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Mr Circuit Technology

Science/Electronics Experiment Kits and Labs

“HOW A RESISTOR WORKS”

HANDS-ON ELECTRONICS MODULE

ITEMS TO PRINT FOR STUDENT

- Page 01 - Student Instruction Sheet
(and) - Experiment Page #12
- Page 02 - Crossword Puzzle
- Page 03 - Word Search Puzzle
- Page 04 - Written 10-Question Multiple Choice Quiz

ITEMS TO PRINT FOR TEACHER

- Page 05 - Answers to Crossword
- Page 06 - Answers to Word Search
- Page 07 - Answer Key to Written Quiz
- Page 08 - Poster to put up on classroom wall
- Page 09 - Price List for Parts Kits for your to order more. Send Purchase Order to Gary@MrCircuitTechnology.com or order online at www.MrCircuitTechnology.com

PREPARATION: You can print the Page 8 color poster to put up on your classroom wall to announce the fact that you are offering Hands-On Electronics Experiments.


Step 1 - Make a copy of pages 1 through 4 and also the Experiment Page #12 for each student and give it to them along with a Parts Kit #MC1-01-PK (that has the experiment parts) with a 9-Volt battery and a Solderless Circuit Board Parts Kit #MC1-00-PK

Step 2 - When your students have completed the module, collect all the Parts Kits and batteries for later use.

Step 3 - Also, collect all the Written Quizzes for grading and use the Answer Key to grade them.

For Tech Support or any questions, you can email us or call 805-295-1642

Experiment Parts Kit
#MC1-00-PK
Solderless
Circuit Board
Exciting, Educational
and Fun

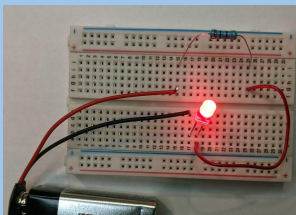


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Experiment Parts only
(packaged in a 3x5 inch
resealable plastic bag.)

LEARN more today,
EARN more tomorrow!

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Experiment 1 Parts Kit
#MC1-01-PK
“How a Resistor
Works”
Exciting, Educational
and Fun

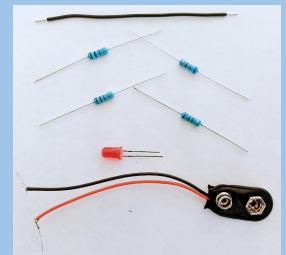


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STUDENT INSTRUCTION SHEET

Exp 1 - "HOW A RESISTOR WORKS"

HANDS-ON ELECTRONICS MODULE

Table of Contents of Student Activities

Page 01 - Student Instruction Sheet and
- Experiment Page 12

Page 02 - Crossword Puzzle

Page 03 - Word Search Puzzle

Page 04 - Written 10-Question Multiple Choice Quiz

PREPARATION:

Step 1 - Be sure that you have all the pages listed above in the Table of Contents.


Step 2 - Also, be sure you have the following:

- (a) the Parts Kit #MC1-01-PK (has electronic parts for this module)
- (b) a 9-Volt battery
- (c) the Solderless Circuit Board Parts Kit #MC1-00-PK.

Step 3 - Then, when you have all the above materials, go to www.MrCircuitTech.com on a computer that is connected to the Internet and then Click on **Mr Circuit Lab 1** button and then Click on the "**How a Resistor Works**" link and do the online lesson.

Step 4 - Complete the rest of the Student Activity pages.

Experiment Parts Kit
#MC1-00-PK
Solderless
Circuit Board
Exciting, Educational
and Fun

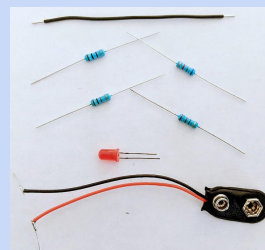
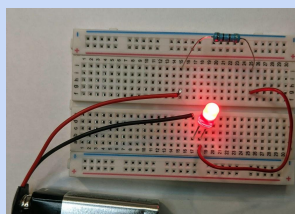


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Mr Circuit Basic Electronics Lab 1

EXPERIMENT 1

LED CURRENT INDICATOR

HOW A RESISTOR WORKS

PURPOSE: To observe the effect of a resistor controlling current flow.

PROCEDURE:

- 1) Build the circuit shown in the pictorial diagram. Observe the brightness of the LED.
- 2) Replace, one at a time, the following resistors for R1 (100 ohm resistor) and observe in each case the brightness of the LED.
Resistors: 220 ohm, 1K, 6.8K.

RESULTS:

By performing this experiment you found that the brightness of the LED depends upon the value of the resistor in the circuit. The higher the resistance value, the less the brightness of the LED.

EXPLANATION OF EXPERIMENT 1.

Fig. 1 shows the basic circuit of the LED Current Indicator. This circuit is made up of three components: the **battery**, the **LED**, and the **resistor**, which are connected in series, one following the other.

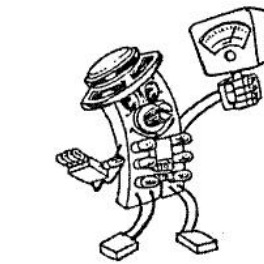
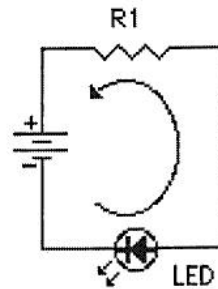
In this circuit the current flows from the negative of the battery to the positive of the battery, passing through the LED and the resistor, as indicated in the schematic.

As current passes through the LED, it illuminates. **The more the current, the greater the brightness.**

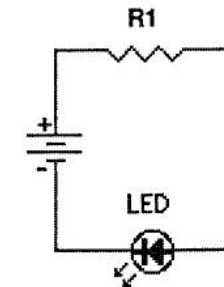
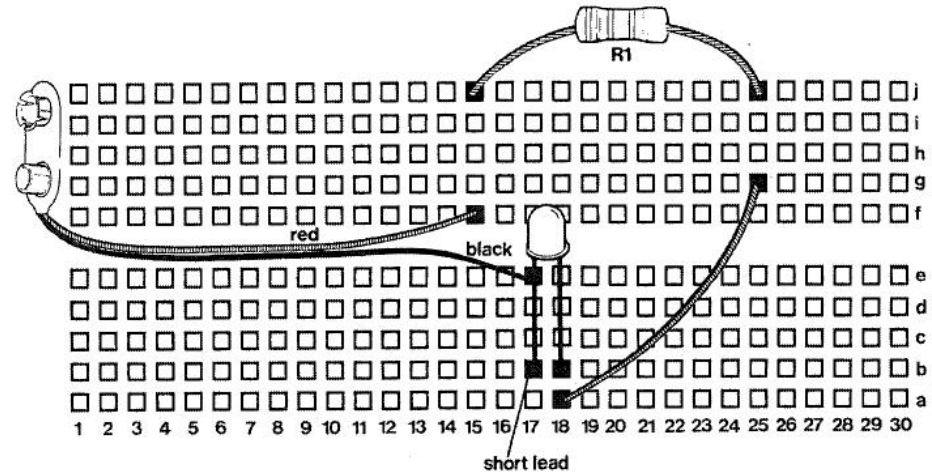
The element that controls the amount of current flowing through the circuit is the resistor. The smaller the resistance value, the smaller the opposition to the current flow and the higher the current. The higher the current, the brighter the LED.

On the other hand, the higher the resistance value, the greater the opposition to current flow and the lower the current. The lower the current, the dimmer the LED.

Now you understand why, as you insert in the circuit progressively higher values of resistance, the brightness of the LED decreases. The higher the resistance, the lower the amount of current that flows through the circuit.



PICTORIAL DIAGRAM

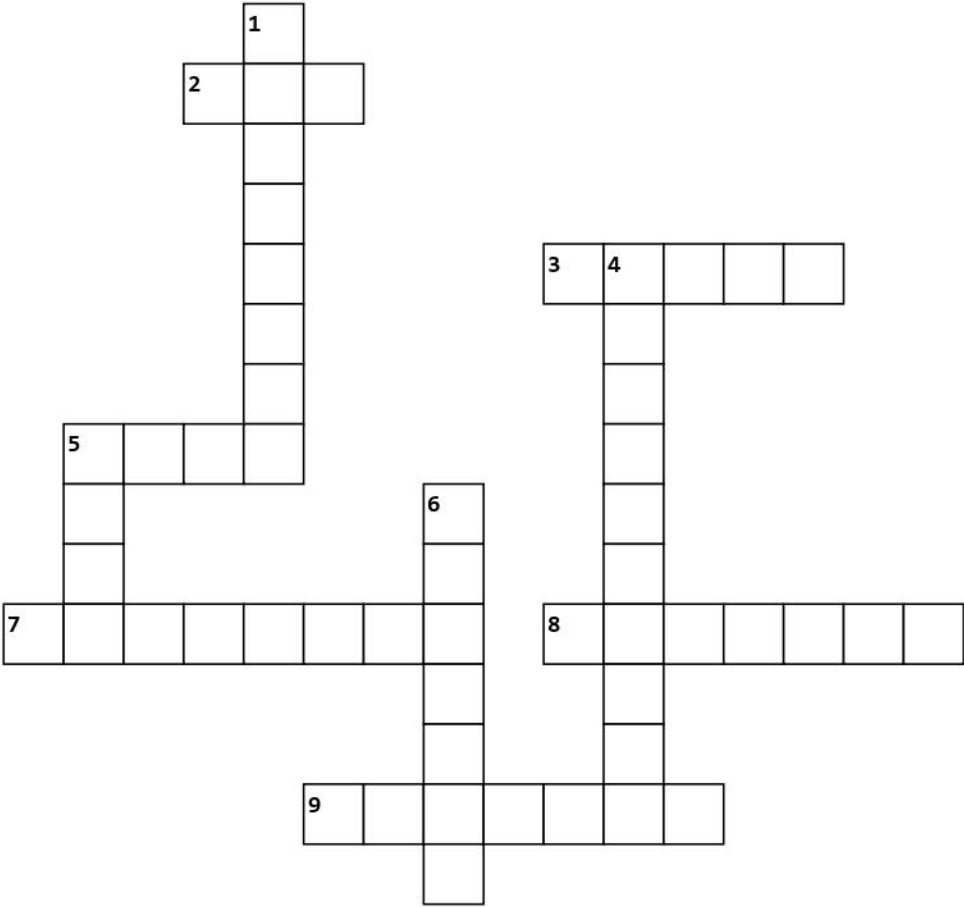


R1:

- 100 ohms (Brown, Black, Brown, Gold).
- 220 ohms (Red, Red, Brown, Gold).
- 1K ohm (Brown, Black, Red, Gold).
- 6.8K ohm (Blue, Gray, Red, Gold).

CROSSWORD

Experiment 1 - "How A Resistor Works"



Across

- 2. What color is the positive lead on the battery snap?
- 3. What is the first color on a 1000 Ohm resistor?
- 5. What is the color of the third band on a 6.8k Ohm resistor?
- 7. The brightness of the LED depends on the Ohms of the
- 8. What is the short lead on an LED is connected to?
- 9. How many Ohms made the LED the brightest?

Down

- 1. Which side of the battery do the electrons flow from?
- 4. What reduces the current flow in a circuit?
- 5. What is the first color band on a 6800 Ohm resistor?
- 6. What determines the brightness of the LED?

Experiment 1 - "How A Resistor Works"

Z S P S G R Y Y Q M D I A G R A M L R A
V G I C C O B R I G H T N E S S Q D H N
P S C N L O P N J P S H H V S Z Z H G G
O N T O J S J P A B C D L I E A E S S X
S A O C B U W E O M H O F T I R U M C Q
I P R D Z O O R Z S I H B A R O L H H D
T S I E B C R F P H I C R G E T A O E L
I H A L B R P O E R H T A E S A V Y M R
V O L U C U R R E N T P I N I C U W A E
E N Z L X R O M N Z Q B Q O U I R J T S
E P V H G E G I H P Q J M T N D E U I I
X P V Z T X R N A D H T X K V N M M C S
P G I Q N Q E G V Y Y Q K M X I M P S T
E K T E E M S Q Y R E B D K Y H I E C O
R R S T N P S J R J R W F H N K D R D R
I M E O O Y I W E A I L G B M W E X S I
M Y J W P Q V O T X W C Y W I N T M G G
E Q A C M T E L T U F U I L U S A O S Z
N S L O O F L F A L M O I T X S F K O L
T Y Z Y C H Y Y B I L L U M I N A T E Z

1. resistor
2. led
3. current
4. battery
5. component
6. schematic
7. brightness
8. illuminate
9. flow
10. dimmer
11. ohms
12. opposition
13. progressively
14. jumper
15. wire
16. snap
17. diagram
18. pictorial
19. indicator
20. series
21. negative
22. positive
23. performing
24. experiment
25. value



QUIZ for Experiment 1 in Mr Circuit Lab 1

This Quiz covers the training learned by completing



“How a Resistor Works” Experiment 1

Circle the letter for your answer to each question and then hand this quiz in to your teacher.

A
B
C
D

#1 In Experiment #1, the brightness of the LED depends on _____ .

A. the capacitor value in the circuit
 B. the value of the resistor in the circuit
 C. the solderless circuit board
 D. the battery snap

#6 The short lead on an LED is?

A. the Gate
 B. the Anode
 C. the Cathode
 D. the Positive

A
B
C
D

A
B
C
D

#2 Of the four values of resistors in Exp. #1, which value caused the LED to be the brightest?

A. 100 ohm
 B. 220 ohm
 C. 1k ohm
 D. 6.8k ohm

#7 What are the colors on a 1000 Ohm $\pm 5\%$ resistor?

A. brown, black, red, gold
 B. green, blue, red, silver
 C. blue, gray, red, gold
 D. brown, red, green silver

A
B
C
D

A
B
C
D

#3 What color is the third band on the 6.8k ohm resistor?

A. blue
 B. green
 C. black
 D. red

#8 With an LED in a circuit, the more _____, the greater the brightness.

A. air
 B. capacitance
 C. current
 D. light

A
B
C
D

A
B
C
D

#4 Which side of battery does the electron current flow from?

A. positive side
 B. left side
 C. negative side
 D. top side

#9 To reduce the amount of current flowing in a circuit, you can _____ the amount of resistance.

A. increase
 B. decrease
 C. rotate
 D. circle

A
B
C
D

A
B
C
D

#5 What is the color of the positive lead on the battery snap?

A. green
 B. red
 C. black
 D. yellow

#10 Of the four values of resistors in Exp. #1, which value caused the LED to be the dimmest?

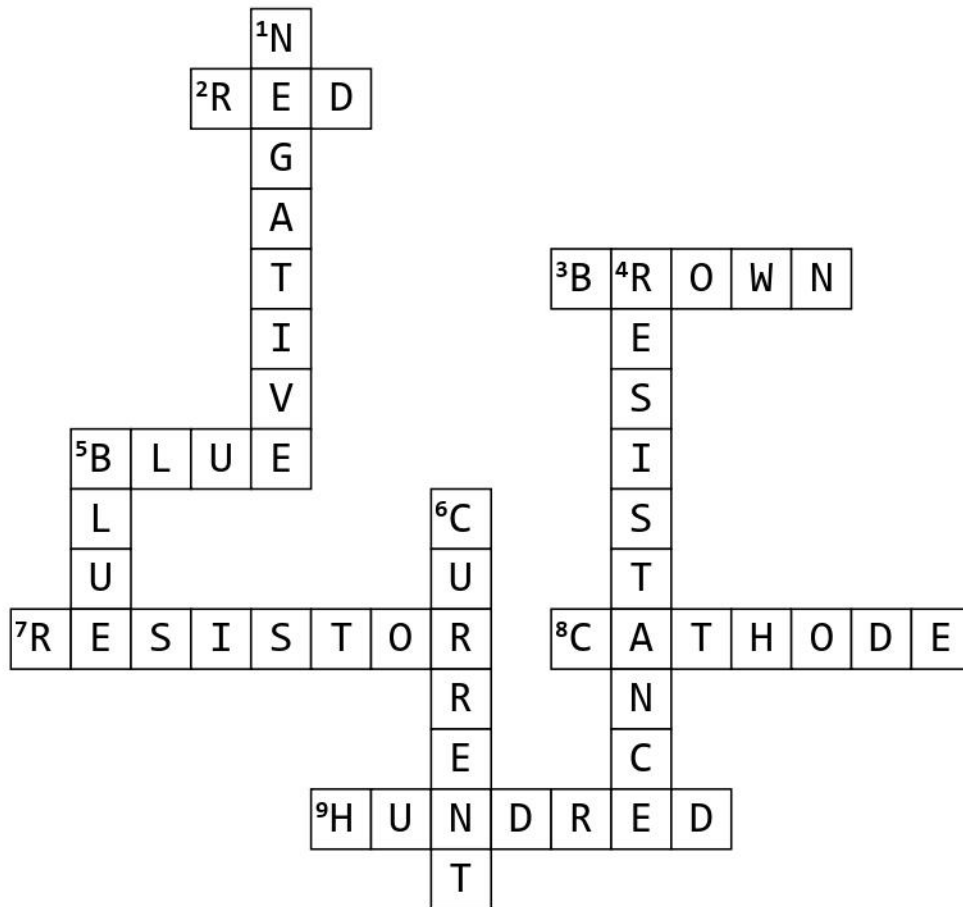
A. 100 ohm
 B. 220 ohm
 C. 1k ohm
 D. 6.8k ohm

A
B
C
D

Score	
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ANSWERS FOR CROSSWORD

Experiment 1 - "How A Resistor Works"



Across

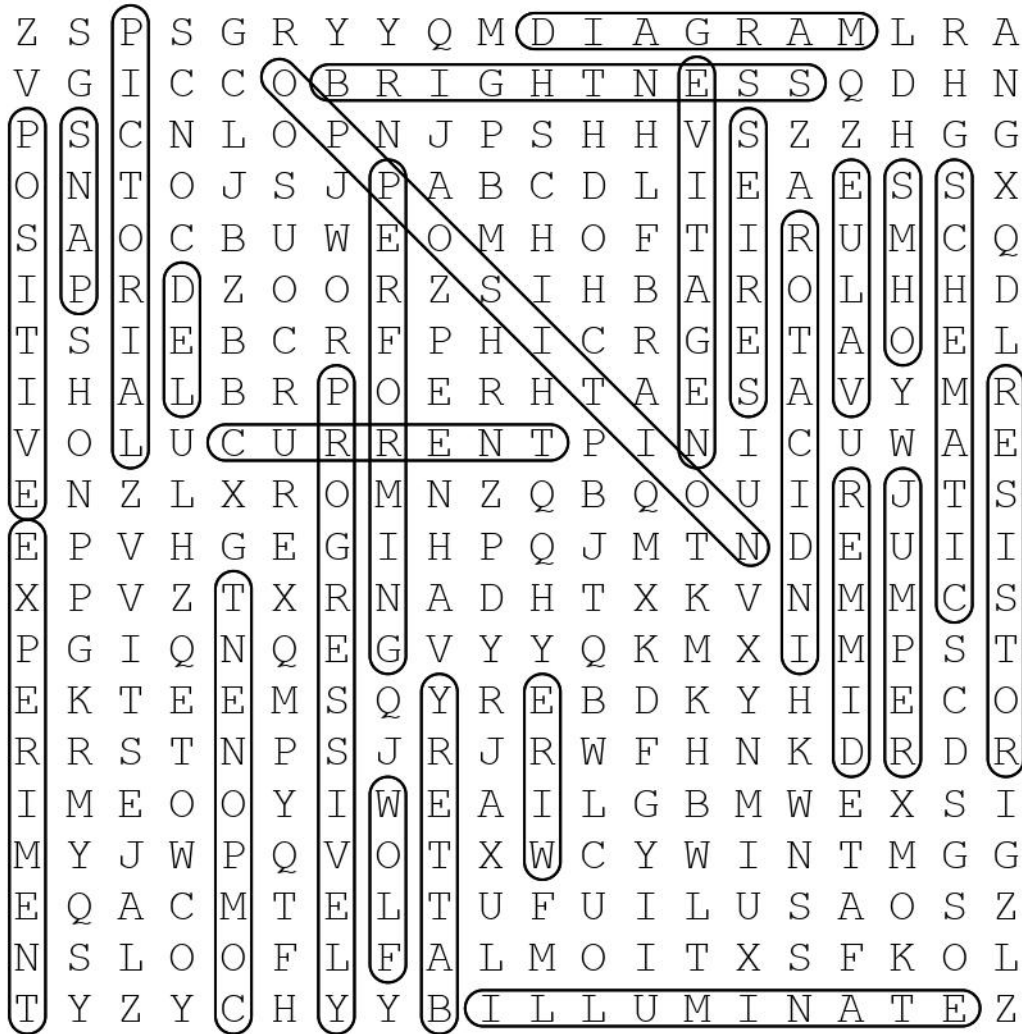
2. What color is the positive lead on the battery snap?
3. What is the first color on a 1000 Ohm resistor?
5. What is the color of the third band on a 6.8k Ohm resistor?
7. The brightness of the LED depends on the Ohms of the
8. What is the short lead on an LED is connected to?
9. How many Ohms made the LED the brightest?

Down

1. Which side of the battery do the electrons flow from?
4. What reduces the current flow in a circuit?
5. What is the first color band on a 6800 Ohm resistor?
6. What determines the brightness of the LED?

ANSWERS FOR WORD SEARCH

Experiment 1 - "How A Resistor Works"

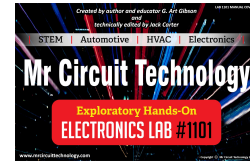


1. resistor
2. led
3. current
4. battery
5. component
6. schematic
7. brightness
8. illuminate
9. flow
10. dimmer
11. ohms
12. opposition
13. progressively
14. jumper
15. wire
16. snap
17. diagram
18. pictorial
19. indicator
20. series
21. negative
22. positive
23. performing
24. experiment
25. value

**QUICK-CHECK ANSWER KEY for Experiment 1 QUIZ
for Mr Circuit Electronics Training (“How a Resistor Works”)**

Place this sheet over top of the STUDENT QUIZ (offset a little to the left and then offset to the right) to compare the answers on this sheet to the answers that the student marked. Put an ‘X’ for each wrong answer.

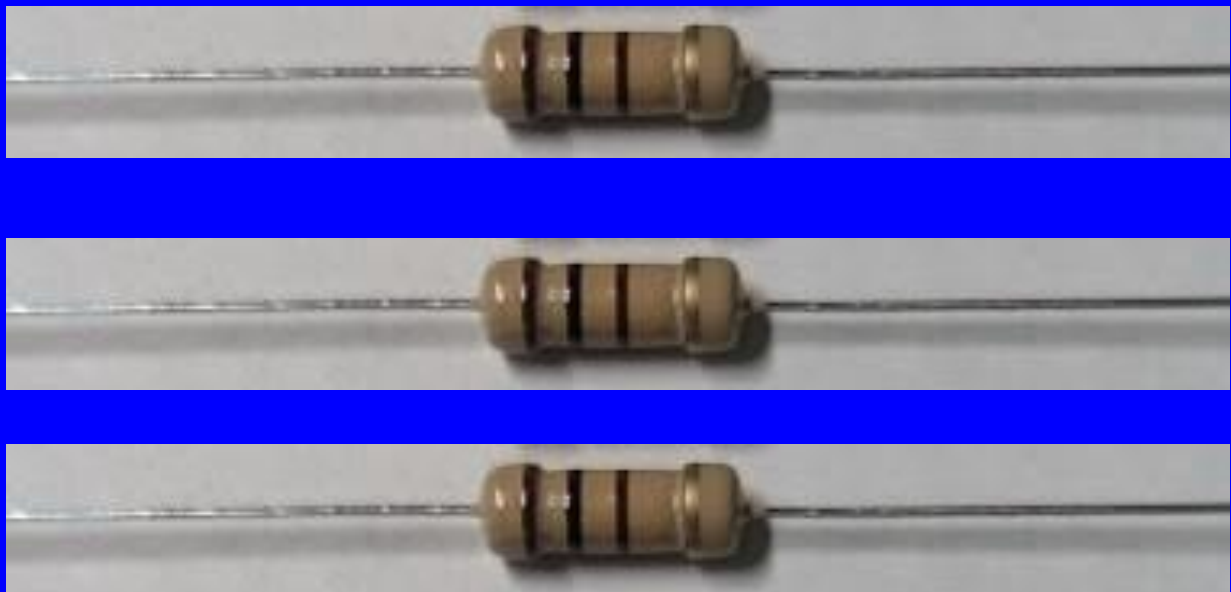
Count the right answers and record the score of right answers in your grade book.



<p>A <input checked="" type="radio"/> B C D</p>	<p>#1 In Experiment #1, the brightness of the LED depends on _____ .</p> <p>A. the capacitor value in the circuit B. the value of the resistor in the circuit C. the solderless circuit board D. the battery snap</p>	<p>#6 The short lead on an LED is?</p> <p>A. the Gate B. the Anode C. the Cathode D. the Positive</p>	<p>A B <input checked="" type="radio"/> C D</p>
<p><input checked="" type="radio"/> A B C D</p>	<p>#2 Of the four values of resistors in Exp. #1, which value caused the LED to be the brightest?</p> <p>A. 100 ohm B. 220 ohm C. 1k ohm D. 6.8k ohm</p>	<p>#7 What are the colors on a 1000 Ohm ±5% resistor?</p> <p>A. brown, black, red, gold B. green, blue, red, silver C. blue, gray, red, gold D. brown, red, green silver</p>	<p><input checked="" type="radio"/> A B C D</p>
<p>A B C <input checked="" type="radio"/> D</p>	<p>#3 What color is the third band on the 6.8k ohm resistor?</p> <p>A. blue B. green C. black D. red</p>	<p>#8 With an LED in a circuit, the more _____, the greater the brightness.</p> <p>A. air B. capacitance C. current D. light</p>	<p>A B <input checked="" type="radio"/> C D</p>
<p>A B <input checked="" type="radio"/> C D</p>	<p>#4 Which side of battery does the electron current flow from?</p> <p>A. positive side B. left side C. negative side D. top side</p>	<p>#9 To reduce the amount of current flowing in a circuit, you can _____ the amount of resistance.</p> <p>A. increase B. decrease C. rotate D. circle</p>	<p><input checked="" type="radio"/> A B C D</p>
<p>A <input checked="" type="radio"/> B C D</p>	<p>#5 What is the color of the positive lead on the battery snap?</p> <p>A. green B. red C. black D. yellow</p>	<p>#10 Of the four values of resistors in Exp. #1, which value caused the LED to be the dimmest?</p> <p>A. 100 ohm B. 220 ohm C. 1k ohm D. 6.8k ohm</p>	<p>A B C <input checked="" type="radio"/> D</p>

BUILD A BETTER FUTURE by UNDERSTANDING SCIENCE-ELECTRONICS

RESISTORS CONTROL CURRENT

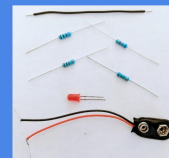
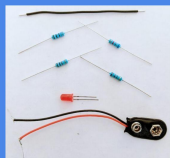


BASIC ELECTRONICS LAB 1

“HOW A RESISTOR WORKS”

(Poster MC1-01-P01)

(Page 8)



PRICE LIST May 2024

PARTS KIT	Mr Circuit Series 1	Price
Number	SCIENCE / ELECTRONICS "PARTS KITS"	Each
MC1-00-PK	Solderless Circuit Board to build kits	\$3.95
MC1-01-PK	Parts Kit for "How a Resistor Works	\$1.95
MC1-02-PK	Parts Kit for "How a Potentiometer Works	\$2.95
MC1-03-PK	Parts Kit for "How a Photocell Works	\$1.95
MC1-04-PK	Parts Kit for "How a Capacitor Works	\$2.95
MC1-05-PK	Parts Kit for "How a Speaker Works	\$2.95
MC1-06-PK	Parts Kit for "How a Diode Works	\$1.95
MC1-07-PK	Parts Kit for "How an SCR Works	\$3.95
MC1-08-PK	Parts Kit for "How an NPN Transistor Works	\$2.95
MC1-09-PK	Parts Kit for "How a PNP Transistor Works	\$2.95
MC1-10-PK	Parts Kit for "How a Transistor Oscillator Works	\$3.95
MC1-11-PK	Parts Kit for "How a 555 Timer IC Works	\$2.95
MC1-12-PK	Parts Kit for "Burglar Alarm circuit	\$3.95
MC1-13-PK	Parts Kit for "Solar-Activated Night Light circuit	\$3.95
MC1-14-PK	Parts Kit for "DC to DC Power Supply circuit	\$2.95
MC1-15-PK	Parts Kit for "Electronic Metronome circuit	\$4.95
MC1-16-PK	Parts Kit for "Electronic Motorcycle circuit	\$3.95
MC1-17-PK	Parts Kit for "Railroad Lights circuit	\$2.95
MC1-18-PK	Parts Kit for "Variable Speed Lights circuit	\$3.95
MC1-19-PK	Parts Kit for "Continuity Tester circuit	\$4.95
MC1-20-PK	Parts Kit for "Audio Generator circuit	\$5.95
MC1-21-PK	Parts Kit for "Electronic Police Siren circuit	\$4.95
MC1-22-PK	Parts Kit for "Solar-Activated Wake-Up Alarm circuit	\$3.95
MC1-23-PK	Parts Kit for "Variable Timer circuit	\$3.95
MC1-24-PK	Parts Kit for "Moisture Detector circuit	\$2.95
MC1-25-PK	Parts Kit for "Code Oscillator circuit	\$4.95
MC1-26-PK	Parts Kit for "Audible Water Detector circuit	\$4.95
MC1-27-PK	Parts Kit for "English Police Siren circuit	\$4.95
MC1-28-PK	Parts Kit for "Electronic Canary circuit	\$7.95
MC1-29-PK	Parts Kit for "fantasy Space Machine Gun circuit	\$5.95
MC1-30-PK	Parts Kit for "Ultrasonic Pest Repeller circuit	\$5.95
Set-MC1-PK	Complete Set of All Series 1 Parts Kits (31 total)	\$120.00

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