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Mr Circuit Technology

Science/Electronics Experiment Kits and Labs


Exp. 11 - "HOW A 555 TIMER WORKS"

LESSON PLAN

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- Page 13 - Price List for Parts Kits for your to order more. Send Purchase Order to Gary@MrCircuitTechnology.com or order online at www.MrCircuitTechnology.com

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



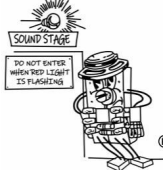
Experiment Parts only (packaged in a 3x5 inch resealable plastic bag.)
LEARN more today, EARN more tomorrow!
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Science Experiment Kit
#MC1-11
 "How a 555 Timer IC Works"
 Exciting, Educational and Fun



LEARN more today, EARN more tomorrow!

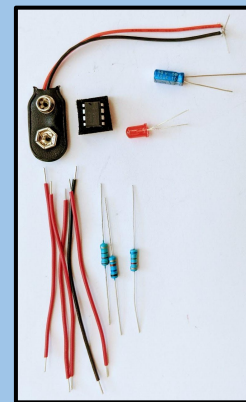
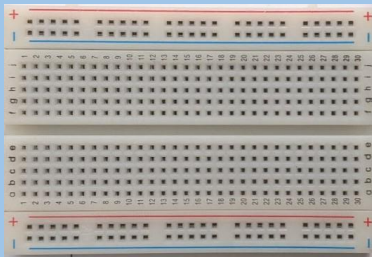
To get started, go to www.MrCircuitTech.com and click on Mr Circuit Lab # button and then, on the menu, click on Experiment 11 "How A 555 Timer IC Works" and then follow the instructions given by the online presentation. Enjoy this hands-on way to learn science and electronics!

MSRP \$3.95

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PREPARATION: You can put the Page 12 poster up on your classroom wall to announce the fact that you are going to do the Science-Electronics Experiment.

Step 1 - Make a copy of pages 1 through 8 for each student. The students can read and do these pages on their own or you can guide them.

Step 2 - Hand out Parts Kit #MC1-00-PK (that has the Solderless Circuit Board) and Parts Kit #MC1-11-PK (that has the experiment parts) with a 9-Volt battery. Give these items to each student along with the 8 pages.

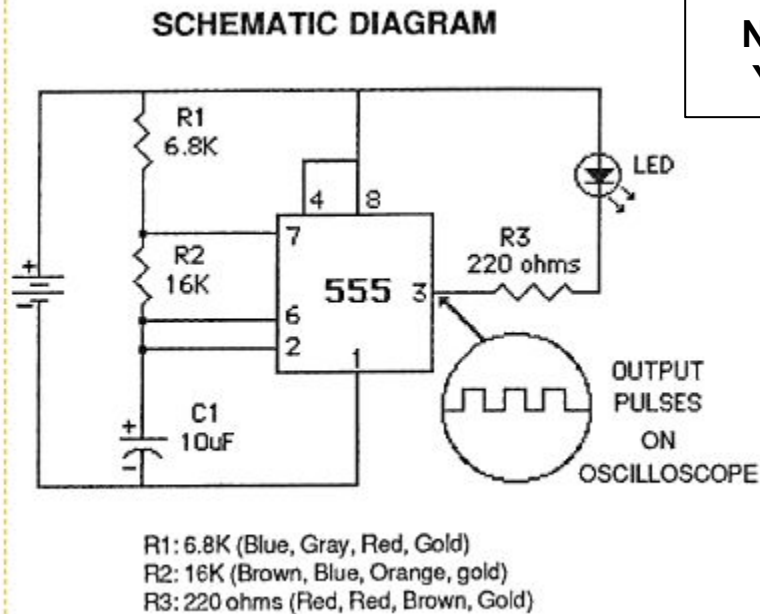
Step 3 - When your students have completed the experiment, collect all the Parts Kits and batteries for later use.

Step 4 - Collect all the Written Quizzes for grading and use the Answer Key to grade them.

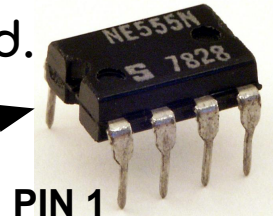
For Tech Support or any questions, you can email us or call 805-295-1642

EXPLANATION OF EXPERIMENT part 1 of 2

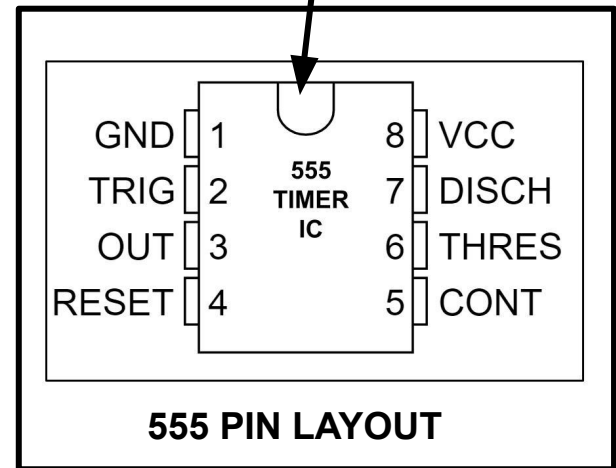
*** You are going to build a circuit to demonstrate how a 555 Timer Integrated Circuit works. Here is the SCHEMATIC DIAGRAM of the circuit you will build.



NOTCH TO HELP
YOU FIND PIN 1



PIN 1



A 555 IC was invented by engineers who needed timer circuits that generate many different types of pulses.

Some pulses stay on for a long time and shut off for a short time. Some pulses stay on for the same amount time that they turn off. There are many reasons why this is important. Computers use lots of timing circuits.

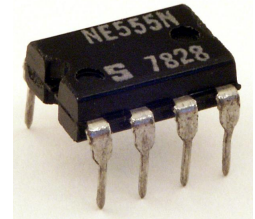
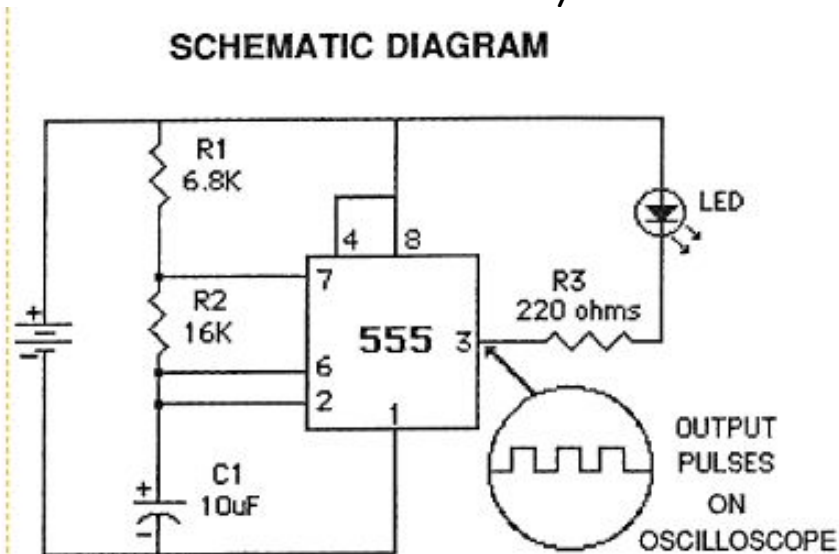
The 555 is called and 'Integrated Circuit' because it has many different circuits inside of it that work together.

Notice above that the 555 has 8 pins, numbered 1 through 8 in a counter-clockwise direction. Each pin has a purpose and is used to connect to resistors and capacitors and the power.

(Continue to Page 2)

EXPLANATION OF EXPERIMENT part 2 of 2

Let's talk about how the circuit works. Here is the schematic of the timer circuit that you will build.



R1: 6.8K (Blue, Gray, Red, Gold)
R2: 16K (Brown, Blue, Orange, gold)
R3: 220 ohms (Red, Red, Brown, Gold)

This circuit has 3 resistors and one capacitor connected to the pins of the 555. It also has a 9-volt battery and an LED. The LED will blink according to the pulses coming out of the 555.

With the 10uF capacitor, this circuit will send pulses at a rate of approximately 1 per second. (1 Hertz) The time off and the time on are approximately the same. You will see the LED blink on and off at a rate of one blink per second.

If you increase the 10uF capacitor to a 100uF capacitor, the pulse rate (or blink rate) will slow down a lot.

(Continue to Page 3)

PURPOSE OF THIS EXPERIMENT

MC1-11-R-3

*** To observe that a 555 Integrated Circuit can be used to make a timer circuit.

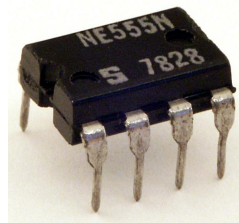
PARTS NEEDED FOR EXPERIMENT

In this experiment, you will use

a BATTERY SNAP



a 555 IC



an LED



220 Ohm resistor



6.8k Ohm resistor



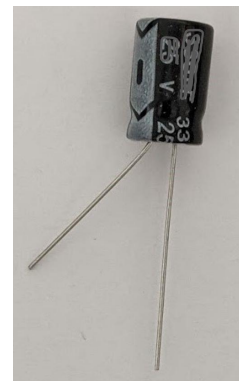
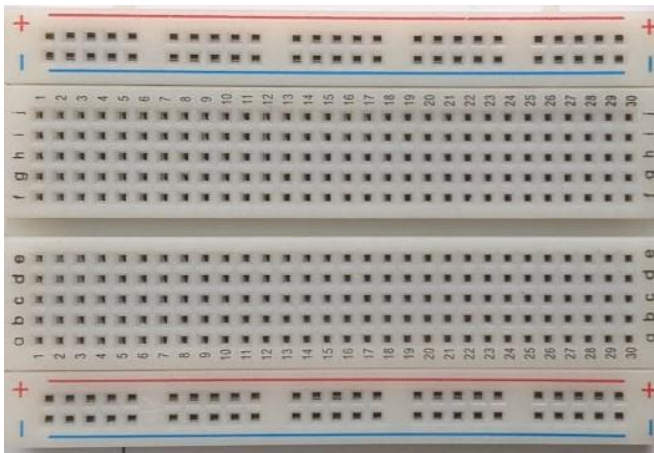
16k Ohm resistor



5 Jumper Wires



and a SOLDERLESS CIRCUIT BOARD a 10uF capacitor



You will also need a good 9 Volt battery

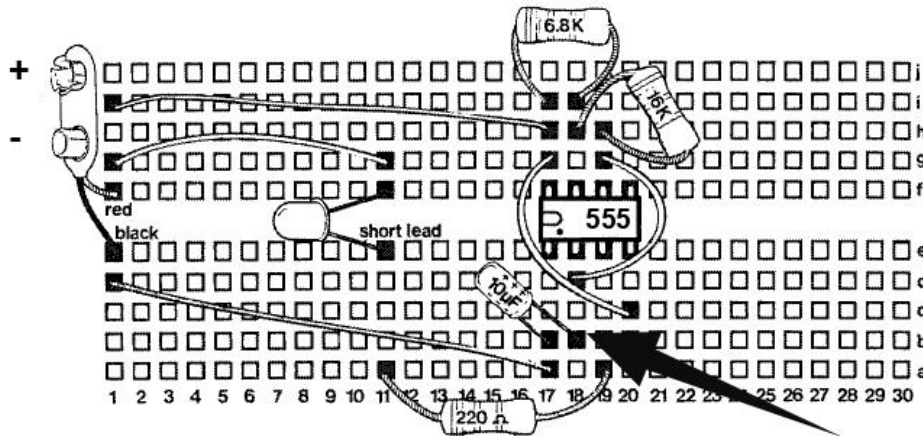
(Continue to Page 4)

DO THE EXPERIMENT (part 1 of 2)

MC1-11-R-4

Now you are going to build the circuit on a Solderless CB.

Step 1 - Take out all the parts needed and a Solderless Circuit Board and 9-Volt battery.



Long Lead of
capacitor

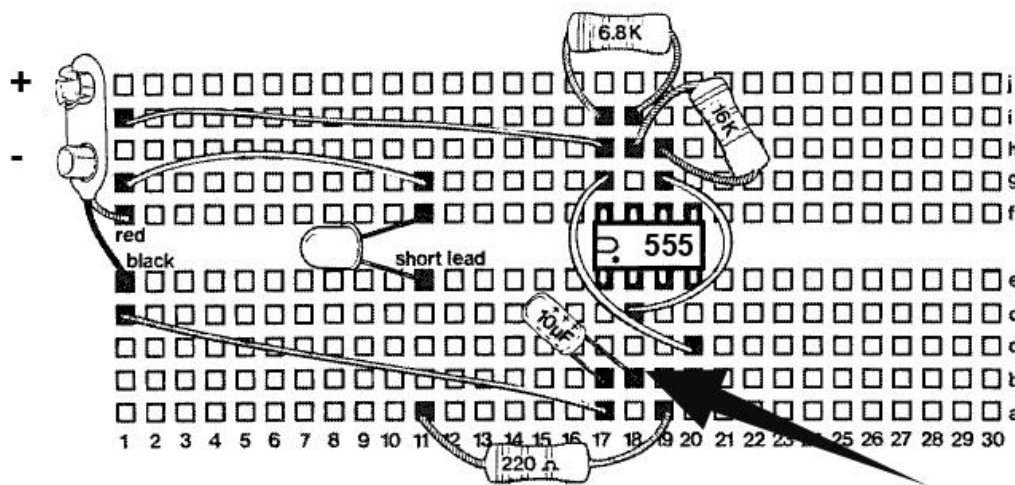
Step 2 - Install all the parts on the Solderless Circuit Board in this order. Check them off as you go.

- Install an LED with the Short Lead in hole 11e and the Long Lead in hole 11f
- Install the 220 Ohm resistor (red, red, brown, gold) in holes 11a to 19a
- Install the 6800 (6.8k) Ohm resistor (blue, gray, red, gold) in holes 17i to 18i
- Install the 16k Ohm resistor (brown, blue, orange, gold) in holes 18h to 19h
- Install the 555 Timer IC with Pin 1 in hole 17e as shown in pictorial
- Install the 10uF Electrolytic Capacitor - Long lead in hole 18b, Short lead in 17b
- Install Jumper Wire #1 in holes 1d to 17a
- Install Jumper Wire #2 in holes 1g to 11g
- Install Jumper Wire #3 in holes 1i to 17h
- Install Jumper Wire #4 in holes 17g to 20c
- Install Jumper Wire #5 in holes 18d to 19g
- Install the Battery Snap, Black lead in hole 1e and Red Lead in hole 1f

(Continue to Page 5)

DO THE EXPERIMENT (part 2 of 2)

MC1-11-R-5



Long Lead of
capacitor

Step 3 - "Connect the battery to the Battery Snap. You should see the LED light blink on and off at a rate of about one blink per second.

If you do not, check your wiring and the 9-volt battery.

CONCLUSION

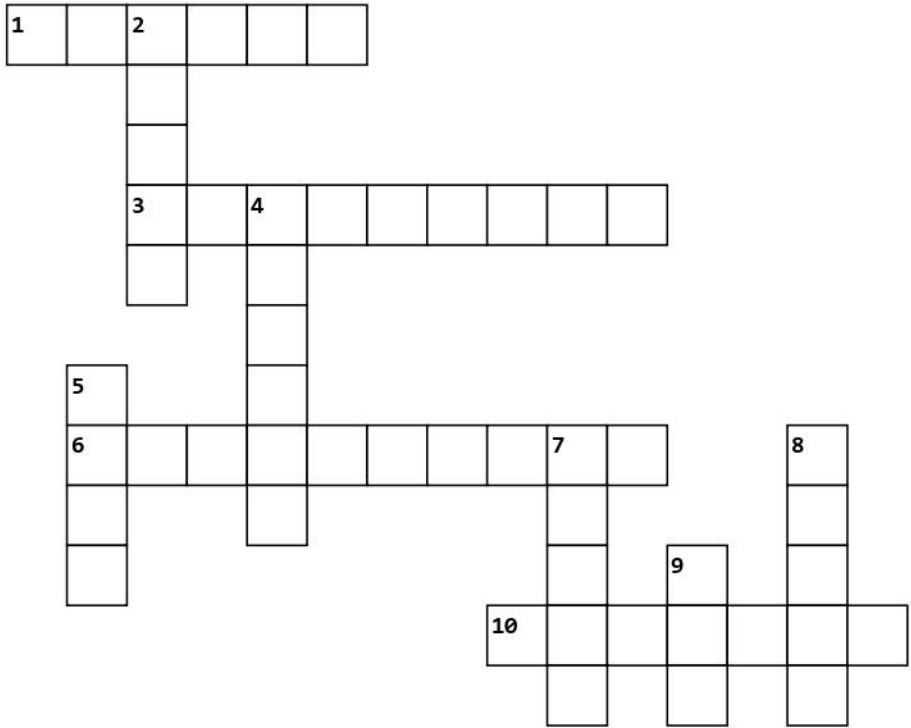
You should have observed in this simple experiment that a 555 Integrated Circuit can be used to make a timer circuit to make an LED blink.

Note: Engineers call this an Astable (two states) free-running, multivibrator. This just means the LED has two-states, on or off. It is free-running because it just keeps blinking. You can research more about this if you want to on the internet..

(End of Experiment 11)

CROSSWORD

Experiment 11 - "How a 555 TIMER IC Works"



Across

- 1.** The pulse rate with a 10uF capacitor is approximately one pulse per _____ .
- 3.** The component which affects the pulse rate is the _____ .
- 6.** A 555 Timer is an _____ CIRCUIT.
- 10.** When installing the 555 Timer IC on a solderless circuit board, you install it across the CENTER _____ .

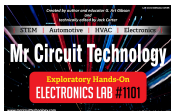
Down

- 2.** When the 555 Timer IC is working as a _____ , it puts out pulses on pin 3.
- 4.** If you connect an oscilloscope to the output of pin 3, what might you see?
- 5.** When you count the _____ on the 555 Timer IC, you count counter-clockwise.
- 7.** How many pins does a 555 Timer IC have?
- 8.** From which pin on the 555 Timer IC do the pulses come from?
- 9.** The mark or indentation on the 555 Timer IC helps to find which pin?

Experiment 11 - "How a 555 TIMER IC Works"

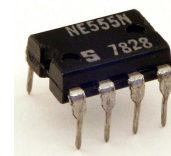
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W U G L X C R F O R D V S B H T U G I M
E T N R U D M M K I Q N Q P A G P V E Q
W Z R O N X L K T Z C T Q L N Q D K D K
H P O T E T H D M P G T B R N P C N F Y
J I N I W K Z P P B W Q Q P E I U K P S
Q J S C X K T R G A V A S Z L G L V W E
U C N A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

1. A 555 Timer is an _____ CIRCUIT.
2. How many pins does a 555 Timer IC have?
3. From which pin on the 555 Timer IC do the pulses come from?
4. The mark or indentation on the 555 Timer IC helps to find which pin?
5. The component which affects the pulse rate is the _____ .
6. The pulse rate with a 10uF capacitor is approximately one pulse per _____ .
7. When the 555 Timer IC is working as a _____ , it puts out pulses on pin 3.
8. When you count the _____ on the 555 Timer IC, you count counter-clockwise.
9. When installing the 555 Timer IC on a solderless circuit board, you install it across the CENTER _____ .
10. If you connect an oscilloscope to the output of pin 3, what might you see?



QUIZ for Exp 11 or STEM KIT #11 in the Mr Circuit Electronics Training Lab 1

This Quiz covers the training learned by completing "How a 555 Timer IC Works" Experiment 11



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

A B C D

#1 How many pins does a 555 Timer IC have?
A. 8
B. 3
C. 6
D. 12

#6 What does the indentation or marking on the top end of the 555 Timer IC help you find?
A. Pin 5
B. Pin 4
C. Pin 1
D. the bottom of the IC

A B C D

A B C D

#2 What pin is the output pin on the 555 Timer?
A. 8
B. 3
C. 6
D. 12

#7 When a 555 Timer IC is working as a 'clock', it puts out pulses on _____.
A. Pin 8
B. Pin 2
C. Pin 5
D. Pin 3

A B C D

A B C D

#3 If you connect an oscilloscope to the output Pin 3 on this circuit when operating, what might you see?
A. pulses
B. aliens
C. resistance values
D. inductance variations

#8 When you are counting the pins on a 555 Timer IC, you count them _____.
A. up and down
B. clockwise
C. by tens
D. counter-clockwise

A B C D

A B C D

#4 What is the value of the capacitor in microfarads connected to Pin 2 of the 555 Timer IC in this circuit?
A. 1000uF
B. 10uF
C. 33uF
D. 470uF

#9 When installing the 555 Timer IC on the solderless circuit board, you install it _____.
A. always on the right end of the board
B. with pin 1 in hole 1a
C. across the center channel
D. on the bottom of the board

A B C D

A B C D

#5 If we reverse the polarity of the battery snap on the circuit, what will happen?
A. It will work just fine.
B. You might destroy the 555 Timer IC.
C. The LED will burn out.
D. The LED will self-destruct.

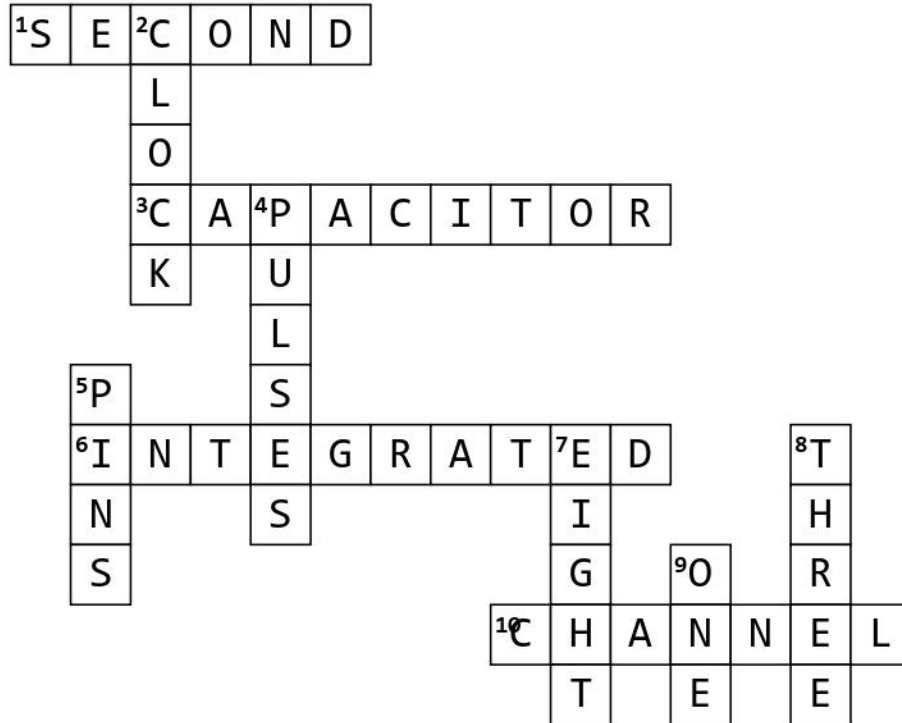
#10 When a 555 Timer IC is working as a 'timer', it puts out a voltage on _____ for a set period of time and then shuts off automatically.
A. Pin 3
B. Pin 5
C. Pin 8
D. Pin 2

A B C D

Score []

ANSWERS FOR CROSSWORD

Experiment 11 - "How a 555 TIMER IC Works"



Across

- 1. The pulse rate with a 10uF capacitor is approximately one pulse per _____ .
- 3. The component which affects the pulse rate is the _____ .
- 6. A 555 Timer is an _____ CIRCUIT.
- 10. When installing the 555 Timer IC on a solderless circuit board, you install it across the CENTER _____ .

Down

- 2. When the 555 Timer IC is working as a _____ , it puts out pulses on pin 3.
- 4. If you connect an oscilloscope to the output of pin 3, what might you see?
- 5. When you count the _____ on the 555 Timer IC, you count counter-clockwise.
- 7. How many pins does a 555 Timer IC have?
- 8. From which pin on the 555 Timer IC do the pulses come from?
- 9. The mark or indentation on the 555 Timer IC helps to find which pin?

ANSWERS FOR WORD SEARCH

Experiment 11 - "How a 555 TIMER IC Works"

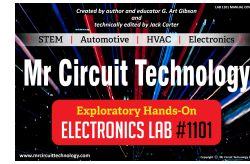
D B D R X S H O T W F P M C C U G A P S
 W U G L X C R F O R D V S B H T U G I M
 E T N R U D M M K I Q N Q P A G P V E Q
 W Z R O N X L K T Z C T Q L N Q D K D K
 H P O T E T H D M P G T B R N P C N F Y
 J I N I W K Z P P B W Q Q P E I U K P S
 Q J S C X K T R G A V A S Z L G L V W E
 U C N A U O L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

1. A 555 Timer is an _____ CIRCUIT.
2. How many pins does a 555 Timer IC have?
3. From which pin on the 555 Timer IC do the pulses come from?
4. The mark or indentation on the 555 Timer IC helps to find which pin?
5. The component which affects the pulse rate is the _____ .
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8. When you count the _____ on the 555 Timer IC, you count counter-clockwise.
9. When installing the 555 Timer IC on a solderless circuit board, you install it across the CENTER _____ .
10. If you connect an oscilloscope to the output of pin 3, what might you see?

**QUICK-CHECK ANSWER KEY for Experiment 11 QUIZ
for Mr Circuit Electronics Training (“555 Timer IC”)**

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.

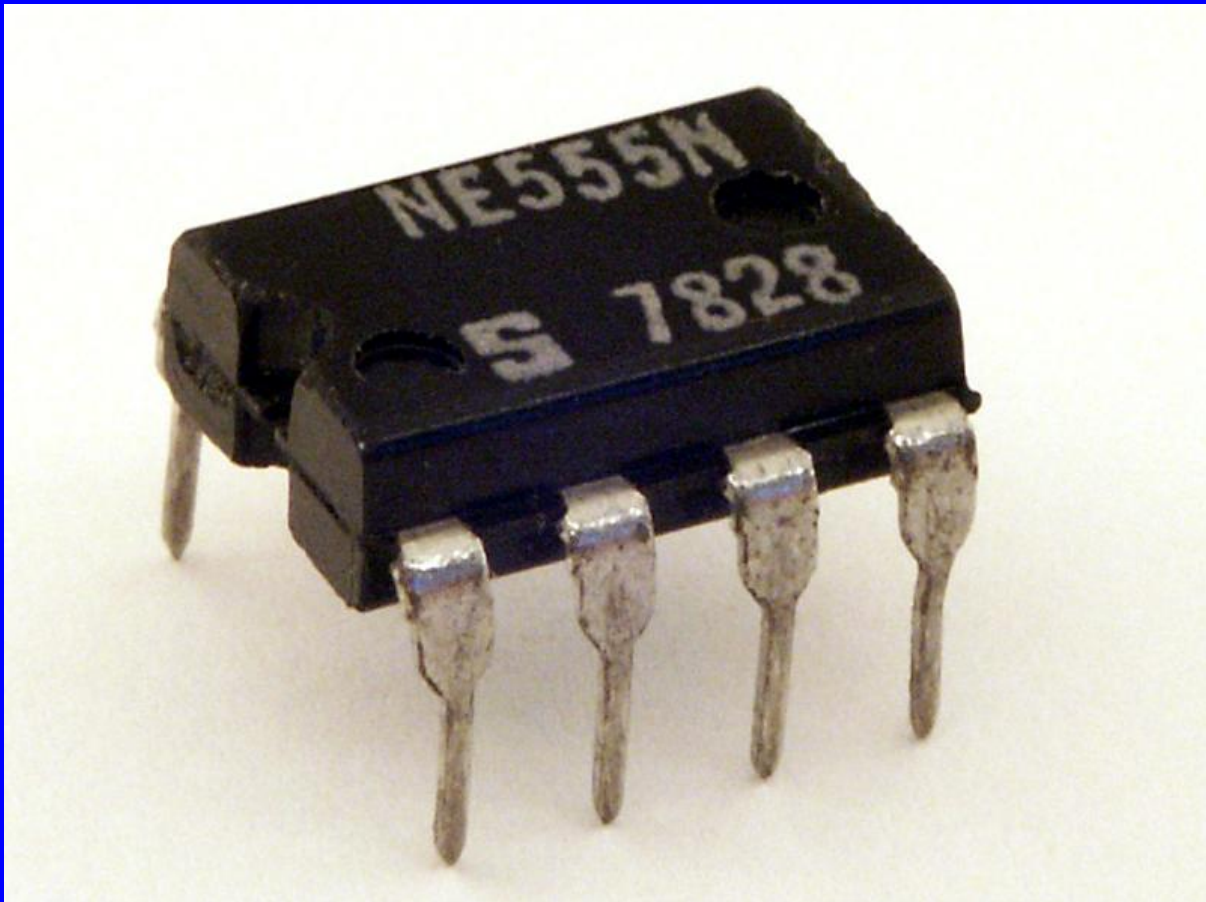
Count the right answers and record the score of right answers in your grade book.



<p><input type="radio"/> A</p> <p><input type="radio"/> B</p> <p><input type="radio"/> C</p> <p><input type="radio"/> D</p>	<p>#1 How many pins does a 555 Timer IC have?</p> <p>A. 8 B. 3 C. 6 D. 12</p>	<p>#6 What does the indentation or marking on the top end of the 555 Timer IC help you find?</p> <p>A. Pin 5 B. Pin 4 C. Pin 1 D. the bottom of the IC</p>	<p><input type="radio"/> A</p> <p><input type="radio"/> B</p> <p><input checked="" type="radio"/> C</p> <p><input type="radio"/> D</p>
<p><input type="radio"/> A</p> <p><input checked="" type="radio"/> B</p> <p><input type="radio"/> C</p> <p><input type="radio"/> D</p>	<p>#2 What pin is the output pin on the 555 Timer?</p> <p>A. 8 B. 3 C. 6 D. 12</p>	<p>#7 When a 555 Timer IC is working as a ‘clock’, it puts out pulses on _____ .</p> <p>A. Pin 8 B. Pin 2 C. Pin 5 D. Pin 3</p>	<p><input type="radio"/> A</p> <p><input type="radio"/> B</p> <p><input type="radio"/> C</p> <p><input checked="" type="radio"/> D</p>
<p><input checked="" type="radio"/> A</p> <p><input type="radio"/> B</p> <p><input type="radio"/> C</p> <p><input type="radio"/> D</p>	<p>#3 If you connect an oscilloscope to the output Pin 3 on this circuit when operating, what might you see?</p> <p>A. pulses B. aliens C. resistance values D. inductance variations</p>	<p>#8 When you are counting the pins on a 555 Timer IC, you count them _____ .</p> <p>A. up and down B. clockwise C. by tens D. counter-clockwise</p>	<p><input type="radio"/> A</p> <p><input type="radio"/> B</p> <p><input type="radio"/> C</p> <p><input checked="" type="radio"/> D</p>
<p><input type="radio"/> A</p> <p><input checked="" type="radio"/> B</p> <p><input type="radio"/> C</p> <p><input type="radio"/> D</p>	<p>#4 What is the value of the capacitor in microfarads connected to Pin 2 of the 555 Timer IC in this circuit?</p> <p>A. 1000uF B. 10uF C. 33uF D. 470uF</p>	<p>#9 When installing the 555 Timer IC on the solderless circuit board, you install it _____ .</p> <p>A. always on the right end of the board B. with pin 1 in hole 1a C. across the center channel D. on the bottom of the board</p>	<p><input type="radio"/> A</p> <p><input type="radio"/> B</p> <p><input checked="" type="radio"/> C</p> <p><input type="radio"/> D</p>
<p><input type="radio"/> A</p> <p><input checked="" type="radio"/> B</p> <p><input type="radio"/> C</p> <p><input type="radio"/> D</p>	<p>#5 If we reverse the polarity of the battery snap on the circuit, what will happen?</p> <p>A. It will work just fine. B. You might destroy the 555 Timer IC. C. The LED will burn out. D. The LED will self-destruct.</p>	<p>#10 When a 555 Timer IC is working as a ‘timer’, it puts out a voltage on _____ for a set period of time and then shuts off automatically.</p> <p>A. Pin 3 B. Pin 5 C. Pin 8 D. Pin 2</p>	<p><input checked="" type="radio"/> A</p> <p><input type="radio"/> B</p> <p><input type="radio"/> C</p> <p><input type="radio"/> D</p>

BUILD A BETTER FUTURE by UNDERSTANDING SCIENCE-ELECTRONICS

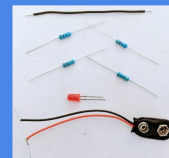
A 555 TIMER IC



BASIC ELECTRONICS LAB 1

“HOW A 555 TIMER IC WORKS”

(Poster MC1-M-11-P01)



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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