

CONCEPT MAP OF UNIT

TOPIC: ANALOG AND DIGITAL CIRCUIT

STEM 1: Electronics

This unit will introduce basic electronic theory, use of solderless circuit board and how electronic components like resistors, potentiometers, photocells, capacitors, transistors and IC Timer 555 work. It will also introduce digital technology and provide experience with digital circuits by exploring logic gates and the principles of Boolean Algebra.

TEACHER

Ronelie D. Asuncion

GRADE

9

KEY LEARNING(S)

Recognizing the basic components used in electronics; learning their basic functions; and constructing electronic devices.

UNIT ESSENTIAL QUESTIONS

What makes an electronic circuit function properly?

OPTIONAL INSTRUCTIONAL TOOLS

EKI Electronic Discovery and Digital Electronic Kits

CONCEPT

Familiarization of electronic components and their uses; analog circuits are based on regulating current flow.

CONCEPT

Digital Circuits are based on switching electricity on and off. The operation of a digital circuit is based on logic gates that are formed when the basic kind of circuitry is combined.

CONCEPT

Digital circuits work with binary data (0's and 1's). These are the only numbers digital and computer circuits understand and work well.

LESSON ESSENTIAL QUESTIONS

How can you create an analog electronic circuit with the appropriate components and connections?

LESSON ESSENTIAL QUESTIONS

What are the basic logic circuits or gates?

LESSON ESSENTIAL QUESTIONS

How do these logic gates function properly to create a desired circuit?

VOCABULARY

Analog Circuit
Solderless circuit board
Resistor
Potentiometer
Photocell
Capacitor
Transistor
IC Timer 555
LED-Light Emitting Diode

VOCABULARY

Digital Circuit
Truth Table
Logic gate
Logic indicator
Logic state (hi/lo)
AND, OR Logic Gates
NOT(Inverter) and YES Gate
NOR and NAND Logic Gate
IC (Integrated Circuit)

VOCABULARY

Binary numbers
Binary counters

ADDITIONAL INFORMATION

This unit deals with students building and understanding a basic analog and digital circuitry." It includes exploring the uses of the different electronic components and their proper connections. A second unit can deal with the creation of more complicated logic gates and designing a project using digital circuits.

Assessment will consist of vocabulary and wiring tests, the actual work done, and work habits (often called "career readiness.")

CONCEPT MAP OF UNIT

Students will learn the basics of simple electronics, be able to recognize symbols used in a schematic diagram and be able to build a simple circuit.

TOPIC:

STEM 2: Electronics

TEACHER

Debbie Grothaus

GRADE

9th grade Physics

KEY LEARNING(S)

Recognize the basic components used in electronics.
Learn the names and schematic symbols of electronic components.
Learn to follow and understand electronic schematic diagrams.

UNIT ESSENTIAL QUESTIONS

What are the basic components used in electronics?
How can you use a solderless circuit board to demonstrate simple circuits? How do you interpret a simple schematic diagram to build a simple circuit?

OPTIONAL INSTRUCTIONAL TOOLS

Electronics kit, "Mr. Circuit One".
"Discover Electronics" manual.

CONCEPT

Basic components can be put together to create an electronic circuit that can be demonstrated by a task such as lighting an LED.

CONCEPT

A solderless circuit board can be used to put together the electronic components so that they can be used over and over.

CONCEPT

Certain symbols are used to represent the different components used in a circuit. These symbols are arranged into schematic diagrams which can then be read and built.

LESSON ESSENTIAL QUESTIONS

What are the basic components used to build simple electronic circuits? What are their names and what do they do? How can these components be combined to create a simple circuit?

LESSON ESSENTIAL QUESTIONS

How does the solderless circuit board work? What are the basic connectivities of the board and how can this be used to build a simple circuit?

LESSON ESSENTIAL QUESTIONS

What are the symbols used to represent the different components used to build a simple circuit? What is a schematic diagram and how can it be used to represent a circuit?

VOCABULARY

Electronics, Electricity
Wires
Battery
Resistors
LED
Potentiometer
Photocell
Capacitor
Diode
SCR
Transistor

VOCABULARY

Solder
Circuit

VOCABULARY

Schematic diagram
(Various symbols)

ADDITIONAL INFORMATION

Extension would be to continue doing more lessons and labs in the manual. Two full class periods would be needed (at least). Students that were quicker could do more lessons where struggling students could still take their time to ensure complete understanding.

CONCEPT MAP OF UNIT

This unit will explore the basic components of electricity such as, electricity is the flow of electric charge (electrons). Electric Charge is a property of subatomic particles. Current is the movement of electric charge. Voltage is the electric potential that exists to move a charge. Power is the rate at which electric energy is flowing in a circuit. Ohm's Law: Power = Voltage x Current. Resistance is a physical property that quantifies how well a charge can move through a material. Ohm's Law: Voltage = Current x Resistance. Electric circuits provide a means to harness electrical energy and use it in our everyday lives. Circuits require a voltage source to operate. Circuits require a closed loop to operate; that is they need a path for the electric current to return to its source. Circuits can be connected in either series or parallel. Components connected in series have identical current, but different voltage. Components connected in parallel have identical voltage, but different current.

TOPIC:	Circuits
TEACHER:	Jessica Esquibel
GRADE:	8 th

KEY LEARNING(S)

Explain how electricity flows.
Complete a circuit and distinguish between series and parallel.
Compare different types of materials to determine which material is a conductor of electricity.

UNIT ESSENTIAL QUESTIONS

What is current and how does it flow?
What is the difference between series and parallel circuits?
Does different material affect current flow?

OPTIONAL INSTRUCTIONAL TOOLS

- Battery with holder
- 2 Lamps
- 2 Ammeters
- 2 Voltmeters
- 8 Wires
- 1 Switch

CONCEPT

Students will be able to explain how electric current flows in a circuit.

CONCEPT

Students will be able to wire a basic circuit and draw a schematic diagram.

CONCEPT

Students will be able to take measurements using a voltmeter and ammeter of a circuit, by comparing different materials such as graphite, copper, aluminum, etc.

CONCEPT

Students will be able to explain the difference between series and parallel connections.

LESSON ESSENTIAL QUESTIONS

What is electricity?
Will current flow through an open (disconnected) circuit? Why or why not?
What are electric charge, current, voltage, and power, and how are they related?

LESSON ESSENTIAL QUESTIONS

Will you be able to wire a basic circuit using provided materials with no instructions? Can you draw a schematic diagram of your completed circuit?

LESSON ESSENTIAL QUESTIONS

How does the resistance (type) of a material determine how much electric current flows through it?

LESSON ESSENTIAL QUESTIONS

What is the difference between series and parallel connections?

VOCABULARY

Electricity, Current, Protons
Neutrons, Electrons, Voltage, Power

VOCABULARY

Circuits
Schematic

VOCABULARY

Conductor

VOCABULARY

Series circuits
Parallel circuits

ADDITIONAL INFORMATION

Assessment will consist of vocabulary and correctly completing and wiring a circuit.
Safety procedures must be followed.

CONCEPT MAP OF UNIT

Most often, when we talk about electricity we think of Ben Franklin who with his kite experiment discovered that lightning is electrical in nature. Electronics on the other hand is the technology that uses the basic concepts of electricity and the flow of electrons to manipulate a lot of the devices we have at present.

This unit will enable students to apply the basic skills on electronics to create electrical circuits that allows current to flow and the manipulation of the flow to build patterns of coding and decoding.

TOPIC: DISCOVER
ELECTRONICS

Science and Technology

TEACHER

Mignon Penalosa

GRADE

8th grade

KEY LEARNING(S)

Everything we see around us is matters. It matters because living and nonliving are all made up of matter. The basic building block of matter is the atom consisting of subatomic particles, protons (+), electrons (-) and neutrons (neutral). Flow of electrons create a current in the form of electrical energy. This type of energy is used in electronics to devices work.

UNIT ESSENTIAL QUESTIONS

How do you build an electrical circuit?

OPTIONAL INSTRUCTIONAL TOOLS

Mr. Circuit One Kit

CONCEPT

The basic parts of an electrical circuit and the functions of its parts.

CONCEPT

There are two types of circuits, digital and analog.

CONCEPT

Numbering Systems and Binary Numbers are used in digital circuitry.

CONCEPT

Analog circuits are use used in devices that are regulated or controlled. These include audio amplifiers, radios and TVs. Digital circuits are used in devices that utilizes a switch that controls blinking of lights in Christmas lights, traffic lights that switches in colors following a logical coding system and in clocks and timers.

LESSON ESSENTIAL QUESTIONS

What are the components of an electronic circuit? What is the function of each component in the circuit?

LESSON ESSENTIAL QUESTIONS

What is the difference between an analog circuit to a digital one? What are the uses of each type and their benefits?

LESSON ESSENTIAL QUESTIONS

How is the number system and binary numbers used to create devices that use digital circuitry?

LESSON ESSENTIAL QUESTIONS

What are the advantages and disadvantages of an analog circuit? Of a digital circuit?

VOCABULARY

Resistor, Capacitor, Diode
Photocell, Potentiometer
LED, IC, SCR, Transistor
Dry cell, Wires with insulation

VOCABULARY

Analog, Digital, Switching circuit
Regulating circuit, Logic gates
Buss strip, Solder, Logic indicator

VOCABULARY

Decimal, Binary numbers, Octal
Base-two system, Two-bit binary
number

VOCABULARY

Analog, Digital, Regulated
Switching, Truth table
HI=1=ON, LO=0=OFF

ADDITIONAL INFORMATION