Unit 3

Text A

Simple Electric Circuit

1. An Electric Circuit

A fundamental relationship exists between current, voltage, and resistance. A simple electric circuit consists of a voltage source, some type of load, and a conductor to allow electrons to flow between the voltage source and the load.[1] In the following circuit a battery provides the voltage source, electrical wire is used for the conductor, and a light provides the resistance (see Figure 3-1). An additional component has been added to this circuit, a switch. There must be a complete path for current to flow. If the switch is open, the path is incomplete and the light will not illuminate. Closing the switch completes the path, allowing electrons to leave the negative terminal and flow through the light to the positive terminal.

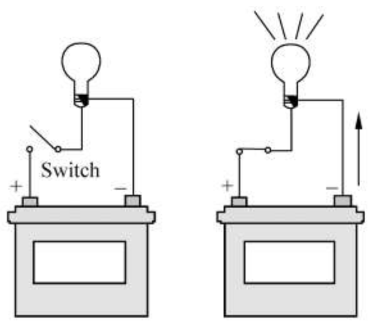


Figure 3-1 A simple electric circuit

2. An Electrical Circuit Schematic

The following schematic is a representation of an electrical circuit, consisting of a battery, a resistor, a voltmeter and an ammeter (see Figure 3-2). The ammeter, connected in series with the circuit, will show how much current flows in the circuit. The voltmeter, connected across the voltage source, will show the value of voltage supplied from the battery. Before an analysis can be made of a circuit, we need to understand Ohm’s Law.

3. Ohm’s Law

The relationship between current, voltage and resistance was studied by the 19th century

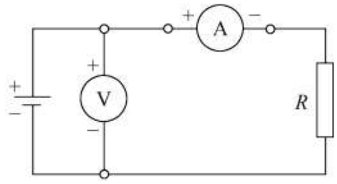


Figure 3-2　A representation of an electrical circuit

German mathematician, Georg Simon Ohm. Ohm formulated a law which states that current varies directly with voltage and inversely with resistance. From this law the following formula is derived:

$$I = \frac{U}{R} \quad \text{or} \quad \text{current} = \frac{\text{Voltage}}{\text{Resistance}}$$

Ohm’s law is the basic formula used in all electrical circuits. Electrical designers must decide how much voltage is needed for a given load, such as computers, clocks, lamps and motors. Decisions must be made concerning the relationship of current, voltage and resistance. All electrical design and analysis begins with Ohm’s law. There are three mathematical ways to express Ohm’s law. Which of the formulas is used depends on what facts are known before starting and what facts need to be known.

$$I = \frac{U}{R} \qquad U = I \times R \qquad R = \frac{U}{I}$$

4. Ohm’s Law Triangle

There is an easy way to remember which formula to use. By arranging current, voltage and resistance in a triangle, one can quickly determine the correct formula (see Figure 3-3).

Figure 3-3　Ohm’s law triangle

5. Using the Triangle

To use the triangle, cover the value you want to calculate. The remaining letters make up the formula (see Figure 3-4).[2]

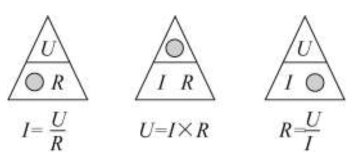


Figure 3-4　Forms of Ohm’s law triangle

Ohm’s law can only give the correct answer when the correct values are used. Remember the following three rules:

(1) Current is always expressed in amperes or amp.

(2) Voltage is always expressed in volt.

(3) Resistance is always expressed in ohm.

6. Resistance in a Series Circuit

A series circuit is formed when a number of resistors are connected end-to-end so that there is only one path for current to flow.[3] The resistors can be actual resistors or other devices that have resistance. The illustration shows four resistors connected end-to-end (see Figure 3-5). There is one path of electron flow from the negative terminal of the battery through R_4, R_3, R_2, R_1 returning to the positive terminal.

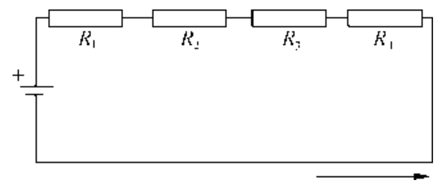


Figure 3-5 Resistance in a series circuit

7. Formula for Series Resistance

The values of resistance add in a series circuit (see Figure 3-6). If a 4Ω resistor is placed in series with a 6Ω resistor, the total value will be 10Ω. This is true when other types of resistive devices are placed in series. The mathematical formula for resistance in series is

$$R_t = R_1 + R_2 + R_3 + R_4 + R_5$$

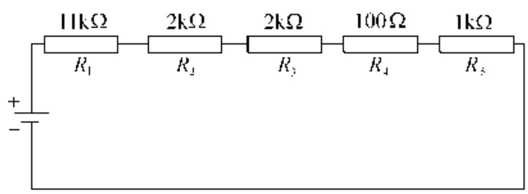


Figure 3-6 The values of resistance add in a series circuit

Given a series circuit where R_1 is 11kΩ, R_2 is 2kΩ, R_3 is 2kΩ, R_4 is 100Ω, and R_5 is 1kΩ, what is the total resistance?

$$\begin{aligned} R_t &= R_1 + R_2 + R_3 + R_4 + R_5 \\ &= (11\,000 + 2000 + 2000 + 100 + 1000)\Omega \\ &= 16\,100\Omega \end{aligned}$$

8. Current in a Series Circuit

The equation for total resistance in a series circuit allows us to simplify a circuit (see Figure 3-7). Using Ohm's law, the value of current can be calculated. Current is the same anywhere it is measured in a series circuit.

$$I = \frac{U}{R}$$

$$= \frac{12}{10} \text{A}$$
$$= 1.2\text{A}$$

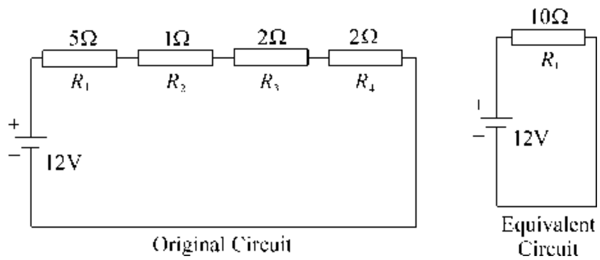


Figure 3-7 Original circuit and equivalent circuit

9. Voltage in a Series Circuit

Voltage can be measured across each of the resistors in a circuit. The voltage across a resistor is referred to as a voltage drop. A German physicist, Kirchhoff, formulated a law which states the sum of the voltage drops across the resistances of a closed circuit equals the total voltage applied to the circuit.[4] In the following illustration, four equal value resistors of 1.5Ω each have been placed in series with a 12V battery (see Figure 3-8). Ohm's law can be applied to show that each resistor will "drop" an equal amount of voltage.

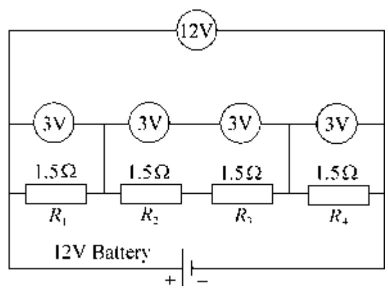


Figure 3-8 Voltage in a series circuit

First, solve for total resistance:

$$R_t = R_1 + R_2 + R_3 + R_4 = (1.5 + 1.5 + 1.5 + 1.5)\ \Omega = 6\Omega$$

Second, solve for current:

$$I = \frac{U}{R}$$
$$= \frac{12}{6} \text{A}$$
$$= 2\text{A}$$

Third, solve for voltage across any resistor:

$$U = I \times R$$
$$= (2 \times 1.5)\text{V}$$
$$= 3\text{V}$$

If voltages were measured across any single resistor, the voltmeter would read 3V.[5] If voltage were measured across a combination of R_3 and R_4 the voltmeter would read 6V. If voltage were measured across a combination of R_2, R_3, and R_4 the voltmeter would read 9V. If the voltage drops of all four resistors were added together the sum would be 12V, the original supply voltage of the battery.

10. Voltage Division in a Series Circuit

It is often desirable to use a voltage potential that is lower than the supply voltage. To do this, a voltage divider can be used (see Figure 3-9). The battery represents U_I which in this case is 50V. The desired voltage is represented by U_O which mathematically works out to be 40V. To calculate this voltage, first solve for total resistance:

$$\begin{aligned} R_t &= R_1 + R_2 \\ &= (5 + 20)\Omega \\ &= 25\Omega \end{aligned}$$

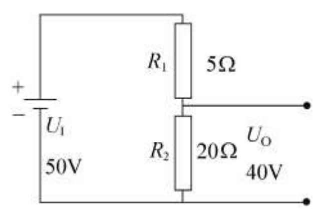


Figure 3-9 Voltage division in a series circuit

Second, solve for current:

$$\begin{aligned} I &= \frac{U_I}{R_t} \\ &= \frac{50}{25}\text{A} \\ &= 2\text{A} \end{aligned}$$

Finally, solve for voltage:

$$\begin{aligned} U_O &= I \times R_2 \\ &= (2 \times 20)\text{V} \\ &= 40\text{V} \end{aligned}$$

New Words

circuit	[ˈsɜːkɪt]	*n.* 电路；一圈，周游，巡回
fundamental	[ˌfʌndəˈmentl]	*adj.* 基础的，基本的
load	[ləʊd]	*n.* 负荷，负载，加载
battery	[ˈbætərɪ]	*n.* 电池
component	[kəmˈpəʊnənt]	*n.* 成分
switch	[swɪtʃ]	*n.* 开关，电闸；转换

illuminate	[ɪ'luːmɪneɪt]	*vt.* 阐明，说明（问题等）；启发，启蒙
negative	['negətɪv]	*adj.* 阴性的，负的；否定的，消极的 *n.* 否定，负数 *vt.* 否定，拒绝（接受）
positive	['pɒzətɪv]	*adj.* 阳的，带正电的；肯定的，积极的，确实的；[数]正的
schematic	[skiː'mætɪk]	*adj.* 示意性的
voltmeter	['vəʊltmiːtə]	*n.* 电压表
ammeter	['æmiːtə]	*n.* 电流表
mathematician	[ˌmæθəmə'tɪʃn]	*n.* 数学家
vary	['veərɪ]	*vt.* 改变，变更；使多样化 *vi.* 变化，不同；违反
inverse	[ˌɪn'vɜːs]	*adv.* 相反地，倒转地
derive	[dɪ'raɪv]	*v.*（使）起源于，来自；获得
designer	[dɪ'zaɪnə]	*n.* 设计者，设计师
lamp	[læmp]	*n.* 灯
relationship	[rɪ'leɪʃnʃɪp]	*n.* 关系，关联
analysis	[ə'næləsɪs]	*n.* 分析，分解
triangle	['traɪæŋgl]	*n.* 三角形
calculate	['kælkjuleɪt]	*vt. & vi.* 计算；考虑，计划，打算 *vt. & vi.*（美）以为，认为
equation	[ɪ'kweɪʒn]	*n.* 相等，平衡；因素；方程式，等式
meter	['miːtə]	*n.* 仪表，计，表；米
divider	[dɪ'vaɪdə]	*n.* 分割者；间隔物，分配器

Phrases

electric circuit	电路
consist of	由……组成，包括，包含
be used for	用来做……，被用于
make up	组成，构成
series circuit	串联电路
series resistance	串联电阻
electron flow	电流
be placed in	被放置在
be referable to	可归因于，与……有关
voltage drop	电压降
solve for	求解
supply voltage	供电电压，电源电压
voltage potential	电压电位

Notes

[1] A simple electric circuit consists of a voltage source, some type of load, and a conductor to allow electrons to flow between the voltage source and the load.

本句中的谓语动词是 consist of，意为“由……组成，包括，包含”。to allow electrons to flow between the voltage source and the load 是一个动词不定式短语，作定语，修饰和限定 a conductor，表明是什么样的导线，而不是整个句子。

本句意为：一个简单的电路包括电源、某些类型的负载和一条让电子在电源和负载之间流动的导线。

[2] To use the triangle, cover the value you want to calculate. The remaining letters make up the formula.

这两个句子关系紧密，要联系起来理解。后一个句子表明的是使用三角形，盖住要计算的值的结果，剩下的字母组成公式。To use the triangle 是一个动词不定式短语，作目的状语，修饰 cover。you want to calculate 是一个定语从句，修饰和限定 the value。make up 的意思是“组成，构成”。

本句意为：要利用这个三角形，盖住你想要计算的值。用剩下的字符组成公式。

[3] A series circuit is formed when a number of resistors are connected end-to-end so that there is only one path for current to flow.

本句中的 end-to-end 不能凭字面理解为尾对尾，而是首尾相连的意思。so that there is only one path for current to flow 是一个结果状语从句。when a number of resistors are connected end-to-end 是一个条件状语从句。

本句意为：当多个电阻首尾相连，电流只有一条路径流动时，就形成了串联电路。

[4] A German physicist, Kirchhoff , formulated a law which states the sum of the voltage drops across the resistances of a closed circuit equals the total voltage applied to the circuit.

看懂这个句子的关键是分析它的句子结构。这是一个多层从句的句子。全句的主语是 A German physicist，谓语是 formulated，宾语是 a law，Kirchhoff 是同位语。which 引导的定语从句修饰 a law。在该定语从句中，which 作主语，states 是谓语动词，states 后又是一个宾语从句，省略了引导词 that。在这个宾语从句中，主语为 the sum of the voltage drops，谓语为 equals，宾语为 the total voltage。结构清楚后，整个句子的意思就一目了然了。

本句意为：德国物理学家基尔霍夫提出了一个定律为，整个回路中各个电阻器上的电压降的总和等于给这个回路提供的电压。

[5] If voltage were measured across any single resistor, the voltmeter would read 3V.

注意，“表的读数为……”的表达是本句中的 voltmeter would read，而不是 voltmeter would be read。read 应理解“显示，指示”。例如，The dial reads 32. 刻度显示出 32。

本句意为：如果测量任何单个电阻器上的电压，电压表的读数都会是 3V。

Exercises

【Ex.1】根据课文内容，回答以下问题。

1. What does Ohm’s law state?

2. According to the passage, how to use the triangle?

3. What is a series circuit?

4. How do we measure the voltage drop of each of the resistors in a circuit?

5. If three resistors of 10Ω, 20Ω and 30Ω respectively have been placed in series with a 12V battery, what is the voltage drop of each of the resistors in a circuit?

【**Ex.2**】根据下面的英文解释，写出相应的英文词汇。

英 文 解 释	词 汇
a closed path followed or capable of being followed by an electric current	
a device used to break or open an electric circuit or to divert current from one conductor to another	
a position in a circuit or device at which a connection is normally established or broken	
an instrument, such as a galvanometer, for measuring potential differences in volts	
an instrument that measures electric current	
a device that generates light, heat, or therapeutic radiation	
a device that converts any form of energy into mechanical energy, especially an internal-combustion engine or an arrangement of coils and magnets that converts electric current into mechanical power	
a person who does research connected with physics or who studies physics.	
the difference in voltage between two points in an electric field or circuit	
a device that measures and records the amount of electricity, gas, water, etc. that you have used or the time and distance you have travelled, etc	

【**Ex.3**】把下列句子翻译成中文。

1. A power supply could be something as simple as a 9V battery or it could be as complex as a precision laboratory power supply.

2. Variable resistors have a dial or a knob that allows you to change the resistance.

3. Diodes are components that allow current to flow in only one direction.

4. LEDs use a special material which emits light when current flows through it.

5. The letter *L* stands for inductance. The simplest inductor consists of a piece of wire.

6. Two metallic plates separated by a non-conducting material between them make a simple capacitor.

7. The time required for a capacitor to reach its charge is proportional to the capacitance value and the resistance value.

8. When AC current flows through an inductance a back emf or voltage is generated to prevent changes in the initial current.

9. Reactance is the property of resisting or impeding the flow of AC current or AC voltage in inductors and capacitors.

10. To produce a drift of electrons, or electric current, along a wire it is necessary that there be a difference in "pressure" or potential between the two ends of the wire.

【Ex.4】把下列短文翻译成中文。

Switches are devices that create a short circuit or an open circuit depending on the position of the switch. For a light switch, ON means short circuit (current flows through the switch, lights light up). When the switch is OFF, that means there is an open circuit (no current flows, lights go out). When the switch is ON it looks and acts like a wire. When the switch is OFF there is no connection.

【Ex.5】通过 Internet 查找资料，借助电子词典、辅助翻译软件及 AI 工具，完成以下技术报告，并附上收集资料的网址。通过 E-mail 发送给老师，或按照教学要求在网上课堂提交。
1. 一个电路包括哪些主要元件，各种元件由哪些公司生产（附各种最新产品的图片）。
2. 叙述德国物理学家基尔霍夫的生平简历及其重大贡献。

Text B

DC Parallel Circuit

1. Resistance in a Parallel Circuit

A parallel circuit is formed when two or more resistances are placed in a circuit side-by-side so that current can flow through more than one path. The illustration shows two resistors placed side-by-side (see Figure 3-10). There are two paths of current flow. One path is from the negative terminal of the battery through R_1 returning to the positive terminal. The second path is from the negative terminal of the battery through R_2 returning to the positive terminal of the battery.

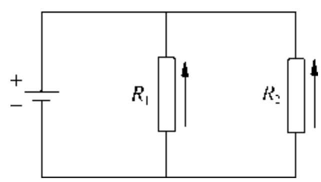


Figure 3-10 Resistance in a parallel circuit

2. Formula for Equal Value Resistors in a Parallel Circuit

To determine the total resistance when resistors are of equal value in a parallel circuit, use the following formula:

$$R_t = \frac{\text{Value of one resistor}}{\text{Number of resistors}}$$

In the following illustration there are three 15Ω resistors (see Figure 3-11). The total resistance is

$$\begin{aligned} R_t &= \frac{\text{Value of one resistor}}{\text{Number of resistors}} \\ &= \frac{15}{3}\,\Omega \\ &= 5\Omega \end{aligned}$$

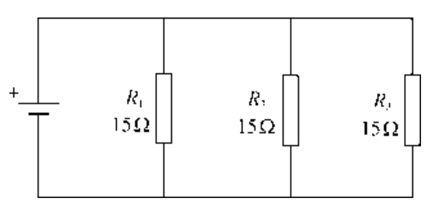


Figure 3-11 Equal value resistors in a parallel circuit

3. Formula for Unequal Resistors in a Parallel Circuit

There are two formulas to determine total resistance for unequal value resistors in a parallel circuit. The first formula is used when there are three or more resistors. The formula can be extended for any number of resistors. The following is an example of three resistors.

$$\frac{1}{R_t}=\frac{1}{R_1}+\frac{1}{R_2}+\frac{1}{R_3}$$

In the following illustration there are three resistors (see Figure 3-12). each of different value. The total resistance is

$$\frac{1}{R_t}=\frac{1}{R_1}+\frac{1}{R_2}+\frac{1}{R_3}$$

$$\frac{1}{R_t}=\frac{1}{5}+\frac{1}{10}+\frac{1}{20}$$ Insert value of the resistors

$$=\frac{4}{20}+\frac{2}{20}+\frac{1}{20}$$ Find lowest common multiple

$$=\frac{7}{20}$$ Add the numerators

$$\frac{R_t}{1}=\frac{20}{7}$$ Invert both sides of the equation

$R_t \approx 2.86\Omega$ Divide

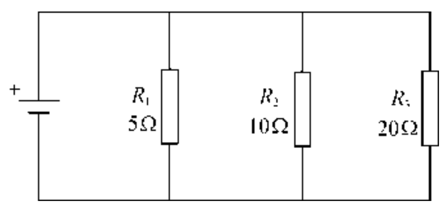


Figure 3-12 The total resistance when there are three resistors

The second formula is used when there are only two resistors.

$$R_t=\frac{R_1\times R_2}{R_1+R_2}$$

In the following illustration there are two resistors (see Figure 3-13), each of different value. The total resistance is

$$R_t=\frac{R_1\times R_2}{R_1+R_2}$$

$$=\left(\frac{5\times 10}{5+10}\right)\Omega$$

$$=\frac{50}{15}\Omega$$

$$\approx 3.33\Omega$$

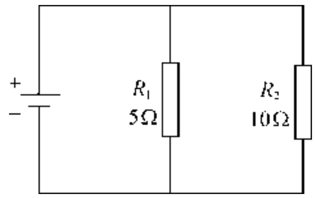


Figure 3-13 The total resistance when there are only two resistors

4. Voltage in a Parallel Circuit

When resistors are placed in parallel across a voltage source, the voltage is the same across each resistor. In the following illustration three resistors are placed in parallel across a 12V battery (see Figure 3-14). Each resistor has 12V available to it.

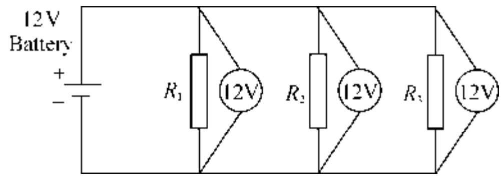


Figure 3-14 Voltage in a parallel circuit

5. Current in a Parallel Circuit

Current flowing through a parallel circuit divides and flows through each branch of the circuit (see Figure 3-15).

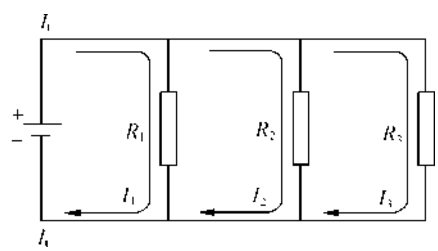


Figure 3-15 Current in a parallel circuit

Total current in a parallel circuit is equal to the sum of the current in each branch. The following formula applies to current in a parallel circuit

$$I_t = I_1 + I_2 + I_3$$

6. Current Flow with Equal Value Resistors in a Parallel Circuit

When equal resistances are placed in a parallel circuit, opposition to current flow is the same in each branch. In the following circuit R_1 and R_2 are of equal value (see Figure 3-16). If total current (I_t) is 10A, then 5A would flow through R_1 and 5A would flow through R_2.

$$\begin{aligned} I_t &= I_1 + I_2 \\ &= (5+5)\text{A} \\ &= 10\text{A} \end{aligned}$$

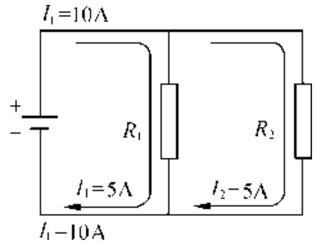


Figure 3-16 Current flow with equal value resistors in a parallel circuit

7. Current Flow with Unequal Value Resistors in a Parallel Circuit

When unequal value resistors are placed in a parallel circuit, opposition to current flow is not the same in every circuit branch. Current is greater through the path of least resistance. In the following circuit R_1 is 40Ω and R_2 is 20Ω (see Figure 3-17). Small values of resistance means less opposition to current flow. More current will flow through R_2 than R_1.

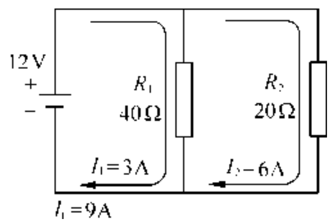


Figure 3-17 Current flow with unequal value resistors in a parallel circuit

Using Ohm's law, the total current for each circuit can be calculated.

$$\begin{aligned} I_1 &= \frac{U}{R_1} \\ &= \frac{12}{40}\text{A} \\ &= 0.3\text{A} \\ I_2 &= \frac{U}{R_2} \\ &= \frac{12}{20}\text{A} \\ &= 0.6\text{A} \\ I_t &= I_1 + I_2 \\ &= (0.3+0.6)\text{A} \\ &= 0.9\text{A} \end{aligned}$$

Total current can also be calculated by the first calculating total resistance, then applying the formula for Ohm's law.

$$R_t = \frac{R_1 \times R_2}{R_1 + R_2}$$

$$= \left(\frac{40 \times 20}{40 + 20}\right)\Omega$$

$$= \frac{800}{60}\Omega$$

$$\approx 13.333\Omega$$

$$I_t = \frac{U}{R_t}$$

$$= \frac{12}{13.333}\text{A}$$

$$\approx 0.9\text{A}$$

8. Series-parallel Circuit

Series-parallel circuit is also known as compound circuit. At least three resistors are required to form a series-parallel circuit. The following illustrations show two ways a series-parallel circuit could be found (see Figure 3-18).

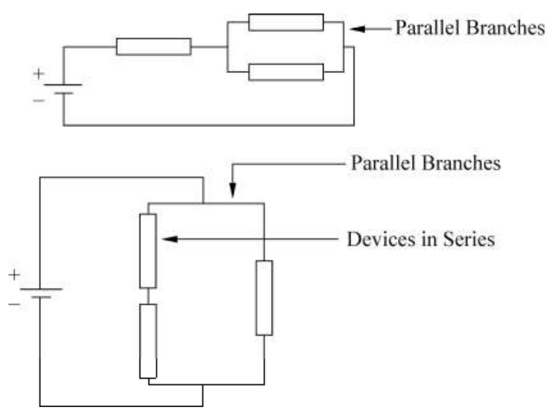


Figure 3-18 Series-parallel circuit

9. Simplifying a Series-parallel Circuit to a Series Circuit

The formulas required for solving current, voltage and resistance problems have already been defined. To solve a series-parallel circuit, reduce the compound circuits to equivalent simple circuits. In the following illustration R_1 and R_2 are parallel with each other (see Figure 3-19). R_3 is in series with the parallel circuit of R_1 and R_2.

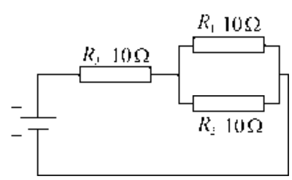


Figure 3-19 The compound circuits

First, use the formula to determine total resistance of a parallel circuit to find the total resistance of R_1 and R_2. When the resistors in a parallel circuit are equal, the following formula is used:

$$R = \frac{\text{Value of any one resistor}}{\text{Number of resistors}}$$

$$= \frac{10}{2}\Omega$$

$$= 5\Omega$$

Second, redraw the circuit showing the equivalent values. The result is a simple series circuit which uses already learned equations and methods of problem solving (see Figure 3-20).

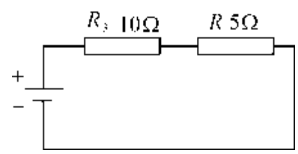


Figure 3-20 Simplifying a series-parallel circuit to a series circuit

10. Simplifying a Series-parallel Circuit to a Parallel Circuit

In the following illustration R_1 and R_2 are in series with each other (see Figure 3-21). R_3 is in parallel with the series circuit of R_1 and R_2.

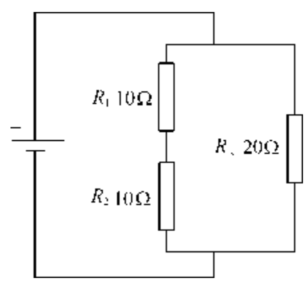


Figure 3-21 A series-parallel circuit

First, use the formula to determine total resistance of a series circuit to find the total resistance of R_1 and R_2. The following formula is used:

$$R = R_1 + R_2$$

$$= (10 + 10)\Omega$$

$$= 20\Omega$$

Second, redraw the circuit showing the equivalent values. The result is a simple parallel circuit which uses already learned equations and methods of problem solving.

New Words

side-by-side	['saɪd baɪ saɪd]	*adj*. 并排的，并行的
multiple	[ˈmʌltɪpl]	*n*. 倍数，若干
		adj. 多重的，多个的

numerator	[ˈnjuːməreɪtə]	*n.*（分数中的）分子
invert	[ɪnˈvɜːt]	*adj.* 转化的
		vt. 使颠倒，使转化
		n. 颠倒的事物
amp	[æmp]	*n.* 安培
branch	[brɑːntʃ]	*n.* 枝，分支，支流，支脉
compound	[ˈkɒmpaʊnd]	*n.* 混合物，[化]化合物
		adj. 复合的
		vt. & *vi.* 混合，配合
simplify	[ˈsɪmplɪfaɪ]	*vt.* 单一化，简单化
reduce	[rɪˈdjuːs]	*vt.* 减少，缩小，简化；还原
method	[ˈmeθəd]	*n.* 方法
redraw	[ˌriːˈdrɔː]	*vt.* 重画
		vi. 刷新（屏幕）

Phrases

parallel circuit	并联电路
negative terminal	负极端
positive terminal	正极端
lowest common multiple	最小公倍数
apply to	将……应用于
flow through	流过
be calculated by ...	用……计算
series-parallel	串-并联
compound circuits	复合电路
parallel branch	并联分支

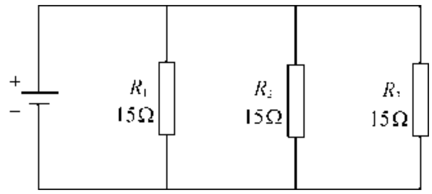
Exercises

【Ex.6】根据文章所提供的信息判断正误。

1. A parallel circuit is formed when two or more resistances are placed in a circuit side-by-side so that current can flow through only one path.
2. To determine the total resistance when resistors are of equal value in a parallel circuit, use the following formula

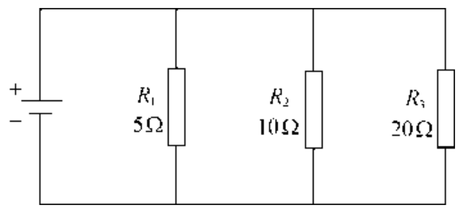
$$R_t = \frac{\text{Value of one resistor}}{\text{Number of resistors}}$$

3. In the following illustration there are three 15Ω resistors. The total resistance is 45Ω.

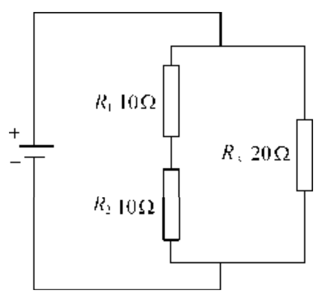


4. In the following illustration there are three resistors, each of different value. The total resistance is

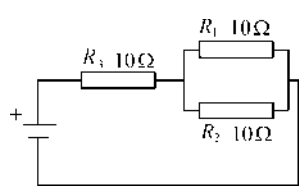
$$\frac{1}{R_t}=\frac{1}{R_1}+\frac{1}{R_2}+\frac{1}{R_3}$$



5. When resistors are placed in series across a voltage source, the voltage is the same across each resistor.
6. Current flowing through a parallel circuit divides and flows through each branch of the circuit. Total current in a parallel circuit is equal to the sum of the current in each branch.
7. When different resistances are placed in a parallel circuit, opposition to current flow is the same in each branch.
8. Series-parallel circuit is also known as compound circuits. At least more than two resistors are required to form a series-parallel circuit.
9. In the following illustration R_1 and R_2 are series with each other. R_3 is in parallel with the series circuit of R_1 and R_2.



10. In the following illustration, the total resistance is 105Ω.



科技英语翻译知识

词义的引申

科技英语论理准确，所下的定义、定律和定理精确，所描绘的概念、叙述的生产工艺过程清楚。但是在英译汉时，经常会出现某些词在字典上找不到适当的词义的情况。如果生搬硬套，译文则生硬晦涩，不能确切表达原意，甚至有时造成误译。这时就要结合上下文，根据逻辑关系，进行词义引申，才能恰如其分地表达原意。

1．概括化或抽象化引申

科技英语常常使用表示具体形象的词来表示抽象的意义。翻译这类词时，一般可将其词义作概括化或抽象化的引申，译文才符合汉语习惯，流畅、自然。例如：

(1) The plan for launching the man-made satellite still lies on the table.

那项发射人造卫星的计划仍被搁置，无法执行。

on the table 按字面意思译成“放在桌子上”语义不通，根据上文意思抽象引申为“无法执行”，符合原意。

(2) Military strategy may bear some similarity to the chessboard but it is dangerous to carry the analogy too far.

打仗的策略同下棋可能有某些相似之处，但是如果把这两者之间的类比搞过了头则是危险的。

chessboard 是“棋盘”。棋盘是实物，打仗的策略是思想，不好类比。因此，这里把具体的“棋盘”引申为概括性的“下棋”，就说得通了。

(3) The book is too high-powered for technician in general.

这本书对一般技术人员来说也许内容太深。

high-powered 本意为“马力大”，引申为“（艰）深”。

(4) The expense of such an instrument has discouraged its use.

这种仪器很昂贵，使其应用受到了限制。

expense 原意为花费、开支，引申为“（仪器）昂贵”。

(5) Industrialization and environmental degradation seem to go hand in hand.

工业化发展似乎伴随着环境的退化。

hand in hand 原意为“携手”，引申为“伴随”。

2．具体化或形象化引申

科技英语中有时用代表抽象概念或属性的词来表示一种具体事物。如按字面译，则难以准确表达原文意思。这时就要根据上下文对词义加以引申，用具体或形象化的词语表达。

例如：

(1) Along the equator it reaches nearly halfway around the globe.

它沿着赤道几乎绕地球半周。

reach halfway 意为“达到一半路程”。本句讨论的是围绕地球旋转，根据这一具体语境，可以将 reach halfway 本来含义形象化地引申为“绕地球半周”。

(2) The shortest distance between raw material and a finished part is precision casting.

把原料加工成成品的最简便的方法是精密铸造。

shortest distance 原意为“最短距离”，直接按照这一字面意思，句子有失通顺。可以形象化地引申为“最简便的方法”。

(3) The foresight and coverage shown by the inventor of the process are most commendable.

这种方法的发明者所表现的远见卓识和渊博知识，给人以良好的印象。

coverage 原意为“覆盖”，引申为“渊博知识”。

(4) The purpose of a driller is to cut holes.

钻床的功能是钻孔。

purpose 原意为“目的”，引申为“功能”。

(5) There are many things that should be considered in determining cutting speed.

在测定切削速度时，应当考虑许多因素。

things 原意为“事情”，具体引申为“因素”。

Reading Material

阅读下列文章。

Text	Note
OrCAD View	
1. Full-Featured Schematic Editor	
OrCAD Capture, a flat[1] and hierarchical Schematic Page Editor, is based on OrCAD's legacy of fast, intuitive[2] schematic editing. Schematic Page Editor combines a standard Windows user interface with functionality and features specific to the design engineer for accomplishing design tasks and publishing design data.	[1] *adj*. 平面的 [2] *adj*. 直觉的
(1) Undo and redo schematic edit unlimited times.	
(2) Use Label State for “what if” scenarios[3].	[3] *n*. 情况
(3) Launch Property Spreadsheet Editor at design or schematic level to edit or print your design properties.	
(4) View and edit multiple schematic designs in a single session.	
(5) Reuse design data by copying and pasting within or between schematics.	

(6) Select parts from a comprehensive[4] set of functional part libraries.

[4] *adj.* 全面的，广泛的

(7) In-line editing of parts to allow pin name and number movement.

(8) File locking in case the design is being open by another user.

2. OrCAD Capture

OrCAD Capture® design entry is the most widely used schematic entry system in electronic design today for one simple reason: fast and universal design entry. Whether you're designing a new analog circuit, revising schematic diagram for an existing PCB[5], or designing a digital block diagram with an HDL module, OrCAD Capture provides simple schematic commands you need to enter, modify and verify the design for PCB.

[5] Printed Circuit Board，印制电路板

(1) Place, move, drag, rotate, or mirror individual parts or grouped selections while preserving both visual and electrical connectivity[6].

[6] *n.* 连通性

(2) Ensure design integrity through configurable Design and Electrical Rule checkers.

(3) Create custom title blocks and drawing borders to meet the most exacting specifications.

(4) Insert drawing objects, bookmarks, logos[7] and bitmapped pictures.

[7] *n.* 标识

(5) Choose from metric or imperial[8] unit grid spacing to meet all drawing standards.

[8] *adj.* 英制的（度量衡）

(6) Design digital circuits with VHDL or Verilog Text Editor.

Find and select parts or nets quickly from the OrCAD Capture Project Manager and the multi-window interface makes navigation[9] across hierarchy a breeze.

[9] *n.* 向导，导航

3. Project Manager Coordinates Design Data

The sophisticated[10] Project Manager simplifies organizing and tracking the various types of data generated in the design process.

[10] *adj.* 先进的，精妙的

An expanding-tree diagram makes it easy to structure and navigate all of your design files, including those generated by PSpice® simulators, Capture CIS and other plug-ins.

(1) Project Creation Wizard guides you through all the resources available for a specific design flow.