Exciting, Educational and Fun

MC1-002-LP

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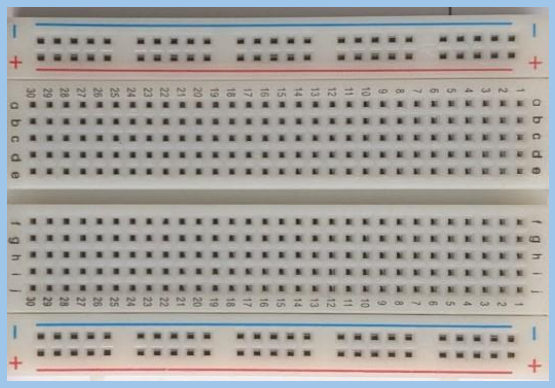
Mr Circuit Technology

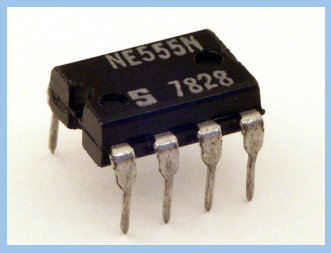
Science/Electronics Experiment Kits and Labs

"ELECTRONIC COMPONENTS"

LESSON PLAN

Table of Contents



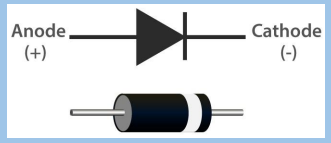


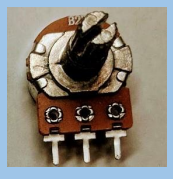
PREPARATION: You can put the Page 14 poster up on your classroom wall to announce the fact that you are going to do this Science-Electronics Lesson.

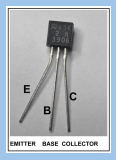
Step 1 - Make a copy of pages 1 through 10 for each student. The students can read and do these pages on their own or you can guide them.

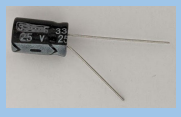
Step 2 - When your students have completed reading the Lesson, the Crossword Puzzle, Word Search Puzzle, and the Written Quiz, collect all their work for grading using the Answer Keys in this Lesson Plan.

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









Mr. CIRCUIT® ELECTRONIC COMPONENTS (Page 1)

MC1-002-R-1

LESSON 2 (page 1 of 7

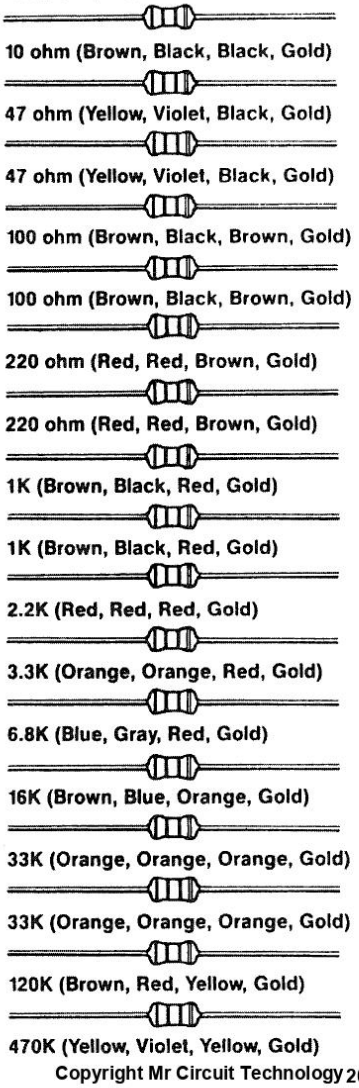
In this lesson you will learn about the PHYSICAL APPEARANCE, SCHEMATIC SYMBOL, and basic FUNCTION of the following electronic components:

BATTERIES, SWITCHES, RESISTORS, POTENTIOMETERS, PHOTOCELLS, CERAMIC DISC CAPACITORS, ELECTROLYTIC CAPACITORS, DIODES, LEDs, SCRs, TRANSISTORS, INTEGRATED CIRCUITS, AND SPEAKERS as shown below.

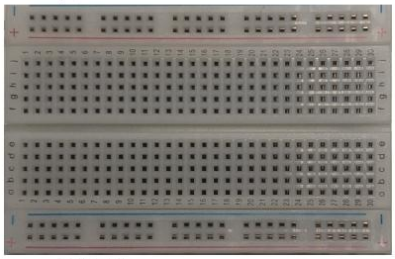
PARTS INVENTORY SHEET

Page 3

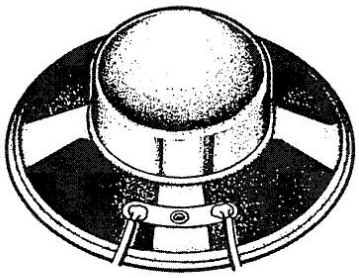
RESISTORS (Resistors have no polarity)



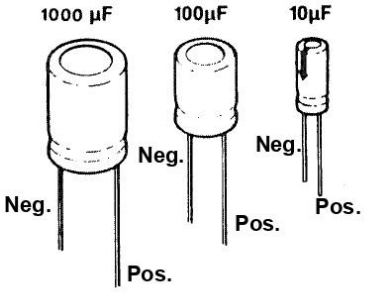
Solderless Circuit Board



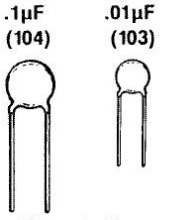
Speaker



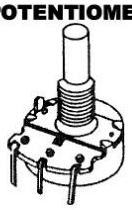
RADIAL ELECTROLYTIC CAPACITORS



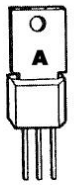
CERAMIC CAPACITORS



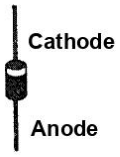
POTENTIOMETER



SCR



POWER DIODE



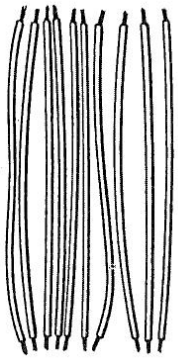
LED

PHOTOCELL

No polarity

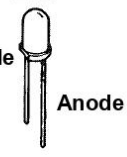
BATTERY SNAP

JUMPER Wires

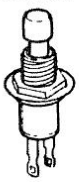


555 TIMER IC

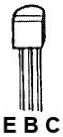
LED



N/O PUSHBUTTON SWITCH



Transistor NPN 2N3904



Transistor PNP 2N3906

(Continue to Page 2)

Mr. CIRCUIT® ELECTRONIC COMPONENTS (Page 2)

MC1-002-R-2

LESSON 2 (page 2 of 7)

After you learn about ELECTRONIC COMPONENTS, you will build several circuits with them

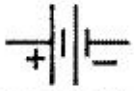
Look at the PHYSICAL APPEARANCE and read the FUNCTION of each of these components and then copy the SCHEMATIC SYMBOL in the box to the right.

Draw the Schematic Symbols in the boxes below.

BATTERIES There are several types.

Physical Appearance Schematic Symbol

#1

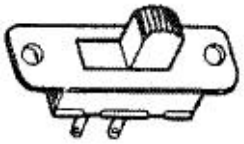


BATTERY

FUNCTION: A battery stores electric energy.

SWITCHES

Physical Appearance Schematic Symbols



SWITCH

#2

PUSHBUTTON

FUNCTION: A switch or a pushbutton is a device that opens or closes an electric circuit.

(Continue to Page 3)

Mr. CIRCUIT® ELECTRONIC COMPONENTS (Page 3)

MC1-002-R-3

LESSON 2 (page 3 of 7)

Look at the PHYSICAL APPEARANCE and read the FUNCTION of each of these components and then copy the SCHEMATIC SYMBOL in the box to the right.

RESISTORS

Physical Appearance | Schematic Symbol

#3

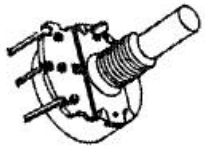
RESISTOR

FUNCTION: A resistor limits or controls the amount of current flowing through a circuit by presenting an opposition or **resistance** to the current flow.
Identify the resistors in your Lab and observe them.

POTENTIOMETERS

Physical Appearance | Schematic Symbol

#4



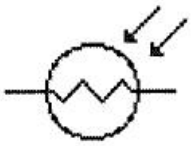
POTENTIOMETER

FUNCTION: A potentiometer is a variable resistor.
Identify the potentiometer in your Lab .

PHOTOCELL

Physical Appearance | Schematic Symbol

#5



PHOTOCELL

FUNCTION: A photocell is a special kind of resistor that varies its resistance according to the intensity of the light that hits its surface.
Identify the photocell in your Lab.

(Continue to Page 3)

Mr. CIRCUIT® ELECTRONIC COMPONENTS (Page 4)

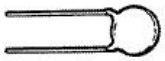
MC1-002-R-4

LESSON 2 (page 4 of 7)

Look at the PHYSICAL APPEARANCE and read the FUNCTION of each of these components and then copy the SCHEMATIC SYMBOL in the box to the right.

CERAMIC CAPACITORS

Physical Appearance Schematic Symbol

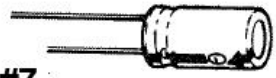
#6 

CERAMIC CAPACITOR

FUNCTION: A capacitor acts as a temporary battery by storing electricity. Ceramic capacitors store small amounts of electricity.
Identify the ceramic capacitors in your Lab .

ELECTROLYTIC CAPACITORS

Physical Appearance Schematic Symbol



#7

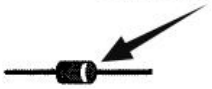
ELECTROLYTIC CAPACITOR

FUNCTION: Electrolytic capacitors store relatively large amounts of electricity. They have polarity, which means that they have a positive and a negative terminal and therefore care must be taken when connecting them to a circuit. They must be installed in the right direction.
Identify the electrolytic capacitors in your Lab , observe them and note the indicated polarity of their leads.

DIODES

Physical Appearance Schematic Symbol

Cathode

#8 

ANODE CATHODE

DIODE

FUNCTION: A diode is a device that allows current to flow through it in one direction only. You can compare the diode to a "one way street".
Diodes have two leads, one is the anode and the other is the cathode. The cathode is indicated by a band around the body of the diode.
Identify and observe the diode in your Lab .

(Continue to Page 5)

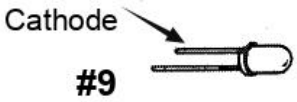
MC1-002-R-5

LESSON 2 (page 5 of 7)

Look at the PHYSICAL APPEARANCE and read the FUNCTION of each of these components and then copy the SCHEMATIC SYMBOL in the box to the right.

LIGHT EMITTING DIODES (LED's)

Physical Appearance



#9

Schematic Symbol

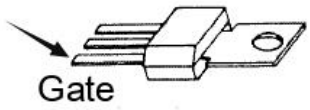
LED

FUNCTION: LED's are a special kind of diode that emit light when current flows through them. They have two terminals called anode and cathode. The cathode is indicated by a flat side on the case of the LED or by the shorter lead.
Identify the two LED's in your Lab and try to recognize the anode and the cathode leads.

SCR's.

Physical Appearance

#10

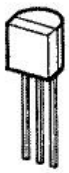


Schematic Symbol

FUNCTION: The SCR allows current to flow through it only after a momentary positive voltage is applied to the gate. SCR's have three leads which are called: **anode**, **cathode,** and **gate.**
Identify and observe the SCR in your Lab .

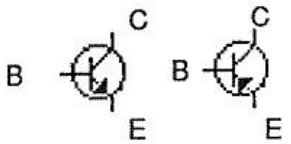
TRANSISTORS

Physical Appearance



E B C

Schematic Symbol



#11 NPN PNP **#12**

NPN

PNP

FUNCTION: The transistor is a component used to amplify electricity. It has three terminals called **Emitter**, **Base,** and **Collector**.
According to how transistors are manufactured they become an NPN or PNP type. Observe the difference in the schematic symbol between these two types.
Identify and observe the two transistors in your Lab .

(Continue to Page 5)

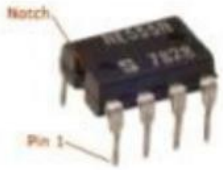
MC1-002-R-6

LESSON 2 (page 6 of 7)

Look at the PHYSICAL APPEARANCE and read the FUNCTION of each of these components and then copy the SCHEMATIC SYMBOL in the box to the right.

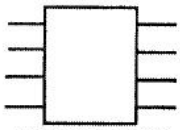
INTEGRATED CIRCUIT

Physical Appearance



#13

Schematic Symbol



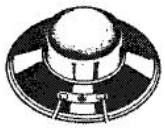
FUNCTION: Integrated Circuits (IC's) have several components (transistors, diodes, resistors, capacitors, etc), condensed into a very small package. Each type of IC performs a different function according to the different components it has inside.

Identify and observe the IC in your Lab.

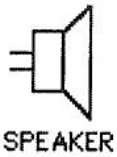
SPEAKERS

Physical Appearance

#14



Schematic Symbol



FUNCTION: The purpose of the speaker is to produce sound waves from the electric current that flows through it.

Identify and observe the speaker.

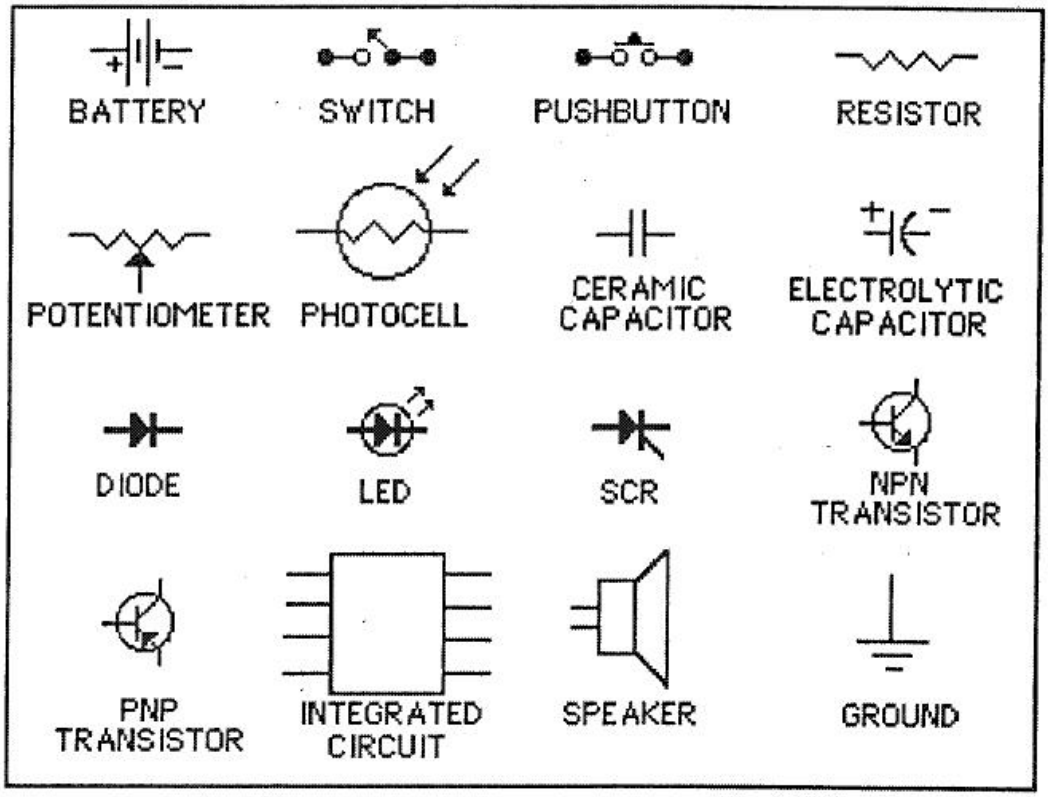
(Continue to Page 5)

Mr. CIRCUIT® ELECTRONIC COMPONENTS (Page 7)

MC1-002-R-7

LESSON 2 (page 7 of 7)

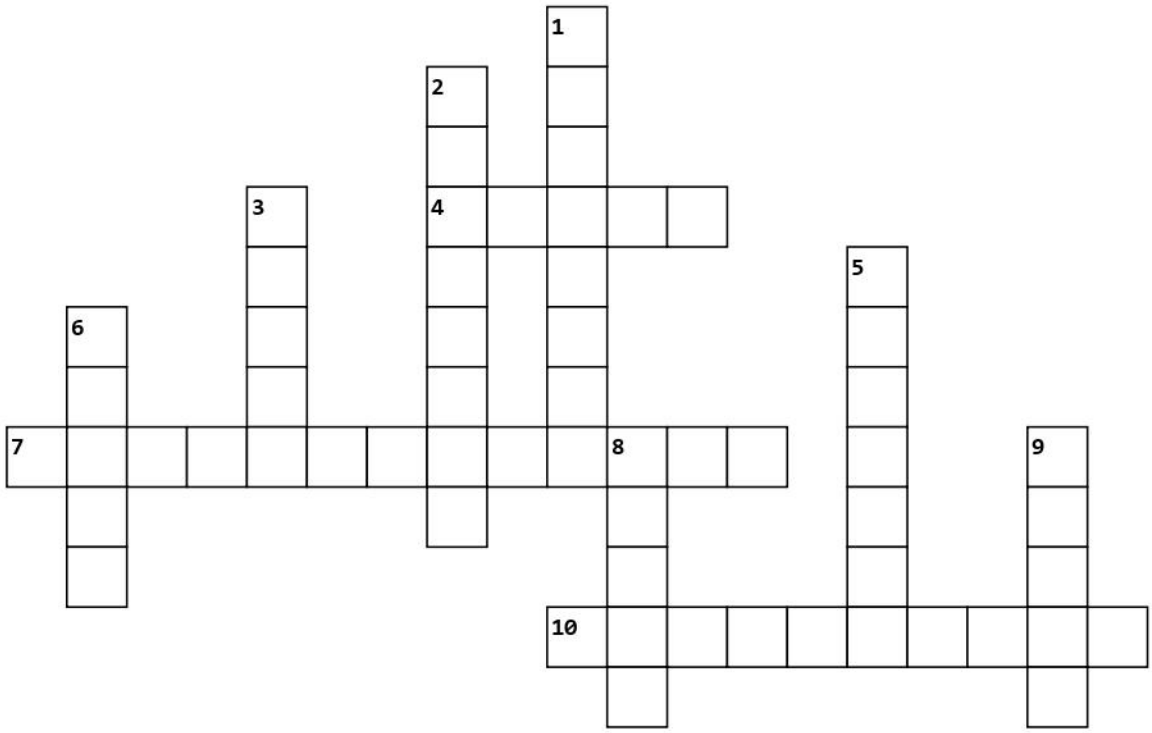
Here is a SCHEMATIC SYMBOLS CHART. Copy this whole chart exactly as you see it into the box below.



(End of Lesson 2)

CROSSWORD

Lesson 2 - "Electronic Components"



Across

4. To change the resistance on a potentiometer, you twist the _____ .

7. What component can vary current in a circuit?

10. The change in current is caused by the change in _____ .

Down

1. The electrons come out of the _____ terminal of the battery.

2. A potentiometer is a variable _____ .

3. What is the third color band on a 100 Ohm resistor?

5. The purpose of the 100 Ohm resistor in the circuit is to _____ the LED.

6. The word LED stands for Light-Emitting _____ .

8. How many terminals does a potentiometer have?

9. What is the color of the negative lead on the battery snap?

Mr. CIRCUIT®
MC1-002-WS

WORD SEARCH

Lesson 2 - "Electronic Components"

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

1. What component can vary current in a circuit?

2. What is the third color band on a 100 Ohm resistor?

3. To change the resistance on a potentiometer, you twist the _____ .

4. How many terminals does a potentiometer have?

5. What is the color of the negative lead on the battery snap?

6. The purpose of the 100 Ohm resistor in the circuit is to _____ the LED.

7. The change in current is caused by the change in _____ .

8. The electrons come out of the _____ terminal of the battery.

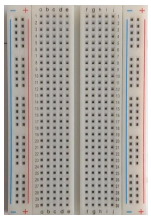
9. The word LED stands for Light-Emitting _____ .

10. A potentiometer is a variable _____ .

(Student Name) (Period/Student Number) (Date)

QUIZ for Lesson 2 in the Mr Circuit Lab 1 (Page 10)

QUIZ for Lesson 2 - "Component Identification"



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

A B C D

#1 What is the primary function of a battery in a circuit?

A. provide electric energy
B. serve as a paper weight
C. give resistance to a circuit
D. amplify electricity

A B C D

#2 What is the primary function of a resistor?

A. resist proton flow
B. add color to your circuit
C. count electrons
D. limit or control current

A B C D

#3 What is the primary function of an LED?

A. control electron flow
B. light up when current flows through it
C. provide heat to keep you warm
D. store electrons

A B C D

#4 Which set of components has a schematic symbol that includes a 'squiggly' line?

A. a resistor, a photocell, and a potentiometer
B. a capacitor and an SCR
C. an LED and a Battery
D. an Integrated Circuit and a Speaker

A B C D

#5 Which of these has a 'diode symbol' as part of its symbol?

A. a Diode
B. an SCR
C. an LED
D. All the above

A B C D

#6 Which type of capacitor generally stores relatively large amount of electric charge?

A. a ceramic disc capacitor
B. an electrolytic capacitor
C. a surface mount capacitor
D. a mica capacitor

A B C D

#7 What component varies its resistance according to the light intensity?

A. a Photocell
B. a Transistor
C. a 555 Timer IC
D. an SCR

A B C D

#8 What component has an Emitter, Base, and Collector?

A. a Transistor
B. an SCR
C. a Diode
D. a Potentiometer

A B C D

#9 Which of these component has a Gate, an Anode, and a Cathode lead?

A. an SCR
B. a Transistor
C. a Diode
D. a Resistor

A B C D

#10 What is the purpose of a speaker?

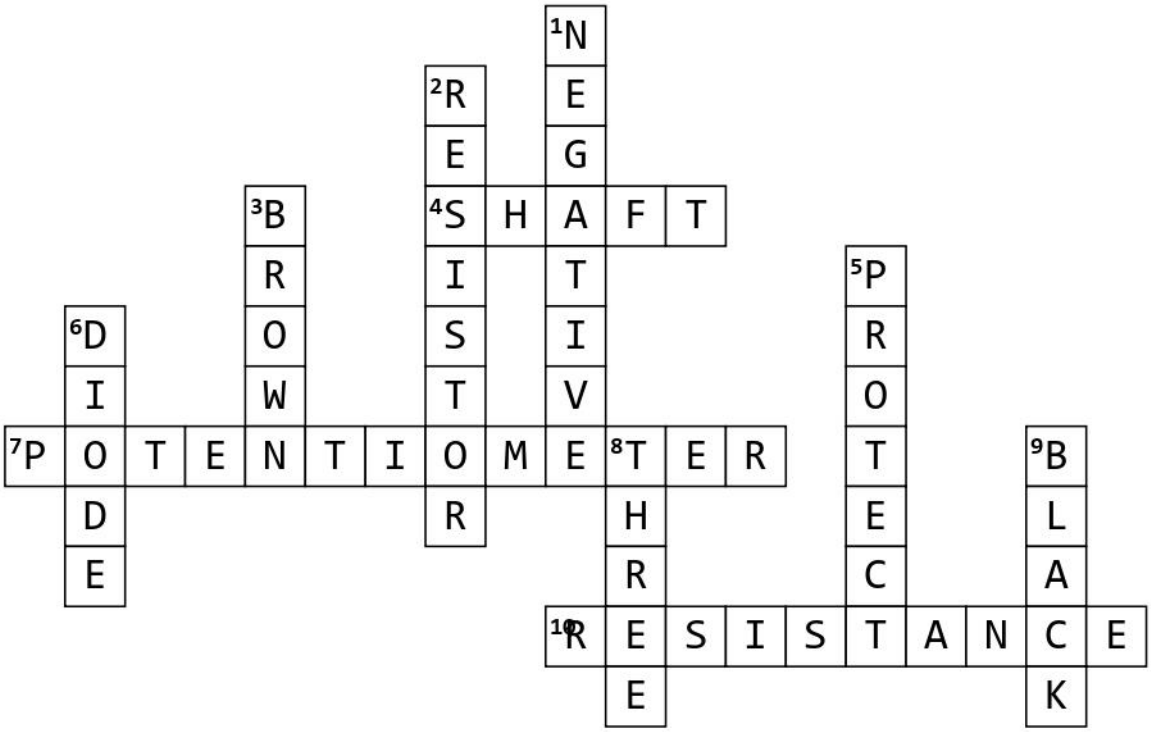
A. convert electrical currents into sound waves
B. use power
C. be an adjustable capacitor
D. take up space in a circuit

(Form SQ00-2)

Score

ANSWERS FOR CROSSWORD

Lesson 2 - “Electronic Components”



Across

4. To change the resistance on a potentiometer, you twist the _____ .

7. What component can vary current in a circuit?

10. The change in current is caused by the change in _____ .

Down

1. The electrons come out of the _____ terminal of the battery.

2. A potentiometer is a variable _____ .

3. What is the third color band on a 100 Ohm resistor?

5. The purpose of the 100 Ohm resistor in the circuit is to _____ the LED.

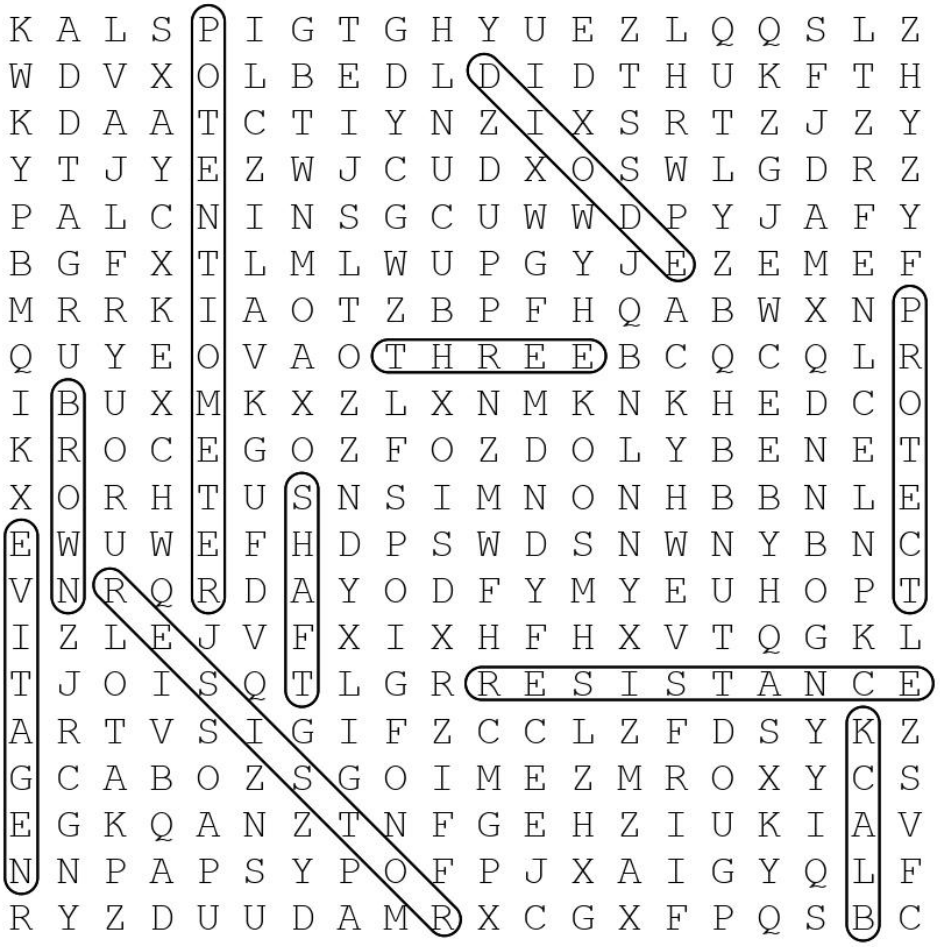
6. The word LED stands for Light-Emitting _____ .

8. How many terminals does a potentiometer have?

9. What is the color of the negative lead on the battery snap?

ANSWERS FOR WORD SEARCH

Lesson 2 - "Electronic Components"



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QUICK-CHECK ANSWER KEY for Lesson 2 QUIZ

for Mr Circuit Electronics Training ("Component Identification")

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.

A
B
C
D

#1 What is the primary function of a battery in a circuit?

A. provide electric energy
B. serve as a paper weight
C. give resistance to a circuit
D. amplify electricity

A
B
C
D

#2 What is the primary function of a resistor?

A. resist proton flow
B. add color to your circuit
C. count electrons
D. limit or control current

A
B
C
D

#3 What is the primary function of an LED?

A. control electron flow
B. light up when current flows through it
C. provide heat to keep you warm
D. store electrons

A
B
C
D

#4 Which set of components has a schematic symbol that includes a 'squiggly' line?

A. a resistor, a photocell, and a potentiometer
B. a capacitor and an SCR
C. an LED and a Battery
D. an Integrated Circuit and a Speaker

A
B
C
D

#5 Which of these has a 'diode symbol' as part of its symbol?

A. a Diode
B. an SCR
C. an LED
D. All the above

A
B
C
D

#6 Which type of capacitor generally stores relatively large amount of electric charge?

A. a ceramic disc capacitor
B. an electrolytic capacitor
C. a surface mount capacitor
D. a mica capacitor

A
B
C
D

#7 What component varies its resistance according to the light intensity?

A. a Photocell
B. a Transistor
C. a 555 Timer IC
D. an SCR

A
B
C
D

#8 What component has an Emitter, Base, and Collector?

A. a Transistor
B. an SCR
C. a Diode
D. a Potentiometer

A
B
C
D

#9 Which of these component has a Gate, an Anode, and a Cathode lead?

A. an SCR
B. a Transistor
C. a Diode
D. a Resistor

A
B
C
D

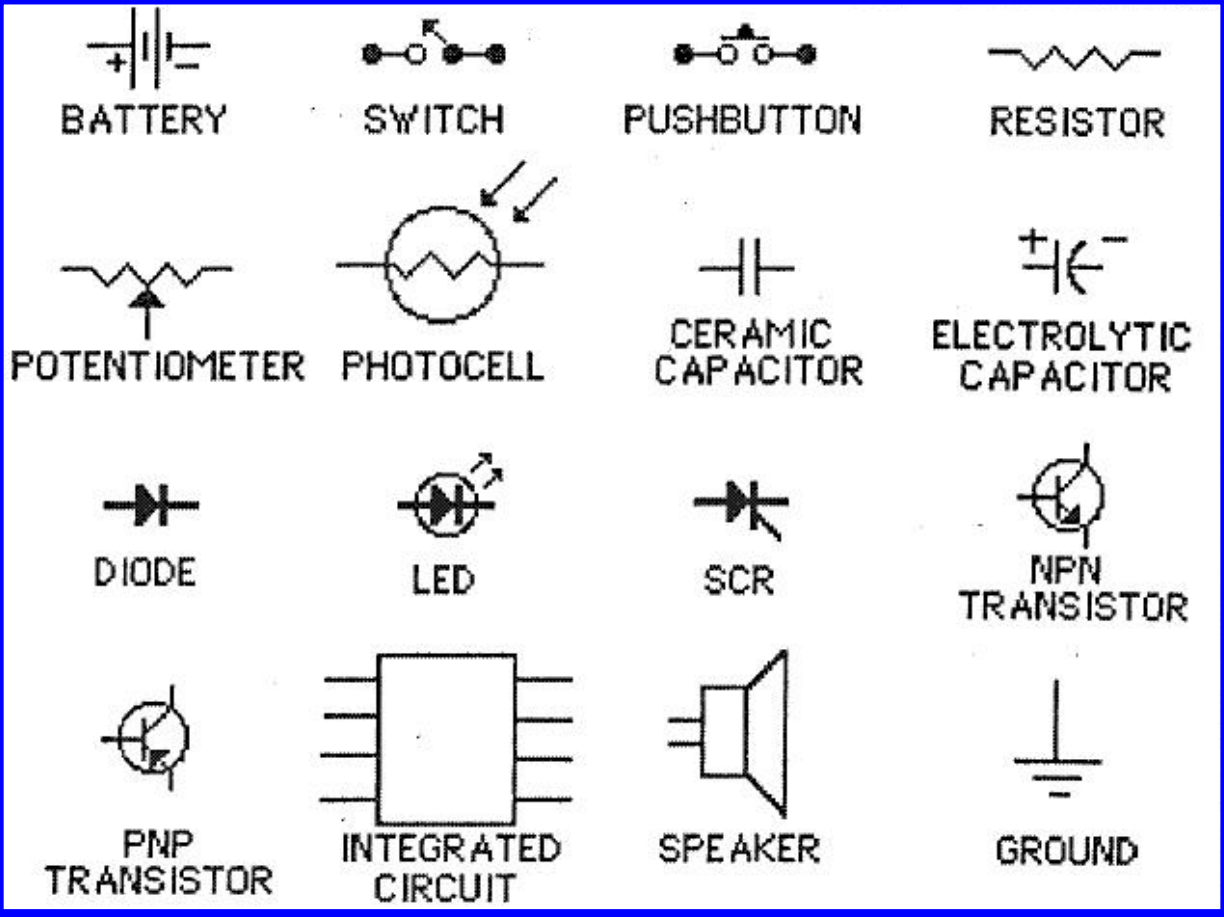
#10 What is the purpose of a speaker?

A. convert electrical currents into sound waves
B. use power
C. be an adjustable capacitor
D. take up space in a circuit

(Form SQAK00-2)

BUILD A BETTER FUTURE by UNDERSTANDING SCIENCE

ELECTRONIC CIRCUITS USE ELECTRONIC COMPONENTS

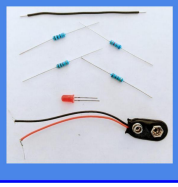


BASIC ELECTRONICS LAB 1

"ELECTRONIC COMPONENTS"

(Poster MC1-002-P01)

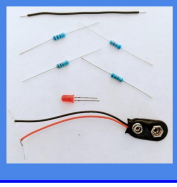
MC1-01
Electronic Parts



For more info: www.MrCircuitTechnology.com MrCircuit23@gmail.com

Mr Circuit Technology

MC1-01
Electronic Parts



PRICE LIST May 2024

PRICE LIST

PARTS KIT Number	Mr Circuit Series 1 SCIENCE / ELECTRONICS "PARTS KITS"	Price 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
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MC1-25-PK	Parts Kit for "Code Oscillator circuit	$4.95
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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**