Dash's Dance Contest

Summary:

Dash is competing in a dance competition at Dot's big dance party, first as a solo act and then with a partner.

In this dance-themed puzzle, your students will learn how to program the **Repeat until** block and understand how it can be stopped by programming an event that will stop the repeat. Students will program Dash's sounds and dance moves over the course of **4 challenges**. In the final program, Dash will repeat a slow dance with a partner (the obstacle) until detecting a clap. The concentration of this puzzle is on programming the **Repeat until** block as a loop until something happens, e.g., detecting an obstacle in front.

Concepts Covered

- **Repeat until -** students will program Dash to **Repeat** a series of commands **until** the specific statement is true
    - **Repeat Until**/Obstacle in Front = All Lights Red, Say Wee!
    - students will program Dash's **distance sensors** using the **Obstacle in Front** event.
    - students will nest a series of commands to repeat inside the **Repeat until** bracket
- **Drive** - students will program the robot to drive **backward** and **forward, left** and **right.**
- **Look** - students will program the robot to **look left** and **right, up** and **down**.
- **All Lights** - students will program Dash's ears and chest to light up in colors, e.g., green.
- **Adding commands outside of a loop** - students will learn to add a non-repeat block outside of the **Repeat Until** block.
- **Connecting Stacks** - students will learn to connect more than one stacks of commands.

In app:

Have students complete the Dance Contest Challenge in Blockly.
Solutions to the challenges are in the downloadable file under "Downloadable Materials".

Vocabulary

Repeat Until: Blocks inside of the repeat until block will loop until the specific statement is true. If there is any code beneath this block, it will begin.

Reflection Questions

1. Brainstorm everyday routines that **Repeat until**? Examples: Eating one forkful of food at a time until you are full. Walking until you arrive at your destination.
2. Where does the specific event that will stop the **Repeat until** appear in the sequence of a program?
3. What would happen if the **Repeat until** statement was never true? The specified event never occurs. For example, no one claps or there is no obstacle detected.
4. In this program, the robot is programmed to stop the **Repeat until** loop when there is an obstacle in front. Explain how this could be a true or false statement. (Possible response: If the front obstacle is detected, then it is true. If the front obstacle is not detected, then it is false.)
5. How could the **Repeat until** block be used to solve a real-world problem? (Possible response: A website only allows users to sign up if they're over age 18. The program allows repeated users to sign up, unless a user inputs his or her age as less than 18. Then the signup page is terminated. An auto-read function on an iPad plays the text over and over until the user taps the screen twice.)

Activity Extensions

1. Dash has Got the Moves!
Now you have a dancing robot! Explain how Dash can be programmed to repeat other actions at the dance. Oh no! There's been a flood in the gym. It looks like punch! Dash has been serving punch to everyone, but can't seem to stop. What is missing from this “Dash serves punch to his friends” program? (1) move forward towards punch bowl. (2) scoop up punch with ladle (3) pour punch (4) hand to friend. Have students sketch this program out, correct it and add an event to the **Repeat until** block to stop Dash from flooding the entire gym!
Standard(s): CC MP 1-8

2. Loopy Dance
Dash is going to perform a way out dance move at Dot's Dance party. Have students help Dash choreograph a dance that repeats a series of steps until an event occurs. Suggestions: clap, voice, obstacle, being picked up, etc. Direct students to create Dash's Dance in the **Create New** section of the Blockly App.
Standard(s): CC MP 1-8

3. You're Cooking Now!

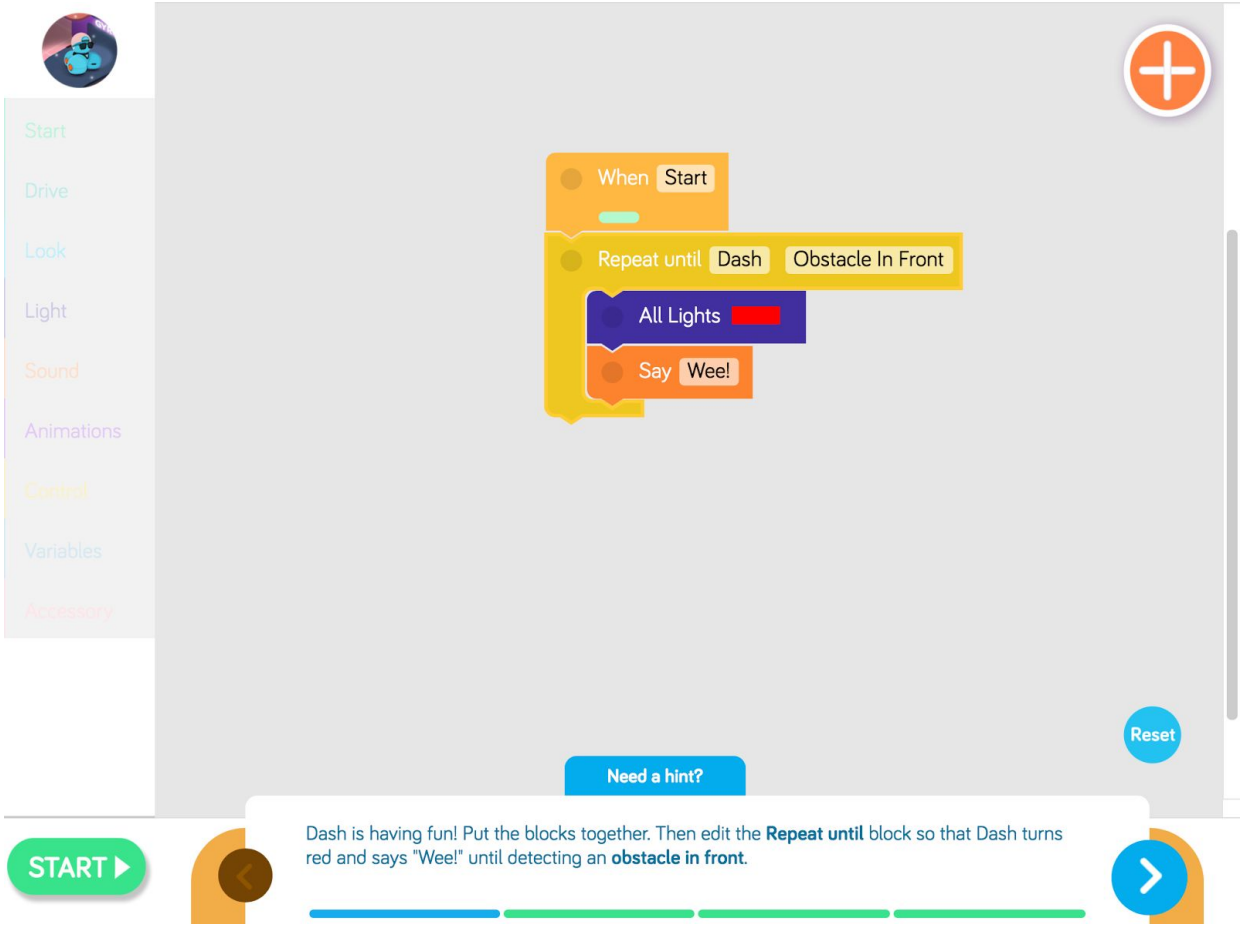
No party is complete without some snacks and beverages. Divide students into 2 groups and determine who will be in charge of making the snacks and the beverages. It may be a well-known snack or something your students make up on their own. What do robots like to eat? Instruct students to list the ingredients and number the procedure. Tell students to identify any repeated actions. Using paper and markers, have students create a program for their recipe with a **Repeat until** block. Example: **Repeat** stirring the milk and powder **until** the mixture thickens.
Standard(s): 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

4. Twisted Logic
It's game time at Dot's Dance Party. Get out the Twister game board. Play the game with students. Then discuss which steps were repeated and what the **Repeat until** statement for Twister could be. (Possible response: **Repeat** the game **until** one player from either team falls or touches an elbow or knee to the mat.)
Standard(s): CC MP 1-8

Solutions

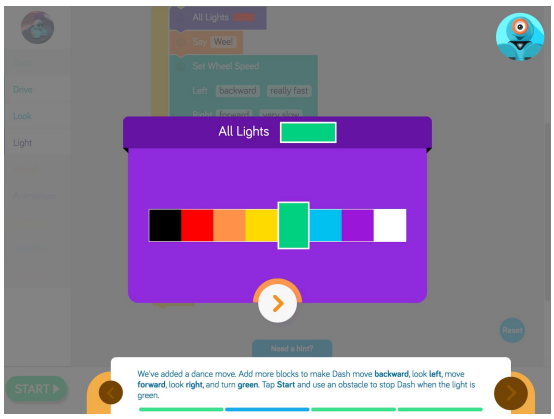
Challenge 1

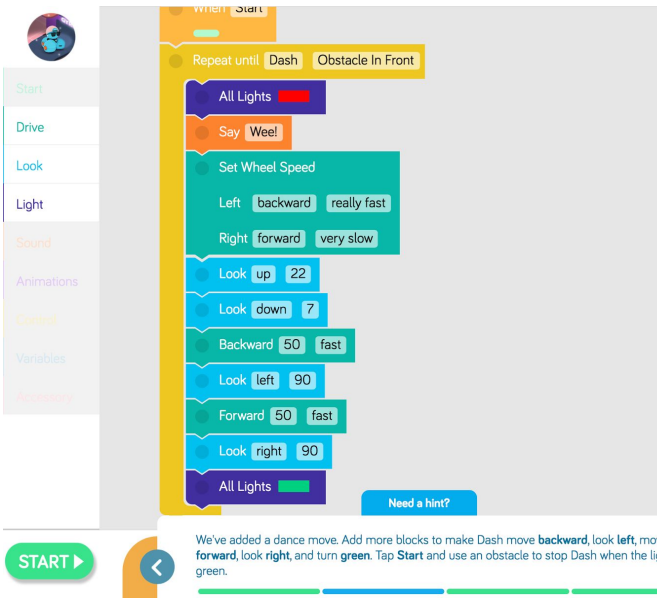
Dash is having fun! Put the blocks together. Then edit the **Repeat until** block so that Dash turns red and says, “Wee!” until detecting an **obstacle in front.**



Challenge 2

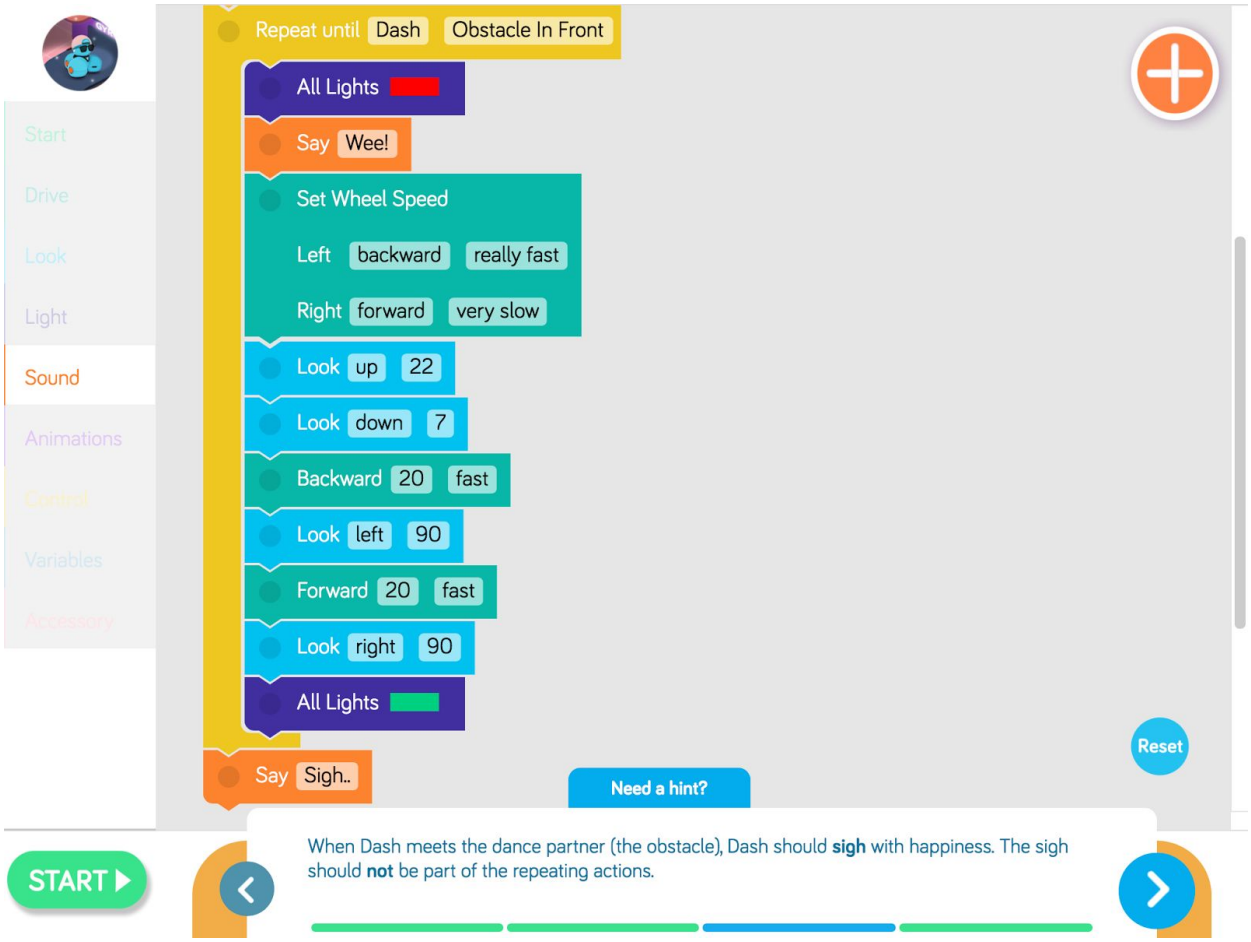
We've added a dance move. Add more blocks to make Dash move **backward**, look **left**, move **forward**, look **right,** and turn **green**. Tap **Start** and use an obstacle to stop Dash when the light is green.





Challenge 3

When Dash meets the dance partner (the obstacle), Dash should **sigh** with happiness. The sigh should **not** be part of the repeating actions.

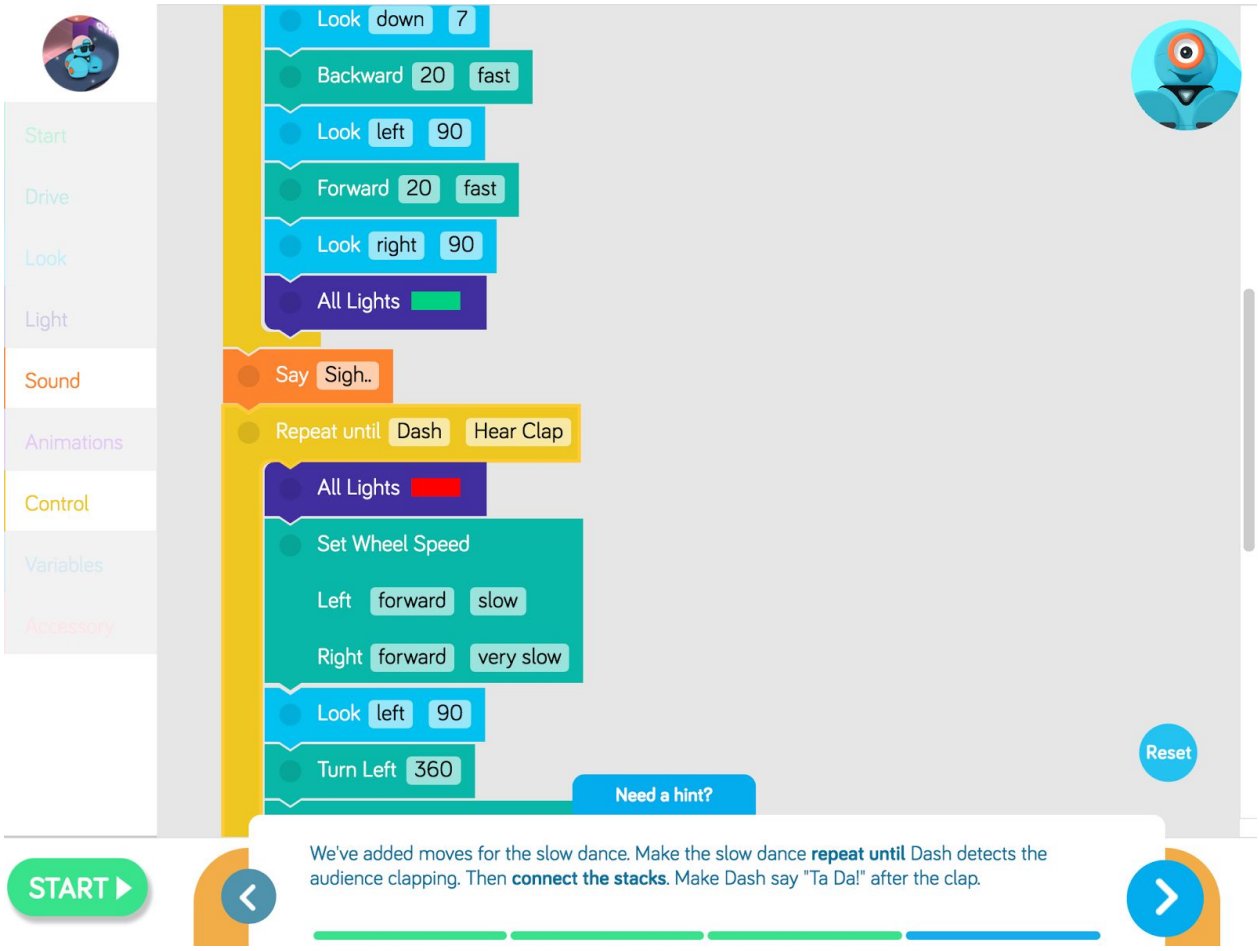


Challenge 4

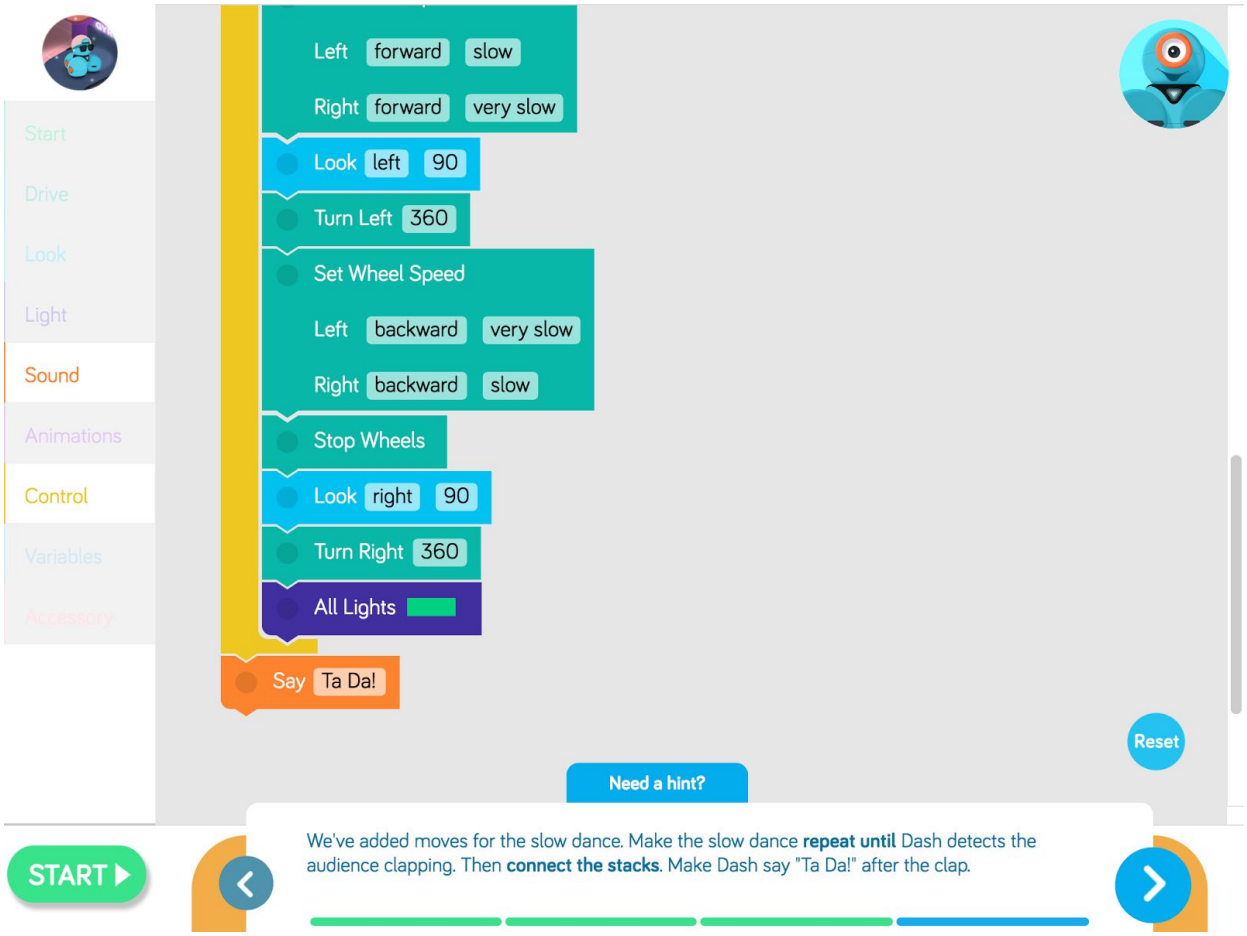
We've added moves for the slow dance. Make the slow dance **repeat until** Dash detects the audience clapping. Then **connect the stacks.** Make Dash say, “Ta Da!” after the clap.

**Before connecting stacks...*

*Connected stacks...



**Bottom of program*



Standards

CC Mathematical Practices:
1, 2, 4, 5, 6, 7, 8

CC Math 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

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 Engineering Design 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.
- 3-5-ETS1-2 Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of a problem. *Also applies to Activity Extensions