OVERVIEW:

Lesson Plan 1

REFRESHER COURSE

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

LESSON PLAN OUTLINE

- Activity 1: Routes – 45 minutes
  - 3 tasks
- Activity 2: Functions – 45 minutes
  - 3 tasks
- Activity 3: Subroutines– 45 minutes
  - 3 tasks
- Activity 4: Loops – 45 minutes
  - 3 tasks

OUTCOMES

- By the end of this section, students should be able to:
  - Demonstrate how Movement TagTiles® work.
  - Create functions.
  - Build subroutines within functions.
  - Make a function with a loop

ASSESSMENT

Students can show mastery of the content by:

- Describing how KUBO would move when placed on each of the three types of Movement tiles.
- Creating a route and changing it into a function.
- Making a function that contains both a subroutine and a loop.
- Explaining the difference among a route, function, subroutine, and loop as well as when each would be used.

PREREQUISITE KNOWLEDGE

- Reading a coordinate grid.
  - The KUBO map that students will use is drawn on a coordinate grid using letters A-J and numbers 1-10. Students should have a general idea of how to find locations on a coordinate grid using these letters and numbers. A lesson on how to read the coordinate grid might need to be taught prior to starting KUBO lessons.

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.
  - › www.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.

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 map as a whole class. Are there places on there that students have seen or encountered? Are there places on there that students haven't seen or encountered?
    - How are cities planned? Spend time researching with students how city planners design areas such as the ones seen on the map. What concerns need to be considered? If possible, have someone from the local city planning office come and speak to students.
  - ELA:
    - After students create a route, have them elaborate on the journey and turn it into a story complete with plot elements such as conflict, resolution, characters, and setting.
  - Math/Science:
    - Utilize ratios to compare KUBO's map to the real world. Create a ratio for the map (for example, 1 inch = 45 feet or 1 cm = 10 m). Calculate how far KUBO travels in each task.

ACTIVITY 1:

Routes

OUTCOME

- Learn the direction of the Movement TagTiles.
- Observe how KUBO moves.
- Create routes for KUBO to follow.

TIME

- 45 minutes

MATERIALS

- Task 1:
  - Movement TagTiles
- Task 2:
  - Movement TagTiles
  - KUBO
  - Pencils
  - Worksheet 1.2
- Task 3:
  - Movement TagTiles
  - KUBO
  - Activity map
  - Pencils
  - Worksheet 1.3

TEACHER NOTES

Task 1:

- To learn more about routes and functions, watch the videos at *www.kubo.education/getting-started-tutorials*.
- Before students can begin coding, they have to learn to use KUBO's language, TagTiles.
- Students need to get five of each kind of Movement tile from Section 1 of the KUBO box.
- Working in pairs, one student will play the part of the robot, and the other will control the robot using the tiles. This activity requires some floor space.
- If students are struggling with left vs right, large printable tiles are available on KUBO.education. Teachers can print the large tiles to review the directions and post them in the classroom for reference.

ACTIVITY 1:

Routes

- When students are directing their "robot" partner, the "robot" student should either turn right, left, or forward. If you have enough space in your classroom, you could have the students take steps with each tile. The goal is that students review left vs right in accordance to the TagTiles and replicate the movements of KUBO.
- If students are struggling with the difference between the Go Left and Go Right Movement tiles, consider going to a larger space or outside to play a class game of Simon Says using the visuals of the TagTiles (actual tiles or printed versions).
- When students are drawing their routes on their worksheet, it might be helpful for them to see or use the TagTiles.
- If students are struggling with the difference between the Go Left and Go Right TagTiles, have them play concentration, a memory matching game that uses tiles, and have students name the direction of the tiles every time they make a match.

Task 2:

- Students will place KUBO on the different Movement tiles and observe how KUBO moves. They will record their observations on the associated worksheet.
- To ensure students have equal time working with KUBO, number the students 1 and 2. For example, Partner 1 can demonstrate Steps 1 and 3, and Partner 2 can demonstrate Steps 2 and 4.

Task 3:

- Students will create routes for KUBO to follow.
- Have each student create a route on the map for Step 3.
- Both students should record the information asked for in Step 4.

VOCABULARY

- **activity map:** the map that comes with KUBO
- **debug:** to fix or tweak
- **KUBO:** a screenless coding robot
- **Movement TagTile:** a directional arrow tile that KUBO follows
- **routes:** a chain of Movement tiles connected in a way that KUBO can follow

DISCUSSION QUESTIONS

Task 1:

- Can you move in the direction the tiles show?
- How do you remember which way is right and which way is left?
- Who creates robots?
- How is a robot different from a human being?

ACTIVITY 1:

Routes

- Have you ever controlled a robot before?
- How did it feel to control a robot? Was it difficult?
- How did it feel to be a robot? Was it easy or difficult to follow the commands?

Task 2:

- Which Movement tile makes KUBO turn right, and which one makes KUBO turn left?
- Did KUBO move the way you thought?
- Why do you think KUBO moves the same way over a tile regardless of which way it faces?

Task 3:

- Did KUBO follow the routes?
- Were you able to debug the route so that KUBO could follow it? Why do you think KUBO couldn't follow the route?
- Where is your route taking KUBO?
- Did KUBO follow your route?
- Did you have to debug your route?

REFLECTION

- What are some routes that you take on a regular basis? Discuss these routes with your partner.
- Think of one new vocabulary word or term that you used while working with KUBO and explain what it means to your partner.

EXTENSION

- Challenge your partner to create a route in which you give them the start and end points. Switch roles.
- Create a route you know KUBO cannot follow. Have your partner debug the route. Switch roles.

ACTIVITY 1:

Routes

NOTES

ACTIVITY 2:

Functions

OUTCOME

- Transition routes into functions.
- Correctly get KUBO from one given location to another using a function.

TIME

- 45 minutes

MATERIALS

- Task 1:
  - Movement TagTiles
  - Blue Record and Play Function TagTiles
  - Activity map
  - KUBO
- Task 2:
  - Movement TagTiles
  - Blue Record and Play Function TagTiles
  - Red Record and Play Function TagTiles
  - Activity map
  - KUBO
- Task 3:
  - Movement TagTiles
  - Blue Record and Play Function TagTiles
  - Red Record and Play Function TagTiles
  - Activity map
  - KUBO

TEACHER NOTES

Task 1:

- To learn more about routes and functions, watch the videos at *www.kubo.education/getting-started-tutorials*
- Remind students that KUBO cannot go through walls, plants, buildings, and so forth.
- 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.

ACTIVITY 2:

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.
- Having students follow KUBO's movements by pointing to the corresponding tiles in their function while KUBO moves will help them recognize issues sooner.

Task 2:

- Each student should create his or her own function; one partner will use the blue Record and Play Function tiles and the other will use the red ones. Or, to save time, students could create a function as a pair. However, both students should get experience creating their own function at some point.
- If students build the function off to the side of the map, they won't have to move it later.
- If your students have a hard time deciding which function to try out first, you could have them flip a coin or say the oldest/youngest or tallest/shortest goes first.
- Step 4 is meant to be an oral discussion between the partners but could be made into a writing assignment.

Task 3:

- If your students have a hard time deciding who will create the function and who will select the locations, you could have them flip a coin or say the oldest/youngest or tallest/shortest goes first.
- This can take as much time or as little time as you want. However, you should allow each student to be each role at least once.
- You could make this a whole-class game by having points tallied as Group 1/Group 2. All points that each Partner 1 collects would be tallied for Group 1, and all the points each Partner 2 collects would be tallied for Group 2.

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

DISCUSSION QUESTIONS

Task 1:

- Did KUBO make it to the cafeteria the first time with your route?
- Did you have to debug your route?
- What are some differences between a route and a function?
- Did you have any problems with transitioning your route to a function?

ACTIVITY 2:

Functions

- Did KUBO make it to the cafeteria with your function?
- Did you have any problems making a function?

Task 2:

- What way is KUBO taking to get to the playground from the bakery?
- How did you work with your partner to come up with two different functions?

Task 3:

- What are your start and end locations?
- How did you decide who will create the first function?
- Did your partner create a function for the start and end points you gave?
- Did your function work correctly the first time?

REFLECTION

- Do you find it easier to create a route and change it into a function or just create the function?
- What strategies did you use to create a function?

EXTENSION

- Using both colors of Record and Play Function tiles, create two functions: one that gets KUBO from A1 to C6 and one that gets KUBO from C6 to G8.
- Create a function that takes KUBO around the campfire by starting and ending in the same spot. Leave your Play Function tile in the starting location and see what happens.

ACTIVITY 2:

Functions

NOTES

ACTIVITY 3:

Subroutines

OUTCOME

- Work with subroutines.
- Make two functions to complete a route and turn a function into a subroutine.

TIME

- 45 minutes

MATERIALS

- Task 1:
  - Movement TagTiles
  - Blue Record and Play Function TagTiles
  - Red Record and Play Function TagTiles
  - Pencils
  - KUBO
  - Activity map
- Task 2:
  - Movement TagTiles
  - Blue Record and Play Function TagTiles
  - Red Record and Play Function TagTiles
  - Pencils
  - KUBO
  - Activity map
- Task 3:
  - Movement TagTiles
  - Blue Record and Play Function TagTiles
  - Red Record and Play Function TagTiles
  - Pencils
  - KUBO
  - Activity map

ACTIVITY 3:

Subroutines

TEACHER NOTES

Task 1:

- To see how subroutines are built, watch the video on the KUBO site (*www.kubo.education/getting-started-tutorials/*).
- Have students make a function using the blue Function tiles. KUBO should memorize this function. Next, students make a function using the red Function tiles.
- To connect the two functions by making a subroutine, place the blue Play Function tile right after the red Record Function tile.
- When students combine the two functions, be sure they pay attention to the direction KUBO is pointed at the transition.
- If students' code doesn't work, they might need to debug as necessary.
- To help students keep their route in the correct order when turning it into a function or subroutine, have one student take the tiles off the route one at a time and hand them to his or her partner. The partner should put them in the correct order one at a time when making the function.

Task 2:

- Students create an additional subroutine following the same steps as Task 1.

Task 3:

- When students are successful with creating subroutines, each partnership will create a new one on their own.
- Then, each partnership will trade tiles with another partnership. Each partnership will try to figure out where KUBO will end up; one point is awarded if they are correct. The partnership views another group's tiles, and the process is repeated. The goal is for each partnership to earn at least three points.

VOCABULARY

- **excursion:** a trip
- **predict:** a guess based on facts you already know
- **subroutine:** a function inside another function

DISCUSSION QUESTIONS

Task 1:

- Will all groups create the same subroutine for the same destinations? Why or why not?
- What do you need to remember when making subroutines?
- Did KUBO go where you wanted, or do you need to debug your functions?

ACTIVITY 3:

Subroutines

Task 2:

- How do you make KUBO execute the blue function?
- Why are subroutines useful?

Task 3:

- What is a subroutine? How do you make one?
- Can you come up with a short story in which KUBO starts at one spot, moves to a second, and then moves on to a third?
- Did you accurately predict where KUBO would go?
- What makes it challenging to predict KUBO's movement?
- What makes it easy to predict KUBO's movement?

REFLECTION

- If you had to debug the code, what did you have to fix?
- Why is a subroutine helpful? When would you NOT use a subroutine?

EXTENSION

- Create the shortest possible subroutine for KUBO to complete.
- Write a story explaining the adventure you made for KUBO. Make sure it has elements of storytelling such as a plot, conflict, resolution, characters, and setting.

ACTIVITY 3:

Subroutines

NOTES

ACTIVITY 4:

Loops

OUTCOME

- Work with loops.
- Create a function with loops.

TIME

- 45 minutes

MATERIALS

- Task 1:
  - Movement TagTiles
  - Blue Record and Play Function TagTiles
  - Red Record and Play Function TagTiles
  - Loop and Parameter TagTiles
  - KUBO
  - Activity map
  - Pencils
- Task 2:
  - Movement TagTiles
  - Blue Record and Play Function TagTiles
  - Red Record and Play Function TagTiles
  - Loop and Parameter TagTiles
  - KUBO
  - Activity map
  - Pencils
- Task 3:
  - Movement TagTiles
  - Blue Record and Play Function TagTiles
  - Red Record and Play Function TagTiles
  - Loop and Parameter TagTiles
  - KUBO
  - Activity map
  - Pencils
  - Sticky notes of two or three different colors

ACTIVITY 4:

Loops

TEACHER NOTES

Task 1:

- Today, KUBO's class is having field day. They start out the day at the campfire. KUBO wants to warm up for the races by walking around the campfire.
- Students must first lay a route around the campfire and make KUBO follow it.
- Explain to students that KUBO does not need to use eight Movement tiles to go around the campfire. KUBO can use two tiles that repeat four times using loops.
- Draw the route on the board and split it into four repeatable parts so students can see what you mean.
- Then, demonstrate how a function with a loop would be made for this route. Encourage students to follow along using their own tiles.
- After KUBO has memorized the function, place a red Play Function tile on an appropriate quadrant and place KUBO on it. It can be hard for students to figure out in which quadrant and in what direction to place KUBO, so make sure they practice this by making different loops.

Task 2:

- KUBO is ready to run the field day race. Instruct students to try and make a loop for KUBO to go around the wall with the rainbow. Ask them to first draw the route on a piece of paper and divide it up into parts that can be repeated. Then, have them draw the function on the paper next to the route before they create the function.
- This works best if KUBO does NOT start on a corner – when KUBO turns, KUBO also moves forward. Starting on a corner means that KUBO starts with a forward instead of a turn as KUBO will for the other corners. If students are struggling to have their code execute a complete lap, give them the starting and finishing line of the bus stop.
- While an entire lap could be one complete loop that is repeated, encourage the students to find sections of the route that can be repeated. A possible solution is found at the end of this activity.
- Instruct the students to place a red Play Function tile on the quadrant where KUBO needs to start and remind them to pay close attention to the direction KUBO faces.
- Ask the students to make KUBO run two laps around the wall, then three. Discuss the math connection of changing the Parameter tile to execute the correct number of laps – multiplying the Parameter tile by the number of laps desired. (If one complete lap executes the loop two times, then the multiplier will be two. If one complete lap executes the loop one time, then the multiplier will be one.)

Task 3:

- Next, KUBO is ready for a treasure hunt! Students place five sticky notes on the activity map in quadrants of their choosing. Students then program their KUBO to collect as many treasures, or sticky notes, as possible. The team that collects the most treasures wins!
- Sticky notes are the easiest to use for this activity because they stay stuck to the activity map.
- When students are programming their KUBOs, they must use both loops and subroutines.
- For Steps 3 and 4, one team of students must start in quadrant A3 while the other team of students must start in quadrant A8.

ACTIVITY 4:

Loops

- The KUBOs must start moving at the same time. Whichever KUBO reaches a quadrant first claims the treasure for their team.
- Students need to save all the sticky notes they collect.
- After both KUBOs have finished executing the first function, students continue making more functions until all treasures have been collected. Tally the result to declare a winner.
- Since the teams are competing against each other, it is a good idea for them to make an agreement with each other about what to do during certain situations. For example, if they see that their KUBOs are on a collision course with each other during the game, they can decide beforehand which team has the rights to the route or whether to quickly redirect their KUBOs to avoid a crash.
- To make the activity more challenging, you can choose to set a time limit on how long teams must make their functions, loops, and subroutines.

VOCABULARY

- **loop:** a repeated action or actions
- **Parameter TagTile:** a tile used to tell KUBO how many times to repeat a loop

DISCUSSION QUESTIONS

Task 1:

- Is there a trick to figuring out which part of the function repeats?
- Did KUBO do what you wanted?

Task 2:

- What are loops and how can we use them?
- What can we do if we don't have enough Go Forward 1 tiles for a function?
- Can you predict what number the Parameter tile should be based on the number of laps required?

Task 3:

- What strategy will you choose?
- What do you plan to do if KUBO is on a collision course with another KUBO or might fall off the table or activity map?
- Did you change your strategy along the way?
- What things affected the strategy you used while playing the game?
- Was the game difficult? What made it fun or boring?

ACTIVITY 4:

Loops

REFLECTION

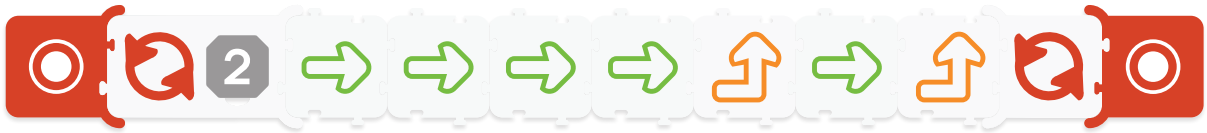
- Did the function you built around the wall with the rainbow work? If you had to debug your code, how did you do it?
- Why do you think loops are useful?

EXTENSION

- A lap around the wall with the rainbow is 1/5 of a mile. How many feet did KUBO run?
- Predict how long it will take KUBO to run 1 mile. Have KUBO run 1 full mile and compare predictions.
  - If your class uses the metric system, change the questions to read, “A lap around the wall with the rainbow is 1/5 of a km. How many meters did KUBO run? Predict how long it will take KUBO to run 1 km. Have KUBO run 1 full km and compare predictions.”
- Place a value on each sticky note. For example, yellow sticky notes are 5 points, and pink sticky notes are 2 points. You could also make the point values fractions or decimals. The highest number of points collected wins.

ANSWER KEY

Possible route for KUBO’s lap around the wall (starting and ending at the bus stop):



ACTIVITY 4:

Loops

NOTES

Standards Addressed

US ISTE CURRICULUM STANDARDS

	KUBO CODING				KUBO CODING+		
Learning Outcome	**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

	KUBO CODING				KUBO CODING+		
Learning Outcome	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

			KUBO CODING				KUBO CODING+		
	Learning Outcome	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

			KUBO CODING				KUBO CODING+		
	Learning Outcome	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
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

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			KUBO CODING				KUBO CODING+		
	Learning Outcome	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
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 descerning 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							