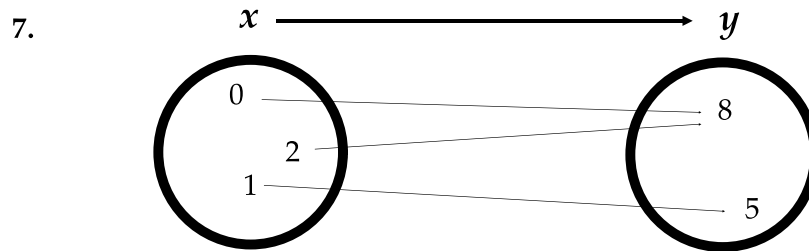| x	y
6	0
-4	?
0	?
2	?
-3	?
17	?

Draw a map for each list of ordered pirs:

4. (0, 5), (1, 6), (2, 7), (3, 8)

5. (0, 5), (3, 5), (-3, 5), (16.3, 5)

6. $(-3, 11), (6, \sqrt{17}), \left(\dfrac{3}{2}, 5\right)$

Which of the following maps or charts are functions?

7.

8.

9. $x = 3y^2$

x	y
75	-5
75	5
300	10
12	2
0	0
-1	?

10.

x	y
1	17.5
0	17.5
1	17.5
3	17.5
2	17.5
5	17.5

11.

x	y
6	-6
6	4
6	³⁄₂
6	6
1	5
-1	5