

The Terrible Troll of Trepidation

Summary

Description

You shall not pass! Dash has transformed into the Terrible Troll of Trepidation. To continue, your students will need to defeat this terrifying Troll.

Learning Procedure

Students will learn to edit **variables** within a **Change by** and **If block** over a series of **9 challenges**. In this puzzle, the Troll is Dash whose eye lights will act as “hit points,” students will need to customize the 12 LED lights in Dash’s eye pattern block in order to indicate when the “Troll” is losing an increasing number of hit points over a series of 3 claps. Students will need to understand the concepts of “greater than,” “less than” or “equal to” in order to properly identify and set the variables which will be triggered over three sequential claps

Concepts Covered

- **When** - students will learn to program an event in the **When** block that when met, executes a command.
- **Variables**
 - students will learn that **Change by** and **If blocks** contain placeholders for variables.
 - students will learn to edit the variable in the **Change by** and **If** blocks.
- **Eye Pattern**
 - students will edit the Eye Pattern blocks as hit points
 - students will edit the **When** block to cue eye lights to turn off.
- **Sound** - students will record things for Dash to say in the **My sounds** block, e.g., “You shall not pass!”
- **Change by**
 - students will learn to edit “greater than,” “less than” or “equal to” statements in a **Change by** block.
 - students will use the **Change by** block to **increase** the value of the variable by a designated increment, e.g., **+1**.
- **If block**
 - students will learn to edit “greater than,” “less than” or “equal to” statements in an **If** block.
 - students will learn how to program a conditional statement using the **If** block, e.g., **IF $x > 1$** , Dash will execute eye pattern and sound.
- **All Lights** - students will program **All Lights** in Dash’s ears and chest to look like they are off by selecting the color black from the menu.

In App

Vocabulary

Variables: a value that can change

Change by: changes the value of a variable by an argument. It is essentially an increment or decrement block depending on the sign of the argument.

If : a conditional statement, that if proved to be true, performs a function

Conditional Statements: IF statements that determine whether the action is true or false and will have an action to follow. Example: **IF** Dash sees (TRUE) something in front, **then stop**. **IF** Dash doesn't see (False) something in front, **then keep moving forward**.

Reflection Questions

1. Explain the function of the **Change by** block in the Troll of Trepidation Puzzle. What would happen if this block were deleted from this program? How would this change the program?
2. Define the meaning of the term **Variable** in programming. Compare it to the meaning of the term variable as it relates to science and mathematics? Explain. (You might discuss dependent, independent and controlled variables as they pertain to science.)
3. Determine what all programmed variables have in common, if anything. Examples of possible responses: *They are measurable. They are quantifiable.*
4. Which board game(s) or video game(s) do you play that include variables? What are they? How can they be changed? Do they change by increments or decrements? How?
5. Create a hopscotch board using chalk on the playground. Identify each square as a placeholder for a variable. Have different groups of students determine the value or expression of each variable. How do different values or expressions change the game?

Extension Activities

1. Terrible Troll: The Sequel!

You've defeated the Troll. Hurray! You win! Ask students what they could add to the program to make the Troll come back to life after the 4th clap. Example: Add another sound and an eye pattern that will happen if the variable = 4. Now have students dress up Dash like a terrible Troll. Using the Doink App, have students insert a background that will serve as a setting in a sensational sequel, "Return of the Terrible Troll." Instruct students to record their program as an iMovie using an iPad, edit it and share it with Wonder Workshop! Who knows? You may end up in their Inventor Hall of fame! Post on Twitter with #DashtheTerribleTroll.

2. Super Scientist

Students will work in small groups to investigate, observe and research a grade related NGSS practice in order to identify and evaluate a given variable's effect on property, matter, the environment, etc. Example: While investigating the seasons of the year in Pennsylvania, the students determines the variable to be the amount of sunlight the Earth is exposed to at different times of the year. Students will create a virtual 3D model of their investigation using 3D Tin, a free web 2.0 program, illustrating the variable and its effect.

Possible grade level investigations: *Grade 1: Earth's place in the Universe, Grade 2: Matter, Grade 3: Motion and Stability, Grade 4: Earth's Systems, Grade 5: Matter and its interactions.*
<http://www.3dtin.com/>

3. My Monster's Bigger Than Yours!

Comparing numbers as "greater than," "less than," or "equal to" each other, is a part of the Common Core Standards in grades 1-5 at various levels of difficulty. Create a game for your students using appropriate numbers as battling monsters. Explain to students that the larger monster will always eat the smaller one. Note to younger students that we are discussing the number's value, rather than its actual physical size. With younger grades, the "greater than" symbol may be drawn with enormous fangs in order to illustrate that the larger monster is eating the smaller one. See the Common Core Math Standards below for grades 1-5 to determine the type of numbers to compare, e.g., one digit, two digit, or numbers with two decimals to thousandths. Standards: 1.NBT.B.3; 2.NBT.A.4; 4.NBT.A.2; 5.NBT.A.3

4. The Terrible Troll Meets the Three Billy Goats Gruff

In this activity, students will listen to the original fable of the *Three Billy Goats Gruff* and then work in small groups to create their own fairy tale smash-ups, using Dash as the Terrible Troll and characters from any other fairy tale. Example: *The Terrible Troll Meets the Three Pigs!* In the "Create New" section of the Blockly App, program Dash to stop the three pigs from walking over the bridge by programming hit points in the **Change by** and **If** blocks.

<http://www.pitt.edu/~dash/type0122e.html> Standards: CCSS.ELA-LITERACY.W.1.6; CCSS.ELA-LITERACY.W.2.6; CCSS.ELA-LITERACY.W.3.6; CCSS.ELA-LITERACY.W.4.6; CCSS.ELA-LITERACY.W.5.6

Educational Standards

CC Mathematical Practices:

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

CC Math Standards **Covered in Math Activity Extensions*

1.NBT.B.3; 2.NBT.A.4; 4.NBT.A.2; 5.NBT.A.3

4.OA.C.5; 5.OA.B.3;

3.OA.D.8

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 **As outlined in the Super Scientist Activity Extension.*

- 1-ESS1-2 Earth's Place in the Universe - Make observations at different times of year to relate the amount of daylight to the time of year.
- 2-PS1-3 Matter and Its Interactions - Make observations to construct an evidence-based account of how an object made of a small set of pieces can be disassembled and made into a new object.
- 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-ESS2-1 Earth's Systems - Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.
- 5-PS1-3 Matter and Its Interactions - Make observations and measurements to identify materials based on their properties.

Solutions

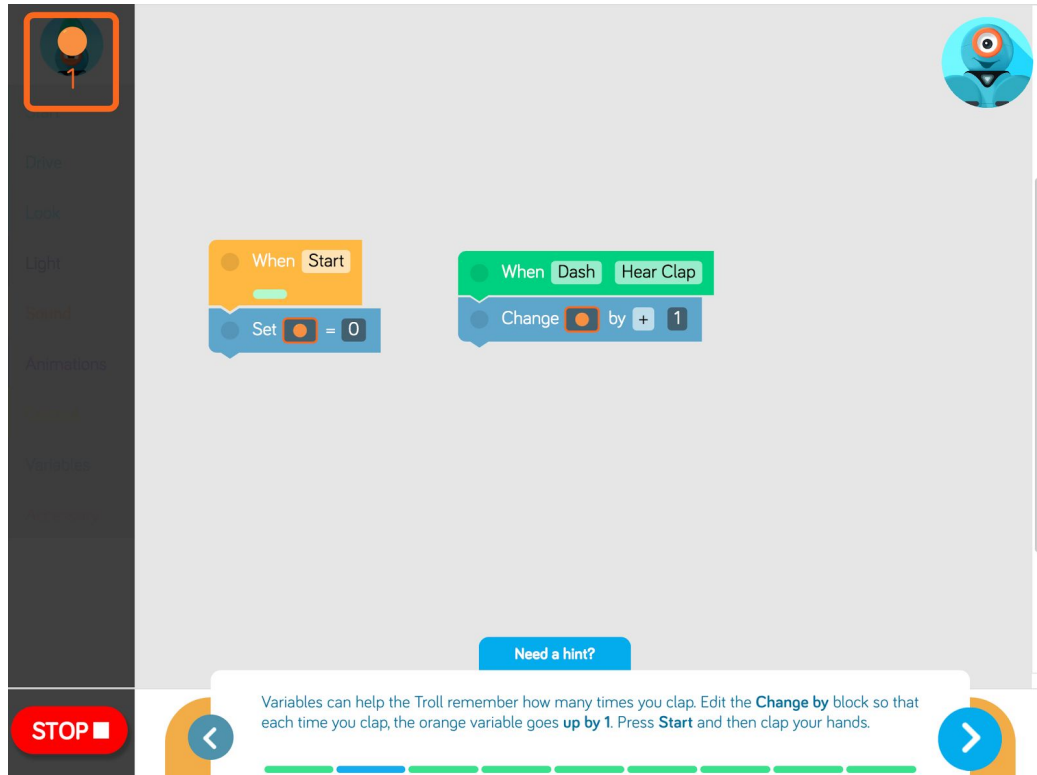
Challenge 1

To get past the Troll, you'll need to use a **variable**. A variable is like a bag that holds a **number** that you put into it. Press **Start** and you'll see the **orange** variable on the top left side.

The image shows a Scratch-like programming environment. On the left is a category menu with options: Start, Drive, Look, Light, Sound, Animations, Control, Variables, and Accessory. The main workspace contains two code blocks: an orange 'When Start' block and a blue 'Set orange = 0' block. A 'Reset' button is in the bottom right of the workspace. A 'Need a hint?' button is centered below the workspace. A white hint box at the bottom contains the text: 'To get past the Troll, you'll need to use variables! A **variable** is like a bag that holds a **number** you put into it. Press **Start**, and you'll see the **orange** variable on the top left side.' A green 'START' button is on the left of the hint box, and a progress bar with 10 segments is below it.

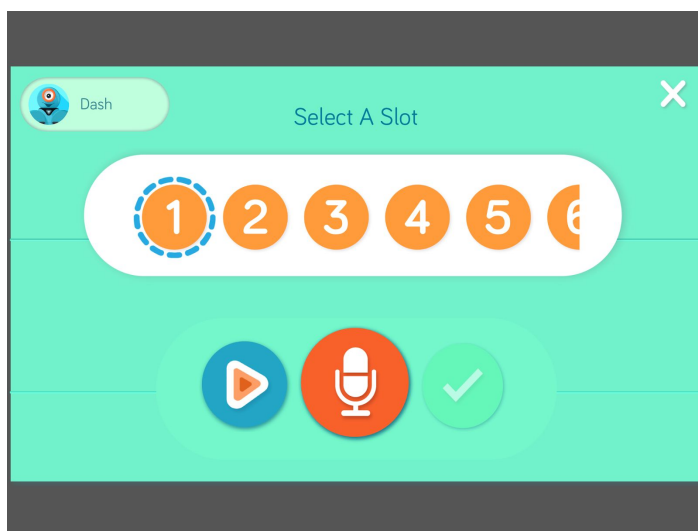
Challenge 2

Variables can help the Troll remember how many times you clap. Edit the **Change by** block so that each time you clap, the orange variable goes **up by 1**. Press **Start** and then clap your hands.



Challenge 3

We've added an **Eye Pattern** block. Dash has 12 eye lights, which are the Troll's 12 hit points. Tap the **My Sounds** block and record your voice saying, "You shall not pass!"



When Start

Set [Eye Lights] = 0

Eye Pattern All on

My sounds #1

When Dash Hear Clap

Change [Eye Lights] by + 1

Need a hint?

START ▶

◀ ▶

We've added an **Eye Pattern** block. Dash has 12 eye lights, which are the Troll's 12 hit points. Tap the **My sounds** block and record your voice saying, "You shall not pass!"

Reset

Challenge 4

When you clap, the Troll loses 4 hit points! Make Dash turn **off 4 eye lights** after your clap. Then make Dash say something like, "Ouch!" The 4 eye lights you turn off must be next to each other.

Eye Pattern Custom

When Start

Set [Eye Lights] = 0

Eye Pattern All on

My sounds #1

When Dash Hear Clap

Change [Eye Lights] by + 1

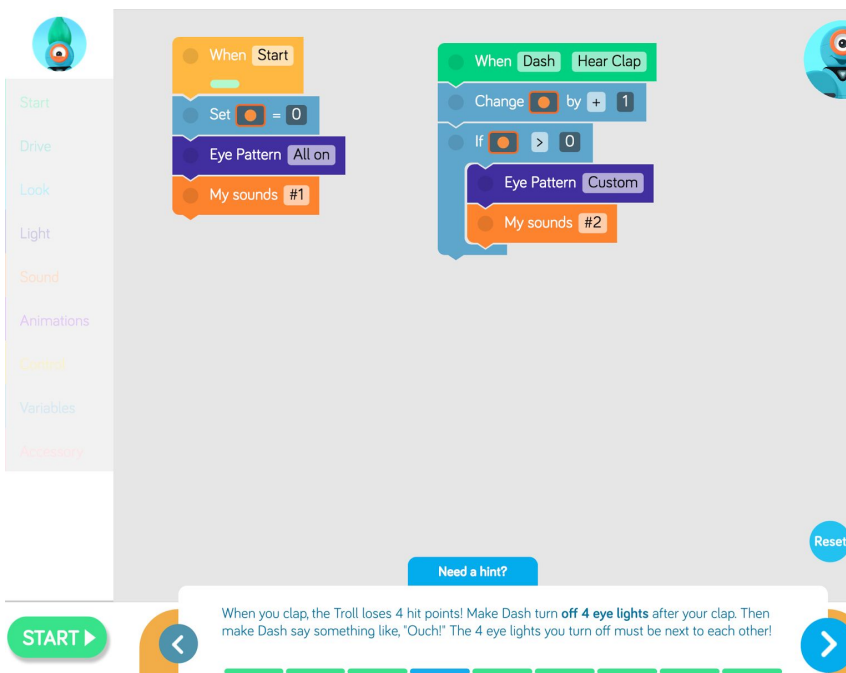
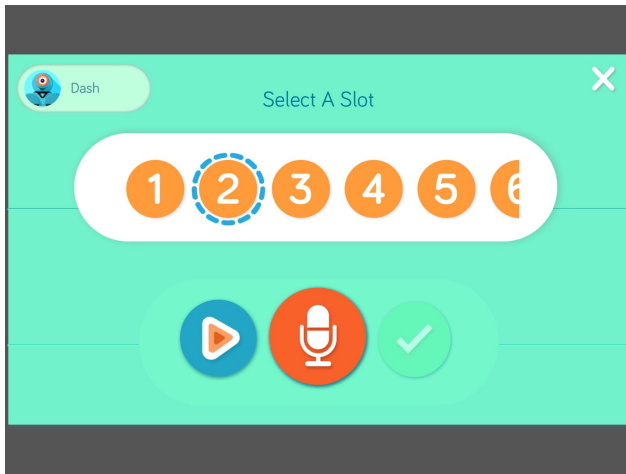
Need a hint?

START ▶

◀ ▶

Reset

When you clap, the Troll loses 4 hit points! Make Dash turn off 4 eye lights after your clap. Then make Dash say something like, "Ouch!" The 4 eye lights you turn off must be next to each other!



Challenge 5

The Troll reacts every time you clap, because those numbers are all **greater than 0**. Edit the **If** blocks so that the Troll only reacts if **the 1st time you clap**.

Start

Drive

Look

Light

Sound

Animations

Control

Variables

Accessory

When Start

Set = 0

Eye Pattern All on

My sounds #1

When Dash Hear Clap

Change by + 1

If = 1

Eye Pattern Custom

My sounds #2

Reset

Need a hint?

START ▶

◀ ▶

The Troll reacts every time you clap, because those numbers are all **greater than 0**. Edit the If block so that the Troll only reacts **the first time you clap**.

Challenge 6

Now the Troll needs a reaction for the 2nd time you clap. Follow the pattern and add a new **sound**. Maybe the Troll will say something like, "You got me!"

Dash

Select A Slot

1 2 3 4 5 6

▶ 🎤 ✓

When Start

- Set \bullet = 0
- Eye Pattern All on
- My sounds #1

When Dash Hear Clap

- Change \bullet by + 1
- If \bullet = 1
 - Eye Pattern Custom
 - My sounds #2
- If \bullet = 2
 - My sounds #3

Need a hint?

The second time you clap, the Troll's hit points go down to 4. The Troll is getting weaker! What should you add to the program to make that happen?

START ▶

◀ ▶

Reset

Challenge 7

The second time you clap the Troll's hit points go down to 4. The Troll is getting weaker. What should you add to the program to make that happen?

Eye Pattern Custom

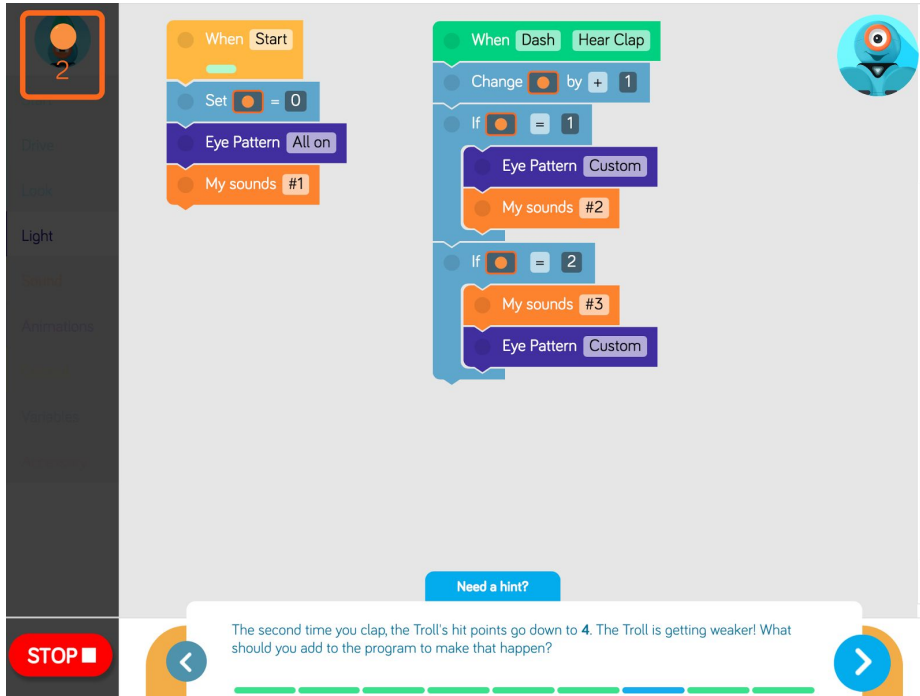
Need a hint?

The second time you clap, the Troll's hit points go down to 4. The Troll is getting weaker! What should you add to the program to make that happen?

START ▶

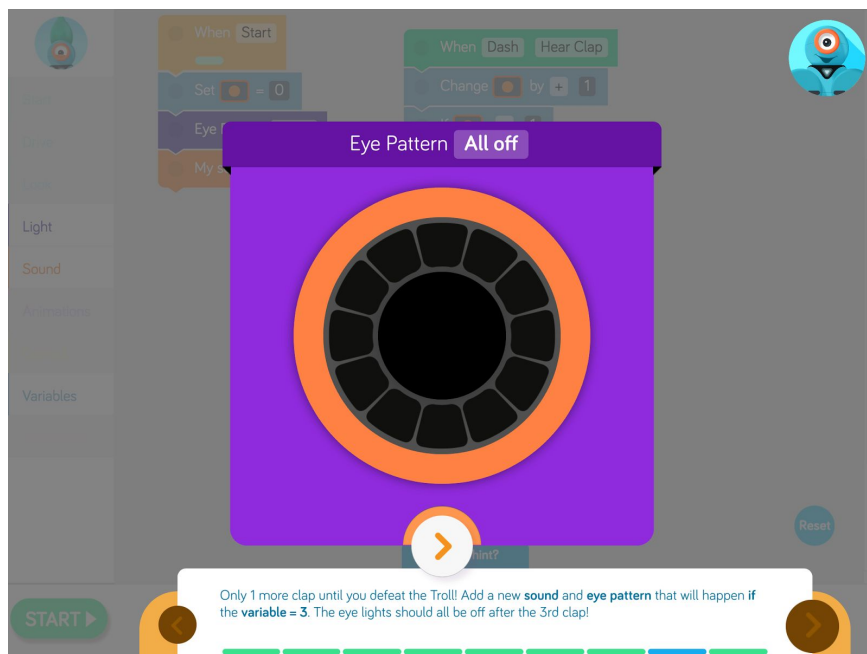
◀ ▶

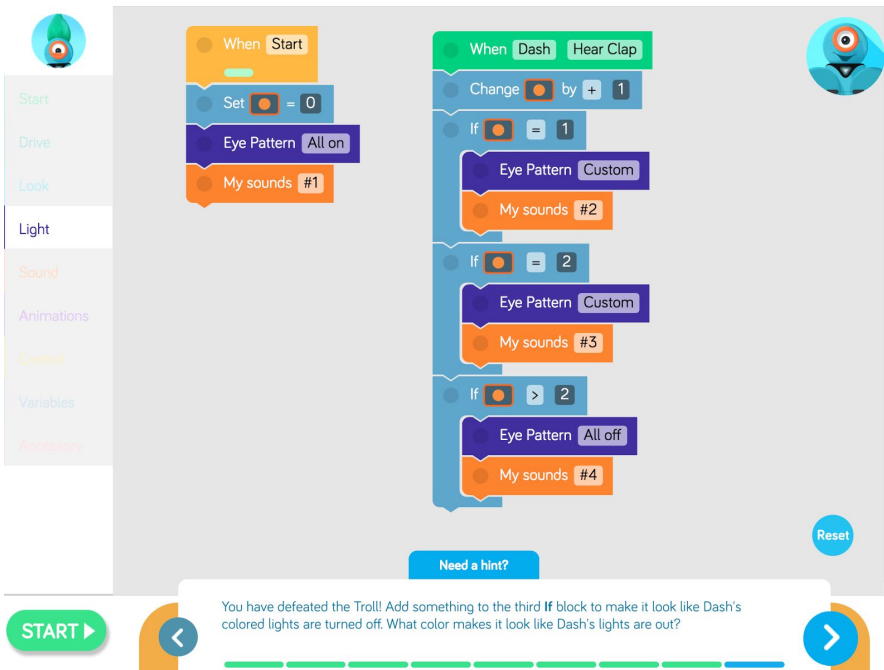
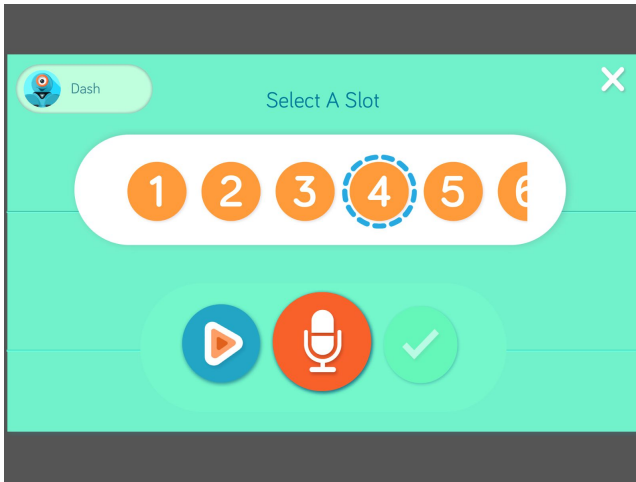
Reset



Challenge 8

Only 1 more clap until you defeat the Troll. Add a new **sound** and **eye pattern** that will happen **if** the **variable = 3**. The eye lights should all be off after the third clap.





Challenge 9

You have defeated the Troll. Add something to the third **If** block to make it look like Dash's colored lights are turned off. What color makes it look like Dash's lights are out?

Light

Animations

START ▶

Need a hint?

Reset

You have defeated the Troll! Add something to the third If block to make it look like Dash's colored lights are turned off. What color makes it look like Dash's lights are out?

Start

Drive

Look

Light

Sound

Animations

Control

Variables

Accessory

Reset

Need a hint?

START ▶

You have defeated the Troll! Add something to the third If block to make it look like Dash's colored lights are turned off. What color makes it look like Dash's lights are out?