DRONE THE UNKNOWN

Introduction to Coding and Drones

Leaders Guidebook and Worksheets

VIRGINIA 4-H

Virginia Cooperative Extension
Virginia Tech • Virginia State University

www.ext.vt.edu

INTRODUCTION TO CURRICULUM

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Background

This curriculum is designed to familiarize participants with drone technology, its uses, and basic operations. The curriculum includes lessons on coding via multiple mediums and a general understanding of coding in the world today. The curriculum also covers several Virginia Standards of Learning topics. Youth have many questions about drones that this curriculum addresses.

Introducing new technologies and the concepts that go with them is an important part of educating future generations. Drones are an example of a successful, innovative idea that has the potential to transform many industries and daily lives. This curriculum is intended to expand the imaginations of youth and get them excited to solve the problems — from simple to more daunting — we face as a society. The lessons in this guidebook can be adapted and adjusted to each classroom, but the core of the lessons should stay the same. With youth being the inventors of the future, the hope is to show them what they can accomplish by using their own ideas and working as a team.

This curriculum is designed to be used as a school enrichment program, but it could be adapted to a 4-H SPIN club. It is recommended for grades three through six. An estimated time allotment is added to each lesson, but it could change based on class size and ability; more or less time may be needed in those situations. The estimated total time for completion of the program is 5-7 hours.

Virginia Standards of Learning

Science

4.1: The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which

a) Distinctions are made among observations, conclusions, inferences, and predictions.
c) Appropriate instruments are selected and used to measure length, mass, volume, and temperature in metric units.
d) Appropriate instruments are selected and used to measure elapsed time.
e) Predictions and inferences are made, and conclusions are drawn based on data from a variety of sources.

4.2: The student will investigate and understand characteristics and interactions of moving objects. Key concepts include

a) Motion is described by an object's direction and speed.
b) Changes in motion are related to force and mass.
c) Friction is a force that opposes motion.
d) Moving objects have kinetic energy.

5.1: The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which

c) Estimates are made and accurate measurements of elapsed time are made using proper tools.
i) Inferences are made and conclusions are drawn.

6.1: The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which

b) Precise and approximate measurements are recorded.

6.2: The student will investigate and understand basic sources of energy, their origins, transformations, and uses. Key concepts include

a) Potential and kinetic energy.

Math

4.4: The student will

b) Estimate and determine sums, differences, and products of whole numbers.
d) Create and solve single-step and multistep practical problems involving addition, subtraction, and multiplication, and single-step practical problems involving division with whole numbers.

4.6: The student will

a) Add and subtract with decimals.
b) Solve single-step and multistep practical problems involving addition and subtraction with decimals.

4.7: The student will solve practical problems that involve determining perimeter and area in U.S. Customary and metric units.

5.1: The student, given a decimal through thousandths, will round to the nearest whole number, tenth, or hundredth.

5.4: The student will create and solve single-step and multistep practical problems involving addition, subtraction, multiplication, and division of whole numbers.

5.8: The student will

a) Solve practical problems that involve perimeter, area, and volume in standard units of measure.

b) Differentiate among perimeter, area, and volume and identify whether the application of the concept of perimeter, area, or volume is appropriate for a given situation.

Computer Technology

3-5.1: Demonstrate an operational knowledge of various technologies.

a) Use various types of technology devices to perform learning tasks.

- Use a keyboard, mouse, touchscreen, touchpad, and other input devices to interact with a computer.
- Demonstrate the ability to perform a wide variety of basic tasks using technology, including saving, editing, printing, viewing, and graphing.

b) Communicate about technology with appropriate terminology.

- Use basic technology vocabulary in daily practice.

3-5.2: Identify and use available technologies to complete specific tasks.

b) Use content-specific tools, software, and simulations to complete projects.

- Use tools in various content areas as directed by the teacher.

6-8.1: Demonstrate an operational knowledge of various technologies.

a) Use various types of technology devices to perform learning tasks.

- Demonstrate the ability to perform specific tasks using technology, including organizing, analyzing, and presenting data; formatting and presenting text and graphic information; and capturing and manipulating images.

b) Communicate about technology with appropriate terminology.

- Use technology vocabulary in daily practice.

6-8.2: Identify and use available technologies to complete specific tasks.

a) Identify the specific uses for various types of technology and digital resources.

- Explain how various careers incorporate technology.

b) Use content-specific tools, software, and simulations to complete projects.

- Use tools in various content areas, such as graphing calculators, science simulations, story diagramming applications, image processing applications, and history timeline applications.

Computer Science

4.1: The student will construct sets of step-by-step instructions (algorithms) both independently and collaboratively.

a) Using sequencing.
b) Using loops.

4.3: The student will analyze, correct, and improve (debug) an algorithm that includes sequencing, events, loops, and variables.

4.15: The student will give examples of computing technologies that have changed the world and express how those technologies influence, and are influenced by, cultural practices.

5.15: The student will evaluate and describe the positive and negative impacts of the pervasiveness of computers and computing in daily life (e.g., downloading videos and audio files, electronic appliances, wireless Internet, mobile computing devices, GPS systems, wearable computing).

6.12: The student will explore careers related to data.

4-H Life Skills

Leadership Teamwork Self-Responsibility Critical Thinking

Problem-Solving Decision-Making Planning or Organizing Personal Safety

Wise Use of Resources Communication Cooperation Conflict Resolution

Sharing Contribution to Group Marketable/Useful Skills

Before You Start

Before beginning this curriculum, it is important to understand the concepts presented in this guidebook.

Area – The number of unit squares that can be contained within a figure.

Coding – The primary method for communication between humans and machines; the process of sequencing instructions for a computer to understand in order to perform certain functions.

Diameter – Any straight line segment that passes through the center of a circle with end points on the circle.

Drone or unmanned aerial vehicle (UAV) – A remote-controlled or autonomously flown device through software-controlled flight plans; pilotless aircraft or robot.

Federal Aviation Agency (FAA) – Regulating agency of all aspects of civil aviation.

Hypothesis – A potential explanation for something that is based on known facts but has not yet been proven.

Inference – A conclusion reached on the basis of evidence and reasoning.

Kinetic energy – The energy possessed by an object in motion.

Perimeter – The total distance around the edge of a figure.

Potential energy – The energy an object has because of its position relative to another object.

Radius – The distance from the center of a circle to the outside of a circle.

Sprite/actor – The figure or item receiving a code.

In addition to the terminology, please read the regulations outlined by the FAA on its website, found at www.faa.gov/uas/recreational_fliers.

Safety precautions:

1. Provide eye protection to all participants if available.
2. Establish an area where drones can be flown that is away from potential passersby.
3. Require youth to wait behind a line that is safely away from the drone path when drones are on the course.
4. Do not allow participants to touch drones while in the air.
5. Fly one drone at a time.
6. Make school or building administration aware of the program ahead of time.

Recommended Equipment and Supplies

- Drones with grabber (Parrot Education's Parrot Mambo Mission drones); max of five youth per drone recommended.
- iPad minis, regular iPads, and/or tablets with Google Play (app needed: Tynker).
- Computers with Bluetooth capability.
- Scrap paper, recycled materials, crafting materials.
- Timers.
- Writing utensils.
- Tape.
- Copies of worksheets.

LESSON 1. CODING 101

Objectives

1. Develop a basic understanding of coding.
2. Learn how to create a sequence of events.
3. Learn the functions of the coding system.
4. Understand how drones can be used in the world.

Life Skills

Problem-Solving Planning or Organizing Marketable/Useful Skills
Teamwork Communication

SOL Correlation

Science	Computer Technology	Computer Science
4.1, 5.1, 6.1	3-5.1, 3-5.2, 6-8.2	4.1, 4.3, 4.15, 5.1

Time Required: 60 Minutes

Supply List

- Computers with internet access OR iPads with the Tynker app; two at most per computer or iPad.
- Copies of worksheets.
- Writing utensils.

Background Information and Procedure

- Students will discuss coding and its various uses.
- Students will write their own codes to create a specific sequence of events.
- Students will learn how codes are used in real life.

OPTIONAL Get Acquainted Activity: Begin by asking students if they know what the term "coding" means. Some may mention video games or computers. Make sure participants understand that phones, tablets, and electronics are connected to each individual button/action. For example, when typing on a phone or tablet, each letter is programmed to be the assigned letter. Each application is programmed to do specific tasks. These codes are much longer and more complicated than the codes they will be creating, but it is a starting point.

In this next activity, students should be put in groups of two or three.

1. Set up a simple obstacle course. Use desks and chairs in a variety of places to make it a little challenging.
2. In their groups, students should write step-by-step directions, also called a code, for a group member to successfully walk through the obstacle course. Emphasize to students the importance of writing specific and clear directions. Use Worksheet 1.1 to help guide students.
3. After the students have completed their codes, collect the instructions and have the students go one by one through the obstacle course as the instructor reads the code exactly as written.

More than likely, students will leave out important steps for their group members to follow, and the rest of the course is changed because of the errors. Explain to them that this is what can happen with coding, and it is important to be specific and to include each step.

Explain to the class that they will use computers or iPads to learn the basics of coding. Coding is the basic process that programmers use when creating programs. When students play video games or use apps on a phone or tablet, those programs are created through coding. Every button has a certain function, and coding is used to assign those functions.

1. After explaining what coding is and its purpose in the various functions of society, ask students the following questions:
    a. What items do you use that involve coding?
    b. Have you ever coded programs before?
    c. What kind of job might require you to code?
    d. How does coding relate to drones?
2. Tell students that they will get the opportunity to practice coding during this short course. Students will begin by using various computer programs to make objects or sprites/actors. They will then ask their sprites/actors to perform certain tasks — from simply moving across the screen to making an interactive game.
3. Define a **sprite** or **actor** as the character, picture, or item that will receive the written code created by the user. Then use the steps below for either computers or iPads based on what medium the class will use.

Instructions for students on computers:

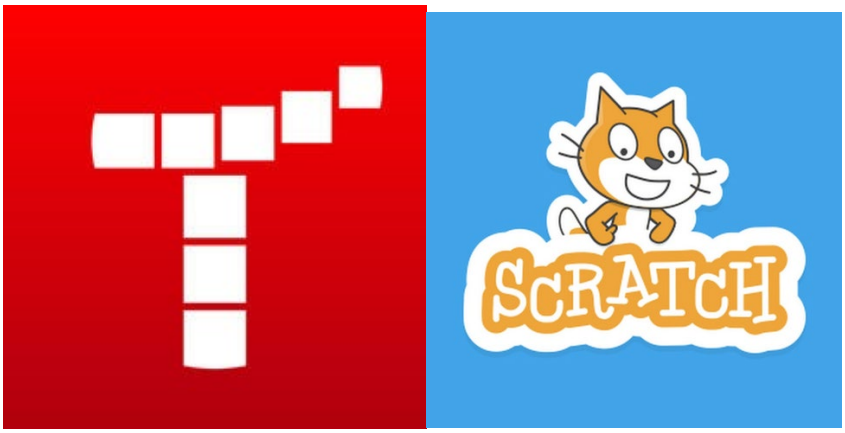
4. Go to https://scratch.mit.edu to open the online coding system. The instructor should become familiar with the website ahead of time. The site provides instructional tutorials.
5. Have students watch the short video on the homepage of the website to give them an idea of the various options available. It is accessed by clicking on the video on the top right-hand corner of the website. They can also watch examples of projects created by users, such as featured projects.
6. Have students complete Worksheet 1.2, found on page 11.
7. When complete, let students experiment with creating their own projects as time allows.

OR Instructions for students on iPads:

4. Make sure all iPads are fully charged and have the Tynker app downloaded. The instructor should become familiar with the app ahead of time.
5. Open the app and have students click the "Projects" button.
6. Choose "Create New Project" and then select "New Project." A character will appear on a gridded screen. Select "</>" to get to the coding screen.
7. Have students complete Worksheet 1.2, found on page 11.
8. When complete, let students experiment by creating their own projects as time allows.

Apply: Ask the students the following questions:

a. What careers can you think of that use coding?
b. In what ways might you ask your drone to perform a certain task?
c. How are drones used in the world today?



Worksheet 1.1. Practice Coding With Friends

Name: _____ Date: _____

Partner(s): _____

Write a code for a partner to follow to complete the task at hand. Be specific in your instructions because your partner will have to follow the steps exactly as written.

Example: How to high-five

1. Take right hand and raise to shoulder level with a 90-degree bend in arm.
2. Find a partner and have them do the same.
3. Take right hand with palm out and reach to partner's right hand in a quick motion.
4. Tap their hand and bring hand back to comfortable position.

Now you try:

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____

Was your partner able to complete the task successfully?

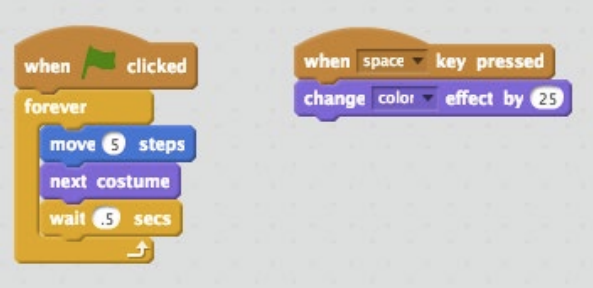
What would you do differently?

Worksheet 1.2. Practice Coding

Name: _____ Date: _____

1. Make your sprite/actor move from the middle to the end of the screen by following the code below. Describe what happened to your character.

2. Add an additional script to your sprite/actor to make the code interactive. What happened when you added this script?



3. Practice moving your sprite/actor from one point to another and rotating it. Write your code below.

4. Get creative! Add a backdrop and a second sprite to your code. Make your new sprite move and change color. Write your code below.

LESSON 2. KNOW THE DRONE

Objectives

1. Learn to make predictions.
2. Learn to take measurements on complex objects.
3. Understand proper measuring terms.
4. Understand potential and kinetic energy.
5. Learn to connect coding to drones.

Life Skills

Teamwork Critical Thinking Decision-Making Planning or Organizing

Communication Cooperation Conflict Resolution Sharing Self-Esteem

Marketable/Useful Skills Personal Safety Self-Responsibility Contribution to Group

Leadership

SOL Correlation

Science

4.1, 4.2, 5.1, 6.1, 6.2

Math

4.4, 4.6, 4.7, 5.1, 5.4, 5.8

Computer Technology

3-5.1, 3-5.2, 6-6.2

Computer Science

4.1, 4.3, 5.1

Time Required: 60-90 minutes

Supply List

- Drones (enough for five students max per drone).
- Rulers (at least one per group).
- Paper or notepads.
- Writing utensils.
- Start and finish markers.
- Timer.
- Tape (as a safety line) or some sort of marker for students to stay behind.
- Copies of Worksheet
- iPads

- Object weighing 16 ounces, such as a box of pasta or a can of beans.
- Optional: String tied to any heavy object (water bottle, ball, etc.).
- Optional: Obstacles (chairs, boxes, tables, hula hoops, etc.).

Background Information

Definitions:

Area – The number of unit squares that can be contained within a figure.

Radius – The distance from the center of a circle to the outside of a circle.

Diameter – Any straight line segment that passes through the center of a circle with end points on the circle.

Hypothesis – A potential explanation for something that is based on known facts but has not yet been proven.

Inference – A conclusion reached on the basis of evidence and reasoning.

Kinetic energy – The energy possessed by an object in motion.

Perimeter – The total distance around the edge of a figure.

Potential energy – The energy an object has because of its position relative to another object.

Other information:

- Before beginning the lesson, be sure to weigh the drone in ounces.
- In this lesson, students are going to put their coding skills to the test and code a drone to fly from Point A to Point B.
- Students will work in teams to measure the size of the drone and predict its weight.
- Students will estimate how long it takes the drone to get from Point A to Point B.
- Remind students that an important part of today's activity is personal safety. This includes waiting behind the safety line, not flying the drone except in the designated area, flying one at a time, wearing safety goggles, and not running during the program.
- Explain to students that every drone is different, and one small difference such as a chip in a propeller can make a big change to the drone's path.
- Ask students what they think might cause variation in the drone's path despite using the same code and starting in the same spot (e.g., wind, weight changes, bent parts, battery power, etc.).

Procedure

1. Assign students to teams. Choose teams ahead of time if needed based on classroom behavior.
2. Set up a course. To do this, use tape to mark an area as the starting point or Point A. Then walk an even and straight distance away from the starting point and tape off an area for landing or Point B. It is also a good idea to tape or mark a safety line or waiting point for students while drones are flying.
3. Before handing out the materials for the day, review the questions below with the participants.
    a. How can you determine the perimeter of an object? The area?
    b. What is the radius of a circle? The diameter?
    c. What is a hypothesis?
    d. What two kinds of energy exist in terms of motion?
    e. What are the differences between potential and kinetic energy?
    f. Optional: Use an object tied to string to make a pendulum in order to demonstrate potential and kinetic energy.
    g. What do you think the code will need to say in order to make the drone functional?
4. Have the students complete Worksheet 2.1 on page 15 At this time, it is a good idea to connect the drones to the iPads. Each team will receive a drone and an iPad to complete Worksheet 2.1.
    a. Explain to students that the codes for the drone in the Tynker app will be dark green and have a drone icon on them except for the starting code.
    b. Other codes that are different colors will not work with the drone.
5. After completing the worksheet, students should begin writing the code to successfully make the drone fly the course. If time allows, change the course and add obstacles to give students a chance to experiment with different codes.

Apply: Ask students the following questions:

a. How did you determine how far the drone would go in nine seconds without flying the drone for that period of time? Define “inference” for students.
b. How could drones be used to complete a task? What would you use your drone for?

GETTING TO KNOW YOUR DRONE

Worksheet 2.1. Get To Know Your Drone

Team members: _____ Team number: _____

_____ Team name: _____

_____ _____

1. Measure the following parts of your drone in inches:
    a. Perimeter of drone: _____
    b. Area of drone: _____
    c. Radius of propeller: _____
2. Estimate the weight of your drone in ounces by comparing its weight to 16 ounces: _____
3. How far does your drone travel when flying for the following times:
    a. One second: _____
    b. Three seconds: _____
4. How far would you estimate your drone to travel after nine seconds? _____ Explain.

5. What kind of energy is used when the drone is flying? _____
6. What kind of energy would be found in the drone's battery? _____

THINK ABOUT IT: Do you think adding weight to your drone will affect how it flies? Why or why not?

7. Now, work as a team to successfully make your drone fly from Point A to Point B as set by your instructor. Use the answers above to determine how many seconds the drone needs to fly.

LESSON 3. DRONES THAT DELIVER

Objectives

1. Learn to make predictions.
2. Learn to take accurate measurements.
3. Make real life connections.
4. Learn to design, build, and test a product.
5. Use creativity in designing delivery mode.

Life Skills

Teamwork Critical Thinking Decision-Making Planning or Organizing

Communication Cooperation Conflict Resolution Sharing Self-Esteem

Marketable/Useful Skills Personal Safety Problem-Solving Leadership

Self-Responsibility Contribution to Group Wise Use of Resources

SOL Correlation

Science

4.1, 4.2, 5.1, 6.1

Math

4.4, 4.6, 4.7, 5.1, 5.8

Computer Technology

3-5.1, 3-5.2, 6-8.2

Computer Science

4.1, 4.2, 4.15, 5.1, 6.12

Time Required: 60-90 minutes

Supply List

- Drones (enough for five students max per drone).
- Rulers (at least one per group).
- Scales.
- Paper or notepads.
- Writing utensils.
- Start and landing markers.
- Various items (paper, bags, string, egg cartons) that can be used to create a delivery mode.

- Scissors.
- Tape.
- Monopoly pieces or Lego characters.
- Optional: 3D pens or printer.
- Copies of worksheet.

Background Information and Procedure

- In this lesson, students are going to apply engineering skills to design a mechanism that will carry an object from Point A to Point B. In addition to the challenge of creating a design, teams will also be challenged to code the drone to Point B, drop off their "package," and return to Point A. The delivery system needs to be an object that will carry the package and can be carried by the drone.
- Flight paths should be simple because the focus is on successfully making a delivery mode; coding is important but a secondary part of this lesson.
- Each team should be given an object to deliver. It should be something small like a Lego character or Monopoly piece.
- Ask the students to think about their last assignment. How far did their drone go in one second? In three seconds? Will it be important to measure the distance from Point A to Point B to determine how many seconds to have the drone fly?
- Continue the activity following the set of questions on Worksheet 3.1 on page 18 Make sure to approve the design of the delivery system before students begin to build.
- **Optional:** If you have access to a 3D printer or 3D pens, make a system using that technology. This could add significant time to the activity.

Apply: After the activity is complete, ask the students the following questions:

a. How did the weight of the design affect the drone's ability to fly? Why?
b. How would drone delivery be helpful in real world scenarios?
c. What was the most challenging aspect of this activity?
d. What would you do differently if you could do it again?

DISCOVERING DELIVERY

Worksheet 3.1. Design and Delivery

Team members: _____ Team number: _____

_____ Team name: _____

_____ _____

Draw a design for your delivery system in the space below.

Product mass: _____ Product perimeter: _____ Product area: _____

Trial 1:

Did your design work? _____ Why or why not? _____

What would you change, if anything? _____

Trial 2:

Did your design work? _____ Why or why not? _____

What would you change, if anything? _____

Trial 3:

Did your design work? _____ Why or why not? _____

What would you change, if anything? _____

THINK ABOUT IT: How could you make your package land without damaging it?

LESSON 4. DROP ZONE DRONES

Objectives

1. Learn to make predictions.
2. Learn to take accurate measurements.
3. Make real life connections.
4. Learn to design, build, and test a product.
5. Use creativity in designing parachutes.

Life Skills

Teamwork Critical Thinking Decision-Making Planning or Organizing

Communication Cooperation Conflict Resolution Sharing Self-Esteem

Marketable/Useful Skills Personal Safety Leadership Contribution to Group

Wise Use of Resources Self-Responsibility

SOL Correlation

Science

4.1, 4.2, 5.1, 6.1

Math

4.4, 4.6, 4.7, 5.1, 5.4, 5.8

Computer Technology

3-5.1, 3-5.2, 6-6.2

Computer Science

4.1, 4.3, 5.1

Time Required: 60-90 minutes

Supply List

- Drones (enough for five students max per drone).
- Rulers (at least one per group).
- Scales.
- Paper or notepads.
- Writing utensils.
- Start and finish markers.
- Various items (paper, bags, string, egg cartons) that can be used to create a delivery mode.
- Lego characters or Monopoly game pieces.
- Scissors.

- Tape.
- Copies of worksheets.
- Timer or device with timer.
- Optional: 3D pens.

Background Information and Procedure

Students will create a way to safely drop packages using drones.

- Ask students to share how safely dropping packages may be possible.
- Depending on the size of your drone, use a Lego character or a Monopoly game piece as the object. If using a larger drone, incorporate the egg drop project into the challenge.
- Have ample supplies such as yarn, tape, and scrap paper available for students to use in their design, but ask them to draw the design first and have it approved before they begin the building process.
- Students should aim to create a design that makes a parachute system. Drones will need to be coded to fly up about 25 feet and drop the structure OR have a teacher fly the drone up to the same distance and release the structure. Students should aim to have the longest time in the air from the drop to the ground.
- Explain to students that the longest hang time will be determined by taking the average time over three trials.
- Have the students complete Worksheet 4.1 on page 21.

Apply: After the activity, ask the follow questions:

a. How did the weight of their design affect the landing?
b. How would this experiment be helpful in real world scenarios?
c. What was the most challenging part of this activity?
d. What would you do differently if you could do it again?

THE PERFECT LANDING

Worksheet 4.1. Drop Zone Drones

Team members: _____ Team number: _____

_____ Team name: _____

_____ _____

Draw a design for your landing system in the space below or use the back of this worksheet.

Product mass: _____ Product perimeter: _____ Product area: _____

Trial 1:

Time from drop to landing: _____ Did your design work? _____ Why or why not?

_____

What would you change, if anything? _____

Trial 2:

Time from drop to landing: _____ Did your design work? _____ Why or why not?

_____

What would you change, if anything? _____

Trial 3:

Time from drop to landing: _____ Did your design work? _____ Why or why not?

_____

What would you change, if anything?_____

Average time in air (Trial 1 time + Trial 2 time + Trial 3 time) / 3: _____

THINK ABOUT IT: How could drones be used in jobs and industries?

LESSON 5. DRONES IN ACTION

Objectives

1. Make real life connections.
2. Use creativity in designing new drone uses.
3. Explore jobs and careers that use drones.
4. Understand how drones and technology can make jobs more efficient and safe.

Life Skills

Teamwork Critical Thinking Decision-Making Planning or Organizing

Communication Cooperation Conflict Resolution Sharing Self-Esteem

Marketable/Useful Skills Personal Safety Problem-Solving Leadership Wise Use of Resources

Self-Responsibility Contribution to Group

SOL Correlation

Computer Technology	Computer Science
3-5.1, 3-5.2, 6-6.2	4.15, 6.12

Time Required: 60-90 minutes

Supply List

- Poster board.
- Markers.
- Timer.
- Copies of worksheet.

Background Information and Procedure

- In this lesson, participants are going to talk about drones in the real world and why they can be useful in efficiency and safety in various industries.
- Optional: Invite professionals from various industries (agriculture, forestry, emergency services, utilities, distribution, search and rescue, etc.) to speak about the use of drones in their industry and/or bring professional-grade drones.

- Start a discussion with the class. Define current issues and give some examples. Ask them what they think current issues are in their community or across the globe. Talk about major events you see and hear on the news.
- Tell the students they will work in their teams to pick one current issue and figure out a way a drone could help resolve or lessen the occurrence of an issue.
- When students have grasped the idea, have them complete Worksheet 5.1 on pages 24-25 in their teams and then conduct a short presentation.
- Discuss ways to make a proper presentation:
    a. Every team member should speak.
    b. Team members should all agree on one idea.
    c. Include an introduction to the problem, drone design, how drones can help solve or lessen the problem, and a conclusion.
    d. Providing a visual of their drone idea is suggested but not required.
    e. Presentations should be at least two minutes.

Apply: After the activity, ask the follow questions:

a. What physical or usage changes can you see drones having in the future?
b. What safety concerns might arise with an increased number of drones?
c. What other industries might drones be beneficial to?

REAL PROBLEMS, REAL SOLUTIONS

Worksheet 5.1. Drones in Action

Team members: _____ Team number: _____

_____ Team name: _____

_____ _____

In this activity, you are going to work with team members to solve a real world problem using drones. This could be a problem in your community or a global issue. Your drone can do anything you imagine to help solve or lessen a problem. Examples include safety, efficiency, or an environmental problem, just to name a few. Use your imagination.

1. State your problem: _____

   _____

2. State your solution using drones: _____

   _____

3. Draw a design for your new drone in the space below or on provided poster board.

4. Prepare a short presentation on your new drone. Everyone on your team should speak. Use the following steps when preparing your presentation:
   a. Introduction of problem.
   b. Your drone design.
   c. How the drone will help solve or lessen problem.
   d. Conclusion.