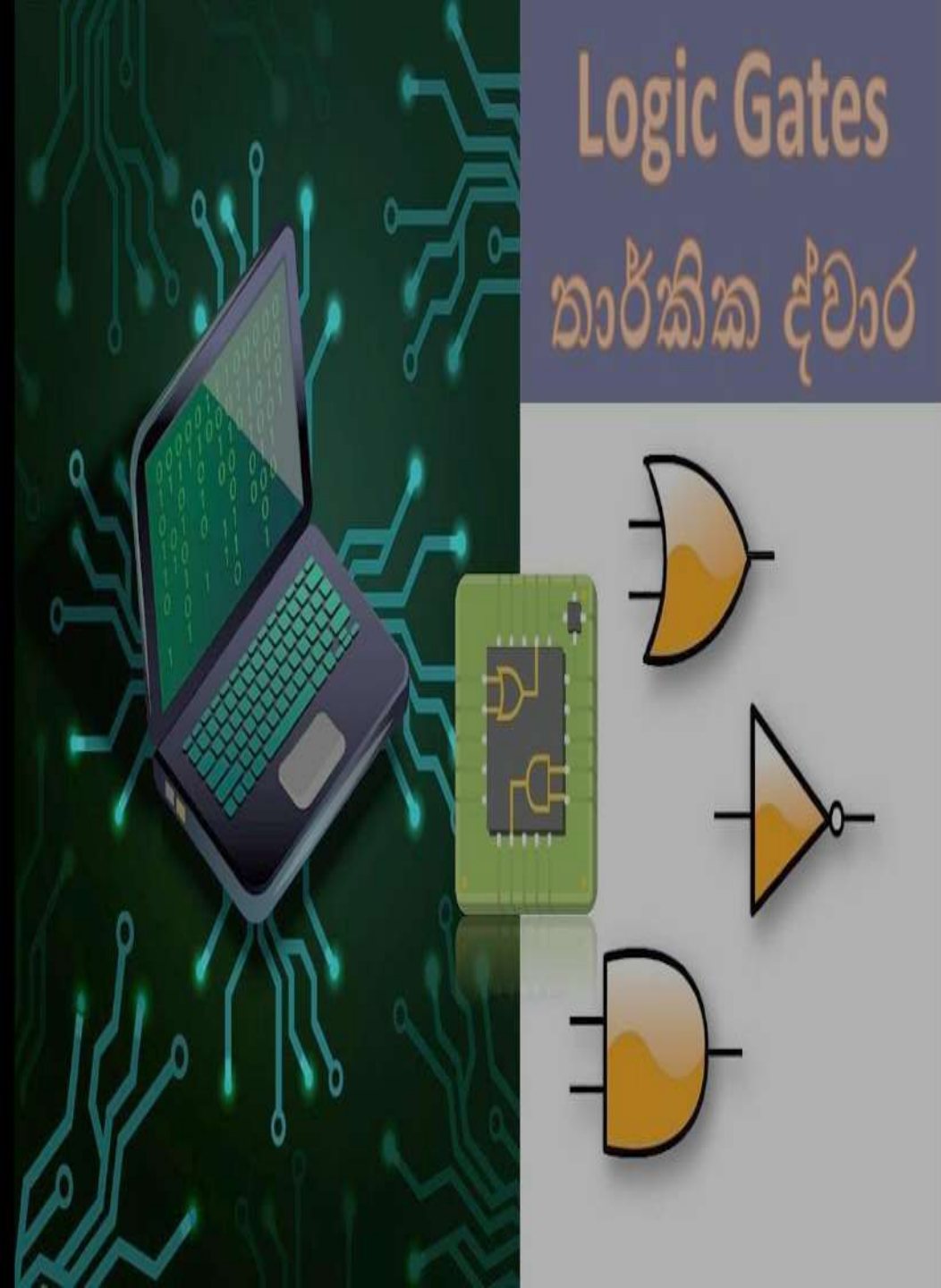


Logic Gates  
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# Physical Computing

5<sup>th</sup> Lesson  
Grade 08



**At the end of the lesson, you will be able to**

- Identify Basic logic gates
- Connecting logic gates in circuits

# What is Logic Gate ?

- Logic gates are the **building blocks of digital circuits**.
- They perform logical operations based on inputs to produce specific outputs.
- Logic gates are used in computers, calculators, and many other devices to process data.
- There are three types of basic logic gates.
  - ❖ AND Gate
  - ❖ OR Gate
  - ❖ NOT Gate

Let us consider the following analogy to understand function of the AND gate.

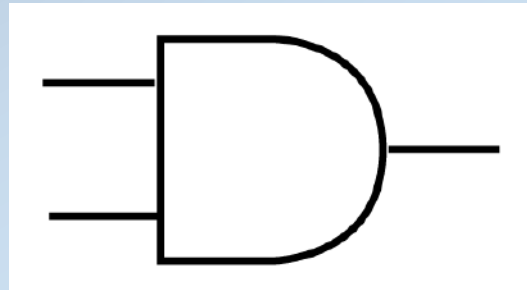
The following diagram of a water tank in a house is to fill water without overflowing. Two valves are used to prevent water waste.



Figure 5.1 : Analogy for AND gate

# AND Gate

- The AND gate produces an output of **1** (True) only when **both inputs** are **1**.
- **Symbol:**  
A symbol resembling a D-shape represents the AND gate.



- **Truth Table:**

- Truth Table:

Input A	Input B	Output
0	0	0
0	1	0
1	0	0
1	1	1

**Example:** Think of a light that only turns on when **both switches** are turned on.

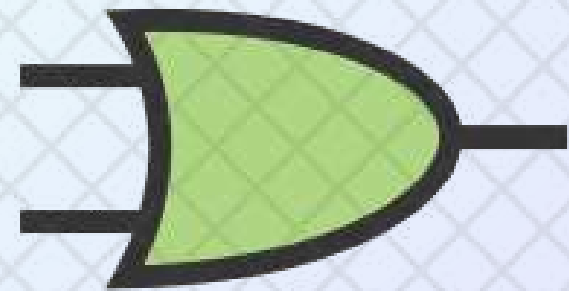
# Questions

1. What are Logic Gates?
2. Name the three of basic logic gates?
3. What is the output of an AND gate if the inputs are 1 and 0?
4. How are circuits constructed using logic gates?





# OR GATE



- Let us consider the following analogy to understand the function of the OR gate. As shown in the illustration below, the house has a water tank in addition to the regular main water supply. The tank is to ensure uninterrupted water supply. There are two valves **A** and **B**.

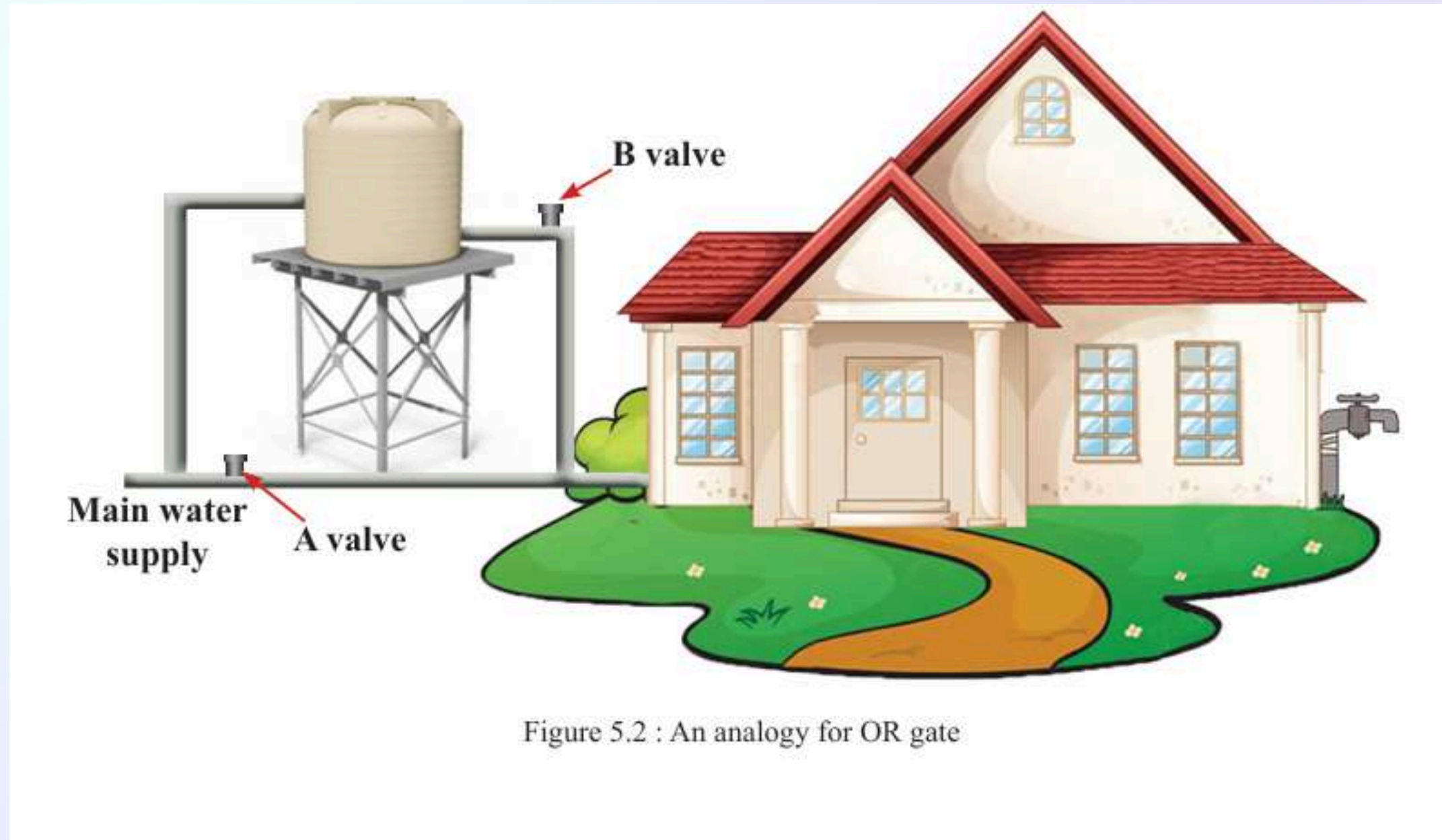
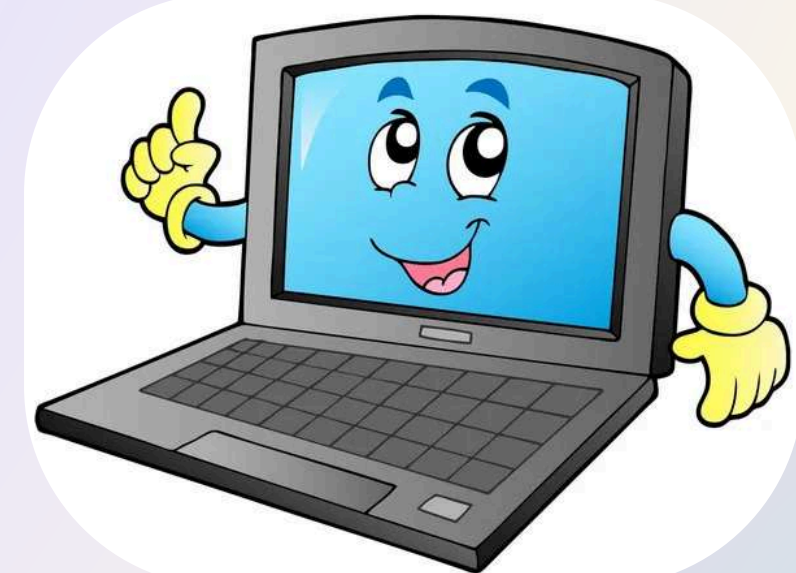


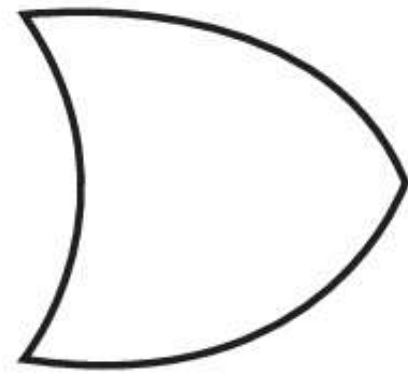
Figure 5.2 : An analogy for OR gate



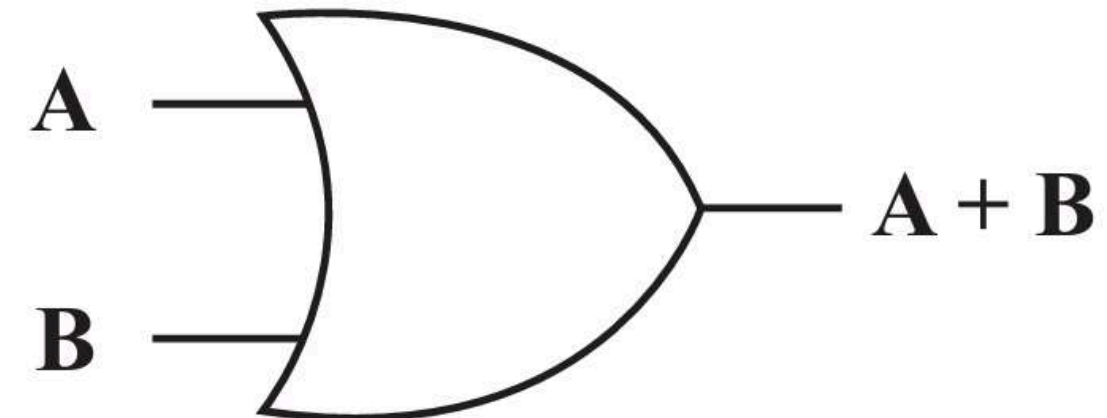
- The following table shows if the house receives water or not based on whether A and B gates are open or closed

A valve	B valve	Water supply to house
Closed	Closed	does not receive water
Closed	Open	receives water
Open	Closed	receives water
Open	Open	receives water





The standard symbol of the OR Gate



When A and B are inputs

## Truth Table of OR Gate

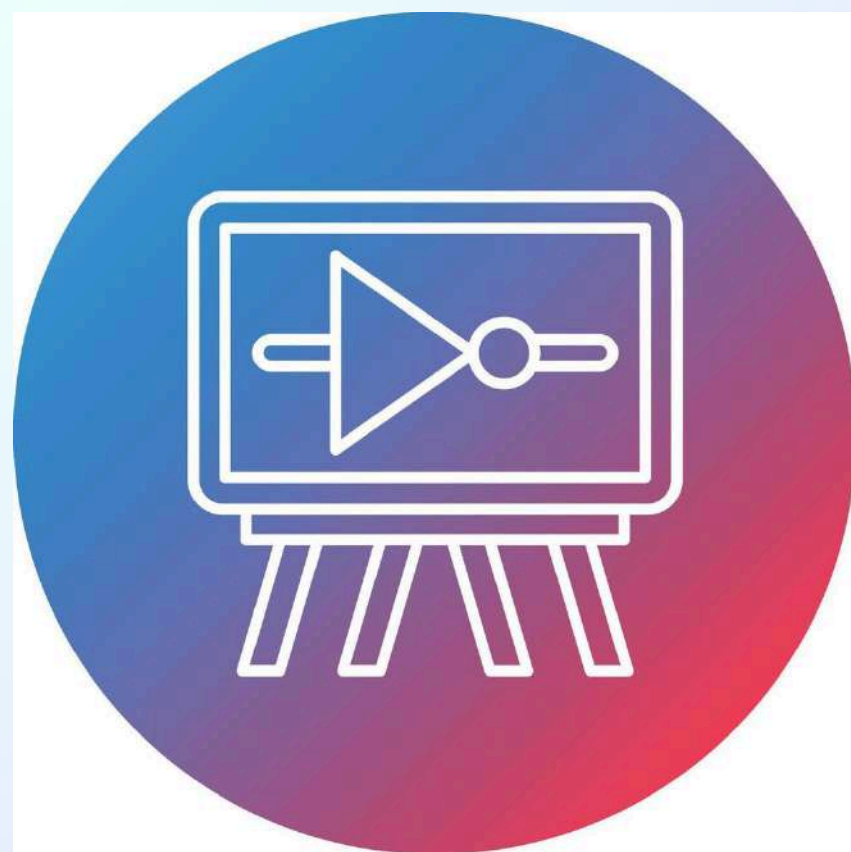
A	B	A+B
0	0	0
0	1	1
1	0	1
1	1	1

**Output of OR Gate is state '1' when at least one input is in '1' state**





# NOT GATE





- Let us consider the following analogy to understand the function of NOT gate. It shows a street with streetlamps that are switched off during day time and switched on at night.

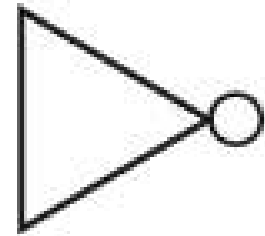


Figure 5.3 : Lighting street lamps automatically

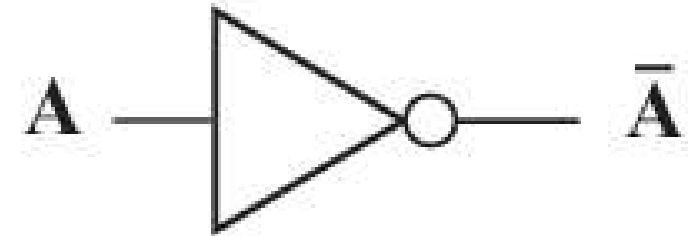
Sunlight	Electric lamp
available	OFF
unavailable	ON



## ***The symbol of NOT gate ;***



Standard Symbol of NOT gate



When A is its input

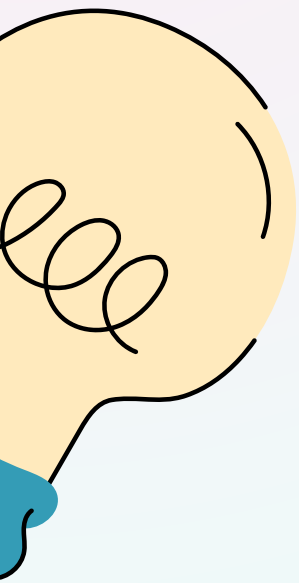
## ***Truth Table of NOT Gate;***

**INPUT**

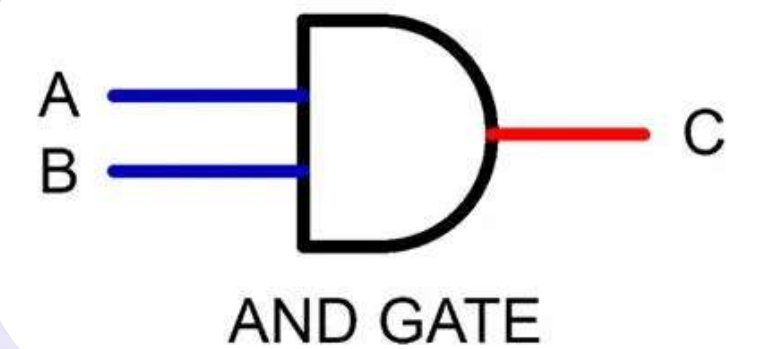
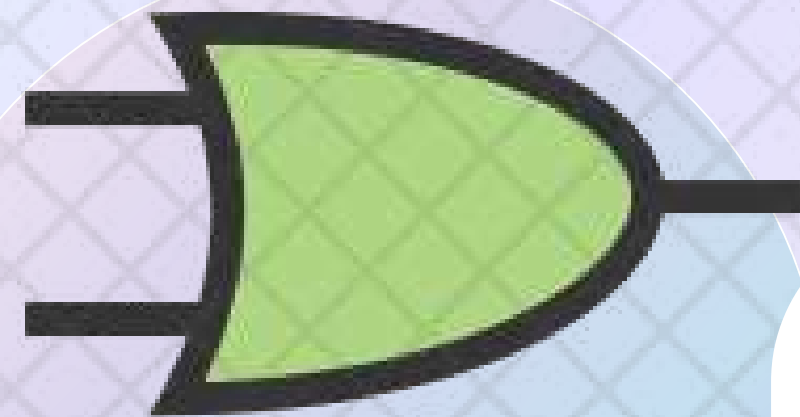
**OUTPUT**

A	$\bar{A}$
1	0
0	1

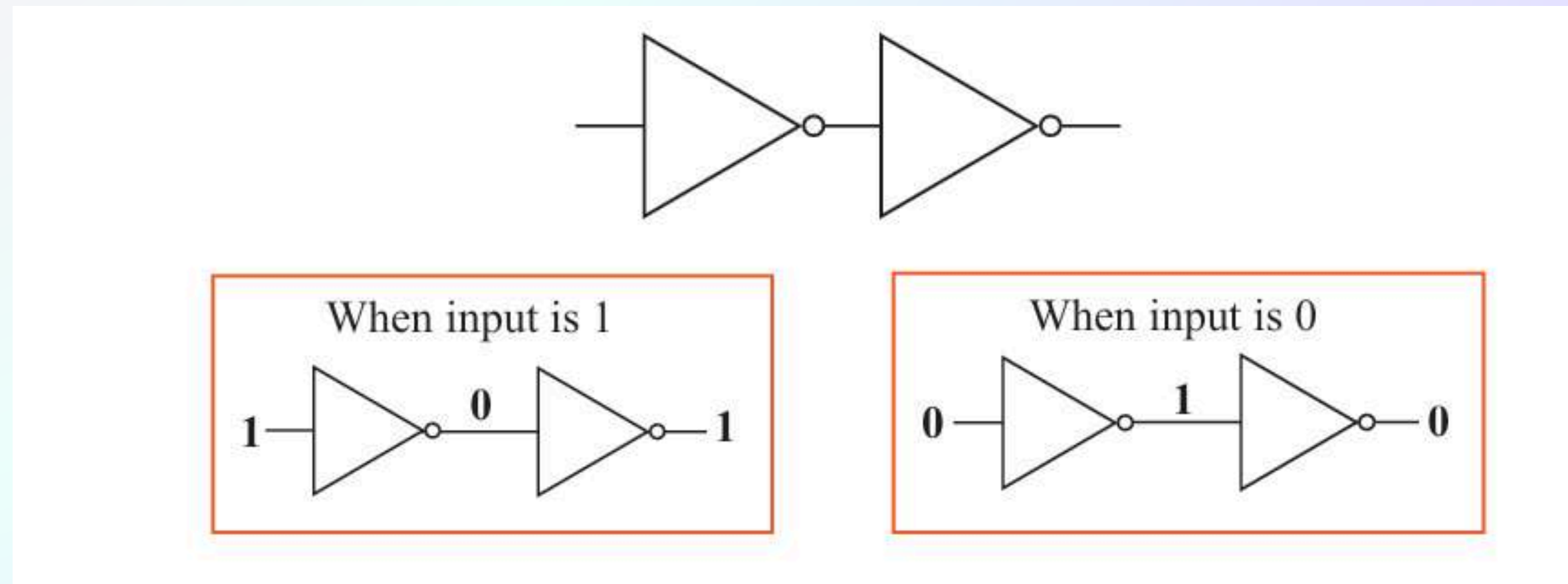




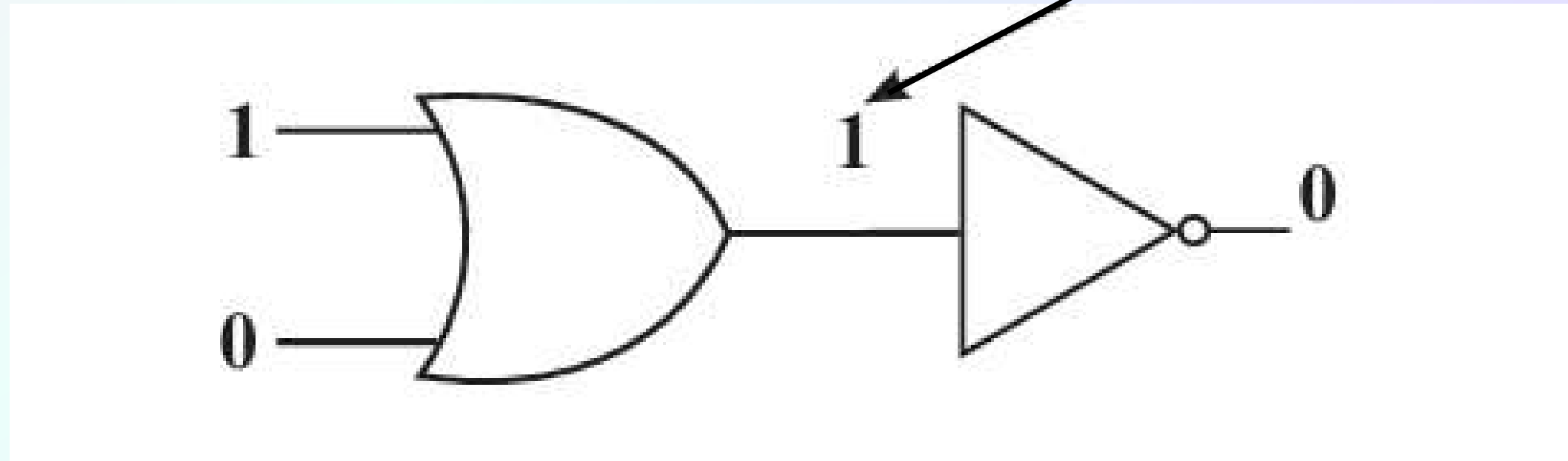
# Connecting logic gates in circuits



- Obtaining output from the circuit below where input is 1 or 0.



- Obtaining the relevant output according to the input given.
- In OR gate, the inputs are added to give the output  $(1 + 0 = 1)$





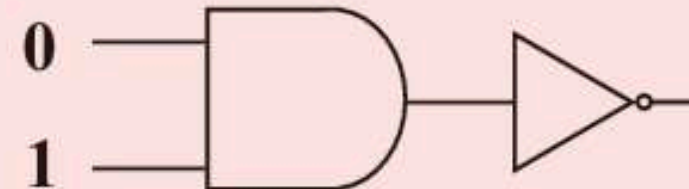
# ACTIVITY TIME

## Activity 5.1

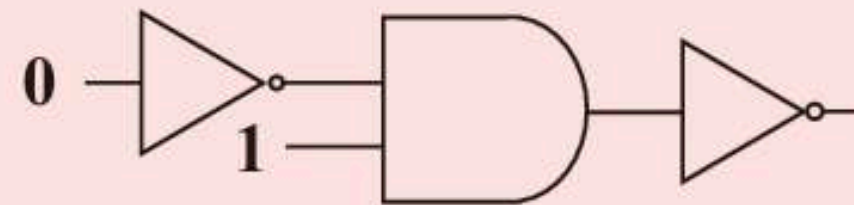


In the circuits given below, write the output for the given input.

1.



2.



3.

