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# Mr Circuit Technology

Science/Electronics Experiment Kits and Labs

## “RESISTOR COLOR CODE”

### LESSON PLAN



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Purchase Order to [Gary@MrCircuitTechnology.com](mailto:Gary@MrCircuitTechnology.com) or  
order online at [www.MrCircuitTechnology.com](http://www.MrCircuitTechnology.com)



**PREPARATION:** You can put the Page 11 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 7 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



Resistors are one of the most used and fundamental components in electronic circuits. You will find them in most electronic circuits.

Now you will learn how to use the **RESISTOR COLOR CODE** to read the nominal Ohms value of a resistor.

What is resistance? **RESISTANCE** is the opposition to current flow. A resistor has **RESISTANCE**.

**RESISTANCE** is measured in Ohms. The higher the Ohms, the higher the resistance. For example, a resistor that has 10,000 Ohms of resistance has more resistance than a resistor of 1,000 Ohms.

The amount of Ohms a resistor has does **NOT** depend on its physical size. A tiny resistor can have 1000 Ohms of resistance and a much larger resistor can have 1000 Ohms of resistance.



**THE RESISTOR COLOR CODE** - Certain small resistors have color bands painted on them. These color bands have meaning. If there are a total of 4 color bands on a resistor, the first and second color bands represent numbers. The third color band tells how many zeros to add after first two numbers. The fourth color band give the tolerance of the resistor. Let's explain.

**(Continue to Page 2)**

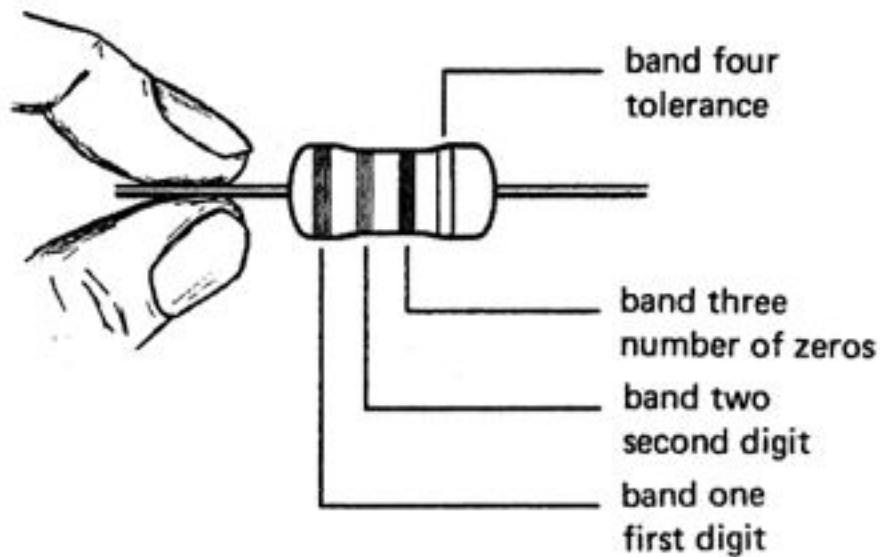
## LESSON 3 (page 2 of 4)

MC1-003-R-2

Here is a drawing of a resistor being held by two fingers. If the first color band is Red then the first digit of the resistor's value is 2. If the second color is Green, then the second digit is 5. If the third color band is Orange, then the number of zeros is 3. So here is the value of the resistor in Ohms.

25,000 Ohms.

(Red, Green, Orange)



THIS IS THE RESISTOR COLOR CODE

black	0
brown	1
red	2
orange	3
yellow	4
green	5
blue	6
violet	7
gray	8
white	9

(Continue to Page 3)

## LESSON 3 (page 3 of 4)

MC1-003-R-3

The fourth color band gives us the Tolerance of the resistor.



If the fourth color band is Gold, then the Tolerance is plus or minus 5 percent. We write that as  $\pm 5\%$ .

What does  $\pm 5\%$  mean? It means that the value in Ohms given by the color bands is accurate to plus or minus 5%.

Example: If the color bands say the resistor is 100 Ohms, it means that the actual value may measure anywhere from 100 minus 5 Ohms to 100 Ohms plus 5 Ohms.

This means that if we measure the Ohms of this resistor with a meter, the meter could give us a value anywhere from 95 Ohms to 105 Ohms.

Many electronic circuits will still work fine even if the resistor is not an exact value. Resistors generally come in Tolerances of  $\pm 20$ ,  $\pm 10$ ,  $\pm 5$ ,  $\pm 1\%$

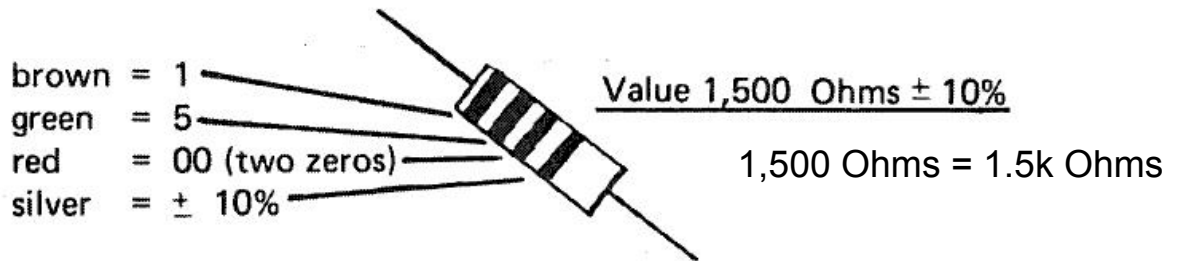
Now let's practice using the Resistor Color Code.

**(Continue to Page 4)**

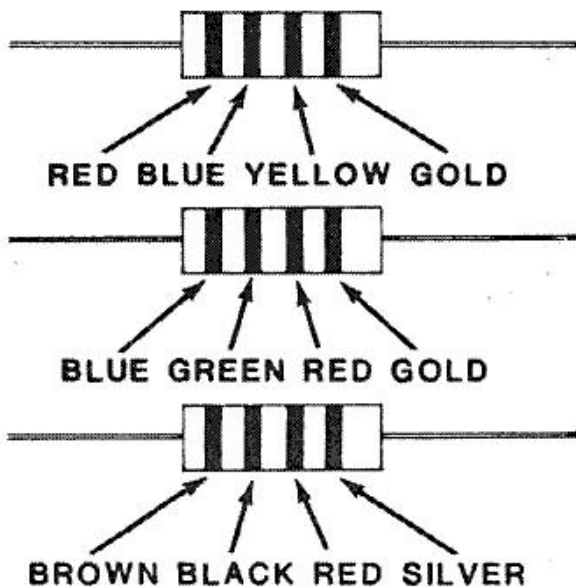
## LESSON 3 (page 4 of 4)

Here is an Example. What is the value and tolerance of the resistor shown here?

The first band is brown, the second band is green, the third band is red, and fourth band is silver. Here is the answer.



Give the value in Ohms and the Tolerance of the following resistors.



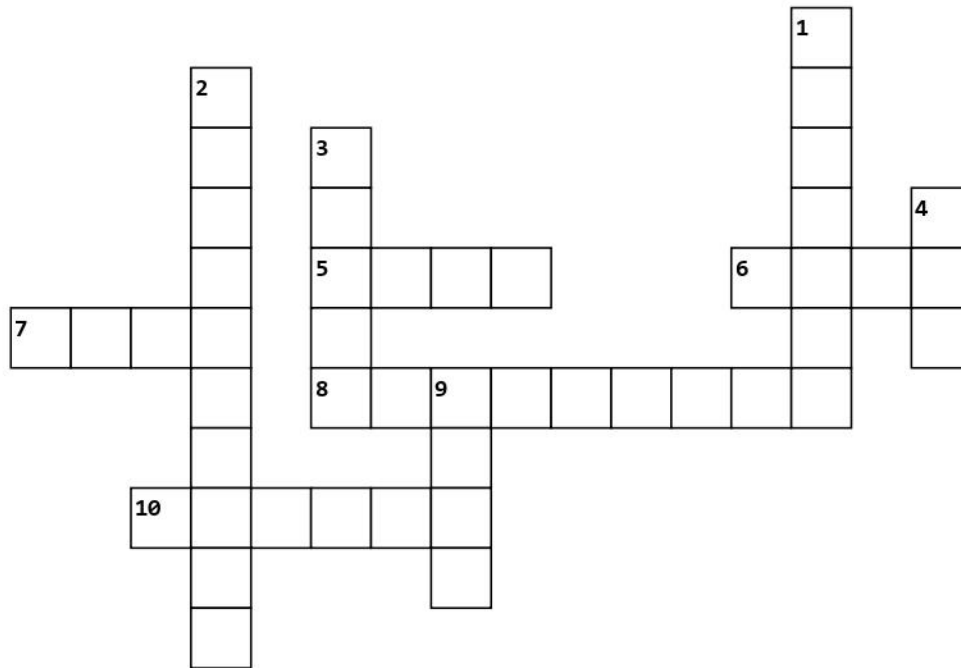
Value \_\_\_\_\_

Value \_\_\_\_\_

Value \_\_\_\_\_

Just an important note about abbreviating numbers in regards to resistor values. In electronics we use the lower case letter 'k' to represent three zeros or thousands and the capital letter 'M' to represent millions. So, 1k = 1000, 6.8k = 6800 and 1M = 1 million, etc.

Lesson 3 - "RESISTOR COLOR CODE"



**Across**

- 5. The color that means  $\pm 5\%$  is the color \_\_\_\_\_ .
- 6. The system to mark resistors with color bands is called the RESISTOR COLOR \_\_\_\_\_ .
- 7. The measurement of resistance is in \_\_\_\_\_ .
- 8. The fourth color band is the \_\_\_\_\_ band.
- 10. The first two color bands are \_\_\_\_\_ .

**Down**

- 1. The \_\_\_\_\_ of the RESISTOR COLOR CODE is to read the value in Ohms.
- 2. Resistance is the \_\_\_\_\_ to current flow.
- 3. You read the RESISTOR COLOR CODE from left to \_\_\_\_\_ .
- 4. The color that stands for the number two is the color \_\_\_\_\_ .
- 9. The value of a 1000 Ohms is \_\_\_\_\_ than 10,000 Ohms.

**Lesson 3 - "RESISTOR COLOR CODE"**

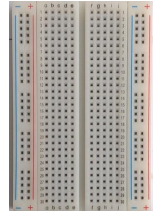
F J L L Y W N I X X V E C I Q Z J O E Z  
O E G Y U O T V H G R E D U K Y G F H K  
C Z R J N F N I W E S Q Y P H H R O H O  
L X T M V O W I C N C M V U A E B I P D  
B A H I E Y C U L H V F T B I O J Q U S  
B E G A V W T O L E R A N C E W T V W M  
G J I S E S M E M H M B T N T Z B G G H  
V K R L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

1. The system to mark resistors with color bands is called the RESISTOR COLOR \_\_\_\_\_ .
2. The value of a 1000 Ohms is \_\_\_\_\_ than 10,000 Ohms.
3. Resistance is the \_\_\_\_\_ to current flow.
4. The fourth color band is the \_\_\_\_\_ band.
5. The measurement of resistance is in \_\_\_\_\_ .
6. The \_\_\_\_\_ of the RESISTOR COLOR CODE is to read the value in Ohms.
7. The color that means  $\pm 5\%$  is the color \_\_\_\_\_ .
8. The first two color bands are \_\_\_\_\_ .
9. The color that stands for the number two is the color \_\_\_\_\_ .
10. You read the RESISTOR COLOR CODE from left to \_\_\_\_\_ .



# QUIZ for Lesson 3 in the Mr Circuit Lab 1 (Page 7)

## QUIZ for Lesson 3 - "Resistor Color Code"



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

A **#1** A resistor of 10,000 Ohms has \_\_\_\_\_ than a resistor of 1,000 Ohms.

B

C **A.** less opposition to current flow

D **B.** more opposition to current flow

**C.** less Ohms

**D.** larger physical size

**#6** What does the color green stand for in the Resistor Color Code?

**A.** 5

**B.** 9

**C.** 0

**D.** 3

A **#2** Resistance in electronics is the \_\_\_\_\_ .

B

C **A.** encouragement to current flow

D **B.** not important

**C.** opposition to current flow

**D.** storage of electrons

**#7** What is the value in Ohms of a resistor with color bands of yellow, violet, black, gold?

**A.** 55,000 Ohms

**B.** 360 Ohms

**C.** 47 Ohms

**D.** 68k Ohms

A **#3** The fourth color band on a  $\pm 5\%$  resistor is what color?

B

C **A.** gold

D **B.** silver

**C.** black

**D.** red

**#8** If the fourth or last band on a resistor is the color silver, what is the tolerance?

**A.**  $\pm 10\%$

**B.**  $\pm 5\%$

**C.**  $\pm 3\%$

**D.**  $\pm 2\%$

A **#4** Why do we put color bands on resistors?

B

C **A.** because numbers would be very small

D **B.** because colors make the circuit work better

**C.** electronics likes many colors

**D.** to test for colorblindness

**#9** There are four bands on a  $\pm 5\%$  resistor. The first two colors represent \_\_\_\_\_ .

**A.** alpha numerics

**B.** alpha characters

**C.** negative numbers

**D.** numerals

A **#5** What is the purpose for the Resistor Color Code?

B

C **A.** to hide the value of the resistor

D **B.** to determine the Ohms of the resistor

**C.** to add color to the circuit

**D.** to make it hard to read the value in Ohms

**#10** In the Resistor Color Code, what is the color that represents '2'?

**A.** Orange

**B.** Violet

**C.** Red

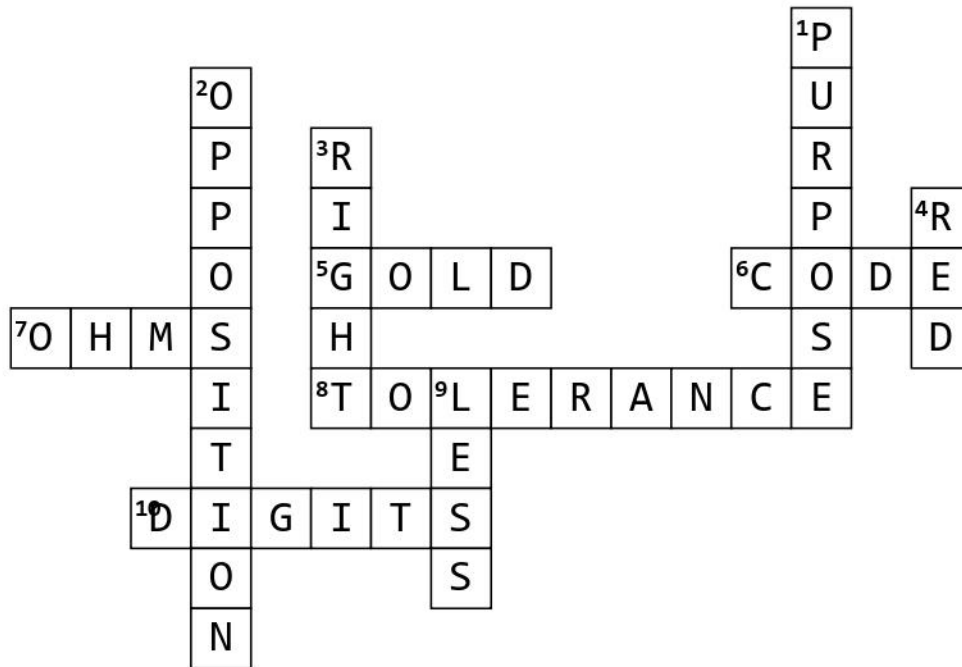
**D.** Black

Score	
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**ANSWERS FOR CROSSWORD**

**Lesson 3 - "RESISTOR COLOR CODE"**



**Across**

- 5. The color that means  $\pm 5\%$  is the color \_\_\_\_\_ .
- 6. The system to mark resistors with color bands is called the RESISTOR COLOR \_\_\_\_\_ .
- 7. The measurement of resistance is in \_\_\_\_\_ .
- 8. The fourth color band is the \_\_\_\_\_ band.
- 10. The first two color bands are \_\_\_\_\_ .

**Down**

- 1. The \_\_\_\_\_ of the RESISTOR COLOR CODE is to read the value in Ohms.
- 2. Resistance is the \_\_\_\_\_ to current flow.
- 3. You read the RESISTOR COLOR CODE from left to \_\_\_\_\_ .
- 4. The color that stands for the number two is the color \_\_\_\_\_ .
- 9. The value of a 1000 Ohms is \_\_\_\_\_ than 10,000 Ohms.

# ANSWERS FOR WORD SEARCH

## Lesson 3 - "RESISTOR COLOR CODE"

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

- The system to mark resistors with color bands is called the RESISTOR COLOR \_\_\_\_\_.
- The value of a 1000 Ohms is \_\_\_\_\_ than 10,000 Ohms.
- Resistance is the \_\_\_\_\_ to current flow.
- The fourth color band is the \_\_\_\_\_ band.
- The measurement of resistance is in \_\_\_\_\_.
- The \_\_\_\_\_ of the RESISTOR COLOR CODE is to read the value in Ohms.
- The color that means  $\pm 5\%$  is the color \_\_\_\_\_.
- The first two color bands are \_\_\_\_\_.
- The color that stands for the number two is the color \_\_\_\_\_.
- You read the RESISTOR COLOR CODE from left to \_\_\_\_\_.

**QUICK-CHECK ANSWER KEY for Lesson 3 QUIZ**  
**for Mr Circuit Electronics Training (“Resistor Color Code”)**

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.

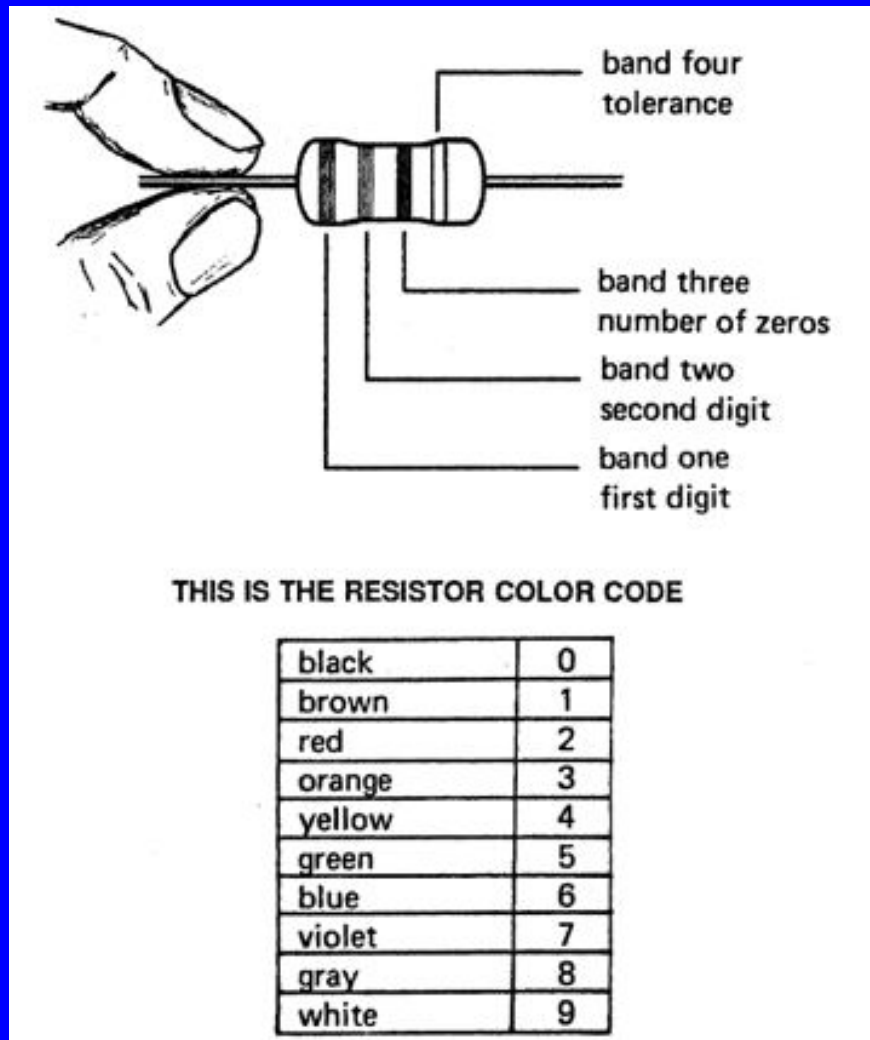
Count the right answers and record the score of right answers in your grade book.



<p>A</p> <p><input checked="" type="radio"/> B</p> <p>C</p> <p>D</p>	<p><b>#1</b> A resistor of 10,000 Ohms has _____ than a resistor of 1,000 Ohms.</p> <p>A. less opposition to current flow B. more opposition to current flow C. less Ohms D. larger physical size</p>	<p><b>#6</b> What does the color green stand for in the Resistor Color Code?</p> <p>A. 5 B. 9 C. 0 D. 3</p>	<p>A</p> <p>B</p> <p>C</p> <p>D</p>
<p>A</p> <p>B</p> <p><input checked="" type="radio"/> C</p> <p>D</p>	<p><b>#2</b> Resistance in electronics is the _____.</p> <p>A. encouragement to current flow B. not important C. opposition to current flow D. storage of electrons</p>	<p><b>#7</b> What is the value in Ohms of a resistor with color bands of yellow, violet, black, gold?</p> <p>A. 55,000 Ohms B. 360 Ohms C. 47 Ohms D. 68k Ohms</p>	<p>A</p> <p>B</p> <p><input checked="" type="radio"/> C</p> <p>D</p>
<p><input checked="" type="radio"/> A</p> <p>B</p> <p>C</p> <p>D</p>	<p><b>#3</b> The fourth color band on a <math>\pm 5\%</math> resistor is what color?</p> <p>A. gold B. silver C. black D. red</p>	<p><b>#8</b> If the fourth or last band on a resistor is the color silver, what is the tolerance?</p> <p>A. <math>\pm 10\%</math> B. <math>\pm 5\%</math> C. <math>\pm 3\%</math> D. <math>\pm 2\%</math></p>	<p>A</p> <p>B</p> <p>C</p> <p>D</p>
<p><input checked="" type="radio"/> A</p> <p>B</p> <p>C</p> <p>D</p>	<p><b>#4</b> Why do we put color bands on resistors?</p> <p>A. because numbers would be very small B. because colors make the circuit work better C. electronics likes many colors D. to test for colorblindness</p>	<p><b>#9</b> There are four bands on a <math>\pm 5\%</math> resistor. The first two colors represent _____.</p> <p>A. alpha numerics B. alpha characters C. negative numbers D. numerals</p>	<p>A</p> <p>B</p> <p>C</p> <p><input checked="" type="radio"/> D</p>
<p>A</p> <p><input checked="" type="radio"/> B</p> <p>C</p> <p>D</p>	<p><b>#5</b> What is the purpose for the Resistor Color Code?</p> <p>A. to hide the value of the resistor B. to determine the Ohms of the resistor C. to add color to the circuit D. to make it hard to read the value in Ohms</p>	<p><b>#10</b> In the Resistor Color Code, what is the color that represents ‘2’?</p> <p>A. Orange B. Violet C. Red D. Black</p>	<p>A</p> <p>B</p> <p><input checked="" type="radio"/> C</p> <p>D</p>

# BUILD A BETTER FUTURE by UNDERSTANDING SCIENCE

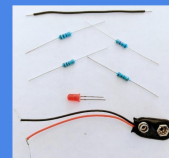
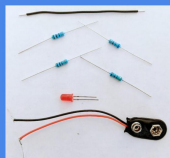
## HOW TO READ THE RESISTOR COLOR CODE



BASIC ELECTRONICS LAB 1

## “RESISTOR COLOR CODE”

(Poster MC1-003-P01)



**PRICE LIST May 2024**

<b>PARTS KIT</b>	<b>Mr Circuit Series 1</b>	<b>Price</b>
<b>Number</b>	<b>SCIENCE / ELECTRONICS "PARTS KITS"</b>	<b>Each</b>
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
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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
<b>Set-MC1-PK</b>	<b>Complete Set of All Series 1 Parts Kits (31 total)</b>	<b>\$120.00</b>

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