Design a Habitat

SAM LABS

Overview

During this lesson, students will gain understanding of how living things require certain elements in order to thrive in an ecosystem. Students will integrate and exhibit learning by simulating the habitat of a sea turtle by providing a current and periodic sunshine.

Key Information

Grade 2   Ages 7–8

45 or 90 minute lesson

Lesson Structure	Learning Objectives
	As a result of this lesson, students will be able to:
Warm-Up	➜ **Recognize** that different animals live in different habitats.
Mini-lesson	➜ **Explain** why sea turtles need sunlight and seawater in order to survive.
Worked Example – Let's Build!	
Challenge 1	➜ **Create** a system that simulates a current of seawater.
Challenge 1 – Debug It!	
Challenge 2	➜ **Create** a system that simulates periodic sunshine and a current of seawater.
Chili Challenges & Exit Ticket	➜ Opportunity to extend understanding and reflect on learning.

Lesson Topics (refer to the Standard Alignment Map)

NGSS Life Science 2-LS4-1 🧬

CCSS Math 🔢   **CSTA Computer Science** 🖥️ **CCSS English Language Arts** ✏️

Materials Required

SAM Labs STEAM kit   Markers   Glue sticks

Sticky notes   Colored construction paper

✏️ The Student Handouts can be used alongside each lesson.

Warm-Up
Recognize that different animals live in different habitats.

Key Information to Share:
- Animals need food, water and shelter in order to survive.
- A **habitat** is the natural home of an animal, plant or organism.

Activity:
- **"Which animals live in each habitat and why?"**
- Label each corner of the room a different habitat: arctic, rainforest, desert, ocean.
- Students can write on a sticky note the name of an animal that lives in one of the four habitats, then place the note in a pile at the front of the room.
- Students can take turns to take a note from the pile, then act as the animal written on the note. The class decides what animal they are, and which habitat they live in.
- Each student then walks and stands in the correct corner of the room. Repeat.

> **Link Forward:** Animals use elements specific to their habitat in order to help them survive.

Mini-lesson
Explain why sea turtles need sunlight and seawater in order to survive.

Key Information to Share:
- Sea turtles are cold-blooded **reptiles**, so they use the Sun to regulate their body temperature.
- Sea turtles drink seawater and have a special 'salt gland' behind each eye which they use to get rid of the salt.
- Sea turtles **migrate** long distances in order to feed and nest; often they will cross entire **oceans**. They use the **current** to help them travel faster.
- Sunlight levels affect ocean current movement
- Sea Turtles share their habitat with a complex marine ecosystem, including seaweed, jellyfish, algae, sea grass, Tiger Sharks.

Activity:
- Display the images of four types of landscape in the Teacher Slides. Think, pair, share: **"Which animals live in each habitat and why?"**
- Discuss the habitat of a sea turtle. Think, pair, share: **"What other plants and animals does a sea turtle share its habitat with?"**
- Display the image of the sea turtle. Think, pair, share: **"What does a sea turtle need to survive in its habitat?"** Encourage students to identify both Sun and water, and within water discuss how seawater is different from other bodies of water in the fact it contains salt.

✏ In their Student Handout, students can sketch an image of a sea turtle in the ocean. They can label the key features of its habitat to explain why it lives there.

✏ Students can complete the keyword activity in the Student Handout.

Keywords:

Migration   The seasonal movement of animals from one region to another.

Habitat   The natural home of an animal, plant or organism.

Ocean   A very large expanse of sea.

Current   A body of water moving in a definite direction.

Reptile   A vertebrate animal recognized by its dry, scaly skin; typically lays soft-shelled eggs on land.
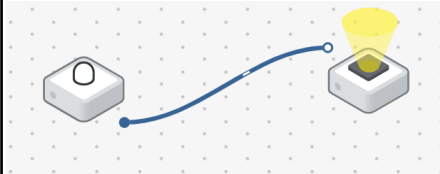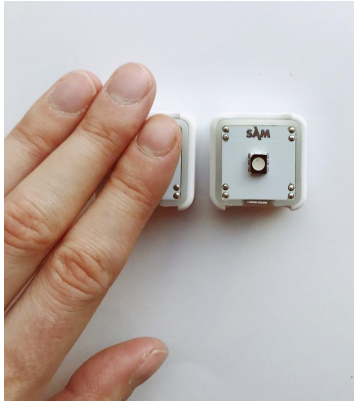
Periodic   Occurring or appearing at intervals.

Let's Discuss: "What is one reason sea turtles need sunlight?" With a partner, students can discuss what would happen if the sea turtle was unable to access sunlight.

Link Forward: Students will build a system that simulates two requirements of a sea turtle's habitat: periodic sunshine and a current of seawater.
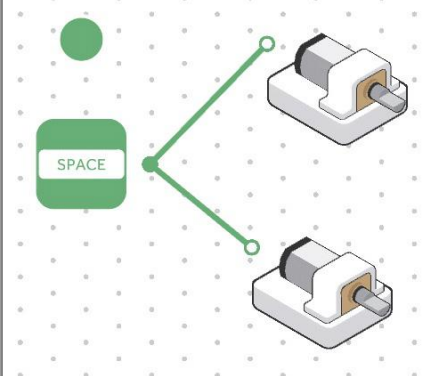
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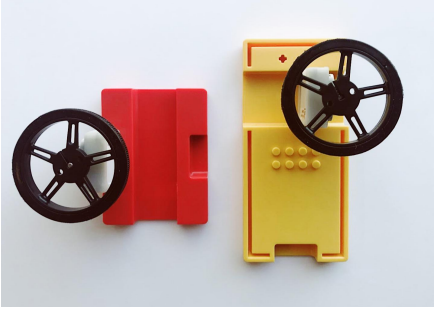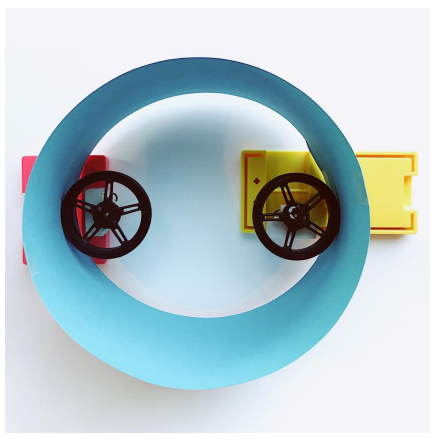## Worked Example – Let's Build!
Create a system that simulates sunshine.

Instructions	Workspace	Notes
Step 1 Turn on and pair: ● 1 Light Sensor block ● 1 RGB LED block and drag onto the workspace. Connect the blocks as shown.		Explain to students that the RGB LED is going to act as the sunshine in the habitat. The Light Sensor will simulate the Sun rising and setting. Explain that the number above the Light Sensor is the reading of light in the room. The Light Sensor spans 1–100 (1 is very dim and 100 is very bright).
Step 2 Test your system. Put your entire palm over the Light Sensor.		Students could use a strong light source as well to compare the range of values received by the Light Sensor. This replicates sunshine and will form part of the system in Challenge 2.

Challenge 1
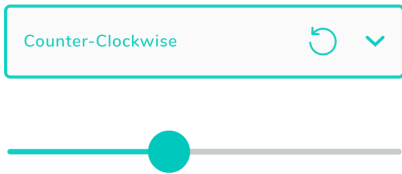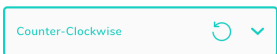### Create a system that simulates a current of seawater.

Instructions	Workspace	Notes
Step 1 Clear the workspace. Turn on and pair: ● 2 DC Motor blocks and drag onto the workspace. Also drag on: ● 1 Key Press block. Connect the blocks as shown. Test your system		Explain to students that the DC Motors will act as the backdrop of the habitat and replicate the water current. Opportunity to discuss what the input and outputs are in this system.

Step 2 Attach 1 Wheel to each DC Motor, aligning the flat part inside the Wheel hole with the flat part of the axle.		Explain that the Wheels will simulate the water current in the habitat.
Step 3 Insert the first DC Motor into the red Car Controller and the second into the yellow Chassis.		The yellow Chassis and red Car Controller act as a base to hold the DC Motors in place and secure them in a vertical position when the waves are created. It may require some pressure to insert the DC Motors.
Step 4 Cut out a long band of paper and draw waves on it. Curve it around the 2 Wheels as shown and secure with tape or glue. Test your system.		Opportunity to discuss the materials which could be used to best represent the sea turtles habitat. Here, a strip of card has been used. Students may wish to experiment with several different materials before deciding on which best fits the purpose. The band of paper will simulate the moving current. As the DC Motors rotate, the paper band should move round.

Checks for Understanding: "Which output is used to simulate the current of seawater? Why do sea turtles migrate?
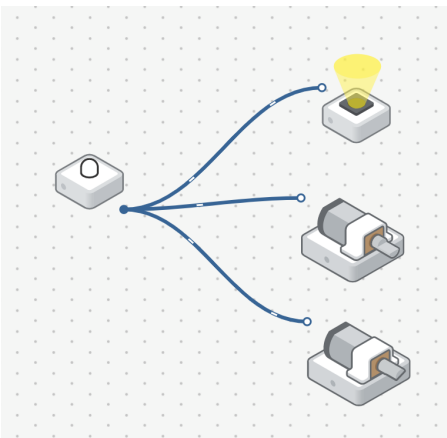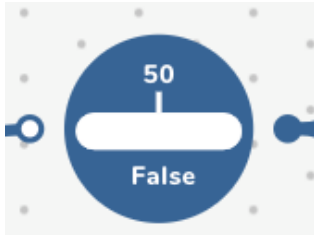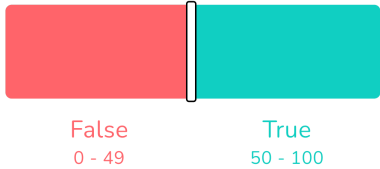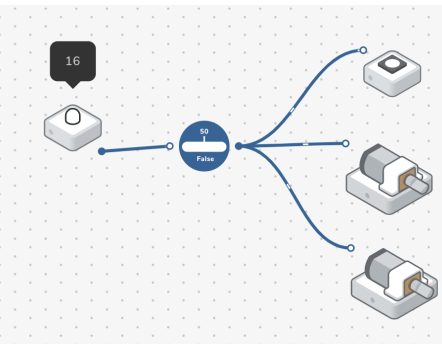
Challenge 1 – Debug It!
How can the DC Motors be used to create a more controlled sea current?

Instructions	Workspace	Notes
Step 1 In the settings of both DC Motors, lower the speed.	Pick rotation & speed Counter-Clockwise ↺ ⌄	By lowering the speed of the DC Motors, the system is simulating the water current at the shoreline.
Step 2 Change the rotation of one of the DC Motors to 'Counter-clockwise'.	Pick rotation & speed Counter-Clockwise ↺ ⌄	Explain that the rotation needs to be changed to ensure the simulated sea current moves in one direction.

Challenge 2
Create a system that simulates periodic sunshine and a current of seawater.

| Instructions	Workspace	Notes
Step 1 Remove from the workspace: ● Key Press. Turn on and pair: ● 1 Light Sensor block ● 1 RGB LED block and drag onto the workspace. Connect the blocks as shown.		NB. The 2 DC Motors from Challenge 1 should already be on the workspace. Explain that this system will regulate the system in order to mimic the sea turtle's real ecosystem. The RGB LED will represent sunlight. The levels of light in the room will control the outputs (RGB LED and DC Motors).

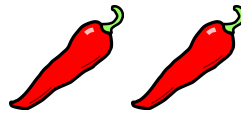|		
Step 2 Drag onto the workspace: ● 1 Threshold block.		Explain that the Threshold will ensure the system is turned on when the values are between a range that has been set. Discuss how this addition to the system helps to regulate when the 'sunshine' and 'current' are simulated. NB. The Threshold changes appearance when dragged onto the workspace.
Step 3 In the settings of the Threshold, set 'true' to '50'.		
Step 4 Connect the blocks as shown.		Explain that when the Light Sensor reads a value of '50' or over, the RGB LED will illuminate and the DC Motors will turn, simulating the effect that sunlight has on ocean currents.
Step 5 Test your system.		Opportunity to recap the habitat requirements of sea turtles that have been simulated by this system.

✏️ Students can complete activities in the Student Handout.

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> **Checks for Understanding:** "Which output simulates the sunshine in this system? Which of these two requirements do sea turtles need to survive?"
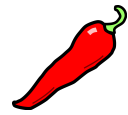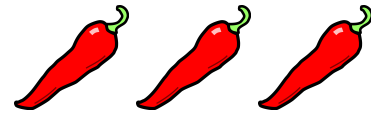
Chili Challenges		
Experiment with the Cycle Brightness block to enable the brightness to increase over time. Can you simulate a sunrise?	Experiment with adding a Time Trigger as an alarm to prompt the sea turtle to wake up and swim. Can you use different time behavior blocks as an alarm?	Experiment with the time behavior blocks to provide set periods of light. Can you program different colored lights for different times of day?

Exit Ticket
Reinforce the learning objectives of the lesson. Students can:

- **annotate their system in the Student Handout.** ✏️
- **reflect on key takeaways by completing an exit ticket summarizing what they've learned.**