



LESSON PLAN SAMPLES

EXPLORE OUR LESSON PLANS

Grades K-3



LITTLE LEGENDS

Pages 1-6

Grades 4-8



STEM FUNDAMENTALS

Pages 7-25

Grades 8-12



FPV INITIATOR

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Little Legends Legendale Neighborhood

Story 1.3 - Scavenger Hunt



Week-at-a-Glance

Day 1	Read	Story Time: <i>Scavenger Hunt</i> Physical Game: <i>Find the Clues</i>	45 min
Day 2	Explore	Board Game: <i>Clue Connector</i>	45 min
Day 3	Code	Unplugged Coding Mission: <i>Scavenger Hunt</i>	45 min
Day 4	Engineer	STEM: Paper airplane	45 min
Day 5	Design	Art: Activity Sheets	45 min

Day 1 - Read

Materials

- Story Slides for *Scavenger Hunt*
- 16 poly dots, 4 of each color

Set Up (Slide 4)

- Prepare to project the story slides and the game instruction slides.
- Split the students into two teams.
- Have 4 poly dots of the same color for each team, for example, 4 yellow and 4 blue.
- Place the remaining poly dots in a line to divide one side of the room from the other. You can also use tape or string to divide the room into two sides.

Little Legends Legendale Neighborhood, Story 1.3 - Scavenger Hunt

Story (Slide 5) 10 minutes

Discuss the following pre-reading questions:

- Have you ever had to take turns with someone?
- How do you feel when you have to take turns?

Read *Scavenger Hunt* out loud using the story slides. Ask questions and discuss the story when and how you feel is best for your students.

Physical Game (Slides 6-12) 25 minutes

Play *Find the Clues*

Synopsis: This game is similar to Capture the Flag. Split the students into two teams. Give each team time to hide 4 dots on their side of the room. When the teacher calls GO, the students try to race across the middle line to find the other team's clues. If they are on the other team's side of the line, that team can tag them and they have to sit down until a person on their team tags them. If the player is holding a clue when they are tagged, they sit down with the clue. A player from their team can get the clue from them. The game continues until one team finds all the other team's clues.

Example: A player from Team 1 races to Team 2's side to find a clue hidden under a chair. The player gets tagged right before reaching the chair and has to sit down. Another player from Team 1 tags him and he runs to get the clue. As he is running back to his side, he gets tagged again and sits down with the clue. Another player from Team 1 goes and gets the clue from him and runs it back to their side.

Alternatives: If the tagging component is too much, just have each team hide the clues on their side and then each team tries to find all four hidden clues first. You could also make it so that the team members can only tag someone from the other team when they have a clue.

Wrap Up (Slide 13) 10 minutes

Have students help clean up all materials.

Gather the students together and discuss the following question:

- What can you do to be legendary when taking turns?

Little Legends Legendale Neighborhood, Story 1.3 - Scavenger Hunt

Day 2 - Explore

Materials

- 4 x Mission Mat
- 4 x Legendale Neighborhood Game Cards (blue back)

Set Up

- Prepare to project the game instruction slides.
- Divide the students into teams of 4.
- Set up a Mission Mat for each team, along with a deck of Legendale Neighborhood Game Cards, or instruct students to do so.

Welcome (Slide 15) 10 minutes

Introduce Board Game and Expectations.

Discuss the following question:

- Why was Ember sad when Gimbal solved the first two clues by himself?

Board Game (Slides 16-23) 25 minutes

Play *Clue Connector*

Goal: Your goal is to get as many cards on the Mission Mat as possible. Cards must have something in common with each card they will touch when placed.

Game Play:

1. Shuffle the neighborhood cards and place them face down near the Mission Mat.
2. On your turn, draw the top neighborhood card and place it on the board so that it only touches cards that share a common characteristic (color, building shape, animal type, plant, etc.).
3. A card placed between 4 other cards must share common characteristics with each of the 4 cards it touches.
4. Cards are placed until they cannot be placed anywhere else.
5. You may build off the edges of the Mission Mat.

Wrap Up (Slide 25) 10 minutes

Have students help clean up all materials. Gather the students together and discuss the following questions:

- How many cards did your team fit on your board?
- Which pieces were the easiest to place on the board?
- Which pieces were the hardest to place on the board?

Little Legends Legendale Neighborhood, Story 1.3 - Scavenger Hunt

Day 3 - Code

Materials

- 4 x Mission Mat
- 4 x Legendale Neighborhood Coding Cards (green back)
- 4 x Little Legends Base Cards (Gimbal side)
- 4 x Gimbal Character Playing Piece

Set Up

- Prepare to project the unplugged coding instruction slides.
- Create a space for each team to carry out the unplugged coding activity.
- Pull the following 4 cards from the Legendale Neighborhood Coding Cards: ducks, butterfly, stars, and marshmallow stick, or instruct the students to do so.
- Pull the landing and launch pad cards from the Little Legends Base Cards, or instruct the students to do so.
- Set up the Mission Mat and coding cards, or instruct students to do so.

Welcome (Slides 25-28) 10 minutes

Discuss the following questions:

- Do you remember how Ember and Gimbal had to follow clues in order?
- Sometimes the order of something is very important!
- Can you think of a time when you had to follow a certain order?

Introduce unplugged coding activity and expectations. Review drone movement vocabulary.

Unplugged Coding (Slides 31-32) 25 minutes

Play *Scavenger Hunt*!

1. Help student teams
 - A. open the clear overlay on the Mission Mat and place the four cards on the mat in any order.
 - B. place the launch and landing pads in the bottom left and upper right corners of the grid respectively.
 - C. carefully close the clear overlay.
2. Teams will work together to create a coding path from the launch pad to each item in the order that it appears in the story, to the landing pad. They will place one card (throttle up, pitch forward, pitch backward, yaw, roll, and throttle down) in each of the grid squares along the chosen path.
3. When the path is complete, students take turns moving the Gimbal playing piece through the coded path.
4. Teams may have to debug (make changes to) their code throughout the activity.
5. If time allows, have successful teams open the overlay, move the cards to new locations, close it, and create a new code.

Wrap Up (Slide 30) 10 minutes

Have students help clean up all materials. Gather the students together and discuss the following questions:

- Were you able to code Gimbal to fly to the clues in order?
- Why would it sometimes be important to code in a special order?



Little Legends Legendale Neighborhood, Story 1.3 - Scavenger Hunt

Day 4 - Engineer

Materials

- *Airplane Templates* (several for every student)
- Poly Dots (used as launch pads)

Set Up

- Prepare to project the paper airplane design slides.
- Print the *Airplane Template* downloadable and make several copies for each student.
- Create a space for each student to engineer their airplane.
- Place four launch pads in the area where the students will be test-flying their planes. Ensure that there is adequate space for the airplanes to fly forward.

Welcome (Slide 32) 10 minutes

Review the Engineering Design Process, paper airplanes, and expectations.

Engineering (Slides 33-48) 25 minutes

1. Discuss the steps in the Engineering Design Process using the instructional slides.
2. Have students follow the activity slides' steps to fold their paper airplanes.
3. Have students (with their airplanes) line up behind each other at their team's launch pad.
4. When you say, "GO," the students on the launch pads will test their airplane, count their steps, and return to the back of their team's line.
5. Repeat this process as long as time allows, making sure each child gets the same number of turns.
6. If there is time, allow students to color their planes.

Wrap Up (Slide 49) 10 minutes

Have students help clean up all materials. Gather the students together and discuss the following questions:

- How did the size of the wings affect the way an airplane flies?
- How do you think an airplane with big wings is used?
- How do you think an airplane with small wings is used?

Little Legends Legendale Neighborhood, Story 1.3 - Scavenger Hunt

Day 5 - Design

Materials

- *Activity Sheets*, 1 copy per student
- Materials needed for any activity you'd like to repeat
- Crayons, markers, or colored pencils

Set Up

- Choose the activities you'd like to repeat.
- Print the *Activity Sheets*.

Welcome, 10 minutes

Discuss important concepts and skills learned this week.

Design (Slides 50-51) 25 minutes

Choose any of the following activities to best meet the needs of your students:

- Reread and discuss the story *Scavenger Hunt*.
- Complete and color the *Activity Sheets*.
- Repeat any of the hands-on activities from this week.

Wrap Up (Slide 52) 10 minutes

Have students help clean up all materials. Gather the students together and discuss the following question:

- How will you be legendary today?



Educator Lesson Planner



Educator Lesson Planner

Drone Legends Educator Lesson Planner

FIRST EDITION

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Love these lessons? Can you think of a way to improve them? Have an idea for a mission? The team behind Drone Legends would love to hear from you! You can share your feedback and ideas with us through our website's contact form or directly through our email!

www.dronelegends.com

For more information:
info@dronelegends.com



Mission 4: Surfer Rescue

Mission duration

TOTAL MISSION DURATION: 90 MINUTES		
Introduction (10 min)	Scenario	10 minutes
Flying Missions (70 min)	Build the Coast	10 minutes
	Time to Fly: Protect the Shore	15 minutes
	Time to Code: Measure Takeoff Height	5 minutes
	Time to Code: Shoreline Watch	15 minutes
	Time to Code: Loop the Shore	20 minutes
Wrap-Up (10min)	Clean and Debrief	10 minutes

Mission 4


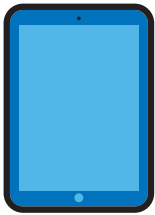
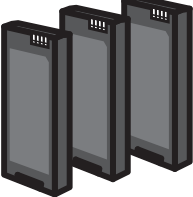


Objectives




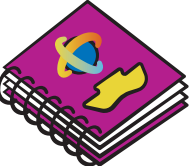


By the end of this exploration, students will be able to do the following:


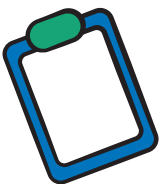


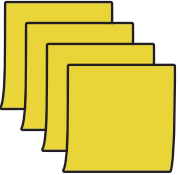

- Fly to find and capture images on camera feed.
- Map and measure different distances along Tello's route.
- Write steps for pilot and translate into block code for Tello.
- Revise block code to increase Tello accuracy and include loops.

Materials

Equipment

Item					
	Tello Drones	Devices	Batteries	Propeller Remover Tools	Launch Pad
#	1 per group	1 per group	3 per group	1 per group	1 per group

Item						
	Obstacle Course Set	Safety Goggles	Operations Manual	Student Mission Guide	Pencils	Safety Checklists
#	1 per group	1 per student	1 per group	1 per student	1 per student	1 per student

Item						
	Measuring Tape	Clipboards	Mission Notes	Code Planner Sheets	Sticky Notes	Masking Tape
#	1 per group	1 per student	1 per student	1 per student	5 per group	1 per group

Preparation Checklist (detailed information found in the Operations Manual)

Complete the following tasks before meeting with students:

- ☐ Charge all batteries and devices.
- ☐ Read through the entire Teacher Guide. Note that all text written in *“italics and quotation marks”* can be read aloud to students as a script for each slide.
- ☐ Practice each student activity yourself, so you feel confident to demonstrate and teach the skills to students.
- ☐ Sort students into groups of 3.
- ☐ Organize equipment to distribute to groups throughout the mission.
 - ☐ Set up the used battery bin and the new battery bin.
 - ☐ Have a Tello and device ready to distribute to every group.
 - ☐ Have a student Mission Guide, Mission Notes, a Code Planner Sheet, a clipboard, and a pencil available for every student.
 - ☐ Sort obstacle course materials into piles for each group while students come in.

Mission Plan 4: Shark Watch

Introduction

Slide	TEACHER	STUDENTS
1	<ul style="list-style-type: none"> ▶ Remind students to be lined up at designated line-up, entry spot ▶ Drop off backpacks, etc. in the designated area. ▶ Walk students to the Academy and sit in teams. ▶ Read through the materials list together and send one student from each group to grab the materials. ▶ Remind the students to place any loose papers to their clipboard. 	<ul style="list-style-type: none"> * lined up to enter * drop off backpacks * sit with team * grab materials * attach loose papers to clipboards
2	<ul style="list-style-type: none"> ▶ <i>"Welcome back, Drone Legends! I hope you are as excited as I am to fly and code Tello today!"</i> ▶ <i>"Did anyone think of 'looking for sharks' when we talked about different ways we can use a drone to help others? That's what we'll be doing in this mission!"</i> 	<p>The teacher reinforces throughout the lesson:</p> <ul style="list-style-type: none"> * sit and listen
3	<ul style="list-style-type: none"> ▶ "What did we learn about Tello during our last mission?" ▶ Ask 2-3 questions to warm up for the new lesson. <ul style="list-style-type: none"> ▷ <i>"Where did we go on our mission?"</i> ▷ <i>"Who did we help with our drones?"</i> ▷ <i>"What flight moves did we practice during our last mission?"</i> ▷ <i>"What did you learn about flying in the last mission that you want to remember this mission?"</i> ▷ <i>"What did you learn about coding in the last mission that you want to remember this mission?"</i> 	<ul style="list-style-type: none"> * raise hands for questions * participate in discussions * follow along with instructions on slides, in Mission Guide, and in Operations Manual
4	<ul style="list-style-type: none"> ▶ <i>"Today, we are going to practice playing a game with integrity, do another coded mission, and learn about loops to simplify code. You will be given a lot more responsibility in this mission, so feel free to refer to the Operations Manual or previous Mission Notes for guidance."</i> 	

Scenario: Drone Alert

Slide	TEACHER	STUDENTS
5	<ul style="list-style-type: none"> ▶ <i>"Before we start, let's talk about some Drone News!"</i> 	
6	<ul style="list-style-type: none"> ▶ <i>"Drones are being used by Australian lifeguards to monitor and track sharks swimming in and around popular beaches."</i> ▶ <i>"The drone is known as the 'Little Ripper' uses artificial intelligence to detect sharks: alerting lifeguards, emergency services, and swimmers."</i> ▶ <i>"The shark-spotting drone has a 90% accuracy rate, while current manned aircraft have accuracy rates of around 20%. These drones are saving lives and protecting the shores."</i> 	
7	<ul style="list-style-type: none"> ▶ <i>"Today, you get to pretend you have a 'Little Ripper' drone, but you're taking it to Paradise: Hawaii! Please take out your Mission Guide and Mission Notes."</i> 	
8	<ul style="list-style-type: none"> ▶ Read the mission scenario out of the student Mission Guide with students. <ul style="list-style-type: none"> ▷ <i>"Sharks swimming along Maui's shoreline pose a risk to surfers, swimmers, and scuba divers. The Maui coast guard hopes you can use your drone to survey the shore and watch for sharks swimming near surfers. You will start by surveying the whole shore. When you spot a group of sharks, you will make Tello yaw 360 degrees as a signal to alert the coast guard."</i> ▷ <i>"Looking for sharks in a boat is ineffective because the boat is too close to the water to see the shark, covers space slowly, and disrupts swimmers. Helicopters are faster and have a better view, but they are expensive to operate and require a human pilot."</i> ▷ <i>"Drones are inexpensive and fast. They use artificial intelligence so they can spot a shark all by themselves. When they see a shark, they set off an alarm that alerts both the swimmer and the coast guard. The swimmer can swim away safely, and the coast guard can move the shark further offshore to keep the beach safe."</i> ▷ <i>"Maui's shark risk is at a dangerous level, and they hope you can help them find the sharks to move them further offshore."</i> ▶ Remind students how to find vocabulary words and go over any words you find necessary. 	

Flying Missions

Build the Coast

Mission 4

Slide	TEACHER	STUDENTS
9	<ul style="list-style-type: none"> ▶ <i>"Before you start your mission, you will need to build and set up your course."</i> ▶ <i>"Turn to page 38 in your Mission Guide and follow the instructions to build your coast. To start, have one member of your team come get the obstacle course pieces, a launch pad, and sticky notes."</i> 	<ul style="list-style-type: none"> ▶ one team member collects materials ▶ build coast as a team ▶ follow instructions in Mission Guide ▶ stand in help line for questions
10	<ul style="list-style-type: none"> ▶ <i>"After your shores are built, and you break into roles, the safety and observer will draw and place the sharks. You can put your sharks on any of the poles, facing any direction for this portion of the mission. It is fun to make them somewhat hard to maneuver to so that the pilot has a challenge."</i> ▶ <i>"Wait until after we break into roles and discuss the rules of the game to place the sharks."</i> 	<ul style="list-style-type: none"> ▶ stand by the shoreline and listen ▶ break into roles
11	<ul style="list-style-type: none"> ▶ <i>"Have someone from your team come up and get the Tello, a battery, and a device. Remember to write down your Tello's SSID in box 1 of your Mission Notes."</i> ▶ <i>Decide what role you will each play to start."</i> 	<ul style="list-style-type: none"> ▶ one team member collects Tello, batteries, and a device ▶ write SSID in Mission Notes

Mission 1: Protect the Shore

Slide	TEACHER	STUDENTS
12	<ul style="list-style-type: none"> ▶ “Everyone will get to be the pilot, safety, and observer during this mission. When the first pilot finishes finding as many sharks as possible, they will pass the control to the next pilot, and everyone will rotate to the next role. Make sure to take turns!” ▶ “Before you get started, let’s go over the rules of the game.” 	
13	<ul style="list-style-type: none"> ▶ “The goal of this mission is to collect as many sharks as you can in 1 minute. You’ll need to work together as a team to get the sharks.” <ul style="list-style-type: none"> ▷ “The rules of play include:” <ul style="list-style-type: none"> ▷ “Pilot turns their back while the safety and observer place the sharks.” ▷ “Pilot maneuvers to shark until the shark is visible on the camera feed.” ▷ “Pilot turns 360 degrees and then hovers.” ▷ “Safety collects the shark and places it offshore (on the launch pad).” ▷ “Pilot maneuvers to next shark.” ▷ “Tello and safety should not be moving at the same time. We don’t want a crash!” ▶ “It is essential during this mission to have integrity and follow the rules carefully. Tello and safety should never be moving at the same time. Make sure your teammates are acting safely so that no one gets hurt. You will have 1 minute to complete the challenge.” 	
14	<ul style="list-style-type: none"> ▶ “Read through the group roles in your Mission Guide so that everyone knows what they are doing. When everyone is done reading, put your eyes on me, and I will start the timer.” ▶ “Pilots, turn your back to the course while the safety and observer draw and place the sharks.” 	<ul style="list-style-type: none"> * read roles and complete mission * go to help line for questions or issues * rotate through roles in teams
ATTENTION SIGNAL TO PULL CLASS BACK TOGETHER.		
15	<ul style="list-style-type: none"> ▶ Once students have finished their mission and returned Tello to the docking station, they can return to the Academy, where they will tally their points in box 2 and answer the question in box 3 of their Mission Notes. ▶ “Does anybody want to explain how they found their answer to this problem?” (Choose a volunteer.) 	<ul style="list-style-type: none"> * return to the Academy when done with mission * solve math problem and tally points

Mission 2: Shoreline Watch

Slide	TEACHER	STUDENTS
16	<ul style="list-style-type: none"> ▶ <i>"You will now help Tello fly the same mission autonomously. That means you will build code in DroneBlocks so that Tello can alert the coastguard of the sharks. The mission will run almost the same, but there are a few slight differences. Take a few minutes to read through the mission together as a team."</i> ▶ Give students time to read through the mission as a group and read through ALL of the group roles. 	
17	<ul style="list-style-type: none"> ▶ <i>"For this mission, you need to move your sharks, so they are all on the front set of poles and facing toward the launch pad. This will simplify the coding process."</i> 	
18	<ul style="list-style-type: none"> ▶ <i>"At the beginning of each coded mission, we measure the takeoff height and record it in our Mission Notes just like we did in Lesson 3: Fumaroles."</i> ▶ <i>"Come get your Tello to measure its takeoff height. Record it in box 4 of your Mission Notes."</i> ▶ <i>"Next, dock Tello at the docking station and then measure, plan, and code your mission."</i> 	<ul style="list-style-type: none"> * break into teams * measure takeoff height and write in Mission Notes * return Tello to the docking station and plan the coded mission

Slide	TEACHER	STUDENTS
19	<ul style="list-style-type: none"> ▶ <i>“Follow the instructions in your Mission Guide to measure and plan your coded mission. Label your diagram (Step 1) in box 5 of your Mission Notes.”</i> ▶ <i>“Be sure to do steps 3 and 4 alone before comparing your code with your team.”</i> ▶ <i>“When you have Tello, follow the instructions to test your code. If you need help, line up at the help line for assistance. We will work on this portion for the next 20 minutes.”</i> ▶ <i>“Your goal is to see as many sharks as possible in Tello’s camera feed before it yaws around. See how many you can get!”</i> ▶ <i>“When you are finished, meet back at the Academy for a quick discussion about Loops. If you get there early, read the Loops section of the Operations Manual.”</i> ▶ <i>“Your 20 minutes begins now.”</i> ▶ When students come to you to check their code in exchange for Tello, look for the following: <ul style="list-style-type: none"> ▷ The mission is drawn and measured in Mission Notes ▷ Mission code is written on each students’ Code Planner Sheet in Column 1 ▷ Team code is written on each students’ Code Planner Sheet in Column 2 ▷ JavaScript translation is written on each students’ Code Planner Sheet in Column 3 ▷ Code is built in DroneBlocks 	<ul style="list-style-type: none"> * measure and plan mission * students work independently as directed in Mission Guide * team checks hand-written code and DroneBlocks app with teacher * collect Tello from docking station * team launches mission * return Tello to plan again
ATTENTION SIGNAL TO PULL CLASS BACK TOGETHER.		
20	<ul style="list-style-type: none"> ▶ <i>“How many sharks did you get to show up in your camera feed? Raise your hand if you got at least 1 shark. 2 sharks? 3 sharks? 4 sharks? All 5 sharks? Great job, team! Let’s use your code and see if we can simplify it a bit.”</i> 	<ul style="list-style-type: none"> * raise hands with number of sharks * sit quietly

Mission 3: Loop the Shore

Mission 4

Slide	TEACHER	STUDENTS
21	<ul style="list-style-type: none"> ▶ “We’ll finish by simplifying the code you just built so that it is easier to read and change. First, let’s think about a new scenario.” 	
22	<ul style="list-style-type: none"> ▶ “Instead of scanning the shore once, rotating at each shark, the coast guard wants to know if you can scan the shore back and forth 10 times, rotating at each shark.” 	
23	<ul style="list-style-type: none"> ▶ “Take a look at your code from the last mission. Now make that 10 times longer. That is pretty long. Now imagine 100 times longer. Wow! Computer programmers are pretty smart. They must have an easier way to do this.” 	
24	<ul style="list-style-type: none"> ▶ “What if you wanted to find the answer to the problem? You could find the answer by counting each dot. Or you could do that by adding 10 plus 10 plus 10 . . . 10 times. Or you could multiply 10 times 10. There is something like multiplying in code that makes solving problems easier and faster.” 	
25	<ul style="list-style-type: none"> ▶ “Using a loop is like using multiplication. It is a fast way to make things repeat.” 	
26	<ul style="list-style-type: none"> ▶ “Let’s think about a different example. Imagine you want Tello to take off, flip 4 times, and land. The code looks like this, pretty simple.” 	
27	<ul style="list-style-type: none"> ▶ “Now imagine you want Tello to take off, flip 20 times, then land. It would look like this, not so simple. Let’s see if we can use a loop to simplify it.” 	
28	<ul style="list-style-type: none"> ▶ “Here is what a loop looks like. We look at the original code and find the piece that repeats. Here, ‘flip forward’ repeats. Next, we count how many times the code repeats. Here, ‘flip forward’ repeats 4 times. So we tell the code to ‘repeat 4 times’ and then put a ‘flip forward’ block inside the loop. Let’s try it again.” 	
29	<ul style="list-style-type: none"> ▶ “So again, we know we want Tello to ‘flip forward’ repeatedly. Next, we count how many times it repeats. In this example, ‘flip forward’ repeats 20 times. Finally, we tell the loop to ‘repeat 20 times’, and then we put the ‘flip forward’ block inside the loop. We keep the rest of the code, which doesn’t repeat, the same as before.” 	
30	<ul style="list-style-type: none"> ▶ “We’ll be talking about “refactoring” a lot for the rest of the course. Refactoring means that you rewrite your code to make it easier to read without changing the mission’s goal. The code will still do the same thing, but the blocks will be different. When we put the flip forward mission into a loop, that was refactoring. We made it easier to read, but it still did the same thing as before: flip forward 20 times.” 	

Slide	TEACHER	STUDENTS
31	<ul style="list-style-type: none"> ▶ <i>"Let's refactor your code. Start by finding the repeating pattern in your code. On your Code Planner, circle every time you see that repeating pattern. Here, in my code, jump then clap is my repeating pattern. Notice that in each case, it looks the same: there is one jump and then one clap."</i> 	<ul style="list-style-type: none"> * circle repeating patterns on Code Planner Sheets
32	<ul style="list-style-type: none"> ▶ <i>"Next, count how many times your pattern repeats. The pattern repeats 4 times in my code, so I put a 4 next to my pattern. Your pattern may require a different number."</i> 	<ul style="list-style-type: none"> * count repeating patterns and write that number
33	<ul style="list-style-type: none"> ▶ <i>"Now we can refactor our code using a loop. I keep the first command the same: 'run.'"</i> ▶ <i>"Then write my loop as 'repeat 4 times' then write the repeating pattern: 'jump then clap' and put a looping arrow around them, so they are 'in the loop.'"</i> ▶ <i>"Then I keep the last command the same: 'run.'"</i> 	<ul style="list-style-type: none"> * write a loop on the Code Planner Sheet and write the repeating pattern and number with an arrow
34	<ul style="list-style-type: none"> ▶ <i>"Now try it out. Get together with your team and see if you got the same loop. Look at your code altogether and write it down, including your loops. Then build it in DroneBlocks."</i> ▶ <i>"If you can't figure out whose loop is correct, line up at the help line, and I will help you figure it out!"</i> ▶ <i>"When you are confident in your code, show it to me, get Tello, then launch the mission code!"</i> ▶ Give a 10-, 5-, and 1-minute warning before Wrap Up. 	<ul style="list-style-type: none"> * compare work with the team and then build in DroneBlocks * line up at the help line for questions * team checks work with teacher * collect Tello from docking station * team launches mission
ATTENTION SIGNAL TO PULL CLASS BACK TOGETHER.		
35	<ul style="list-style-type: none"> ▶ <i>"How many sharks did you guys get to show up in your camera feed? Raise your hand if you got at least 1 shark. 2 sharks? 3 sharks? 4 sharks? All 5 sharks? Did anyone's looped code work better than before? Why?"</i> 	

Wrap Up

Clean and Debrief

Mission 4

Slide	TEACHER	STUDENTS
36	<ul style="list-style-type: none"> ▶ <i>"Everyone needs to help clean up before we debrief. The final safety should pull out the battery and return it to the used battery bin. They are also in charge of returning the safety goggles and Safety Checklists to the correct locations. The final observer is responsible for breaking down and returning the obstacle course materials and measuring tape. The final pilot should return the launch pads, Tello, and their device to their proper locations. They are also in charge of returning the team's Mission Guides and Operations Manual to their correct locations. Remember to keep your pencils and clipboards."</i> 	<ul style="list-style-type: none"> * listen to instructions * return materials * clean up the room
37	<ul style="list-style-type: none"> ▶ <i>"When you get to the Academy, answer the questions in box 7 of your Mission Notes."</i> 	<ul style="list-style-type: none"> * write the answer in Mission Notes
38	<ul style="list-style-type: none"> ▶ Ask students 2-3 questions depending on time. You can choose from the following options: <ul style="list-style-type: none"> ▷ <i>"Why do you think drones are good at watching for sharks?"</i> ▷ <i>"Are there any other situations like sharks where drones could help keep humans safe?"</i> ▷ <i>"Are there any other missions that could have used a loop?"</i> ▷ <i>"Do you think that computer programmers use a lot of loops when they write? What for?"</i> ▷ <i>"What is something you wish you could code on a loop in your life?"</i> ▷ <i>"If you could build a drone that could do anything autonomously, what would it be?"</i> 	
39	<ul style="list-style-type: none"> ▶ <i>"Your expert piloting and coding skills have kept the surfers at Maui Shoreline safe! It's important to know that most sharks are not dangerous to humans — people are not part of their natural diet. Most attacks on humans occur when the shark is confused or curious. If a shark sees a human splashing in the water, it may try to investigate, leading to an accidental attack. That's why it is important to keep a safe distance and give them plenty of freedom to swim in their waters. Your early detection services with drones make that happen."</i> ▶ Remind the students to return their clipboards and pencils. 	

Teacher background knowledge

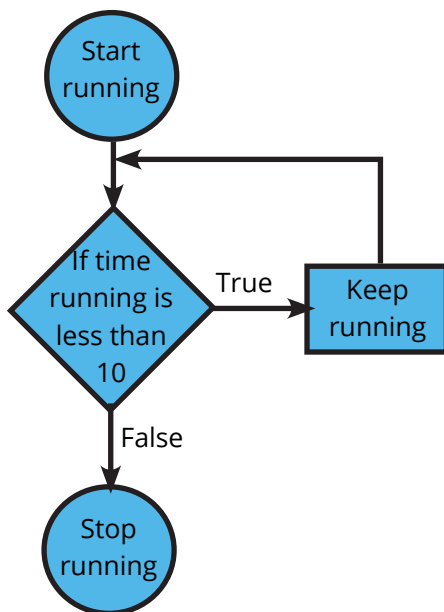
This mission touches on several ideas. They use three different methods to solve the same problem and compare results. They learn about programming loops. They briefly learn about finding a solution to a mathematical word problem.

Loops

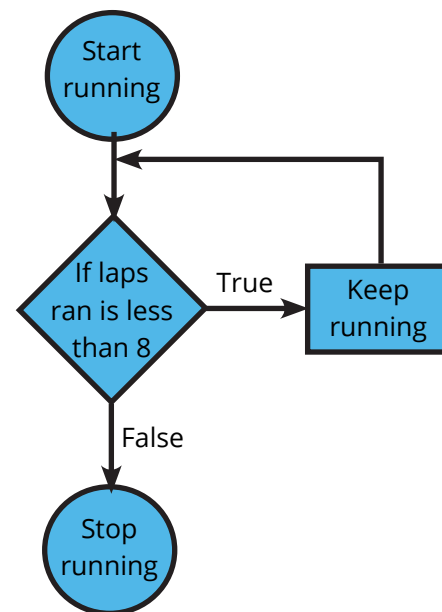
Loops are used in computer programming to create repeated instructions either a certain number of times or until a particular task is performed.

In this case, the students choose how many times they want to make their loop repeat by placing that number in the loop block.

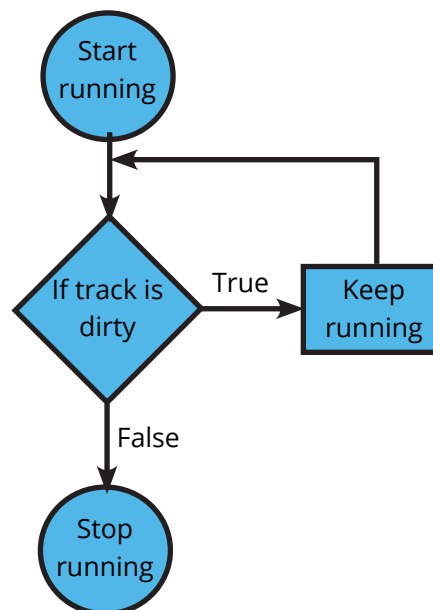
A track coach uses loops all the time. They might say something like, run laps around the track for the next 10 minutes.



Or maybe, run 8 laps around the track.



Or they even run laps around the track until it starts to rain.



The students will probably find loops to be pretty intuitive on their level in this lesson. They don't have to worry much about conditions or logic but will probably just see a loop as a repeating block. That is sufficient.

Word Problem

After completing the flying mission, the students are asked to solve the following problem:

If the total length of the shoreline is 20 meters long, and a shark is found every 4 meters, how many sharks are found?

The students need to divide the total length of the shoreline by the regular distance between each shark. Doing so will give them the number of sharks on the shore.

$$\frac{20 \text{ meters}}{4 \frac{\text{meters}}{\text{shark}}} = 5 \text{ sharks}$$

Alignment

	Standard	How do we meet it?
NGSS	3-5-ETS1-2: Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.	Students solve the problem of identifying sharks close to a shoreline by flying a drone, coding a drone, and then loop-coding a drone, giving them 3 solutions for the same problem.
Common Core	CCSS.MATH.CONTENT.4.NBT.B.6 Find whole-number quotients and remainders with up to four-digit dividends and one-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.	Students solve a mathematical word problem; they are given the whole and the number of intervals and divide to find the size of the gaps.
	CCSS.ELA-LITERACY.SL.4.2/CCSS.ELA-LITERACY.SL.5.2/CCSS.ELA-LITERACY.SL.6.2 Paraphrase portions of a text read aloud or information presented in diverse media and formats, including visually, quantitatively, and orally. / Interpret information presented in diverse media and formats (e.g., visually, quantitatively, orally) and explain how it contributes to a topic, text, or issue under study.	Students read about coding in the operations manually, then participate in a think, pair, share activity with the class to learn more about coding.
	CCSS.ELA-LITERACY.SL.4.1/CCSS.ELA-LITERACY.SL.5.1/CCSS.ELA-LITERACY.SL.6.1 Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 4-6 topics and texts, building on others' ideas and expressing their own clearly.	Students work alone to write code, then collaborate with their team to revise their code to make it as effective and efficient as possible.

	Standard	How do we meet it?
ISTE	3d. Students build knowledge by actively exploring real-world issues and problems, developing ideas and theories and pursuing answers and solutions.	Students learn about shark attacks and develop a real-world solution for scanning the coast and moving the sharks to a safe distance.
	5c. Students break problems into component parts, extract key information, and develop descriptive models to understand complex systems or facilitate problem-solving.	Students learn how to code using loops by doing a step-by-step process to refactor their code into a looped code.
	7c. Students contribute constructively to project teams, assuming various roles and responsibilities to work effectively toward a common goal.	Students work together on a team to capture the sharks both by flying and coding. They each have their roles that contribute to the team.
CSTA	1B-AP-08 Compare and refine multiple algorithms for the same task and determine which is the most appropriate. (P6.3, P3.3)	Students code the shark mission with and without loops and compare results.
	1B-AP-10 Create programs that include sequences, events, loops, and conditionals. (P5.2)	Students use a loop to code the repetitive portion of the shark mission.
	1B-AP-11 Decompose (break down) problems into smaller, manageable subproblems to facilitate the program development process. (P3.2)	Students break down their task of turning their regular code into a looping code in a step-by-step process.
	1B-AP-12 Modify, remix, or incorporate portions of an existing program into one's own work, to develop something new or add more advanced features. (P5.3)	Students take their original code and use loops to make it more efficient and straightforward.



COACH'S PLAYBOOK



Coach's Playbook

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Gameplan

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Technical Support and Curriculum Questions

For technical support, please contact fpvtech@dronelegends.com

For curriculum questions, please contact fpvcurriculum@dronelegends.com

FPV Initiator Implementation Guide

Introduction

Welcome to the FPV Initiator Implementation Guide! This guide is designed to provide the support and structure needed to ensure a positive experience for both the coach and the entire class.

In this program, you will explore the thrilling and adventurous world of FPV (First-Person View) drone racing. As you lead the students through essential concepts, build on each previous lesson, and facilitate numerous hands-on activities, you will witness their confidence and enthusiasm soar!

Every lesson and activity is geared toward preparing the class for the final module, culminating in their first FPV drone race. The last module is a dynamic and adrenaline-fueled FPV race in which every class member will compete.

Content

The *FPV Initiator Program* aligns with both national and state standards, primarily focusing on STEM and social-emotional learning. The objective is to foster a deeper understanding and application of the concepts taught in the *FPV Initiator Program* in relation to these standards.

The program consists of twelve modules, each lasting between 90 and 120 minutes. These modules are flexible to accommodate the diverse schedules of each school. The twelve modules include:

Module 1 – Pilot’s Prelude: Mastering FPV Drone Basics and Gear Insights

Module 2 – Dialing in Control: A Deep Dive into Your RC Setup & Configuration

Module 3 – Unleash Your Potential: Simulator Training for Superior Skill Development

Module 4 – Batteries Included: Tips and Tricks for Safe and Effective Use

Module 5 – Ready, Set, Goggles Up: Setting Up Your FPV Goggles for the Ultimate Flying Adventure

Module 6 – Meet Your Micro: Understanding Your Drone’s Components and Functionality

Module 7 – Betaflight Basics: Customizing Your Drone’s Flight Settings

Module 8 – From Crash to Fix: Learning the Fundamentals of Micro Drone Repair

Module 9 – First Flight, New Heights: Experiencing FPV Drone Racing in Real Life

Module 10 – The Art of Precision: Mastering Control and Maneuvering

Module 11 – Breaking Ground: Building Your First FPV Obstacle Course

Module 12 – Mind Over Motors: Navigating Nerves in Your Inaugural FPV Heat

Modules 1-8 can take place in a classroom setting. As slides and videos play an important part in those modules, having a SmartBoard or projector is beneficial. Modules 9-12 should take place in the Flight Zone. A space such as a gymnasium or other large open room is preferred.

Instruction and Materials

A variety of outstanding materials and resources are provided to enhance the students’ learning experience in this program, including the *Pilot Handbook*, *Coach’s Playbook*, Videos, Slides, Activities, Digital Learning Platform (DLP), Flight Plans, Track Maps, Implementation Guide, and the comprehensive FPV Initiator Kit.

Coach’s Playbook

The *Coach’s Playbook* includes the duration, objectives, materials, slide content, coach tips, class directions, and other useful details for each module. It is a valuable resource that the coach should keep on hand throughout the program.

Slides and Videos

Slides and videos, available on either DLP—GamePlan or Drone Legends Educator Portal (DLEP), play a crucial role in each module, offering step-by-step guidance for the learning and activities in the program. This content is essential in supporting students through each module.

The Pilot Handbook

Each module features hands-on activities for the class, with each team utilizing a shared *Pilot Handbook* as a reference guide. The materials for these activities are listed at the beginning of each module in the *Coach's Playbook*. It is recommended that coaches acquaint themselves with each activity beforehand to ensure they can offer necessary support and address any issues that may arise.

Approaches to Learning

Students are most engaged and enjoy learning when there is a direct application. Therefore, each module includes slides (lesson), tasks (practice), and activities (application). This approach keeps students engaged, excited, and motivated to learn more.

Each module is a critical step leading the class to the final FPV drone race. As students build their knowledge and hone their skills, they will evolve into competent racing team members and pilots. Each step is crucial, culminating in the class race.

Differentiation

Recognizing that every student has unique learning needs and preferences, the *FPV Initiator Program* is designed to accommodate a wide range of learning differences. Every module addresses hard skills, such as repairing the Micro Drone or piloting it for the first time, and soft skills, including self-awareness, self-management, and relationship skills.

Coaches can adjust the pacing of the program to meet the needs of their learners. Materials are also available in digital or print format and can be accessed on GamePlan and DLEP.

Student-Led Learning

While there is a place for teacher-led instruction, students should also be encouraged to lead and explore whenever possible. This can occur at the individual level with many of the tasks or at the team level during module activities. Students will rotate through different leadership roles in each module and even more frequently when piloting the Micro Drone, allowing every student multiple opportunities to lead their team.

Some students may already possess extensive knowledge in operating and repairing RCs (Remote Controlled Vehicles), adjusting software, or piloting FPV drones. Encourage these students to share their insights with the class, while using discretion on the extent of individual contributions. Ultimately, all students are expected to acquire the knowledge and skills to maintain, repair, and pilot their team's Micro Drone.

Additional Support

The aim of this Implementation Guide and the accompanying materials is to offer a comprehensive set of resources to assist the coach in facilitating a rewarding learning experience. Additional support is available through professional development training and online. If technical support is needed, please contact your school's technology department first, as they are also supported in implementing the *FPV Initiator Program*. Should an issue persist, reach out to us at support@dronelegends.com. We hope you enjoy leading your class into the exhilarating world of FPV drone racing!



Module 1: Pilot's Prelude

Mastering FPV Drone Basics and Gear Insights

Module Duration

Total Module Duration: 120 Minutes

Introduction/ Warm-Up (30 min)	Welcome to the <i>FPV Initiator Program</i>	5 minutes
	Let's Discuss! Activity	5 minutes
	<i>FPV Initiator Program</i> Objectives	5 minutes
	<i>FPV Initiator Program</i> Overview Video	5 minutes
	Let's Discuss! Activity	5 minutes
	Let's Discuss! Activity	5 minutes
Instruction (80 min)	Part 1: Gear Overview and <i>Pilot Handbook</i>	20 minutes
	Part 2: Racing Team Assignments; Roles and Responsibilities	20 minutes
	Part 3: Binding the Orqa FPV Controller to the Micro Drone	20 minutes
	Part 4: Linking the Orqa FPV Goggles to the Micro Drone	20 minutes
Wrap-Up (10 min)	Power Down Activity	5 minutes
	Debrief - Let's Discuss! Activity	5 minutes

Objectives

FPV INITIATOR PROGRAM OBJECTIVES

By the end of the *FPV Initiator Program*, students will be able to do the following:



- Understand FPV drone piloting.
- Identify the materials and technical aspects required to fly and race drones in person and in a simulated environment.
- Understand real-world applications of drone technology and explore potential career pathways in the drone industry.
- Fly an FPV Micro Drone.

MODULE 1 OBJECTIVES

By the end of this module, students will be able to do the following:

- Understand the gear provided for drone racing.
- Work together as a racing team.
- Bind the Orqa FPV Controller to the Micro Drone.
- Link the Orqa FPV Goggles to the Micro Drone.

Materials


Item					
	<i>Coach's Playbook</i>	SmartBoard or Projector	Smartphone or Tablet (only required for this module to bind the drone to the controller)	<i>Pilot Handbook</i>	Laptops or Desktops with access to a Chrome browser
#	Coach use	Coach use	Coach use	1 per team (4 students)	1 per student

Item				
	Drone-Related Career Connections Document	Orqa FPV Goggles	rapidFIRE Receiver Modules	Orqa FPV Controller
#	1 per student	1 per team (4 students)	1 per team (4 students)	1 per team (4 students)

Item						
	Orqa Goggles Antennas	Orqa Goggles Batteries	Micro Drones	Drone Flight Batteries	Orqa Controller Transmitter Modules	Pencils
#	2 per team (4 students)	1 per team (4 students)	1 per team (4 students)	1 per team (4 students)	1 per team (4 students)	1 per student

Preparation Checklist

- ❑ Before starting this module, connect your laptop to the Smartboard or projector to test each video to ensure that audio and visual components work correctly.
- ❑ Ensure that the hardware is fully set up and ready to be used. Check that your Orqa FPV Goggles have the faceplate foam installed and that the Orqa FPV Controllers have grip tape and thumbsticks installed.

The grip tape accessories are included in your package and are self-adhering. You will view a demonstration of this process during your professional development session. You can also find resources in the Help Center on Gameplan LMS and the Drone Legends Educator Portal.
- ❑ Practice each student activity yourself so you feel confident to demonstrate and teach the skills to students.
- ❑ Have the laptops or Chromebooks charged and ready for student use.
- ❑ Before students enter the class, display the *Welcome to the FPV Initiator Program* slide (see Warm-Up, slide 1 in the table below).
- ❑ Before starting Part 2: Racing Team Assignments; Roles and Responsibilities, you will need to create racing teams. In the Warm-Up section of this module, you will document the students' experience with drones and conduct observations of their interactions and discourse with peers during partner, class, and teamwork activities. You will use those observations and notes to form racing teams of four students who will work with one another for the duration of the program.
- ❑ Student Activities:
 -  **Gameplan LMS:** Students will access the activities directly within each module on the platform.
 -  **Drone Legends Educator Portal:** Print and prepare hard copies of each student activity.

Module 1: Pilot's Prelude

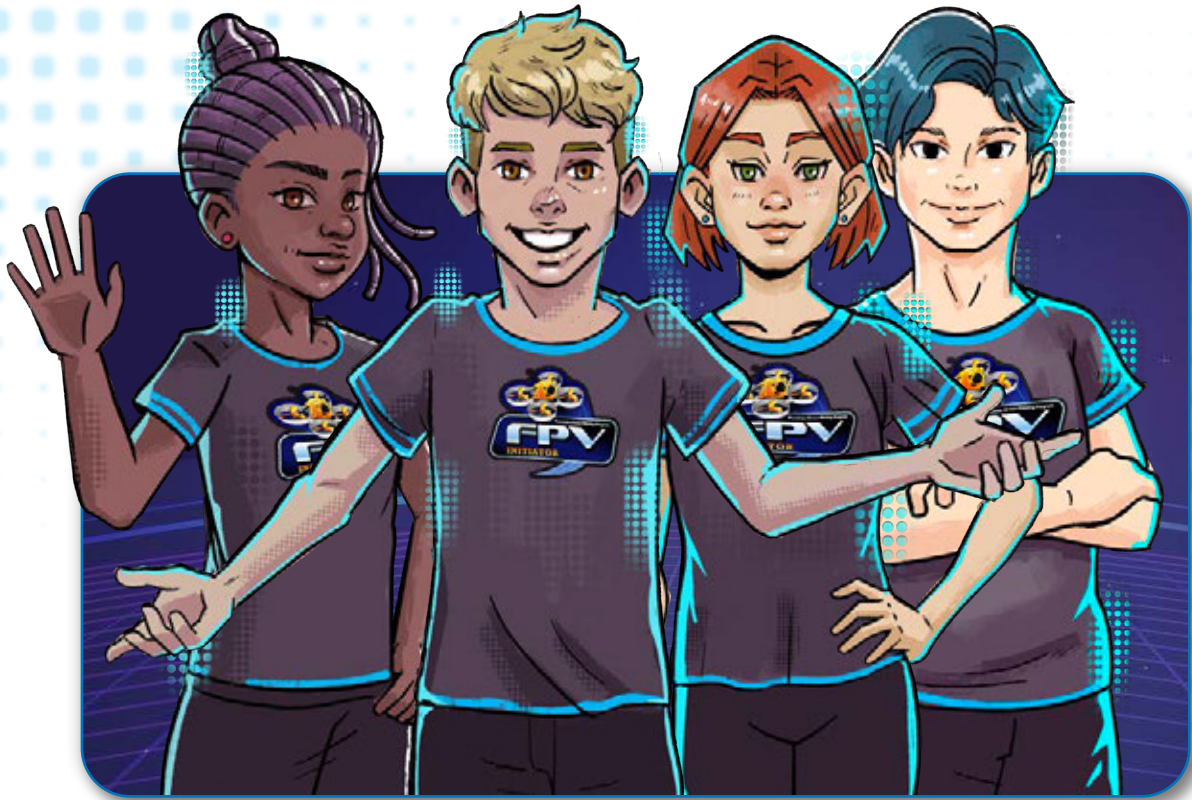
Mastering FPV Drone Basics and Gear Insights


Introduction / Warm-Up



Slide	Coach	Students
1	<p><i>FPV Initiator Program</i> Introduction (coach lead)</p> <ul style="list-style-type: none">• Display the Welcome to the <i>FPV Initiator Program</i> slide as students enter the classroom.• Introduce yourself to the class and provide a little background on why you decided to serve as the coach for this program. <p>Coach Tip: This is a great opportunity to build on the students' enthusiasm for joining the <i>FPV Initiator Program</i>. Building this relationship is important in having a great experience in this program together and helping the class to work together as a team.</p>	<ul style="list-style-type: none">• Computers or laptops• Pencils• Follow along with the slides
2	<p>Let's Discuss! (coach lead and whole class discussion)</p> <ul style="list-style-type: none">• Encourage students to discuss their thoughts and experiences with drones by asking the following questions. There is no right or wrong response. Students with all levels of experience with drones are welcome. <p>Questions:</p> <ul style="list-style-type: none">• <i>Why did you decide to join the FPV Initiator Program?</i> Students may give a large variety of answers, but will typically focus on their excitement to fly drones.• <i>What experience do you have, if any, with drones and drone racing?</i> Some students may own drones and fly them regularly; others may have no experience at all. <p>Coach Tips:</p> <p>Students may have a wide range of comfort in sharing about their own personal experiences and expertise. Making all students feel welcomed and comfortable in sharing can lead to building a great start to this program.</p> <p>Students may have flown commercial drones or seen drone footage in vlogs or travel videos. These are all great and relevant examples of drone experience.</p> <p>While students share their responses to each question, document any details that will help you tailor the program's content to students' interests and experience levels. This can be especially helpful when forming the racing teams.</p>	<p>The coach reinforces the following expectations through the module:</p> <ul style="list-style-type: none">• Listen to instructions• Be respectful of one another's perspectives• Speak at the appropriate times• Participate in discussions

Slide	Coach	Students
3	<p>Objectives (coach lead)</p> <p>State that by the end of this program, students will be able to do the following:</p> <ul style="list-style-type: none"> • Understand FPV drone piloting. • Identify the materials and technical aspects required to fly and race drones in person and in a simulated environment. • Understand real-world applications of drone technology and explore potential career pathways in the drone industry. • Fly an FPV Micro Drone. <p>State that by the end of this module, students will be able to do the following:</p> <ul style="list-style-type: none"> • Understand the gear provided for drone racing. • Work together as a racing team. • Bind the Orqa FPV Controller to the Micro Drone. • Link the Orqa FPV Goggles to the Micro Drone. <p>Coach Tip: Every student may take away a different highlight or experience from this program. By the end, every student will be knowledgeable and able to participate in flying Micro Drones and being a part of a racing team.</p>	<ul style="list-style-type: none"> • Learn about the objectives for the <i>FPV Initiator Program</i> • Learn about the objectives for this module
4	<p><i>FPV Initiator Program Overview Video</i> (whole class)</p> <ul style="list-style-type: none"> • Inform the class that they will watch a brief video overview of the <i>FPV Initiator Program</i>. 	<ul style="list-style-type: none"> • Watch the video • Observe which parts of the video are most exciting
5	<p>Let's Discuss! (group task and whole class discussion)</p> <ul style="list-style-type: none"> • Instruct students to arrange themselves into groups of four. This is not their official racing team. • Next, instruct the groups that they will have five minutes to discuss the following question: <i>What intrigued you the most during the video? Provide reasoning to support your answer.</i> <p>Coach Tip: While the group works together, you should move among them to listen to how they communicate and collaborate. This insight will help you when you place students into their official racing teams (teams of four) later in this module.</p> <ul style="list-style-type: none"> • After five minutes, stop the class and tell each group to select a spokesperson. • Have each spokesperson share their group's thoughts with the class. 	<ul style="list-style-type: none"> • Reflect upon what intrigued them most during the video • Discuss as a group • Choose a spokesperson who will share their group's thoughts

Slide	Coach	Students
6	<p>Let's Discuss! What is a precision drone pilot? (group task and whole class discussion)</p> <ul style="list-style-type: none"> Point out that the term "precision pilot" was used several times during the video. This may be an unfamiliar concept for many of them. Tell the group they will have five minutes to explore this concept further. They are to discuss the following question: <i>What is a precision drone pilot?</i> To help groups explore this question, you can also ask, <i>How would a precision drone pilot differ from a non-precision or casual drone pilot?</i> After five minutes, stop the class and ask the group to select a different spokesperson. Have each spokesperson share their group's thoughts with the class. 	<ul style="list-style-type: none"> Discuss, as a group, the question: "What is a precision drone pilot?" Choose a spokesperson who will share their group's thoughts





Slide	Coach	Students
7	<p>Precision Drone Pilot (coach lead)</p> <p>Coach Tips:</p> <p>For your background knowledge, additional information related to precision drone piloting is located in the <i>Coach's Playbook</i>.</p> <p>Students will also have access to the precision drone pilot definition in the Glossary of Terms section in their <i>Pilot Handbook</i>.</p> <p>Explain to the students that:</p> <ul style="list-style-type: none"> • A precision drone pilot is a skilled professional who specializes in flying drones with precision and accuracy. • They have a deep understanding of drone technology, aerodynamics, and flight principles and can apply this knowledge to operate drones in a precise and controlled manner. <p>Also share that:</p> <ul style="list-style-type: none"> • Precision drone pilots work in various industries, including agriculture, surveying and mapping, cinematography, and search and rescue operations. • They require strong hand-eye coordination, quick reflexes, and the ability to stay calm under pressure. • Precision drone pilots must also possess excellent communication and collaboration skills, as they often work in teams with other professionals, such as surveyors, engineers, and photographers. • With the increasing use of drones in various industries, precision drone pilots are in high demand, making this an exciting and lucrative career path for students interested in STEM fields and technology. 	<ul style="list-style-type: none"> • Learn about precision drone piloting • Understand how being a drone pilot connects with different careers 

Slide	Coach	Students
8	<p>Drone-Related Career Connections (coach lead)</p> <ul style="list-style-type: none"> Instruct students to take a look at their Drone-Related Career Connections Document. <p>Coach Tips:</p> <p> Gameplan LMS: Students will access this document in Module 1 on this platform.</p> <p> Drone Legends Educator Portal: Distribute hard copies of this document.</p> <ul style="list-style-type: none"> Tell the class that the Drone-Related Career Connections document is a resource that will help them connect the drone-pilot skills gained while participating in the <i>FPV Initiator Program</i> and potential drone-related career pathways and opportunities available to them. Also, inform the class that this document is not a comprehensive list, but a broad overview of drone-related industries and careers found nationwide. <p>Coach Tip: There are numerous careers to which skills gained in drone flying can lead. There are also many hobbies that are connected with being a good drone pilot and racing team member. Playing video games, fixing electronics, and being a good communicator all have uses in drone racing.</p>	<ul style="list-style-type: none"> Computers or laptops Notebooks and pencils

CAREER
connection

Instruction		
PART 1: GEAR OVERVIEW AND PILOT HANDBOOK		
Slide	Coach	Students
9	<p><i>FPV Initiator Gear Overview Video</i> (whole class)</p> <ul style="list-style-type: none"> Inform the class that they will watch a brief video that overviews some of the gear they will use with the <i>FPV Initiator Program</i>. 	<ul style="list-style-type: none"> Watch the video FPV gear
10	<p>Let's Discuss! (partner work and whole class discussion)</p> <ul style="list-style-type: none"> Instruct the students to find and sit beside a partner. Acknowledge that the video showed the many parts that go into flying an FPV drone. Ask partners to discuss the following questions: <ul style="list-style-type: none"> <i>Is this your first experience using FPV equipment? If so, what do you think is the most exciting part?</i> <i>How comfortable are you feeling right now about the gear used for FPV piloting?</i> After five minutes, stop the class and ask a few students to share what they discussed with their partner. <p>Coach Tip: Students may have a range of feelings and comfort levels regarding using the FPV gear. Most students will be excited and feel ready to take their first flight. Others may feel intimidated. Assure the students that this program will equip students of all experience and comfort levels to successfully fly the Micro Drone.</p> <ul style="list-style-type: none"> At the end of this activity, instruct students to return to their original seats. 	<ul style="list-style-type: none"> Discuss as partners Reflect on thoughts and feelings about working with FPV gear

Slide	Coach	Students
11	<p><i>Pilot Handbook</i> (small group work)</p> <ul style="list-style-type: none"> Inform the class that pilots use a pilot handbook to give them essential information and guidance on various aspects of aviation related to what they are flying. Tell the class that they will be using their <i>Pilot Handbook</i> as an essential reference tool throughout the duration of the program. Instruct students to place themselves into groups of four. Hand each group an <i>FPV Initiator Pilot Handbook</i>. Tell the class they will have five minutes to explore the handbook. <p>Coach Tip: Refrain from giving groups specific directions for what to look for within the <i>FPV Initiator Pilot Handbook</i>; instead, groups should explore any aspect of the <i>FPV Initiator Pilot Handbook</i> that interests them.</p> <ul style="list-style-type: none"> After five minutes, stop the groups and ask them to share one aspect of the handbook that they found most interesting. Instruct the students to return the <i>Pilot Handbooks</i> and return to their original seats. 	<ul style="list-style-type: none"> <i>FPV Initiator Pilot Handbook</i> Explore the handbook as a group A group member will share something from the <i>Pilot Handbook</i> that interests them
12	<p>Gear Matching Activity (individual activity and whole class review)</p> <ul style="list-style-type: none"> Inform the class this will be the first activity they will complete independently. This activity is designed to help students identify the different gear involved in FPV racing. <p>Coach Tips:</p> <p> Gameplan LMS: Students will access this activity in Module 1 on this platform.</p> <p> Drone Legends Educator Portal: Distribute hard copies of this student activity.</p> <ul style="list-style-type: none"> Once students have finished, hold a class discussion to review the content. <p>Coach Tip: Use the Gear Matching Answer Key to help guide the class review.</p>	<ul style="list-style-type: none"> Computers or laptops Gameplan LMS or Drone Legends Educator Portal Pencils Match the gear name to its picture

Instruction

PART 2: RACING TEAM ASSIGNMENTS; ROLES AND RESPONSIBILITIES

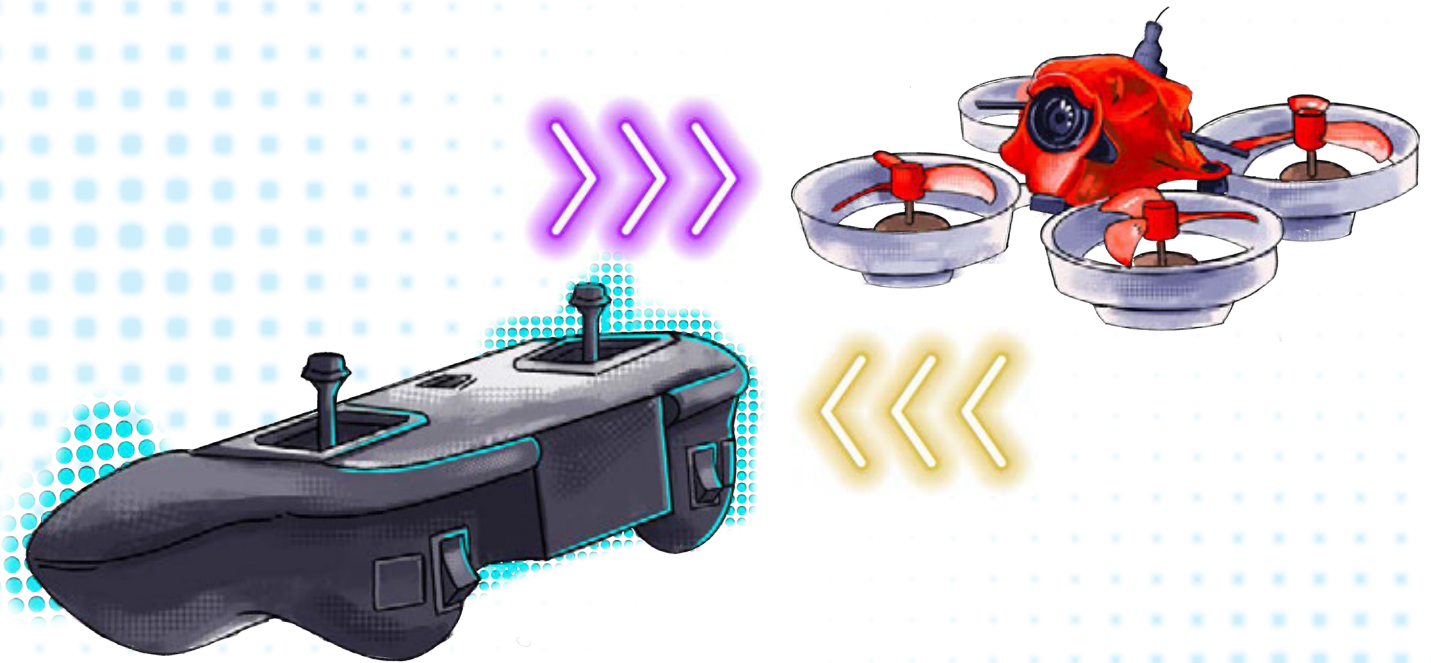
Coach Tip: Before starting this section, use the information in the Module Preparation Checklist to formulate the racing teams.

Slide	Coach	Students
13	<p>Racing Team Assignments (coach lead and racing teams task)</p> <ul style="list-style-type: none"> • Inform the class that you will be placing students into teams of four. Those four students will work together as a drone-racing team for the remainder of the program. • Share with the class that each racing team is comprised of four roles (they will learn more about these roles on the following slide): <ul style="list-style-type: none"> • Configurator • Equipment Manager • Pilot in Command (PIC) • Spotter • Each racing team member will be participating in all four roles. Therefore, it is best for teams to have a range of abilities, skills, and experience. <p>Coach Tips:</p> <p>There are many ways to form racing teams. You can select them by friendships, experience levels, or student preference.</p> <p>It is recommended that students with drone piloting experience, especially with FPV, be placed in teams with less experience. This can help balance the knowledge and skills throughout the class.</p> <p>Of course, use your discretion, and feel free to make changes to racing teams if necessary.</p> <ul style="list-style-type: none"> • Arrange students into their racing teams and instruct them to sit next to their new team members. • Distribute one <i>Pilot Handbook</i> to each team. • Give teams five minutes to introduce themselves to their team and to create a team name. <p>Coach Tips:</p> <p>Prompt the newly formed racing teams to share their names, experiences with drones, and about what part of FPV racing they are most excited.</p> <p>Give each team a few additional minutes to create a name for their team. Provide guidelines for what is appropriate for your setting. Team names can be adjusted later during this program.</p>	<ul style="list-style-type: none"> • Explore the four roles of the drone racing team • Be assigned to a racing team • Get to know the racing team

Slide	Coach	Students
14	<p>Racing Team Roles and Responsibilities (coach lead)</p> <ul style="list-style-type: none"> Share with the students that the four roles of a drone racing team are all important. As we learn about each role, know that every student will become proficient in each role. Although, some roles may be a more natural fit than others. <p>Coach Tip: It is important to establish clear roles and responsibilities for your students during Module 1 to ensure a safe and productive learning environment for the remainder of the program. Reviewing these roles and responsibilities during each module can also be important.</p> <ul style="list-style-type: none"> Use the information in the Coach Tip above to help introduce and guide your discussion with the class. <p>Configurator – The FPV drone team's Configurator customizes drones for pilots, boosting performance. Continuous tuning maximizes individual potential, enhancing race competitiveness and team triumph.</p> <p>Equipment Manager – The Equipment Manager maintains FPV equipment, enabling pilots to fly without technical worries. In teams, they ensure readiness and optimal function, aiding seamless flights and competition.</p> <p>Pilot In Command (PIC) – The PIC's primary responsibility is the safety of the flight. This includes ensuring the drone works properly and evaluating potential issues before and during the flight.</p> <p>Spotter – The Spotter assists the PIC with other tasks, such as troubleshooting technical issues, making adjustments to the FPV goggles or equipment, and offering general support during the flight session.</p>	<ul style="list-style-type: none"> Learn about the four roles in the racing team

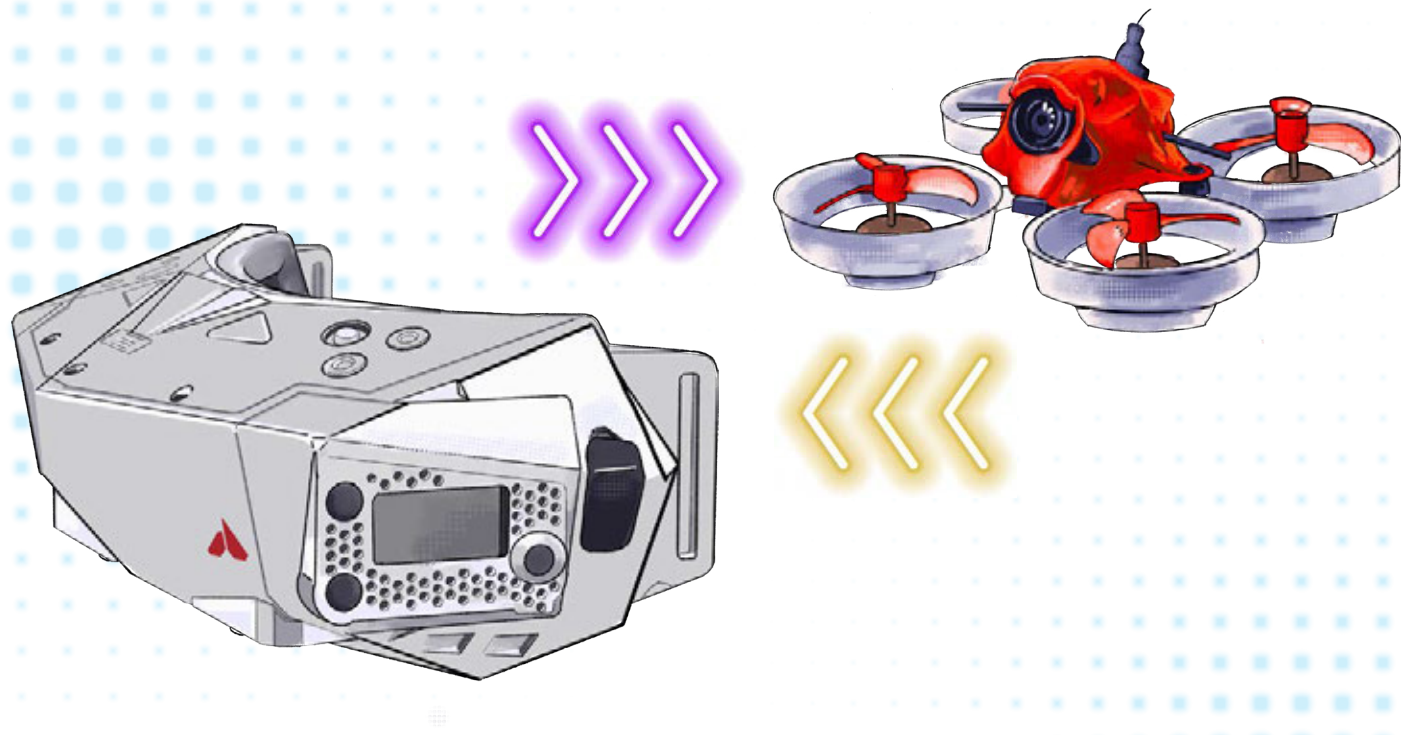


Instruction		
PART 3: BINDING THE ORQA FPV CONTROLLER TO THE MICRO DRONE		
Slide	Coach	Students
15	<p><i>Orqa Controller Binding Guide Video</i> (whole class)</p> <ul style="list-style-type: none">• Inform the class that they will transition into the next phase of this program: learning how to bind the Orqa FPV Controller to the Micro Drone.• Tell the class that first, they will watch the video, then they will receive the next set of gear, and finally, they will get to watch the video a second time.	<ul style="list-style-type: none">• Watch the video



Slide	Coach	Students
16	<p>Binding the Orqa FPV Controller to the Micro Drone Hands-on Activity (racing teams task)</p> <ul style="list-style-type: none"> After the students have watched the video, give each team the following set of materials: <ul style="list-style-type: none"> 1 Micro Drone 1 Drone Flight Battery 1 Orqa FPV Controller 1 Orqa Controller Transmitter Module 1 Pencil After each team has received their materials, play the video a second time. <p>Coach Tip: You can also use these steps for binding the Orqa FPV Controller to the Micro Drone:</p> <ul style="list-style-type: none"> Step 1: Connect the Orqa Controller Transmitter Module to the Orqa FPV Controller. Step 2: Power On the Orqa FPV Controller. Step 3: Open the FPV.Ctrl App on a Tablet or Smartphone. Step 4: Press and hold the “B” button on the Controller to turn on Bluetooth, then connect the Orqa FPV Controller to the Tablet or Smartphone via Bluetooth. Step 5: Open the Ghost menu settings in the FPV.Ctrl App. Step 6: Click “Bind” on the screen. Step 7: Click “Start Bind” on the screen. Step 8: Press and hold down the binding button on the inside rear of the drone using a small implement, such as a pencil. Step 9: At the same time, while holding the binding button, power on the drone with the flight battery (a second pair of hands is helpful here). Step 10: Once bound, look for a green light on the back of the module and a green light on the drone. Pro Tip: If lights are flashing or do not turn on, begin this process again. <p>Coach Tips:</p> <p>When playing the video for the second time, frequently pause the video to give yourself time to help the teams complete each step.</p> <p>Information associated with binding the Orqa FPV Controller to the Micro Drone is located in the <i>Pilot Handbook</i>.</p>	<ul style="list-style-type: none"> 1 Micro Drone 1 Drone Flight Battery 1 Orqa FPV Controller 1 Orqa Controller Transmitter Module 1 Pencil Practice binding the controller to the Micro Drone

Instruction		
PART 4: LINKING THE ORQA FPV GOGGLES TO THE MICRO DRONE		
Slide	Coach	Students
17	<p><i>Orqa Goggles Link Guide Video</i> (whole class)</p> <ul style="list-style-type: none">Tell the students that first, they will watch the video, then they will receive the next set of gear, and finally, they will get to watch the video a second time.	<ul style="list-style-type: none">Watch the video



Slide	Coach	Students
18	<p>Linking the Orqa FPV Goggles to the Micro Drone Hands-on Activity (racing teams task)</p> <ul style="list-style-type: none"> Inform the class that the next step they will work on with their team will be to link the Orqa FPV Goggles to the Micro Drone. Give each team the following set of materials: <ul style="list-style-type: none"> 2 Orqa Goggles Antennas 1 rapidFIRE Goggles Module 1 Orqa FPV Goggles 1 Orqa Goggles Battery 1 Orqa FPV Controller 1 Micro Drone 1 Drone Flight Battery After each team has received their materials, play the video again by returning to the previous slide. <p>Coach Tip: You can also use these steps for linking the Orqa FPV Goggles to the Micro Drone:</p> <ul style="list-style-type: none"> Step 1: Check that the battery is charged to at least 30%. Step 2: Install the rapidFIRE receiver and return the cover. Step 3: Install the omnidirectional antenna on the top mount. Step 4: Install the second antenna on the bottom mount. Step 5: Place the battery in the sleeve of the goggles strap, and plug in the battery. Step 6: Power on the goggles, and find your Micro Drone's output channel. *Important – Have each racing team do this step one team at a time to ensure that each team is only connected with their own Micro Drone. Step 7: Power on the Micro Drone and have someone put the goggles on to identify the output channel. Step 8: To set the Micro Drone's channel, use the Orqa FPV Controller. Begin by powering on the controller. Step 9: Push the throttle stick (left stick) at 50% and push to the left. Hold this position and pitch forward all of the way (right stick pushed forward). Step 10: Adjust the settings by going to the "Features" tab, the "VTX" menu, and then change the channel to the assigned "R" channel. Step 11: Use the controller to cycle through the menu by using the pitch stick. Pushing the stick to the right is similar to "Select" or "Enter." <p>Coach Tips:</p> <p>When playing the video for the second time, frequently pause the video to give teams time to complete each step, particularly Step 6.</p> <p>Information related to linking the Orqa FPV Goggles to the Micro Drone can also be found in the <i>Pilot Handbook</i>.</p>	<ul style="list-style-type: none"> 2 Orqa Goggles Antennas 1 rapidFIRE Goggles Module 1 Orqa FPV Goggles 1 Orqa Goggles Battery 1 Orqa FPV Controller 1 Micro Drone 1 Drone Flight Battery

Wrap-Up

Slide	Coach	Students
19	<p>Power Down (racing teams task)</p> <ul style="list-style-type: none"> • Share with the class that shutting down the gear and storing it correctly is important. This ensures battery health and equipment safety. • Instruct the class to follow the Power Down instructions: <ul style="list-style-type: none"> <input type="checkbox"/> Turn off all equipment (Spotter). <input type="checkbox"/> Unscrew goggles antennas (Configurator). <input type="checkbox"/> Perform a battery check (Equipment Manager). <input type="checkbox"/> Store all equipment in the proper location (Pilot in Command). 	<ul style="list-style-type: none"> • Safely store all FPV gear
20	<p>Debrief - Let's Discuss! (racing teams task and whole class discussion)</p> <ul style="list-style-type: none"> • Inform the class that, in order to wrap up this session, they will discuss a few questions about today's activities and make some drone-related career connections. • Ask the class: <p><i>When setting up your FPV equipment, did you encounter any issues? If so, how were you able to troubleshoot them?</i></p> <p><i>How challenging or easy did you find the process?</i></p> <p><i>What were some of the barriers that you faced? How can communication and teamwork help remove some of those barriers in future tasks and activities?</i></p> 	<ul style="list-style-type: none"> • Class discussion and participation

