

# Unit 3: Introduction to Electronics

Content Area: **Applied Technology**

Course(s):

Time Period: **Marking Period 1**

Length: **10 days**

Status: **Published**

## Summary

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In this unit students will learn about the basics of electronics including components, resistors, breadboards, current, resistance, and circuitry. Students will design and operate circuits using a variety of components that will modify and affect the output while making connections to the electronic and digital devices that they interact with at home and in school.

Revised: July 2021

LA.W.8.1.C	Use words, phrases, and clauses to create cohesion and clarify the relationships among claim(s), counterclaims, reasons, and evidence.
LA.W.8.2	Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.
LA.W.8.4	Produce clear and coherent writing in which the development, organization, voice and style are appropriate to task, purpose, and audience. (Grade-specific expectations for writing types are defined in standards 1–3 above.)
LA.W.8.5	With some guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on how well purpose and audience have been addressed.
LA.W.8.9	Draw evidence from literary or informational texts to support analysis, reflection, and research.
SCI.MS.ETS1.A	Defining and Delimiting Engineering Problems
SCI.MS.ETS1.B	Developing Possible Solutions
SCI.MS.ETS1.B	Developing Possible Solutions
SCI.MS.ETS1.B	Developing Possible Solutions
SCI.MS-ESS3-2	Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects.
SCI.MS-ETS1-2	Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.
SCI.MS-ETS1-1	Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.
WRK.9.2.8.CAP.2	Develop a plan that includes information about career areas of interest.
WRK.9.2.8.CAP.12	Assess personal strengths, talents, values, and interests to appropriate jobs and careers to maximize career potential.

## Essential Questions/Enduring Understandings

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### Essential Questions:

How do electronic devices impact our lives?

Why is sequence so important when working with a circuit?

How do components affect a circuit's output?

### **Enduring Understandings:**

Technology is constantly changing to meet our wants and needs.

Technology has both positive and negative effects on our lives and planet.

Electronic circuits depend on many factors.

### **Objectives**

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Students will know that electronics is the branch of physics and technology concerned with the design of circuits

Students will know the definition of resistance and how it is measured.

Students will know the definition of current and how it is measured.

Students will know the parts of an atom.

Students will know what an LED (light emitting diode) is and how it is used in a circuit.

Students will know that technology changes based on our wants and needs.

Students will know the difference between a direct circuit and parallel current.

Students will know how a push button is used in a circuit and what it does.

Students will be skilled at coding a circuit using Arduino.

Students will be skilled at building a successful circuit using a variety of components including potentiometers, resistors, speakers, photoresistors, and diodes.

### **Learning Plan**

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Pre Assessment (Kahoot/Blooket): Teacher will use online activity to introduce concepts of unit to students.

Electronics Inventory: Teacher will distribute Google Slides through Google Classroom, making a copy for each student. As teacher presents information and definitions on Smart Board, students will edit their slides to match the term to its picture. While teacher is presenting, the actual components being discussed should be shown to students as teacher walks through classroom.

Discover Electronics Part 1: Teacher should use Smart Board to present information to class while students complete accompanying Google Form. Teacher should present the information from the first set of Google Slides, providing students with the definitions of key terms and concepts such as the definition of electronics, parts of an atom, current, and circuits.

Discover Electronics Part 2: Teacher should use Smart Board to present information to class while students complete accompanying Google Form. Teacher should present the information from the second set of Google Slides, providing students with the definitions of key terms and concepts such as voltage and its unit of measurement, current and its unit of measurement, power and its unit of measurement, resistance and its unit of measurement, as well as the resistor color code and its purpose. The information about the resistor color code can be reinforced through viewing a video that explains the color code in even greater detail.

Introduction to Tinkercad Electronics: Students will be introduced to this online platform and shown how to log on to class account. Students will be provided with guidance on how to create a new circuit, how to modify views, how to add/remove components, how to connect jumper wires, how to rotate components, and how to save their work.

Tinkercad - Resistor Circuit: Teacher will distribute document through Google Classroom, making a copy for each student. Students will be given the definition of the term on Smart Board and through a shared Google Doc. Definition should be read aloud and shown on board while students are instructed to copy/write down the definition in the appropriate box as they understand it. Teacher will check for understanding and then guide students through the construction of a simple resistor circuit using a 1000 Ohm (1kOhm) resistor. While students are working, teacher should build same circuit on Smart Board. Once all students have circuit complete, teacher will demonstrate how to simulate circuit and will check that all students have a working circuit. Students will write their observations on the lab notes doc. Teacher will then demonstrate how to modify the resistance level and discuss what students should be observing.

Tinkercad - Potentiometer Circuit: Teacher will distribute document through Google Classroom, making a copy for each student. Students will be given the definition of the term on Smart Board and through a shared Google Doc. Definition should be read aloud and shown on board while students are instructed to copy/write down the definition in the appropriate box as they understand it. Teacher will check for understanding and then guide students through the construction of a potentiometer circuit. While students are working, teacher should build same circuit on Smart Board. Once all students have circuit complete, teacher will demonstrate how to simulate circuit and will check that all students have a working circuit. Students will write their observations on the lab notes doc. Teacher will then demonstrate how to modify the resistance level using the

potentiometer slider and discuss what students should be observing.

Tinkercad - Photoresistor Circuit: Teacher will distribute document through Google Classroom, making a copy for each student. Students will be given the definition of the term on Smart Board and through a shared Google Doc. Definition should be read aloud and shown on board while students are instructed to copy/write down the definition in the appropriate box as they understand it. Teacher will check for understanding and then guide students through the construction of a photoresistor circuit. While students are working, teacher should build same circuit on Smart Board. Once all students have circuit complete, teacher will demonstrate how to simulate circuit and will check that all students have a working circuit. Students will write their observations on the lab notes doc. Teacher will then demonstrate how to modify the resistance level using the photoresistor slider and discuss what students should be observing.

Tinkercad - Speaker Circuit: Teacher will distribute document through Google Classroom, making a copy for each student. Students will be given the definition of the term on Smart Board and through a shared Google Doc. Definition should be read aloud and shown on board while students are instructed to copy/write down the definition in the appropriate box as they understand it. Teacher will check for understanding and then guide students through the construction of a simple speaker circuit. While students are working, teacher should build same circuit on Smart Board. Once all students have circuit complete, teacher will demonstrate how to simulate circuit and will check that all students have a working circuit. Students will write their observations on the lab notes doc. Teacher may then share miniature piano circuit to elaborate and explain how the use of an integrated circuit affects the speaker's output.

Tinkercad - Diode Circuit: Teacher will distribute document through Google Classroom, making a copy for each student. Students will be given the definition of the term on Smart Board and through a shared Google Doc. Definition should be read aloud and shown on board while students are instructed to copy/write down the definition in the appropriate box as they understand it. Teacher will check for understanding and then guide students through the construction of a diode circuit. While students are working, teacher should build same circuit on Smart Board. Once all students have circuit complete, teacher will demonstrate how to simulate circuit and will check that all students have a working circuit. Students will write their observations on the lab notes doc. Teacher will then demonstrate how to rotate the diode, reversing its polarity. Teacher should lead discussion on what students are observing and explain why this is happening.

Tinkercad - Parallel Circuit: Teacher will distribute tutorial document as a material through Google Classroom. Teacher will check for understanding and then guide students through the construction of a circuit that will utilize RGB LEDs, push buttons, and the power rails of a breadboard. While students are working, teacher should build same circuit on Smart Board. Once all students have circuit complete, teacher will demonstrate how to simulate circuit and will check that all students have a working circuit. Teacher should lead discussion on what students are observing and explain why this is happening.

Tinkercad - Arduino Circuit: Teacher will distribute tutorial document as a material through Google Classroom and use Smart Board to show video that explains what Arduino is and how it is used. Teacher will check for understanding and then guide students through the construction of a circuit that will utilize and RGB LED. While students are working, teacher should build same circuit on Smart Board. Once all students have

circuit complete, teacher will demonstrate how to modify the code to change the color of the RGB LED. Students will be instructed to write a code with a minimum of 8 lines that will circulate the RGB LED through a variety of colors. Teacher will instruct students to simulate circuit and will check that all students have a working circuit. Teacher should lead discussion on what students are observing and explain why this is happening.

## **Assessment**

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### **Formative Assessments:**

Google Forms

Guided notes

Engineering Notebook

### **Benchmark Assessments:**

Circuit builds

### **Summative Assessment:**

Circuit results and observations documents

Quizzes

### **Alternate Assessments:**

Checklist

Questioning and discussion

## **Materials**

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Guided note packets/Google Docs (teacher developed)

Technology (student & teacher laptops, SmartBoard)

Google Slides/PowerPoints

Worksheets/notes

YouTube links

## **Integrated Accommodation and Modifications**

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See attached document:

<https://docs.google.com/spreadsheets/d/1bW0L5xhslCD9IsWWnzbMJoRUI5vOFrgbQJ2saYTgLU/edit?usp=sharing>