OVERVIEW:

Lesson Plan 1

ROUTES

Grades:	**K-2**
Group Size:	**Pairs**
Setup Time:	**5 minutes**
Total Time:	**100 minutes**
Activities:	**4**

LESSON PLAN OUTLINE

- Activity 1: Be a Robot – 25 minutes
  - 3 tasks
- Activity 2: KUBO and the TagTiles® – 25 minutes
  - 3 tasks
- Activity 3: KUBO's First Day – 25 minutes
  - 3 tasks
- Activity 4: Remembering Routes – 25 minutes
  - 3 tasks

OUTCOMES AND ASSESSMENT

- By the end of this section, students should be able to:
  - Demonstrate how Movement TagTiles work.
  - Make routes for KUBO to follow on the activity map.

TEACHER PREPARATION

- 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 for whole class discussions and demonstrations.
- It's helpful to show students how to properly handle and store KUBO and TagTiles. Stress the importance of taking care of both KUBO and TagTiles.
- It's also helpful to let students know it's OK to make mistakes as long as they "debug" and figure out what they did wrong and how to fix it.
- When they create routes and functions, it is important for students to understand that KUBO has the same capabilities humans do. For example, KUBO can't drive through walls, fences, water, fire, and so forth.

MANAGEMENT

- It is recommended the students be put in groups of two.
- You might find it helpful to create roles for students so that each student gets a turn being in charge of KUBO.

- You might find it helpful for students to detach KUBO's head from the body and put the tiles away in between activities or anytime you are giving instruction.
- 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.

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:
    - Teach students about cardinal directions (north, south, east, and west) and then apply those directions when referring to the activity map. For example, the top of the map would be north, and the bottom of the map would be south. Then, have students create a route that KUBO could take on the activity map. While KUBO is traveling the route, have students use the cardinal directions to describe which direction KUBO is traveling in.
  - ELA:
    - Read a book about mapping skills to student or have them read the book independently. Two great children's book examples are Follow That Map! by Scot Ritchie or There's a Map on My Lap! by Tish Rabe. Afterward, have students write or draw a story about KUBO using a map to travel somewhere in the world.
  - Math/Science:
    - Have students create two different routes on the activity map. Then, have students compare the distance of the two different routes. They must use the terms more than or less than to compare the number of quadrants in the routes.

ACTIVITY 1:

Be a Robot

OUTCOME

- Use your body to understand the Movement TagTiles®.

TIME

- 25 minutes

MATERIALS

- Movement TagTiles
- Pencils
- Worksheet 1.1

TEACHER NOTES

- Before students can begin coding, they have to learn to use KUBO's language, TagTiles. This activity requires plenty of floor space.
- Students need to get the tiles from Section 1 of the KUBO box. When students are creating their routes to a destination in the classroom, students might need more tiles than what is provided in the KUBO box. One option is for students to share tiles, and another option is for you to pick a shorter route or closer location in the classroom.
- Working in pairs, one student will play the part of the robot, and the other will control the robot using the tiles.
- When students are directing their "robot" partner, the "robot" student should take one step on each command or tile.
- It's important to explain to students that robots can perform actions through commands and messages only from the person controlling them.
- 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.

DISCUSSION QUESTIONS

- Can you move in the directions the tiles show?
- How do you remember which way is right and which way is left?
- 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?

ACTIVITY 1:

Be a Robot

REFLECTION

- Why is knowing directions important?
- How do you use directions and movement daily?

EXTENSION

- Map a new route to a different place in your school.
- Have your “robot” partner act out your directions.

NOTES

ACTIVITY 2:

KUBO and the TagTiles®

OUTCOME

- Use KUBO and the tiles to see how they work together.

TIME

- 25 minutes

MATERIALS

- Movement TagTiles
- Pencils
- Worksheet 1.2
- KUBO
- Activity map

TEACHER NOTES

- Students are almost ready to start playing with KUBO. But first, they have to put KUBO on the tiles to see what they make KUBO do.
- Have students get into groups of two.
- Have students take KUBO's head out of the box and attach it to the body. KUBO's lights will flash blue, which means KUBO is powered on and waiting for a command.
- If KUBO's head is not fully connected to its contact points, KUBO will light up white instead of blue. If this happens, take KUBO's head off and reattach it so that KUBO's lights become blue.
- When KUBO is executing a command, the lights will turn green.
- Here are videos to see how to attach KUBO's head and how he reads the TagTiles (*kubo.education/getting-started-tutorials*).
- Students may create and choose whatever route KUBO takes to the playground. It's OK for some routes to be longer than others.
- Some students might have difficulty with writing their responses on the worksheet. You might find it helpful for those students to draw their responses or be given answer options to choose from.

DISCUSSION QUESTIONS

- What do you think KUBO can do?
- What do you think KUBO will do when placed on the tiles?
- What color does KUBO change to when placed on a tile?

ACTIVITY 2:

KUBO and the TagTiles®

- Which direction does KUBO go when placed on the different tiles?
- Is there an easy way to remember?
- Which path is correct and which path is incorrect? How do you know?
- Does it matter which way the arrows on the tiles face when they are joined together?

REFLECTION

- Why does it not matter what way the tiles are placed?
- How could KUBO navigate from your home to your school?

EXTENSION

- Make a new route to a different place on the activity map.
- Have KUBO follow the route.

NOTES

ACTIVITY 3:

KUBO's First Day

OUTCOME

- Work with routes.
- Build a route to take KUBO from a point on the activity map to the school gates.

TIME

- 25 minutes

MATERIALS

- Movement TagTiles
- KUBO
- Activity map

TEACHER NOTES

- Today is KUBO's first day at school.
- Students will make a route for KUBO to the school gates. They decide where KUBO starts.
- The Extension Task provides students extra practice in creating routes. This is very helpful for students who are new to coding and should be included in this activity if there is time.

DISCUSSION QUESTIONS

- How do you get to school every day?
- How do you think KUBO gets to school?
- How did KUBO get to school?
- Did you find it hard to make routes?
- What advice do you have for your classmates?

REFLECTION

- What kind of route would you take to your school using tiles?
- How many tiles do you think it would take you to reach school from your house?

EXTENSION

- Make a route for KUBO from the school bell to the gymnasium. You must use tiles to plan KUBO's route. Put KUBO down on the starting tile and execute your route.

ACTIVITY 3:

KUBO's First Day

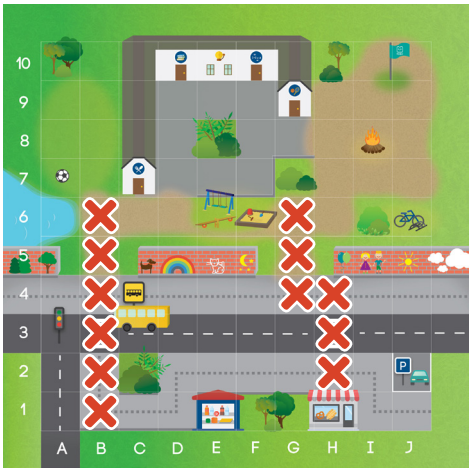
- Make a route for KUBO from the school bell to the cafeteria. You must use tiles to plan KUBO's route. Put KUBO down on the starting tile and execute your route.

NOTES

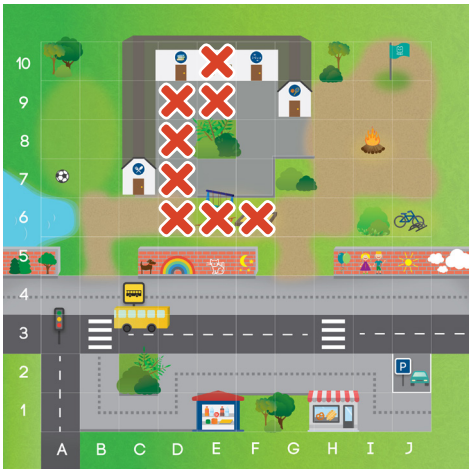
ANSWER KEY

Two possible routes students could create for Task 1:

Two possible routes students could create for Task 2:



Possible route students could create for Task 3:



ACTIVITY 4:

Remembering Routes

OUTCOME

- Use your body to follow routes you have memorized.
- Examine how this relates to how KUBO remembers TagTiles® by reading them.

TIME

- 25 minutes

MATERIALS

- Movement TagTiles
- Pencils
- Paper

TEACHER NOTES

- Students will learn how KUBO remembers routes by itself by using functions.
- On Task 1, after Step 3, students should cover up the route after 30 seconds with a piece of paper.
- When students are walking the route they memorized, they should take one step for each tile they memorized.
- When students are creating their routes, they might need more tiles than those provided in the KUBO Coding set. One option is for students to share tiles, and another option is for you to help students make a shorter route.

DISCUSSION QUESTIONS

- How do you remember directions?
- Can you memorize the route I've just made?
- How did you memorize the TagTiles? Do you have any tips or tricks?
- How many TagTiles could you memorize?

REFLECTION

- What tricks or tools helped you remember the route?
- How many tiles or steps were you able to remember? Why do you think it was hard to remember more tiles or steps?

ACTIVITY 4:

Remembering Routes

EXTENSION

- Use tiles and create a route from your desk to your teacher's desk.
- Memorize the entire route and walk following the route.

NOTES

Appendix

PRINTABLE PAGES

- Student worksheets
  - In order by lesson plan and then activity
  - Printable large images of the TagTiles on paper, which will allow younger students to more easily do Task 1 in Lesson Plan 1
- Coding certificate diploma
- Activity map
- Blank activity map

All printable material can be downloaded from *kubo.education/coding-license*

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

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 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**							