SUPERPOSITION THEOREM

CIRCUIT ANALYSIS METHOD

prepared by:

Gyro A. Madrona

Electronics Engineer

TOPIC OUTLINE

Analogy

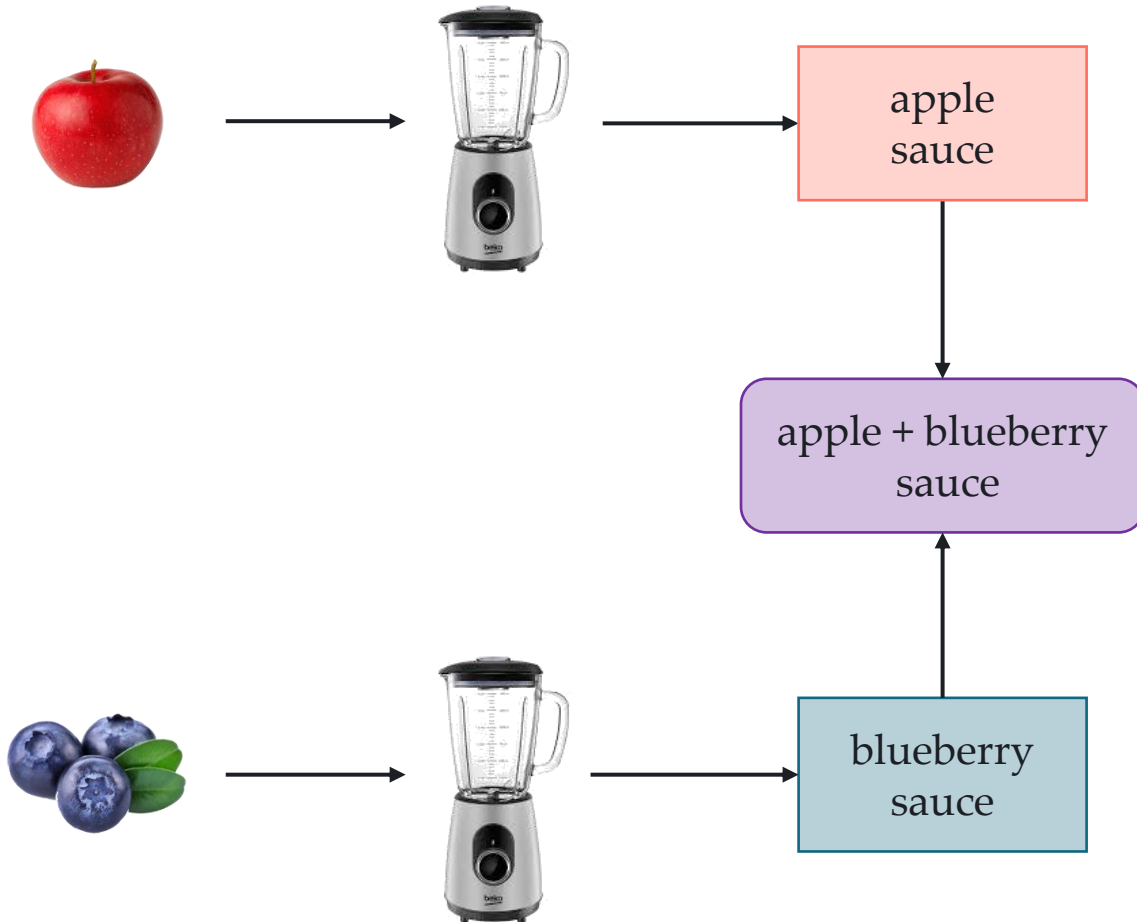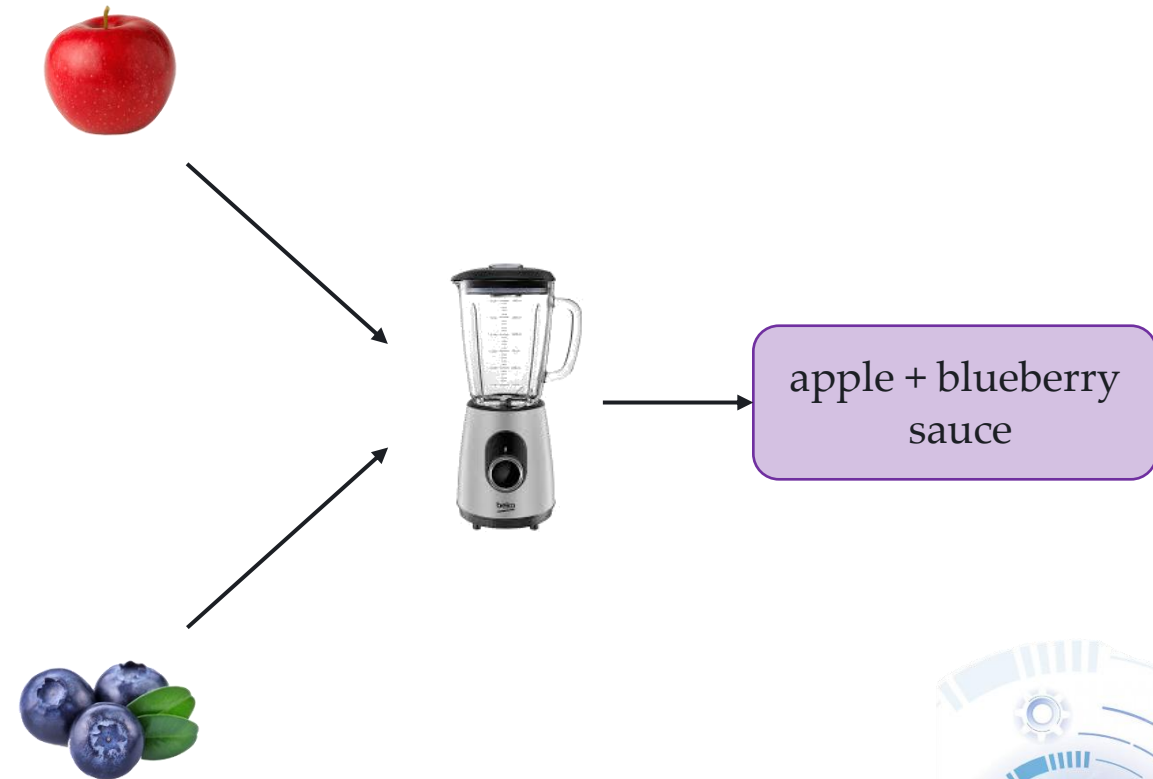**Superposition Theorem**

Linear Circuits

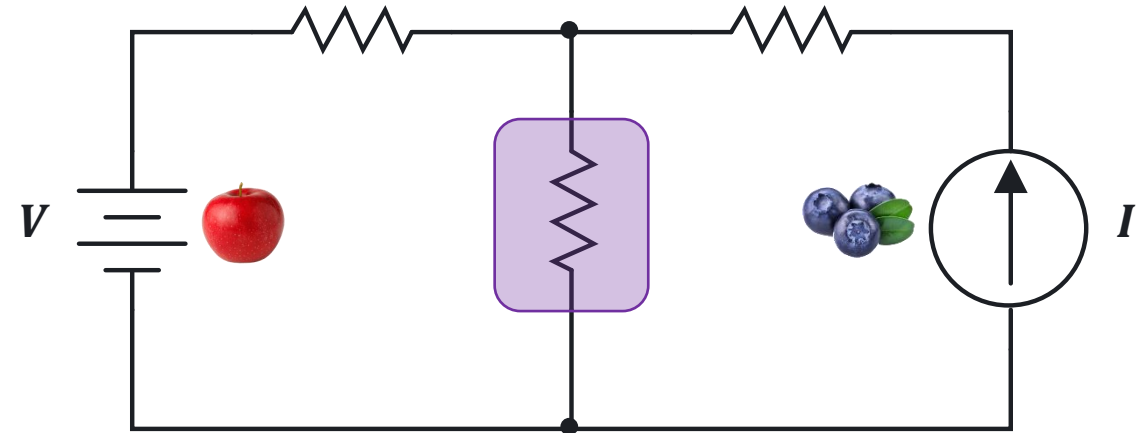# SUPERPOSITION THEOREM
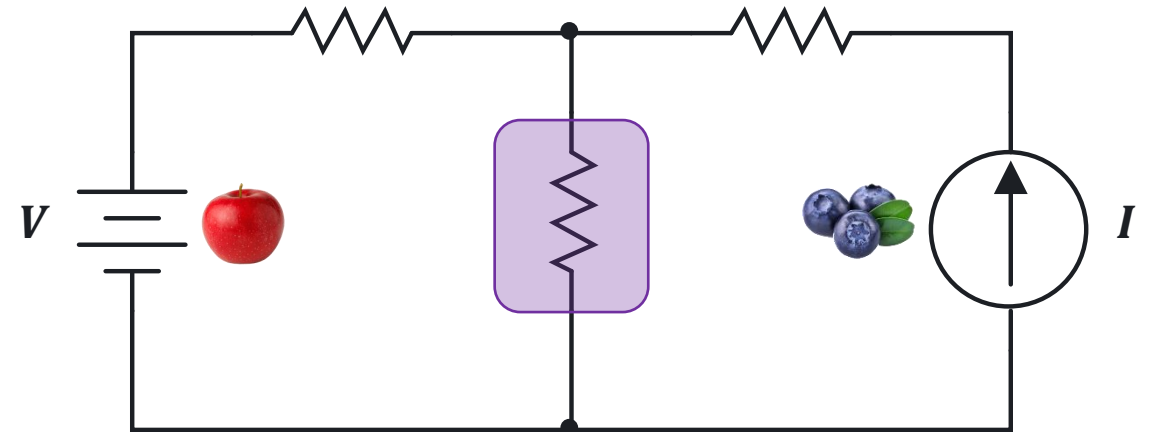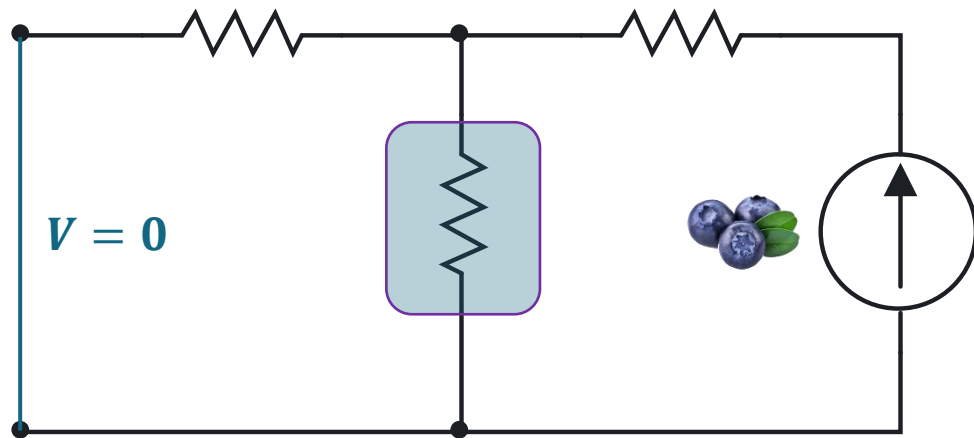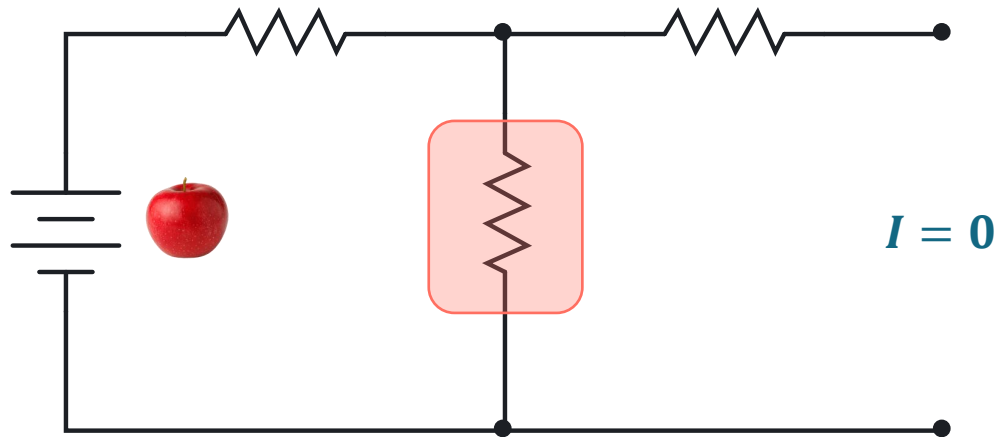
ANALOGY

Method 1:

Method 2:

SUPERPOSITION THEOREM

Superposition theorem states that the output of a **linear circuit** is determined by **summing up** the responses of each source **acting alone** (set other source(s) to zero).

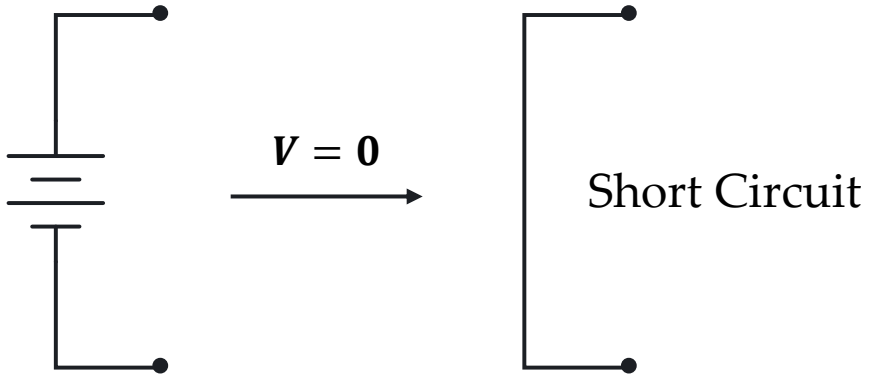# SUPERPOSITION THEOREM

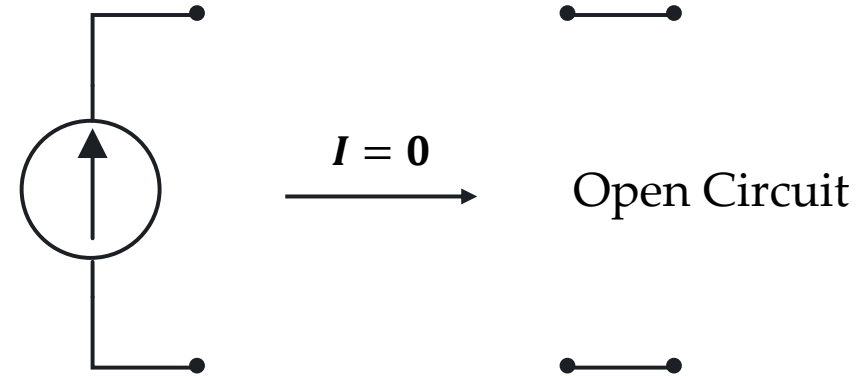$I = 0$

$V = 0$

V

I

SET SOURCE TO ZERO

Voltage Source

Replace with **short** circuit equivalent.

$V = 0$ → Short Circuit

Current Source

Replace with **open** circuit equivalent.

$I = 0$ → Open Circuit

LINEAR CIRCUITS

A circuit is linear if it satisfies the following properties:

1. **Superposition** (Additivity):

The response to the sum of two inputs is equal to the sum of the responses to each input individually.

$$f(x_1 + x_2) = f(x_1) + f(x_2)$$

2. **Homogeneity** (Scaling):

The response to a scaled input is equal to the scaled response.

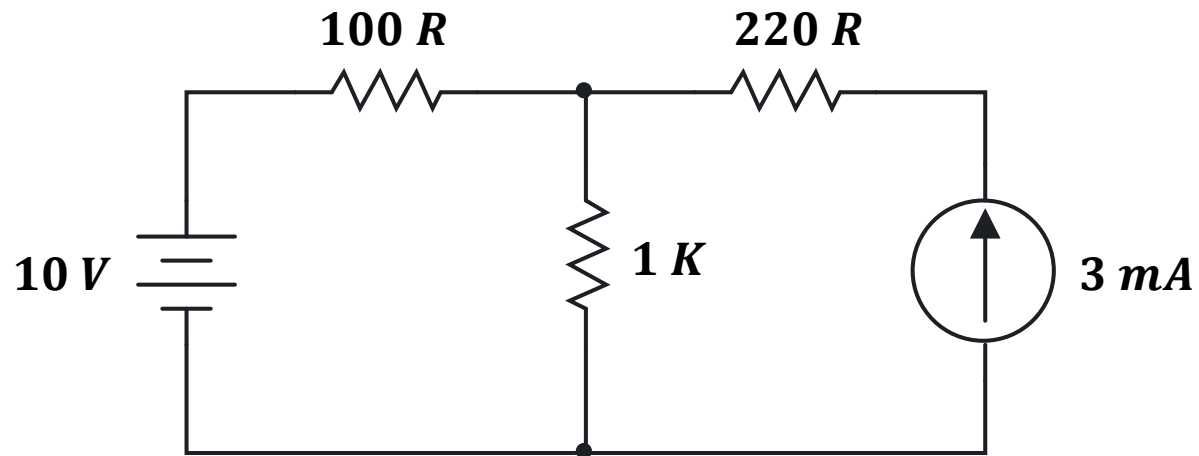$$f(k \cdot x_1) = kf(x_1)$$

Example of linear components:

- Resistors

- Capacitors

- Inductors

EXERCISE

Determine the **voltage** drop of each resistor, the

current that pass through each resistor, and the **total**

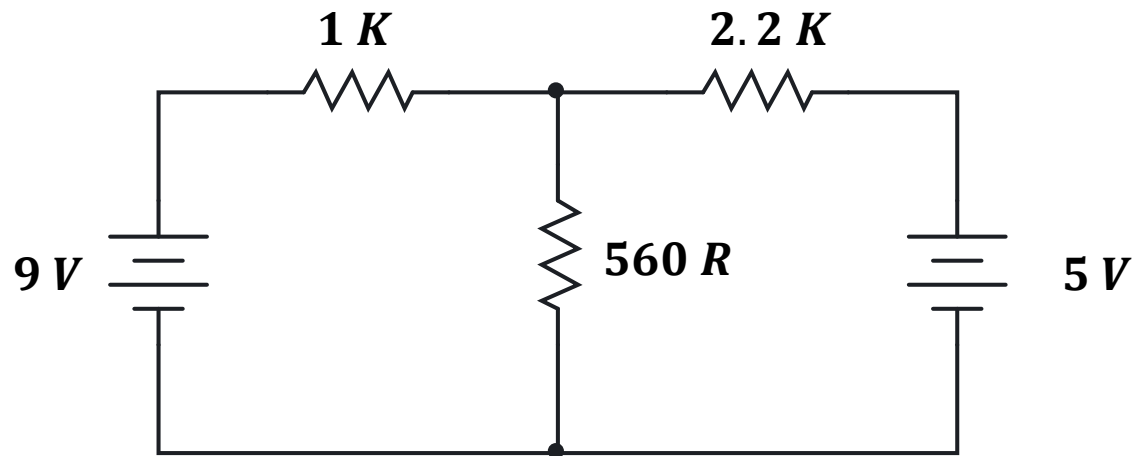**power** of the given circuit.

Solution:

EXERCISE

Determine the **voltage** drop of each resistor, the **current** that pass through each resistor, and the **total power** of the given circuit.

Solution:

LABORATORY