



[Courseware \(/courses/UTAustinX/UT.6.01x/1T2014/courseware\)](/courses/UTAustinX/UT.6.01x/1T2014/courseware)

[Course Info \(/courses/UTAustinX/UT.6.01x/1T2014/info\)](/courses/UTAustinX/UT.6.01x/1T2014/info)

[Discussion \(/courses/UTAustinX/UT.6.01x/1T2014/discussion/forum\)](/courses/UTAustinX/UT.6.01x/1T2014/discussion/forum)

[Wiki \(/courses/UTAustinX/UT.6.01x/1T2014/course\\_wiki\)](/courses/UTAustinX/UT.6.01x/1T2014/course_wiki)

[Progress \(/courses/UTAustinX/UT.6.01x/1T2014/progress\)](/courses/UTAustinX/UT.6.01x/1T2014/progress)

[Questions \(/courses/UTAustinX/UT.6.01x/1T2014/a3da417940af4ec49a9c02b3eae3460b/\)](/courses/UTAustinX/UT.6.01x/1T2014/a3da417940af4ec49a9c02b3eae3460b/)

[Syllabus \(/courses/UTAustinX/UT.6.01x/1T2014/a827a8b3cc204927b6efaa49580170d1/\)](/courses/UTAustinX/UT.6.01x/1T2014/a827a8b3cc204927b6efaa49580170d1/)

Help

## DEFINITIONS (2.0/2.0 points)

Please match the following terms with the letter of their appropriate definitions.

### Voltage

C

Answer: C

A. the rate of energy change

### Current

D

Answer: D

B. defines the amount of work that can be done

### Power

A

Answer: A

C. an electrical potential

### Energy

B

Answer: B

D. the flow of charge (electrons)

### Resistance

E

Answer: E

E. potential divided by flow

## EXPLANATION

Voltage(V), Current(I), and Resistance(R) are related by Ohm's Law:

$$V = I * R$$

.

Power is given by the expressions

$$P = I^2 * R$$

and

$$P = V^2 / R$$

The time integral of power will yeild an expression of energy.

Check

Hide Answer(s)

## DEFINITIONS (2.0/2.0 points)

Please match the following terms with the letter of their appropriate definitions.

**Ohm's Law**

C

Answer: C

A. The sum of the currents into a node equal the sum of the currents leaving a node

**Kirchhoff's Current Law (KCL)**

A

Answer: A

B. The sum of the voltages around the loop is zero

**Kirchhoff's Voltage Law (KVL)**

B

Answer: B

C. Voltage equals current times resistance

**EXPLANATION**

Kirchhoff's Voltage Law (KVL), Kirchhoff's Current Law (KCL), and Ohm's law are fundamental laws of electrical circuits, and are instrumental in circuit analysis.

Check

Hide Answer(s)

Help

## RESISTORS IN SERIES AND PARALLEL (3.0/3.0 points)

Calculate values for R1, R2, R1 in series with R2, and R1 in parallel with R2 as necessary to complete the following table.

R1	R2	R1 in series with R2	R1 in parallel with R2
1000	4000	5000	800
		Answer: 5000	Answer: 800
1000	9000	10000	900
		Answer: 10000	Answer: 900
1000	4000	5000	800
	Answer: 4000		Answer: 800
1000	3000	4000	750
	Answer: 3000	Answer: 4000	
2000	2000	4000	1000
Answer: 2000	Answer: 2000		

**CALCULATING EQUIVALENT RESISTANCE**

The equation for determining the equivalent resistance of two resistors,  $R_1$  and  $R_2$ , in **series** is

$$R_{eq} = R_1 + R_2$$

The equation for determining the equivalent resistance of two resistors,  $R_1$  and  $R_2$ , in **parallel** is

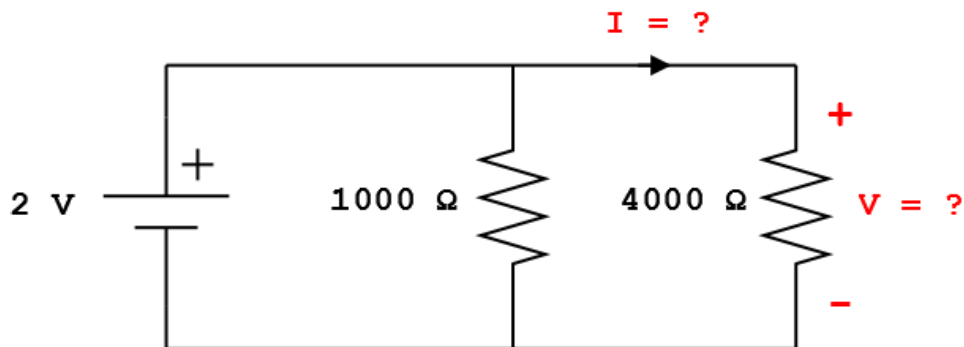
$$R_{eq} = \frac{1}{\frac{1}{R_1} + \frac{1}{R_2}}$$

Check

Hide Answer(s)

**CURRENT DIVIDERS** (2/2 points)

2 V is applied across the parallel combination of a 1000Ω and a 4000Ω resistor as shown.



What is the voltage across the 4000Ω resistor, in V?

2

2

**Answer:** 2

What is the current through the 4000Ω resistor, in mA?

0.5

0.5

**Answer:** 0.5**EXPLANATION**

3 of 5 Because the resistors are in parallel, the voltage across them will be equal. The two resistors are in parallel with the

02/03/2014 02:48 PM

2V source, so the voltage across them both is 2V.

To find the current through the 4000Ω resistor, we can use the current divider equation

$$I_2 = I * \frac{R_1}{(R_1 + R_2)}$$

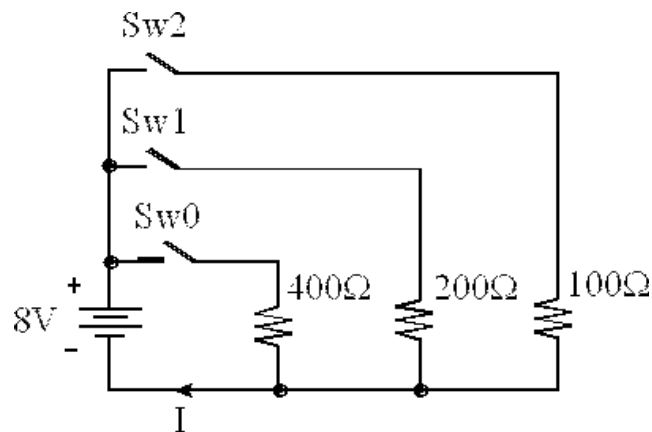
. This equation is derived using Ohm's law and calculations of the equivalent resistance of resistors in parallel.

Check

Hide Answer(s)

### 3 BIT DAC (1/1 points)

Consider this 3-bit digital to analog converter. We define the logic state of each switch as 0 or 1, where 0 means not pushed and 1 means pushed. Define a 3-bit number  $n$  (0 to 7) which specifies the three switch positions.  $n = 0$  means none are pushed.  $n = 1$  means Sw0 is pushed.  $n = 2$  means Sw1 is pushed.  $n = 3$  means Sw1 and Sw0 are pushed.  $n = 4$  means Sw2 is pushed.  $n = 5$  means Sw2 and Sw0 are pushed.  $n = 6$  means Sw2 and Sw1 are pushed.  $n = 7$  means all are pushed.



Derive a relationship between the current  $I$  and the number  $n$ .

- ☐  $I = 0$
- ☒  $I = n * 20mA$
- ☐  $I = 2n + 10mA$
- ☐  $I = 140mA$
- ☐ none of the above

**EXPLANATION**

We use the KCL law to sum the currents from the three resistors into the current  $I$ . If SW2 is pressed the current through the 100ohm resistor will be  $8V/100$ , which is 80mA. If SW1 is pressed the current through the 200ohm resistor will be  $8V/200$ , which is 40mA. If SW0 is pressed the current through the 400ohm resistor will be  $8V/400$ , which is 20mA. For each resistor the current will be zero if the corresponding switch is not pressed. Next think of the system one switch at a time. If  $n=001$  it is just SW0,  $I=20mA$ ; if  $n=010$  it is just SW1,  $I=40mA$ ; and if  $n=100$  it is just SW2,  $I=80mA$ . Putting these three together yields the answer

$$I = n * 20mA$$

Check

Hide Answer(s)



Help

About (<https://www.edx.org/about-us>) Jobs (<https://www.edx.org/jobs>)  
 Press (<https://www.edx.org/press>) FAQ (<https://www.edx.org/student-faq>)  
 Contact (<https://www.edx.org/contact>)



EdX is a non-profit created by founding partners Harvard and MIT whose mission is to bring the best of higher education to students of all ages anywhere in the world, wherever there is Internet access. EdX's free online MOOCs are interactive and subjects include computer science, public health, and artificial intelligence.



(<http://www.meetup.com/edX-Global-Community/>)



(<http://www.facebook.com/EdxOnline>)



(<https://twitter.com/edXOnline>)



(<https://plus.google.com/108235383044095082735/posts>)



(<http://youtube.com/user/edxonline>)

© 2014 edX, some rights reserved.

Terms of Service and Honor Code -  
 Privacy Policy (<https://www.edx.org/edx-privacy-policy>)