Dash the Snowman

Summary

Description

Frosty's got nothing on Dash the Friendly Snowman.

Learning Procedure

Over the course of 3 puzzles, your students will program Dash to turn lights on, off, and then repeat an eye pattern continuously until a clap triggers Dash to perform a second set of eye patterns, closing with an animation. This puzzle teaches students how to repeat commands as a **loop** and how to set a **when** conditional that initiates a new command or loop. It also introduces students to types of fun **animations** that may use in a program to create fun or drama.

Concepts Covered

- **Connect the blocks -** students will learn to connect blocks in a program.
- **Eye Pattern** - students will learn to program the 12 LED lights eye lights, by tapping each light to turn it on or off in the custom menu.
- **Loops** - students will learn how to program **Eye Pattern** blocks as a repeated set of instructions.
- **Repeat Forever** - students will learn to nest **Eye Pattern** blocks in Repeat Forever to program a **loop**.
- **When** - students will learn to program the **When** command as a cue for a command, e.g., **Hear Clap**.
- **Animations** - students will learn how to select and program an **Animation** from the menu to make the robot move and/or say/make a sound, e.g., **Hello**.

In App

Vocabulary

Loop: a set of instructions that a computer program repeats over and over again
Stack: a group of commands arranged in layers
Eye Pattern blocks: an arrangement of lights
When: the When command executes when a specified event occurs
Animations: to bring to life

Reflection Questions

1. How are **patterns** in math and **loops** in coding similar? Create a pattern with colors or shapes. Can you sketch it out as a program with loops?

2. Which **when** condition would be most helpful for Dash in a snowball fight? Explain. (Possible response: Obstacle in Front, Object Behind - depending on which way snowballs are being thrown.)

3. Explain the difference between the **When/Start** command and the green **When/Hear Clap** command.

4. For 5th Grade: How are the movements in juggling like a loop? Watch these two videos. What set of movements repeat with 3 balls? 4 balls?
   https://www.youtube.com/watch?v=hZMR2h93X0k
   https://www.youtube.com/watch?v=DXKbeBd_k4U

5. If you could program your life, what series of actions do you enjoy so much that you'd like to **loop** them to **Repeat Forever**? What might be the consequences? What chore could be made easier with a loop? Explain.

Activity Extensions

1. The UnFriendly Snowman
Challenge students to program *Dash the Unfriendly Snowman*. Instruct students to use the **When** command, so that Dash come to life when someone comes too close, picks Dash up or speaks. What would an unfriendly snowman say? Ask students to program different sounds or actions that Dash can do from the **Animation** bank. Grades 1 and 2: Categorize the commands in the Animation bank under the headings: "Friendly" and "Unfriendly Snowman." Grades 3, 4 and 5: Write a poem about your unfriendly snowman. Include figurative language to describe how your snowman looks and behaves. Examples: simile, metaphor, alliteration and personification. Standards: CCSS.ELA-LITERACY.L.1.5.A; CCSS.ELA-LITERACY.L.2.3; CCSS.ELA-LITERACY.L.4.5; CCSS.ELA-LITERACY.L.5.5; CCSS.ELA-LITERACY.L.3.5;

2. **The Human Loop (Generating Patterns)**
Have students create their own loopy program to act out physically. Students may use claps, stomps, head nods, or any other body movement as physical commands in this human loop. Begin with one command as a loop repeated a specific number of times. Have the next student repeat this same loop and add on his or her own loop command x number of times. Each student must repeat all of the prior loops, and then add on his or her own loop. A student is out when he or she cannot repeat the entire "loopy" program from the beginning. Grades 3-5: Apply a rule that must be followed. Example: All loops must be divisible by 3. Standards:

CCSS.MATH.CONTENT.1.OA.C.5; CCSS.MATH.CONTENT.2.OA.C.3; CCSS.MATH.CONTENT.3.OA.D.9; CCSS.MATH.CONTENT.4.OA.C.5; CCSS.MATH.CONTENT.5.OA.B.3

3. Nature's Loops

Explain to students that nature's cycles are like loops. The repetition of day and night could be expressed as a **Repeat Forever loop**. What are the seasons that loop each year and in what order? Do they **Repeat Forever**? Ask students to research a natural cycle and write a brief narrative explaining it. Illustrate it as a program, sketching this natural cycle with colorful markers. Remind students to include the **Repeat Forever** command. *Examples of other cycles: nitrogen, rock, carbon. Grades 1 and 2 may prefer learning about human cycles, e.g., sleep and breathing. Grades 4 and 5 may research the effects and implications of a natural cycle that's been disturbed, e.g., climate change. Standards: CCSS.ELA-LITERACY.W.1.7; CCSS.ELA-LITERACY.W.2.7; CCSS.ELA-LITERACY.W.3.7; CCSS.ELA-LITERACY.W.4.7; CCSS.ELA-LITERACY.W.5.7; K-LS1-1; 1-ESS1-2

**See Grade K, 1, 4, 5 NGSS Standards below that relate to patterns found in nature.*

4. Treasure Hunt (Sequencing Skills)

Have students hide a treasure for their friend(s) to discover. Hide it someplace nearby and then draw a map to find it. However, the map should be formatted as a program that includes loops. For example, "Walk 4 steps," could be written as repeating loop, e.g., "Walk 1 step, 60 cm. 4 times." Include turns, angles, and different ways to move forward or backward including hops, skips and jumps. If students have carefully programmed their treasure map, their friends should have no trouble finding it! Standards: CCSS.ELA-LITERACY.W.1.3; CCSS.ELA-LITERACY.W.2.3; CCSS.ELA-LITERACY.W.3.3; CCSS.ELA-LITERACY.W.4.3.C; CCSS.ELA-LITERACY.W.5.3.C

Educational Standards

CC Mathematical Practices:

1, 2, 4, 5, 6, 7, 8

CC Language Arts Standards:

As noted in the section for Activity Extensions

CSTA K-12 Computer Science Standards

- CT.L1:3-03. Understand how to arrange information into useful order
- CT.L1:6-01. Understand and use the basic steps in algorithmic problem-solving.
- CT.L1:6-02. Develop a simple understanding of an algorithm
- CPP.L1.3-04. Construct a set of statements to be acted out to accomplish a simple task.
- CPP.L1:6-05. Construct a program as a set of step-by-step instructions to be acted out.
- CT.L2-03. Define an algorithm as a sequence of instructions that can be processed by a computer.

- CT.L2-06. Describe and analyze a sequence of instructions being followed.

NGSS Science and Engineering Practices

- K-2-ETS1-1 Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.
- K-2-PS3-2 - Use tools and materials provided to design and build a device that solves a specific problem or a solution to a specific problem.

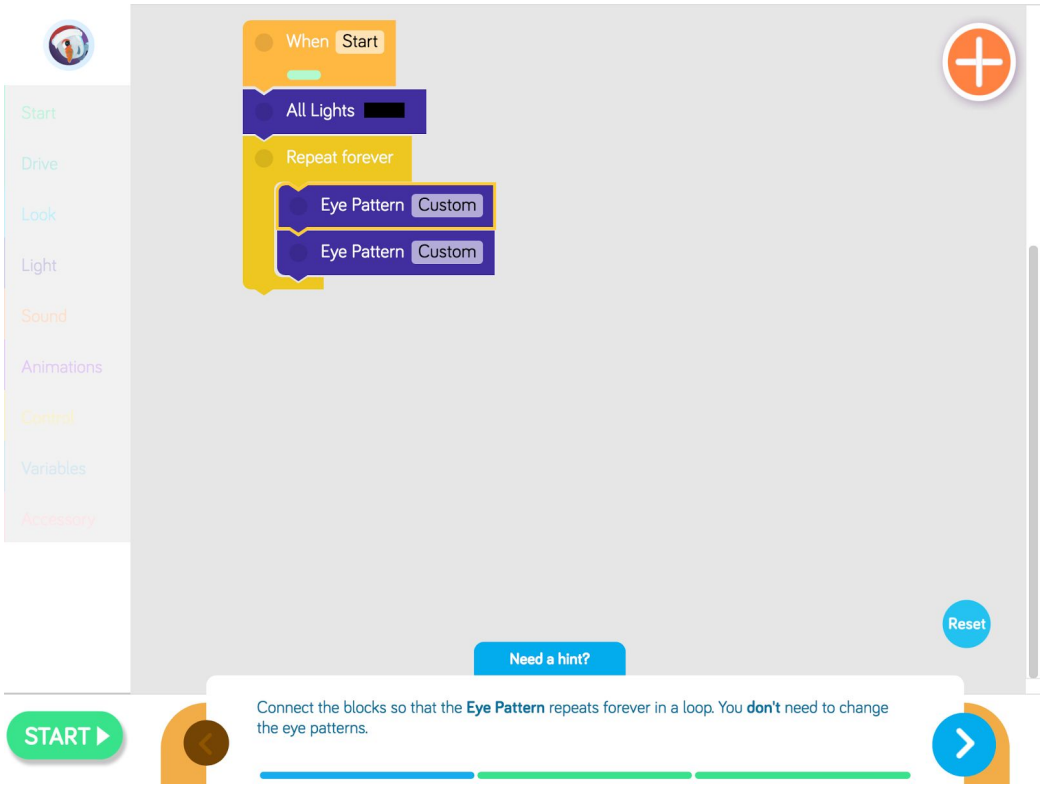
*Relating to Activity Extension: Nature's Loops - Grades K, 1, 3, 4, & 5

- K-LS1-1 - Use observations to describe **patterns** of what plants and animals (including humans) need to survive *See
- K-LS1-1 From Molecules to Organisms: Structures and Processes
  Use observations to describe **patterns** of what plants and animals (including humans) need to survive.
- K-ESS2-1 Earth's Systems - Use and share observations of local weather conditions to describe **patterns** over time.
- 1-ESS1-1 Earth's Place in the Universe - Use observations of the sun, moon, and stars to describe **patterns** that can be predicted.
- 3-PS2-2 Motion and Stability: Forces and Interactions - Make observations and/or measurements of an object's motion to provide evidence that a **pattern** can be used to predict future motion.
- 4-PS4-1 Waves and Their Applications in Technologies for Information Transfer - Develop a model of waves to describe **patterns** in terms of amplitude and wavelength and that waves can cause objects to move.
- 4-PS4-3 Waves and Their Applications in Technologies for Information Transfer - Generate and compare multiple solutions that use **patterns** to transfer information.*
- 4-ESS1-1 Earth's Place in the Universe - Identify evidence from **patterns** in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time.
- 4-ESS2-2 Earth's Systems - Analyze and interpret data from maps to describe **patterns** of Earth's features.
- 5-ESS1-2 Earth's Place in the Universe - Represent data in graphical displays to reveal **patterns** of daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky.

Solutions

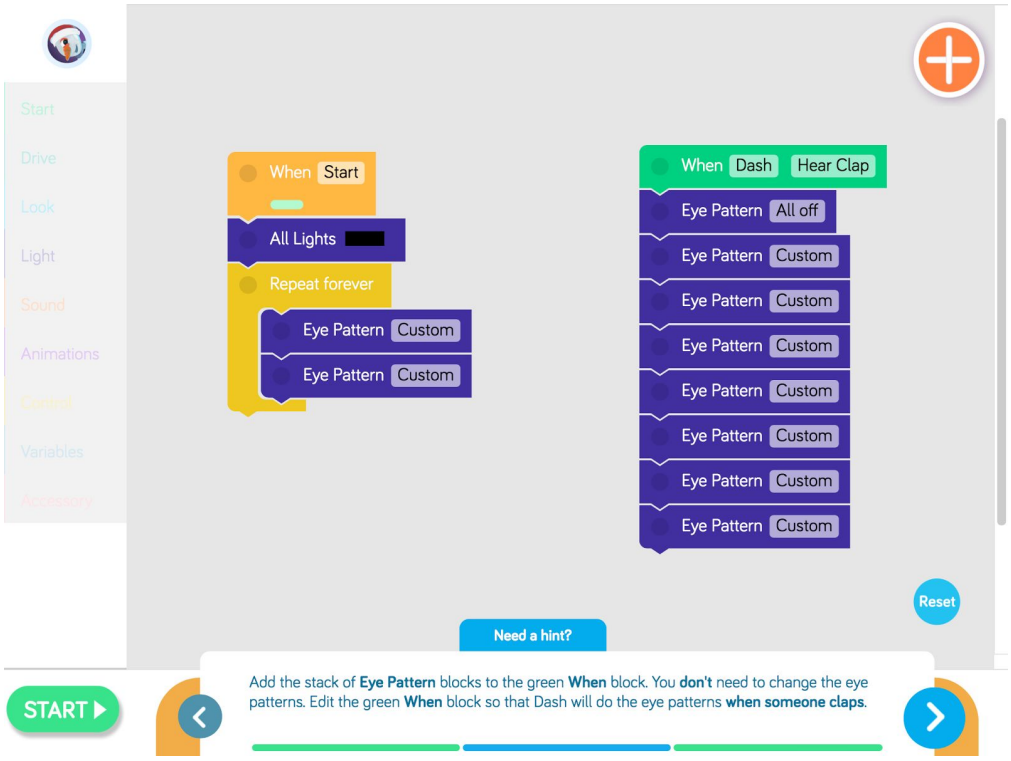
Challenge 1

Connect the blocks so that the **Eye Pattern** repeats forever in a loop. You **don't** need to change the eye patterns.



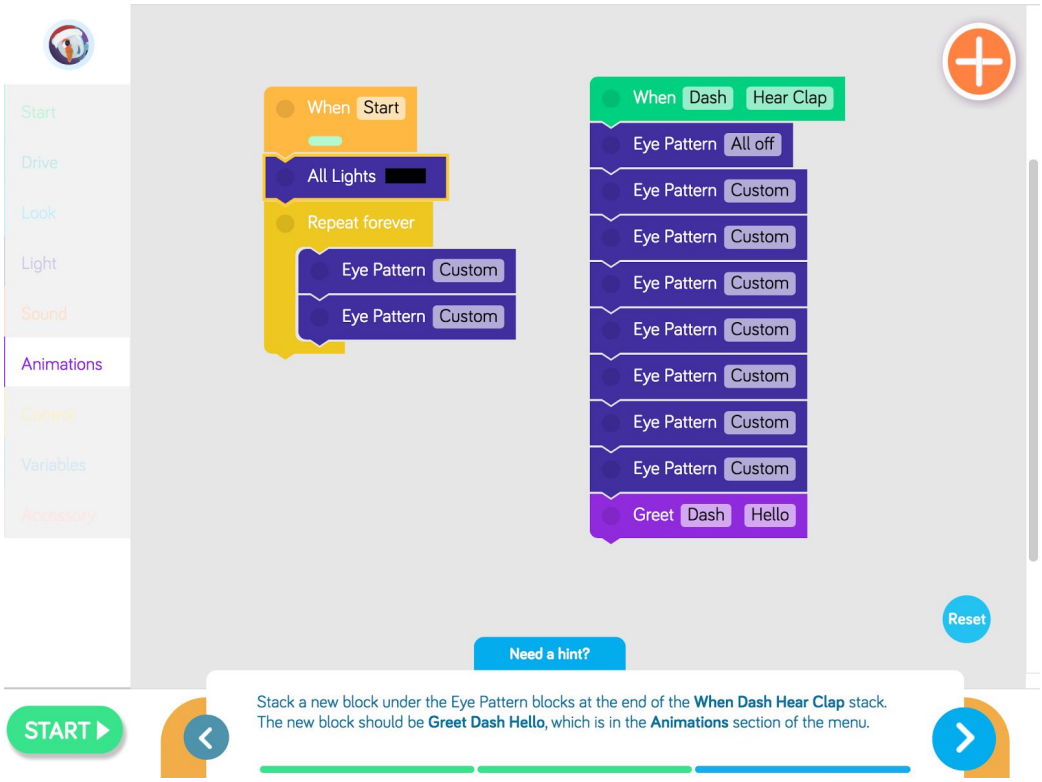
Challenge 2

Add the stack of **Eye Pattern** blocks to the green **When** block. You **don't** need to change eye patterns. Edit the green **When** block so that Dash will do the eye patterns **when someone claps.**



Challenge 3

Stack a new block under the Eye Pattern blocks at the end of the **When Dash Hear Clap** stack. The new block should be **Greet Dash Hello**, which is in the **Animation** section of the menu.


Start
Drive
Look
Light
Sound
Animations
Control
Variables
Accessory
When Start
All Lights
Repeat forever
Eye Pattern Custom
Eye Pattern Custom
When Dash Hear Clap
Eye Pattern All off
Eye Pattern Custom
Eye Pattern Custom
Eye Pattern Custom
Eye Pattern Custom
Eye Pattern Custom
Eye Pattern Custom
Eye Pattern Custom
Greet Dash Hello
Reset
Need a hint?
START
Stack a new block under the Eye Pattern blocks at the end of the When Dash Hear Clap stack.
The new block should be Greet Dash Hello, which is in the Animations section of the menu.