

# **Electrical Circuit (1)**

**Introduction (week1 class1)**

**Dr. Akram Al-Mahrouk**

**Philadelphia University**

FIFTH EDITION

# Fundamentals of Electric Circuits



Charles K. Alexander | Matthew N. O. Sadiku



## **PART 1**

## **DC Circuits 2**

### **Chapter 1**

### **Basic Concepts 3**

- 1.1 Introduction 4
- 1.2 Systems of Units 5
- 1.3 Charge and Current 5
- 1.4 Voltage 9
- 1.5 Power and Energy 10
- 1.6 Circuit Elements 15
- 1.7 †Applications 17
  - 1.7.1 TV Picture Tube
  - 1.7.2 Electricity Bills
- 1.8 †Problem Solving 20
- 1.9 Summary 23
- Review Questions 24
- Problems 24
- Comprehensive Problems 27

# Systems of Units

**TABLE 1.1**

Six basic SI units and one derived unit relevant to this text.

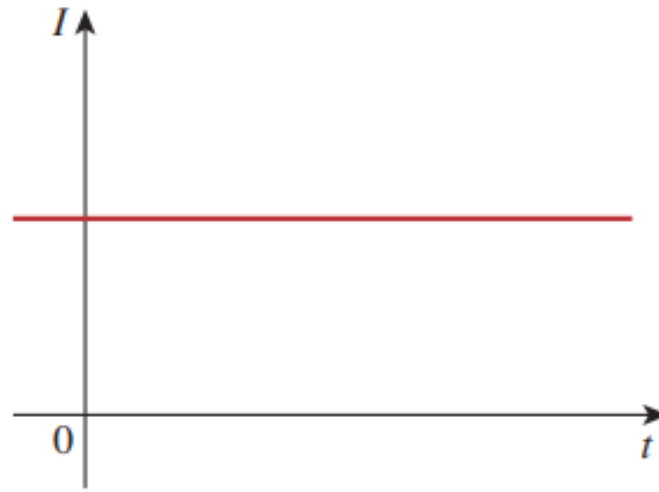
Quantity	Basic unit	Symbol
Length	meter	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Charge	coulomb	C

**TABLE 1.2**

The SI prefixes.

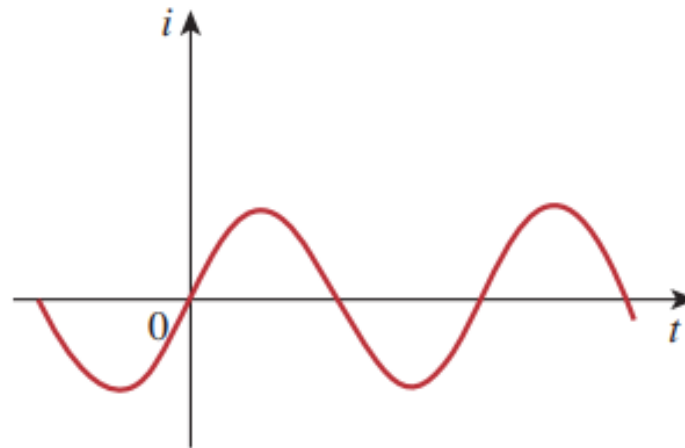
Multiplier	Prefix	Symbol
$10^{18}$	exa	E
$10^{15}$	peta	P
$10^{12}$	tera	T
$10^9$	giga	G
$10^6$	mega	M
$10^3$	kilo	k
$10^2$	hecto	h
10	deka	da
$10^{-1}$	deci	d
$10^{-2}$	centi	c
$10^{-3}$	milli	m
$10^{-6}$	micro	$\mu$
$10^{-9}$	nano	n
$10^{-12}$	pico	p
$10^{-15}$	femto	f
$10^{-18}$	atto	a

DC



(a)

AC



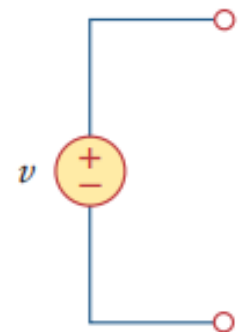
(b)

**Figure 1.4**

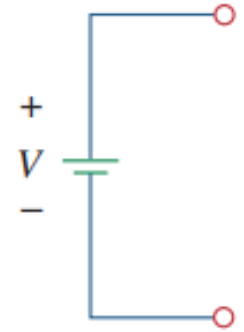
Two common types of current: (a) direct current (dc), (b) alternating current (ac).

Circuit Elements

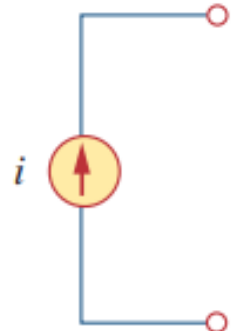
Varying Voltage source



Constant Voltage source

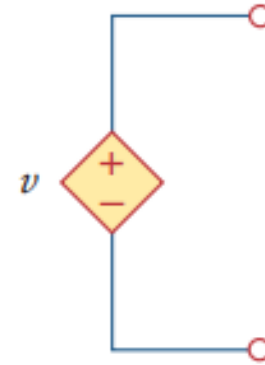


Constant Current source

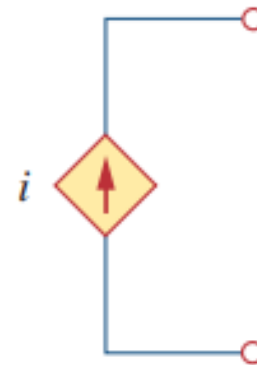


## Circuit Elements

Dependent Voltage source

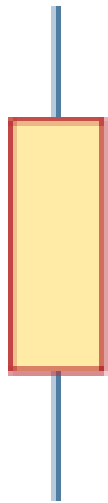
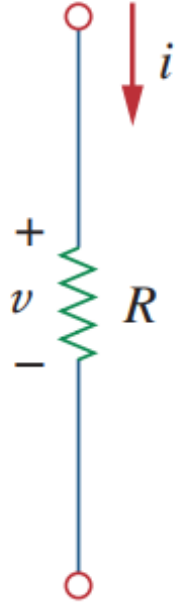


Dependent Current source

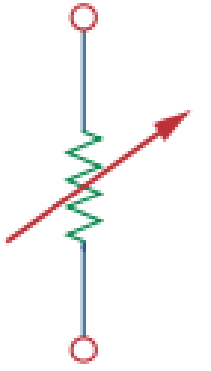


## Circuit Elements

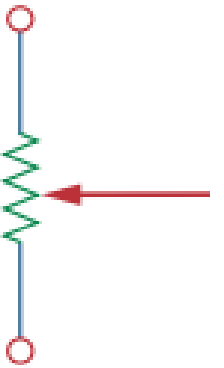
Constant Resistance



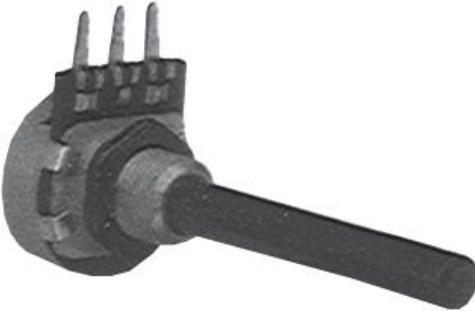
Variable Resistance



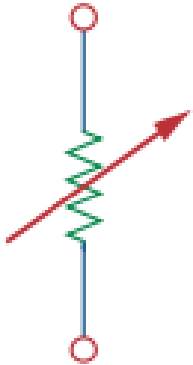
Potentiometer



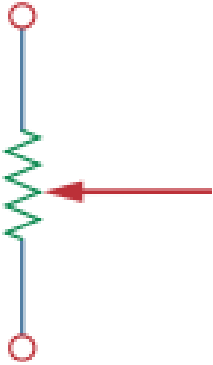
Circuit Elements



Variable Resistance



Potentiometer



Count the following: -

1. Number of resistance?
2. Number of sources?
3. Number of voltage sources?
4. Number of current sources?
5. Number of dependent sources?
6. Number of independent sources?

