

OVERVIEW:

Lesson Plan 2

ADVANCING PROGRAMMING

Grades:	3-5
Group Size:	Pairs
Setup Time:	5 minutes
Total Time:	180 minutes
Activities:	4

LESSON PLAN OUTLINE

- Activity 1: New Routes – 45 minutes
 - › 3 tasks
- Activity 2: New Functions – 45 minutes
 - › 3 tasks
- Activity 3: New Subroutines – 45 minutes
 - › 3 tasks
- Activity 4: New Loops and Recursive Functions – 45 minutes
 - › 3 tasks

OUTCOMES

- By the end of this section, students should be able to:
 - › Demonstrate and understand how Coding+ TagTiles® work.
 - › Use loops within functions that use Coding+ TagTiles.
 - › Build subroutines within functions using Coding+ TagTiles.
 - › Create functions and recursive functions using Coding+ TagTiles.

ASSESSMENT

Students can show mastery of the content by:

- Demonstrating and showing understanding of how Coding+ TagTiles work.
- Using loops within functions that use Coding+ TagTiles.
- Building subroutines within functions using Coding+ TagTiles.
- Creating functions and recursive functions using Coding+ TagTiles.

PREREQUISITE KNOWLEDGE

- Coding+ Lesson 1 or Coding License Lessons 1-4
 - › Students should have prior experience working with KUBO before using the new tiles. The Coding+ set is meant to be used with the original Coding set.
 - › If it has been a while since students have worked with KUBO, you might want to review vocabulary and lessons from Coding+ Lesson Plan 1.

TEACHER PREPARATION

- Have devices available for students to follow along with the slides on www.kubo.education or project the slides for the entire class.
 - › KUBO.education > Classroom Activities > The Coding License
- Make copies of worksheets for each student.
- Make sure all KUBOs have been fully charged before beginning.
- Find an appropriate place to do the activities. KUBO can be used on a table or the floor, but the surface must be level and clean. If you're using KUBO on a tabletop, make sure KUBO doesn't fall off the table.
- Help students find the TagTiles and activity map they will need. You might want to consider hanging up one activity map in front of the whole class to use for discussions and demonstrations.
- It's helpful to show students how to properly handle and store KUBO and the tiles. Stress the importance of taking care of both KUBO and the tiles.
- Let students know it's OK to make mistakes as long as they figure out how to debug and fix the problem.
- If KUBO turns immediately after starting a route, it might help to remove the Play Function tile as soon as KUBO passes over it. This will ensure that KUBO moves correctly.
- When students create routes and functions, it is important for them to understand that KUBO has the same capabilities humans do. For example, KUBO can't drive through walls, fences, water, fire, and so forth.
- You might find it helpful to review with students what they have already learned before going on to teach the new material.
- KUBO's lights can be many colors. When KUBO is not doing anything, you should see blue. When KUBO is recording/memorizing, you should see purple. When KUBO is executing/performing, you should see green. If something is wrong, KUBO will turn red. Removing KUBO's head will clear the error. Removing KUBO's head has no effect on memory. You might want to demonstrate these colors to the class and give them tips on how to troubleshoot.
- Become familiar with the four new categories of TagTiles. Refer to the graphic here.

Distance: Go Forward 2, 3, 4



Speed: Go Slow Speed, Go Medium Speed, Go High Speed



Direction: Turn 90 Degrees Right/Left, Turn 180 Degrees Right/Left, Go Backward, Make a U-turn

- *Note: It is impossible to build a route with the 90-degree and 180-degree tiles because KUBO will not move forward after turning. These tiles are for functions only. As the students learn about these tiles, it will be beneficial to have them explore the difference between them and the Go Left/Go Right Movement tiles.*



Time: Wait 2 seconds, Wait 5 seconds, Wait 10 seconds



MANAGEMENT

- It is recommended the students be put in groups of two and share one KUBO kit.
- You might find it helpful to create roles for students or number them (Partner 1/Partner 2) so that each student gets a turn being in charge of KUBO.
- Have students detach KUBO's head from the body and put the tiles away in between activities or anytime you are giving instructions.
- You might also find it helpful to give students who are new to KUBO some time to free play and discover on their own so they will be more focused when receiving instruction.
- Circulate through the room and provide help as necessary. However, to encourage student-centered active learning, instruct students to follow the “ask three, then me” rule, in which they consult each other before they consult you.
- Many of the questions posed can be answered orally or written down. You will need to let students know how you would like them to be answered.
- Extension activities are not included in the 45-minute time frame. Additional time will need to be allotted for these activities unless you use them only for groups that finish the activities or tasks early.

CROSS-CURRICULUM CONNECTIONS

- The following cross-curriculum connections can be done as additional learning opportunities with the students and connect to different subjects.
 - › Social Studies:
 - Discuss the Gym activity map with the class. Are there items on there they are not familiar with? How does it differ from other gyms they've seen?
 - › ELA:
 - Have students compare two sports that are showcased in the gym. One could be one they are familiar with and one could be one they have to research or interview someone else about.
 - › Math/Science:
 - How many steps does KUBO walk or run at a given time in the gym? Decide the length of one of the quadrants (for example, 10 ft or 3 m) and have students determine how many steps they can take in 10 ft or 3 m. Calculate how many steps KUBO takes during the various tasks.
 - The scoreboard can be used as a great starting point to get students thinking about greater than/less than and time. Have students create story problems for KUBO utilizing the scoreboard.
 - The refreshment stand can also be used in math problems. Have students come up with situations in which KUBO has so many tokens and needs to purchase some items. How much are those items worth? What can KUBO purchase? How many tokens will KUBO have left?

ACTIVITY 1:

New Routes

OUTCOME

- Learn how the Coding+ TagTiles work.
- Observe how KUBO moves.
- Create routes for KUBO to follow using the Coding+ TagTiles.

TIME

- 45 minutes

MATERIALS

- Task 1:
 - › KUBO
 - › Coding+ TagTiles
 - › Worksheet 2.1
 - › Pencils
- Task 2:
 - › KUBO
 - › Coding+ TagTiles
 - › Movement TagTiles
 - › Worksheet 2.2
 - › Pencils
- Task 3:
 - › KUBO
 - › Coding+ TagTiles
 - › Movement TagTiles
 - › Gym activity map

TEACHER NOTES

Task 1:

- This task will introduce the students to the new TagTiles and the categories they are grouped in. You could also introduce the tiles to the entire class prior to this task or review the tiles with the class following this task.
- Students will place KUBO on the different Coding+ tiles and observe how KUBO moves. They will record their observations on the associated worksheet.

ACTIVITY 1:

New Routes

- Students should take turns trying out the new tiles.
- To ensure both students have equal time working with KUBO, have one use two of the new tiles and the other use the remaining tiles.
- The timeframe for this task will vary depending on how much exploration time you give students.
- If you run out of time for students to test out each of the new tiles, please allow them to do so at a later time since not all tiles in a given category do the same thing.

Task 2:

- It is impossible to build a route with the 90-degree and 180-degree tiles because KUBO will not move forward after turning. These tiles are for functions only. As the students learn about these tiles, it will be beneficial to have them explore the difference between them and the Go Left/Go Right Movement tiles; student findings could be recorded on the back of the worksheet if there's room. This could be a hands-on activity or whole-class discussion on the differences. You are also welcome to let them observe this through trial/error while creating the route.
- A desktop or blank map would work for this task. The Gym activity map is not needed until Task 3.
- To ensure both students have equal time working with KUBO, have them switch off on creating the routes.
- If you'd like, students can create routes at the same time and take turns observing KUBO move over each one.
- The timeframe for this task will vary depending on how much exploration time you give students.
- Making a copy of the worksheet on the front and back of one page will allow students to record up to four routes on one page.

Task 3:

- The Gym activity map from the Coding+ set will be used during this task. If you think there are objects or areas your students might not be familiar with on the map, please take time to review them with the class.
- The timeframe for this task will vary depending on how much exploration time you give students.
- Remind students that KUBO cannot go through walls, benches, field goals, and so on.
- To save on time, have the students work together to create one route. If you have more time available, they could each create their own route and take turns having KUBO move over each one.
- Make sure that both students get a chance to try out the route created.
- Step 4 could be done orally or written down.
- Groups could share their ideas for Step 4 as a class if time permits.

VOCABULARY

If it has been a while since students have worked with KUBO, you might want to review vocabulary from Coding+ Lesson Plan 1 or Coding License Lesson Plans 1-4.

- Review Vocabulary
 - › debug: to fix or tweak
 - › KUBO: a screenless coding robot

ACTIVITY 1:

New Routes

- › Movement TagTile: a directional arrow tile that KUBO follows
- › route: a chain of Movement tiles connected in a way that KUBO can follow
- New Vocabulary
 - › Coding+ TagTile: a tile in the KUBO Coding+ set; this set contains the following:
 - Direction TagTile: a tile that changes the direction KUBO is moving. Tiles include Turn 90 or 180 Degrees Left or Right, Go Backward, and Make a U-turn tiles.
 - Distance TagTile: a Movement tile that allows KUBO to move forward two, three, or four quadrants at a time
 - Speed TagTile: a tile that changes how fast KUBO moves for the remainder of the function; can make KUBO go slow, medium, or high speed
 - Time TagTile: a tile that makes KUBO pause for 2, 5, or 10 seconds at a time
 - › Gym activity map: the map of the gym for KUBO

DISCUSSION QUESTIONS

Task 1:

- Which tile changes KUBO's speed?
- Which tile changes KUBO's direction?
- Which tile makes KUBO wait?
- Which tile makes KUBO go farther?
- Did KUBO move the way you expected?
- Which new tile are you looking forward to using the most?

Task 2:

- Can you explain a route or show an example of one?
- What are the four Coding+ tile categories?
- How are the Go Right or Go Left Movement tiles different from the Turn 90 Degrees Right or Left tiles?
- How does the Turn 180 Degrees tile differ from the U-turn tile?
- What did you observe with your new routes?
- Did KUBO move the way you expected?

Task 3:

- Is KUBO getting a hot dog or a piece of fruit?
- What new tile did you use in your route?
- What tile did you use that made KUBO move on the court?
- What other activities could KUBO do in the gym?
- What's your favorite thing on the Gym activity map?

ACTIVITY 2:

New Functions

OUTCOME

- Transition routes into functions using Coding+ TagTiles.
- Get KUBO from one given location to another using a function.

TIME

- 45 minutes

MATERIALS

- Task 1:
 - › KUBO
 - › Coding+ TagTiles
 - › Movement TagTiles
 - › Play and Record Function TagTiles
 - › Gym activity map
- Task 2:
 - › KUBO
 - › Coding+ TagTiles
 - › Movement TagTiles
 - › Play and Record Function TagTiles
 - › Gym activity map
- Task 3:
 - › KUBO
 - › Coding+ TagTiles
 - › Movement TagTiles
 - › Play and Record Function TagTiles
 - › Gym activity map

TEACHER NOTES

Task 1:

- To learn more about routes and functions, watch these videos from www.kubo.education/getting-started-tutorials
- There are two additional colors (green and orange) of Record and Play Function TagTiles available in the Coding+ set.
- A review on using the Coding+ tiles and how to reset KUBO might be needed depending on how long it's been since your students completed the last activity.

ACTIVITY 2:

New Functions

- Ensure that both students are working together to create the route and function. If time allows, you could have each student create his or her own routes and functions.
- If students build the function off to the side of the map, they won't have to move it later. Having another map (printed from www.kubo.education) or a similar grid available might help with the route-to-function transition.
- Avoid placing tiles and functions over the gap created when pushing desks or tables together. KUBO needs a flat surface to memorize on.
- This task might take longer than others because students will build the route first and then change it to a function. To make the transition from routes to functions easier, have students move TagTiles into the function, one tile at a time, in the order they want KUBO to move.

Task 2:

- During this task, students will create a function without first creating a route. This might take some time for some students as they transition to visualizing the route. To aid students who are struggling, have one student point to each box KUBO will move to while the other student finds the correct tile to place in the function. Have them use this strategy to review and test the function.
- Work with students on creating their functions to the side of the map. This will ensure the function stays intact so they can follow it while KUBO moves. Also, if students build the function off to the side of the map, they won't have to move it later.

Task 3:

- To save on time, you could have students create one function in pairs. At some point, each partner needs to have a chance creating a function on their own.
- Check to make sure that the Movement tiles are split evenly among the groups because each function will require at least five forward tiles (unless they use the Coding+ tiles).
- The student that created the function should follow along with the tiles as KUBO moves in case they come across a bug in the function.
- If a function doesn't work, have the other partner try their function out before any debugging occurs to ensure they both get tested in the time frame allowed. If you have more time available, students could debug their functions and try again.

VOCABULARY

- Review Vocabulary
 - › function: a route that can be memorized by KUBO with the use of the Record and Play Function TagTiles
 - › Record and Play Function TagTiles: the tiles that enable KUBO to memorize a route as a function and then perform the function without following tiles
 - › reset: to clear an error; when KUBO turns red, to remove the head and place it back on the body
- New Vocabulary
 - › vice versa: in reverse order; the other way around

ACTIVITY 2:

New Functions

DISCUSSION QUESTIONS

Task 1:

- Did KUBO make it to the other basketball hoop and back?
- Did you have to debug your route?
- Describe some differences between a route and a function when using the new tiles.
- Which of the new tiles did you use to get KUBO to turn around and go back to the other hoop?
- Did you have any problems making a function?

Task 2:

- How did you work together to create the function without creating the route first?
- Did your function work the first time? If not, how did you figure out what to change?
- Which sport is KUBO watching from the benches?

Task 3:

- Which of the new tiles are you using to get KUBO back to the bench?
- Did you help each other create your functions?
- How did you create your function (by pointing to squares, visualizing, or counting squares)?
- Did your function work the first time?

REFLECTION

- Did you struggle with creating your function without creating a route first? What strategy did you use to create a function?
- When KUBO is performing the memorized function, are you able to follow along with your tiles to see what KUBO will do next? Does that help you figure out what to fix in your function?

EXTENSION

- KUBO wants to explore other parts of the gym. Create functions to get KUBO to different locations and write a story to go along with KUBO's movements.
- What is your favorite sport to play? Can KUBO play that sport in this gym? Create a function that would show KUBO playing that sport. After you have a function that shows this, write a story about KUBO's time in the gym.

ACTIVITY 3:

New Subroutines

OUTCOME

- Turn two functions into a subroutine using the Coding+ TagTiles.
- Create functions and subroutines without creating routes first.

TIME

- 45 minutes

MATERIALS

- Task 1:
 - › KUBO
 - › Coding+ TagTiles
 - › Movement TagTiles
 - › Play and Record Function TagTiles
 - › Gym activity map
- Task 2:
 - › KUBO
 - › Coding+ TagTiles
 - › Movement TagTiles
 - › Play and Record Function TagTiles
 - › Gym activity map
- Task 3:
 - › KUBO
 - › Coding+ TagTiles
 - › Movement TagTiles
 - › Play and Record Function TagTiles
 - › Gym activity map

TEACHER NOTES

Task 1:

- Students should work together with one student creating the first function from the starting point to the second stop and the other student creating the function from the second stop to the last stop. They should then combine so they have one function with a subroutine.
- Students should have some idea of how to create a subroutine. This task walks them through it in case they need a refresher. The time needed will depend on how much they remember about creating subroutines.

ACTIVITY 3:

New Subroutines

- Students should have both functions (one function and one subroutine) nearby so they can follow along with the TagTiles as KUBO moves.
- If you have students who are advanced enough, you might want to introduce the concept of algorithms during this activity. An algorithm is a set of step-by-step instructions to complete a task, usually used in computer programming or mathematics. Each subroutine in a program is an algorithm.

Task 2:

- If you have time, one partner could create both functions and change one into a subroutine of the other. The other partner could do the same thing (maybe using different tiles) after the first partner finishes.
- Remind students that creating their functions off to the side of the map ensures they don't have to move them later.

Task 3:

- Students will brainstorm during Steps 1 and 2. Have them discuss their ideas prior to building the subroutine. This discussion could be done with the whole class as well.
- Students will ask you and other groups to watch KUBO play a game. You might want to give students a timeframe in which to create their game (for example, 10 minutes to create and five minutes to share and watch others).

VOCABULARY

- Review Vocabulary
 - › subroutine: a function inside another function
 - › tweak: to change

DISCUSSION QUESTIONS

Task 1:

- Which colors will you use for each function?
- Who will create the first function and who will create the second function?
- Did each of your functions work independently?
- Do you understand how to create a subroutine?
- Did KUBO make it to all the stops on the first try?

Task 2:

- What sport are KUBO's friends playing?
- Who is creating the first function and who is creating the second function?
- Did you have to debug either your function or your subroutine?
- What Coding+ tiles did you use?

ACTIVITY 3:

New Subroutines

Task 3:

- How did you decide what game KUBO will play?
- Did each person have a chance to brainstorm and share his or her ideas?
- What part of the gym will the game take place in?
- Was anyone able to guess your game?

REFLECTION

- How would you explain a subroutine to someone that has never created one?
- What are the benefits of creating a subroutine instead of just one function?

EXTENSION

- KUBO will spend all day in the gym. What will KUBO do? Write a story that includes KUBO playing a game, watching a game, and getting a snack at the refreshment stand.
- What are the rules to the game that KUBO played during recess in the gym? Make a list of rules and the steps needed to play the game. Give your rules to another group and see if they can create a function with a subroutine to play the game. Can two KUBOs play your game?

ACTIVITY 4:

New Loops and Recursive Functions

OUTCOME

- Work with loops that contain Coding+ tiles.
- Create a function that contains a loop and Coding+ tiles.

TIME

- 45 minutes

MATERIALS

- Task 1:
 - › KUBO
 - › Coding+ TagTiles
 - › Movement TagTiles
 - › Play and Record Function TagTiles
 - › Loop and Parameter TagTiles
 - › Gym activity map
- Task 2:
 - › KUBO
 - › Coding+ TagTiles
 - › Movement TagTiles
 - › Play and Record Function TagTiles
 - › Loop and Parameter TagTiles
 - › Gym activity map
- Task 3:
 - › KUBO
 - › Coding+ TagTiles
 - › Movement TagTiles
 - › Play and Record Function TagTiles
 - › Loop and Parameter TagTiles
 - › Gym activity map

TEACHER NOTES

Task 1:

- This task is a review on loops. Students might go through this task quickly depending on their experience with creating loops.

ACTIVITY 4:

New Loops and Recursive Functions

- If students have a hard time with KUBO following the route, have them try placing KUBO on the route facing a different direction. Observing the way KUBO turns on the first Turn tile will help you decide which way KUBO needs to face when starting the route.
- It might be helpful for some students to review the order that the Open and Close Loop tiles need to go in a function.
- If the students do not remove the Play Function tile, KUBO will continue to pass over it and just keep repeating the loop. This does not accurately show their loop and thus should be removed as soon as KUBO passes over it.
- If students do not close their loop or place the tiles in an order that makes sense, KUBO will turn red, shake, and move away. Students will need to fix the issue and reset KUBO before they can try again.

Task 2:

- You might want to check for understanding of the vocabulary term *recursive function* after Step 1.
- When a loop is created correctly, KUBO should continue to repeat it. The only way to stop KUBO from performing the recursive function is to reset KUBO.

Task 3:

- Both steps in this task can be completed orally or they can be written down.
- This is a more open-ended task in which students will select all aspects of the task (what sport to play, where to play it, and how to play it). They will code a function along with a recursive function.
- Allowing groups to guess and discuss the sports they choose will give students new ideas on what they could try.
- It would be OK if students want to include other items such as pieces from a board game.

VOCABULARY

- Review Vocabulary
 - › Loop: a repeated action or a set of repeated actions
 - › Parameter TagTile: the tile used to tell KUBO how many times to repeat a loop
- New Vocabulary
 - › Close Loop TagTile: the Loop tile that tells KUBO to stop memorizing a loop
 - › Open Loop TagTile: the Loop tile with the spot for the Parameter tile; this tile tells KUBO to start memorizing a loop
 - › recursive function: a function that repeats until you reset KUBO

DISCUSSION QUESTIONS

Task 1:

- Will all students have KUBO running the same direction?
- What is the benefit of creating a loop?
- Why would you add a loop into your function?

ACTIVITY 4:

New Loops and Recursive Functions

Task 2:

- Do you remember your function from the last task?
- Do you enjoy running as much as KUBO does?
- How can you get KUBO to stop running?

Task 3:

- What sport did you agree on?
- If you didn't agree, how did you decide which sport KUBO would play?
- Did you create a subroutine in your function for KUBO to get across the gym?
- Explain your recursive function.

REFLECTION

- When would you want to use loops with KUBO?
- When would recursive functions be useful in real life?

EXTENSION

- If each side of a quadrant is 10 feet or 3 meters, what is the perimeter of the basketball court? What is its area? Can you find the perimeter and area of other sections in the gym?
- How is this gym on the map like the one you have at your school? How is it different? Write down your thoughts and share them with someone.

Standards Addressed

US ISTE CURRICULUM STANDARDS

Learning Outcome	KUBO CODING				KUBO CODING+		
	LP 1: Routes	LP 2: Functions	LP 3: Subroutines	LP 4: Loops	LP 1: Refresher course	LP 2: Advancing programming	LP 3: Challenge master
1a Students articulate and set personal learning goals, develop strategies leveraging technology to achieve them and reflect on the learning process itself to improve learning outcomes.	•	•	•	•	•	•	•
1b Students build networks and customize their learning environments in ways that support the learning process.	•	•	•	•	•	•	•
1c Students use technology to seek feedback that informs and improves their practice and to demonstrate their learning in a variety of ways.	•	•	•	•	•	•	•
1d Students understand the fundamental concepts of technology operations, demonstrate the ability to choose, use and troubleshoot current technologies and are able to transfer their knowledge to explore emerging technologies.	•	•	•	•	•	•	•
2a Students cultivate and manage their digital identity and reputation and are aware of the permanence of their actions in the digital world.							
2b Students engage in positive, safe, legal, and ethical behavior when using technology, including social interactions online or when using networked devices.							
2c Students demonstrate an understanding of and respect for the rights and obligations of using and sharing intellectual property.							
2d Students manage their personal data to maintain digital privacy and security and are aware of data-collection technology used to track their navigation online.							
3a Students plan and employ effective research strategies to locate information and other resources for their intellectual or creative pursuits.							
3b Students evaluate the accuracy, perspective, credibility, and relevance of information, media, data, or other resources.							
3c Students curate information from digital resources using a variety of tools and methods to create collections of artifacts that demonstrate meaningful connections or conclusions.							
3d Students build knowledge by actively exploring real-world issues and problems, developing ideas and theories, and pursuing answers and solutions.					•	•	•
4a Students know and use a deliberate design process for generating ideas, testing theories, creating innovative artifacts or solving authentic problems.	•	•	•	•	•	•	•
4b Students select and use digital tools to plan and manage a design process that considers design constraints and calculated risks.	•	•	•	•	•	•	•

Standards Addressed

US ISTE CURRICULUM STANDARDS

Learning Outcome	KUBO CODING				KUBO CODING+		
	LP 1: Routes	LP 2: Functions	LP 3: Subroutines	LP 4: Loops	LP 1: Refresher course	LP 2: Advancing programming	LP 3: Challenge master
4c Students develop, test and refine prototypes as part of a cyclical design process.	•	•	•	•	•	•	•
4d Students exhibit a tolerance for ambiguity, perseverance and the capacity to work with open-ended problems.	•	•	•	•	•	•	•
5a Students formulate problem definitions suited for technology-assisted methods such as data analysis, abstract models and algorithmic thinking in exploring and finding solutions.	•	•	•	•	•	•	•
5b Students collect data or identify relevant data sets, use digital tools to analyze them, and represent data in various ways to facilitate problem-solving and decision-making.	•	•	•	•	•	•	•
5c Students break problems into component parts, extract key information, and develop descriptive models to understand complex systems or facilitate problem-solving.	•	•	•	•	•	•	•
5d Students understand how automation works and use algorithmic thinking to develop a sequence of steps to create and test automated solutions.	•	•	•	•	•	•	•
6a Students choose the appropriate platforms and tools for meeting the desired objectives of their creation or communication.	•	•	•	•	•	•	•
6b Students create original works or responsibly repurpose or remix digital resources into new creations.	•	•	•	•	•	•	•
6c Students communicate complex ideas clearly and effectively by creating or using a variety of digital objects such as visualizations, models or simulations.	•	•	•	•	•	•	•
6d Students publish or present content that customizes the message and medium for their intended audiences.	•	•	•	•	•	•	•
7a Students use digital tools to connect with learners from a variety of backgrounds and cultures, engaging with them in ways that broaden mutual understanding and learning.							
7b Students use collaborative technologies to work with others, including peers, experts, or community members, to examine issues and problems from multiple viewpoints.							
7c Students contribute constructively to project teams, assuming various roles and responsibilities to work effectively toward a common goal.					•	•	•
7d Students explore local and global issues and use collaborative technologies to work with others to investigate solutions.							•

Standards Addressed

UK NATIONAL CURRICULUM COMPUTER SCIENCE STANDARDS

Learning Outcome		KUBO CODING					KUBO CODING+		
		Curriculum Aspect	LP 1: Routes	LP 2: Functions	LP 3: Subroutines	LP 4: Loops	LP 1: Refresher course	LP 2: Advancing programming	LP 3: Challenge master
AIMS	The national curriculum for computing aims to ensure that all pupils:								
	can understand and apply the fundamental principles and concepts of computer science, including abstraction, logic, algorithms and data representation	CS	•	•	•	•	•	•	•
	can analyse problems in computational terms, and have repeated practical experience of writing computer programs in order to solve such problems	CS	•	•	•	•	•	•	•
	can evaluate and apply information technology, including new or unfamiliar technologies, analytically to solve problems	IT	•	•	•	•	•	•	•
	are responsible, competent, confident and creative users of information and communication technology	DL	•	•	•	•	•	•	•
KEY STAGE 1	Understand what algorithms are	CS	•	•			•	•	•
	Understand that algorithms are implemented as programs on digital devices	CS	•	•				•	•
	Understand that programs execute by following precise and unambiguous instructions	CS	•	•			•	•	•
	Create simple programs	CS	•	•			•	•	•
	Debug simple programs	CS	•	•			•	•	•
	Use logical reasoning	CS	•	•			•	•	•
	Predict the behaviour of simple programs	CS	•	•			•	•	•
	Use technology purposefully to create, organise, store, manipulate and retrieve digital content	IT	•	•			•	•	•
Recognise common uses of information technology beyond school	DL								

Standards Addressed

UK NATIONAL CURRICULUM COMPUTER SCIENCE STANDARDS

	Learning Outcome	Curriculum Aspect	KUBO CODING				KUBO CODING+		
			LP 1: Routes	LP 2: Functions	LP 3: Subroutines	LP 4: Loops	LP 1: Refresher course	LP 2: Advancing programming	LP 3: Challenge master
KEY STAGE 1	Use technology safely and respectfully	DL	•	•			•	•	•
	Keep personal information private	DL							
	Identify where to go for help and support when they have concerns about content or contact on the internet or other online technologies.	DL							
KEY STAGE 2	Design programs that accomplish specific goals	CS	•	•	•	•	•	•	•
	Write programs that accomplish specific goals	CS	•	•	•	•	•	•	•
	Debug programs that accomplish specific goals	CS	•	•	•	•	•	•	•
	Control or simulate physical systems	CS	•	•	•	•	•	•	•
	Solve problems by decomposing them into smaller parts	CS			•	•	•	•	•
	Use sequence in programs	CS	•	•	•	•	•	•	•
	Use selection in programs	CS							
	Use repetition in programs	CS				•	•	•	•
	Work with variables	CS							
	Work with inputs	CS	•	•	•	•	•	•	•

Standards Addressed

UK NATIONAL CURRICULUM COMPUTER SCIENCE STANDARDS

	Learning Outcome	Curriculum Aspect	KUBO CODING				KUBO CODING+		
			LP 1: Routes	LP 2: Functions	LP 3: Subroutines	LP 4: Loops	LP 1: Refresher course	LP 2: Advancing programming	LP 3: Challenge master
KEY STAGE 2	Work with outputs	CS	•	•	•	•	•	•	•
	Use logical reasoning to explain how some simple algorithms work	CS	•	•	•	•	•	•	•
	Use logical reasoning to detect and correct errors in algorithms and programs	CS	•	•	•	•	•	•	•
	Understand computer networks including the internet	CS							
	Understand they can provide multiple services, such as the world wide web	CS							
	Understand the opportunities they offer for communication and collaboration	DL							
	Use search technologies effectively	IT							
	Appreciate how results are selected and ranked	CS	•	•	•	•	•	•	•
	Be discerning in evaluating digital content	DL							
	Select, use and combine a variety of software (including internet services) on a range of digital devices to design and create a range of programs, systems and content that accomplish given goals, including collecting, analysing, evaluating and presenting data and information	IT							
	Use technology safely, respectfully and responsibly	DL	•	•	•	•	•	•	•
	Recognise acceptable/unacceptable behaviour	DL							
	Identify a range of ways to report concerns about content and contact	DL							