



SUPERPOSITION THEOREM

CIRCUIT ANALYSIS METHOD

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TOPIC OUTLINE

Analogy

Superposition Theorem

Linear Circuits

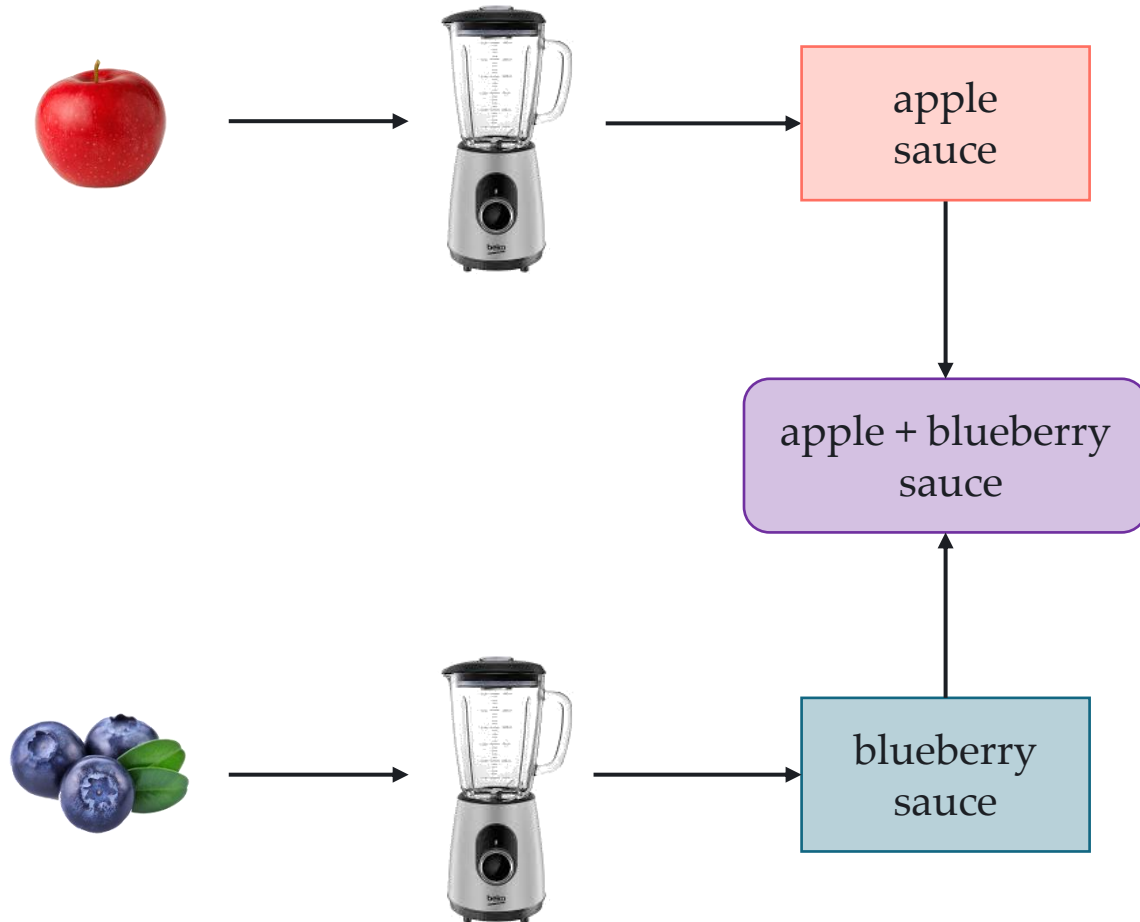


SUPERPOSITION THEOREM

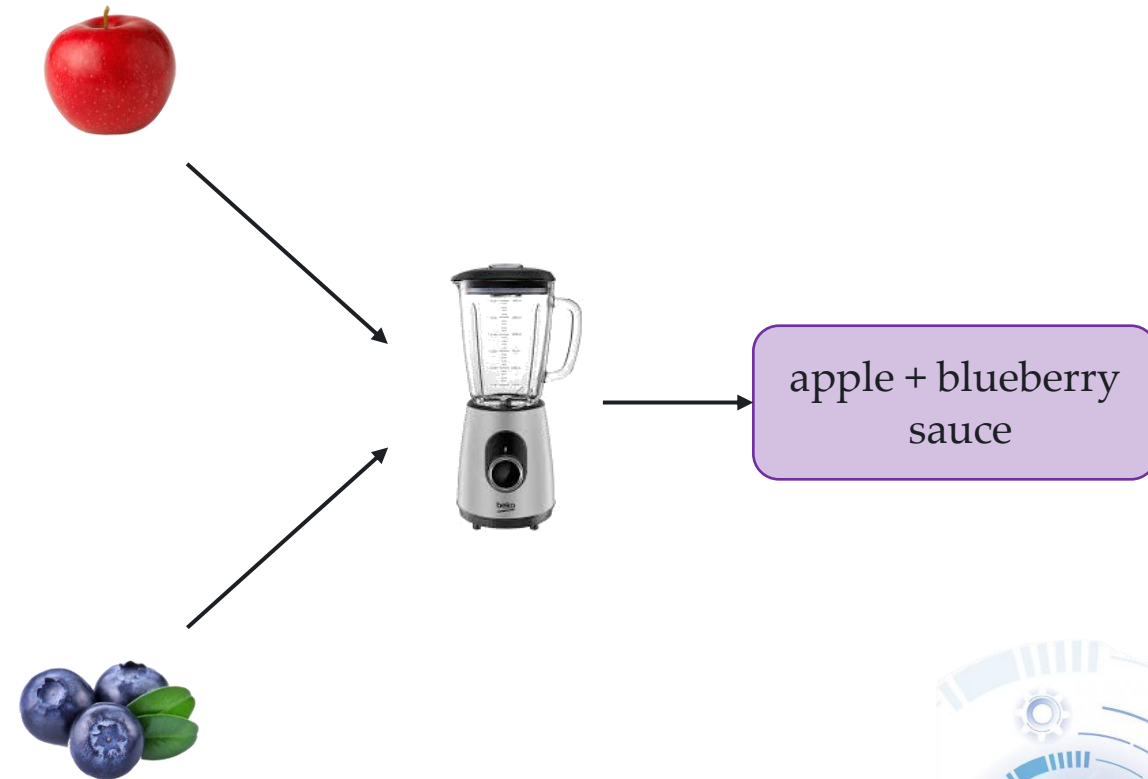


ANALOGY

Method 1:

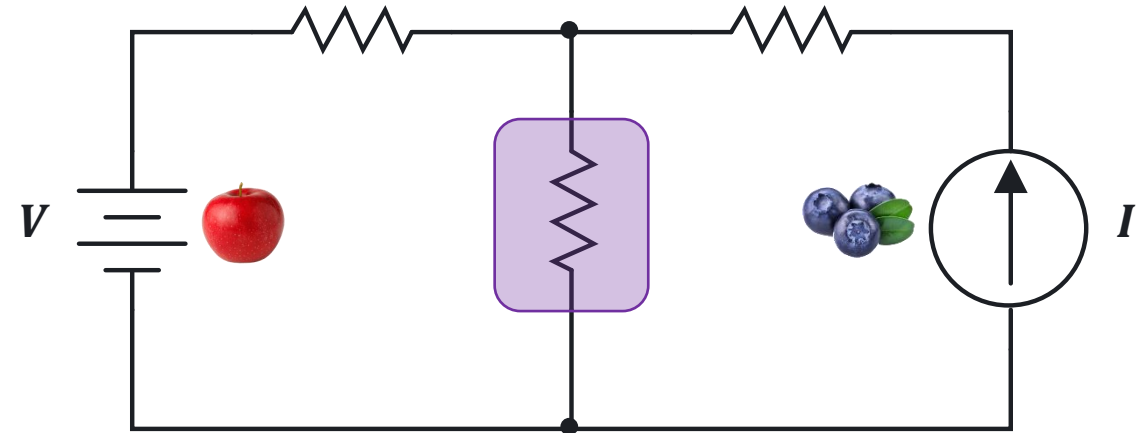


Method 2:

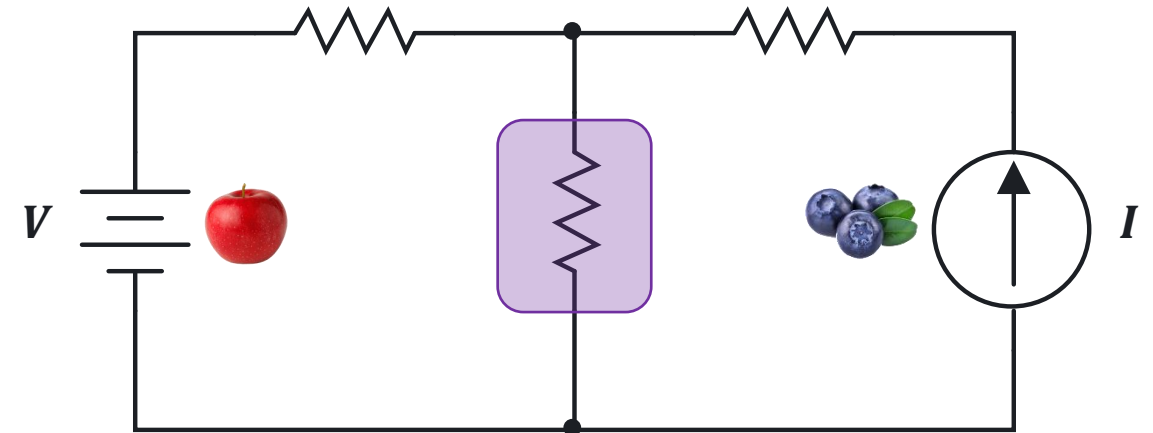
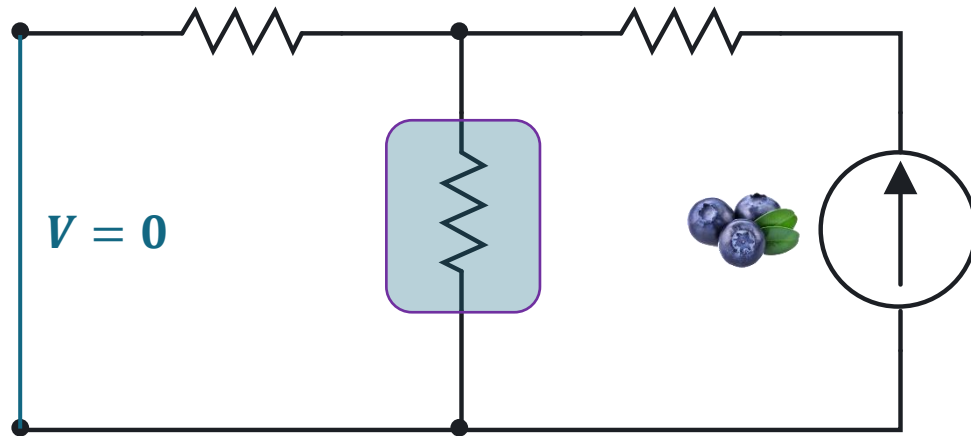
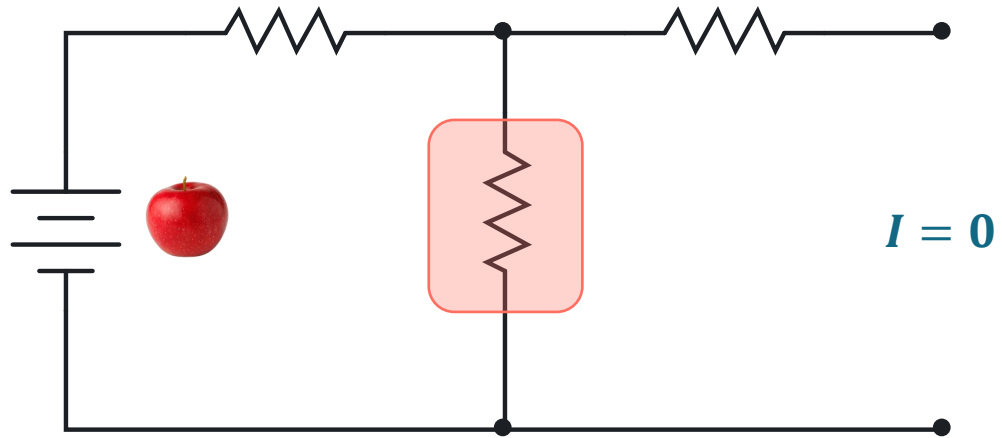


SUPERPOSITION THEOREM

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).



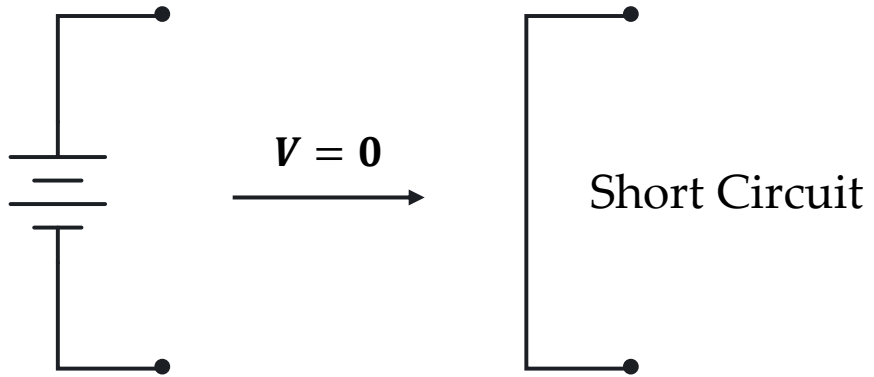
SUPERPOSITION THEOREM



SET SOURCE TO ZERO

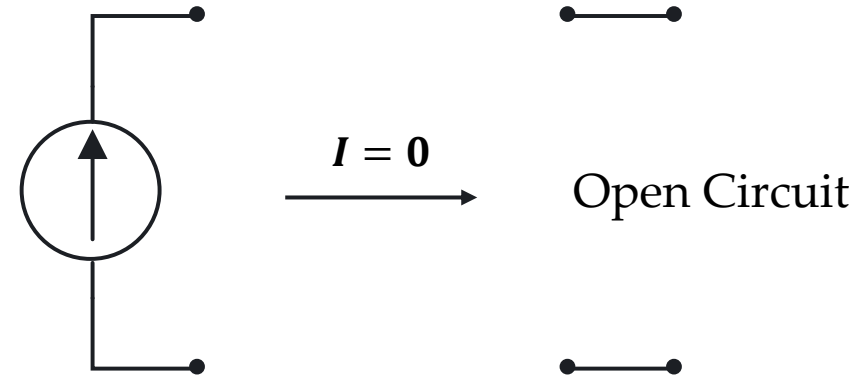
Voltage Source

Replace with short circuit equivalent.



Current Source

Replace with open circuit equivalent.



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:

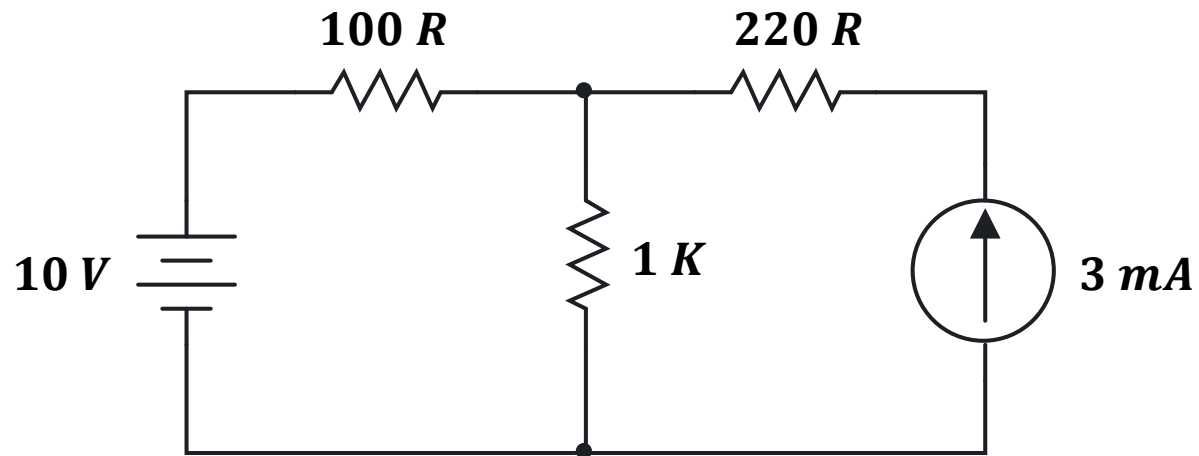
- Resistors
- Capacitors
- Inductors



EXERCISE

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

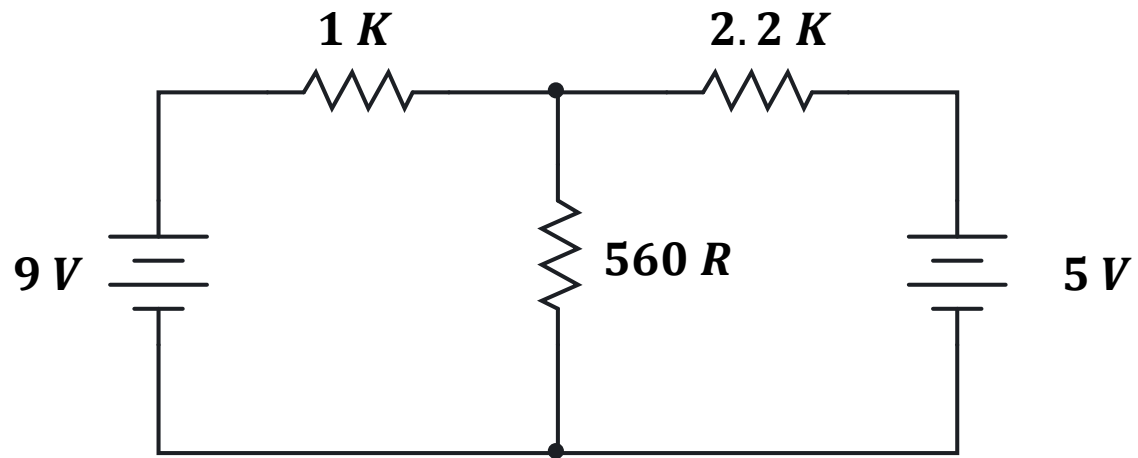
Solution:



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

