

# Police Officer Dash

## Summary

### Description

Police Officer Dash is on duty. When a criminal comes around, Dash springs into action and goes after the intruder.

### Learning Procedure

Over the course of **6 challenges**, your students will add onto a program that will include customized eye patterns to create a bold expression for Officer Dash, repeating blocks of red and blue flashing lights to emulate a police car, recorded warnings for robot Dash to say to the criminal, siren sound effects, and programmed conditional (pressing the top button in the when block) which will cue Dash's flashing red and blue lights.

## Concepts Covered

- **Eye Pattern** - students will edit 12 LEDs in the **Eye Pattern** command to emulate a bold expression.
- **When block** - students will create a program with a cue, e.g., When Dash's top button is pressed, the robot will play a recorded sound, e.g., "Stop, police!"
- **Sounds** - students will record new expressions for the robot to say using the record button in the **My sounds** block.
- **Sound effects** - students will add a **pre-programmed** sound from the **Transport** menu in i.e., siren.
- **All Lights** - students will edit **All Lights** in Dash's ears and chest to turn different colors, e.g., black, red and blue.
- **Repeat block**
  - students will edit the number of times a series of commands repeat.
  - students will nest **All Lights** and **Eye Pattern** blocks inside to repeat.
- **Drive** - students will edit the speed of **Forward** block using the **Accelerometer**.

## In App

### Vocabulary

- **Loops:** a set of instructions that a computer program repeats over and over again
- **Animations:** to bring to life
- **Eye Patterns:** an arrangement of lights
- **Repeat Block:** an action, event or task that when once completed will start again

## Reflection Questions

1. What did you find to be the most difficult part of the Police Officer Dash puzzle? What strategy did you use to complete it? (Examples: teamwork, prior knowledge, guess and check)
2. Explain how the **Repeat** command can simplify programming?
3. What might happen if students A and B create two different “bold expressions” for Officer Dash? How does it affect the program? Try it and see.
4. Could we have used the same **Repeat** block with different colored lights? What other color patterns can you create?
5. Identify two different ways that we can program sound with Dash. (Answers: pre-programmed, new recordings). When would it be necessary to record new sounds?

## Activity Extensions

### 1. Police Power

Is Police Officer Dash ready to go after the next criminal who comes along? Try making the flashing light repeat 3 times instead of 2. What other commands can you add to make Dash an even better police officer? Explain how any changes you make to the program improve Police Officer Dash’s performance.

### 2. Red Light Green Light 1-2-3

Officer Dash is a very careful driver. He slows down before a yellow light, stops for a red light and continue driving after the light turns green. **Add to** the Police Officer Dash Puzzle, so that Dash will stop “**when**” something happens. Create three traffic lights out of cardboard and color paper: one yellow, one red and one green in that order. Program Police officer Dash to respond appropriately to each light when cued. Which cues would work best for the red light? Yellow light? Green light? (Hints: button on top of head, sound or distance sensors, clapping) Why?

### 3. Suspicious Suspects

Tell students that a crime has been committed in Wonderville and there are 2 suspects being held for questioning. Discuss the meaning of the word suspect. Have students work together in small groups to write a brief narrative describing the crime, the victims and the two suspects. Tell students to predetermine the guilty party, but don’t tell anyone else who it is. In the “Create New” section of the Blockly App, students will program Officer Dash to interview each suspect, asking one question at a time. Officer Dash will not move onto the

next question until the suspect has completed his or her answer. Students will need to program a cue for each **“when”** command, so that Dash will know when to ask the next question. Example: When/Top Button Dash will say, “Where were you on the night of April 27th?”

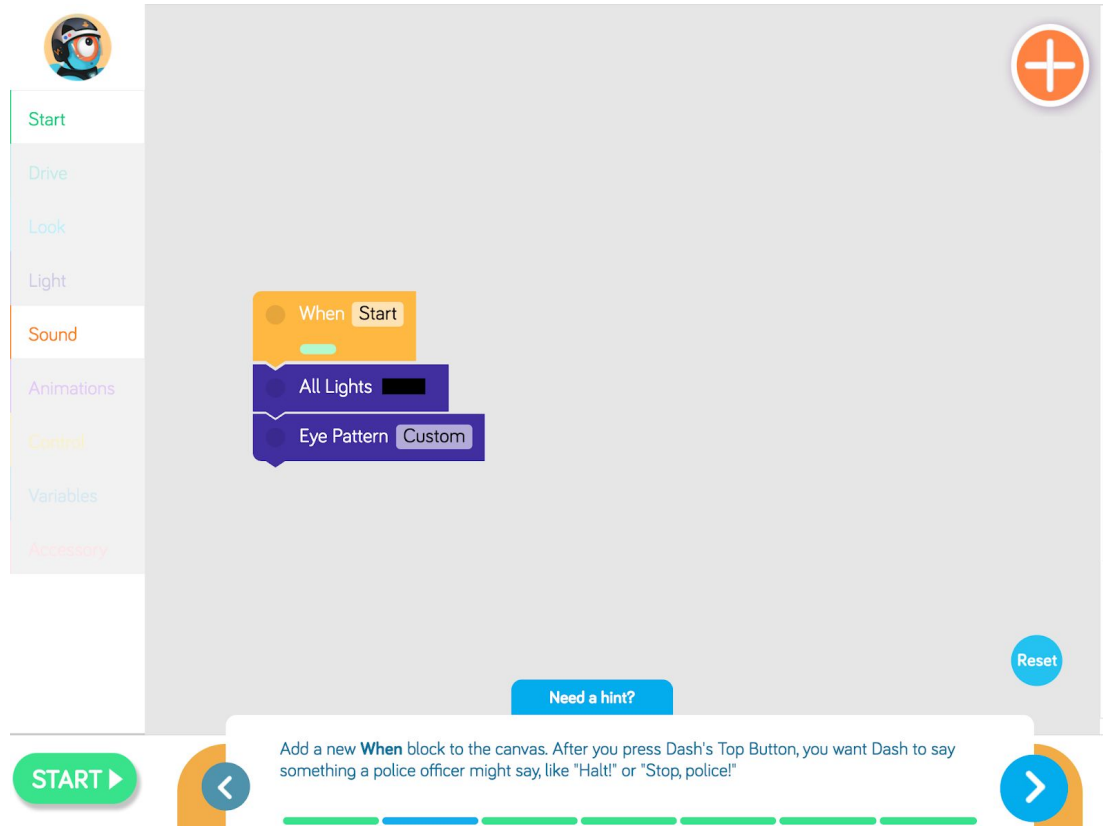
#### **4. Law Abiding Programmers**

Police officers and citizens must follow the law. Laws are rules that citizens of a community must follow. Create a Google Slideshow with sounds and images about the rules of programming you’ve learned in the puzzles you’ve completed so far. *Hint: 1. Sound effects are located in the Sound bank. 2. There are two ways to create a sound: a. selecting a pre-programmed sound from the Sound menu or recording a new sound in the recorder.* The theme of your slideshow must be related to Police Officer Dash and the U.S. law. Insert free images, text and sound effects from the internet.

# Solutions

## Challenge 1

Police Officer Dash is standing guard. When a criminal come around, Dash springs into actions and goes after the intruder. Police Office Dash needs a bold expression. Complete the eye pattern.



The image shows a coding interface for a character named Police Officer Dash. On the left is a vertical menu with categories: Start, Drive, Look, Light, Sound, Animations, Control, Variables, and Accessory. The 'Sound' category is currently selected. The main workspace is a large grey rectangle. In the top-left corner of the workspace is a small circular icon of Dash's head. In the top-right corner is a large orange circle with a white plus sign. In the bottom-right corner is a blue circle with the word 'Reset'. In the center of the workspace, there is a script block starting with a yellow 'When Start' block, followed by a purple 'All Lights' block with a black rectangle, and then a purple 'Eye Pattern' block with a 'Custom' button. Below the workspace is a 'Need a hint?' button. At the bottom of the interface is a green 'START' button with a right arrow, a blue left arrow button, a blue right arrow button, and an orange right arrow button. A white hint box is open, displaying the text: 'Add a new **When** block to the canvas. After you press Dash's Top Button, you want Dash to say something a police officer might say, like "Halt!" or "Stop, police!"'. Below the hint box is a progress bar consisting of seven segments, with the first three being green and the last four being blue.

## Challenge 2

Add a new **When** block to the canvas. After you press Dash's Top Button, you want Dash to say something a police officer might say, like "Halt!" or "Stop, police!"

The image shows a block editor interface for a Dash robot project. On the left is a vertical sidebar with categories: Start, Drive, Look, Light, Sound, Animations, Control, Variables, and Accessory. The 'Sound' category is selected. The main canvas contains two block sequences. The first sequence starts with a 'When Start' block (yellow), followed by 'All Lights' (black) and 'Eye Pattern' (Custom) blocks (purple). The second sequence starts with a 'When Dash Top Button' block (green), followed by a 'My sounds #1' block (orange). A 'Reset' button is in the bottom right of the canvas. A 'Need a hint?' button is at the bottom center. A hint box at the bottom contains the text: 'Add a new **When** block to the canvas. After you press Dash's Top Button, you want Dash to say something a police officer might say, like "Halt!" or "Stop, police!"'. Navigation buttons include a green 'START' button with a right arrow, a blue left arrow, and a blue right arrow.

### Challenge 3

After Dash warns the criminal, Dash's siren should go off. Can you find a siren to **add to the program** for Dash to use?

The image shows a Scratch-like programming environment for Dash the robot. On the left is a category menu with options: Start, Drive, Look, Light, Sound (highlighted), Animations, Control, Variables, and Accessories. The main workspace contains two scripts. The first script starts with a 'When Start' event block, followed by 'All Lights' and 'Eye Pattern' blocks. The second script starts with a 'When Dash Top Button' event block, followed by 'My sounds #1' and 'Transport Fire Siren' blocks. At the bottom, there is a 'START' button, a progress bar with seven segments (the first is blue, the others are green), and a 'Need a hint?' button. A challenge text box at the bottom reads: 'After Dash warns the criminal, Dash's siren should go off. Can you find a siren to **add to the program** for Dash to use?'. A 'Reset' button is also visible in the bottom right corner of the workspace.

## Challenge 4

Now for the flashing lights. Rearrange the blocks so the lights flash **red**, the **blue** immediately after the **siren**. The eye patterns are already set up to change with the colors.

The image shows a block editor interface for a challenge. On the left is a vertical sidebar with categories: Start, Drive, Look, Light, Sound, Animations, Control, Variables, and Accessory. The main workspace contains two scripts. The first script starts with a 'When Start' block, followed by 'All Lights' (black) and 'Eye Pattern' (Custom). The second script starts with a 'When Dash Top Button' block, followed by 'My sounds' (#1), 'Transport' (Fire Siren), 'All Lights' (red), 'All Lights' (blue), and two 'Eye Pattern' (Custom) blocks. A 'Reset' button is in the bottom right. A hint box at the bottom says: 'Now for the flashing lights. Rearrange the blocks so the lights flash red, then blue immediately after the siren. The eye patterns are already set up to change with the colors.' Below the hint box is a progress bar with six segments, the fourth of which is blue.

START ▶

◀ ▶

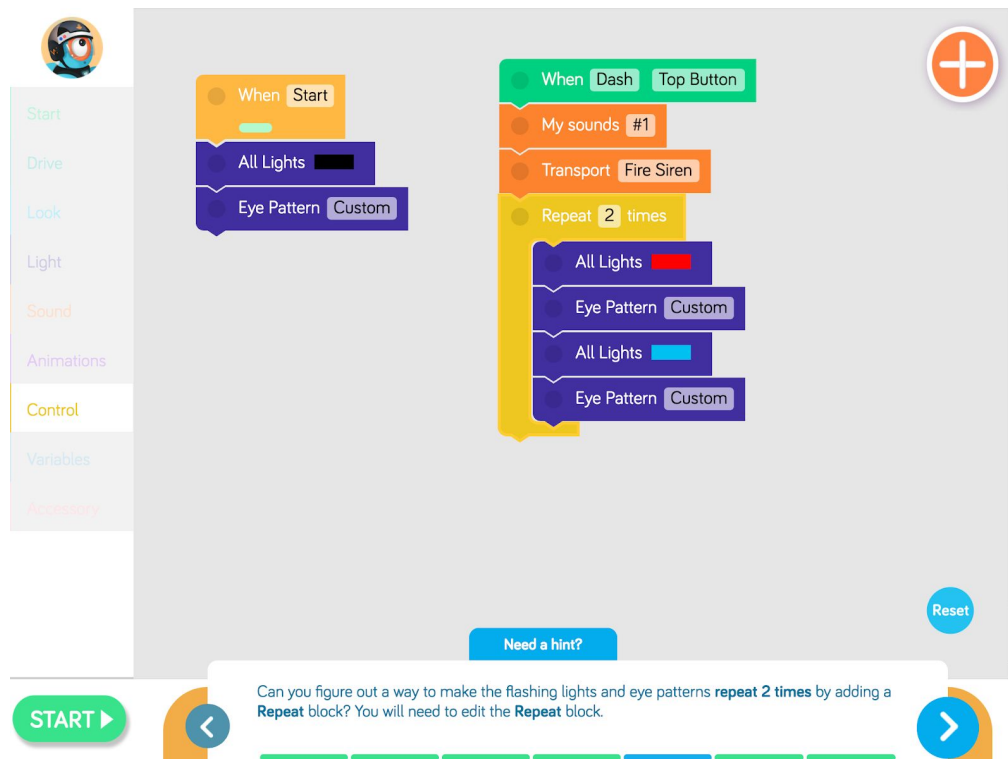
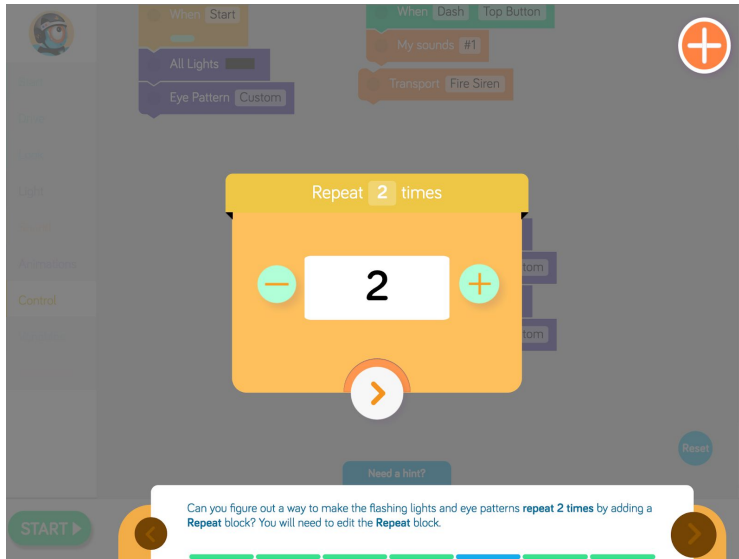
Need a hint?

Now for the flashing lights. Rearrange the blocks so the lights flash **red**, then **blue** immediately after the **siren**. The eye patterns are already set up to change with the colors.

Progress bar: 6 segments, 4th segment is blue.

## Challenge 5

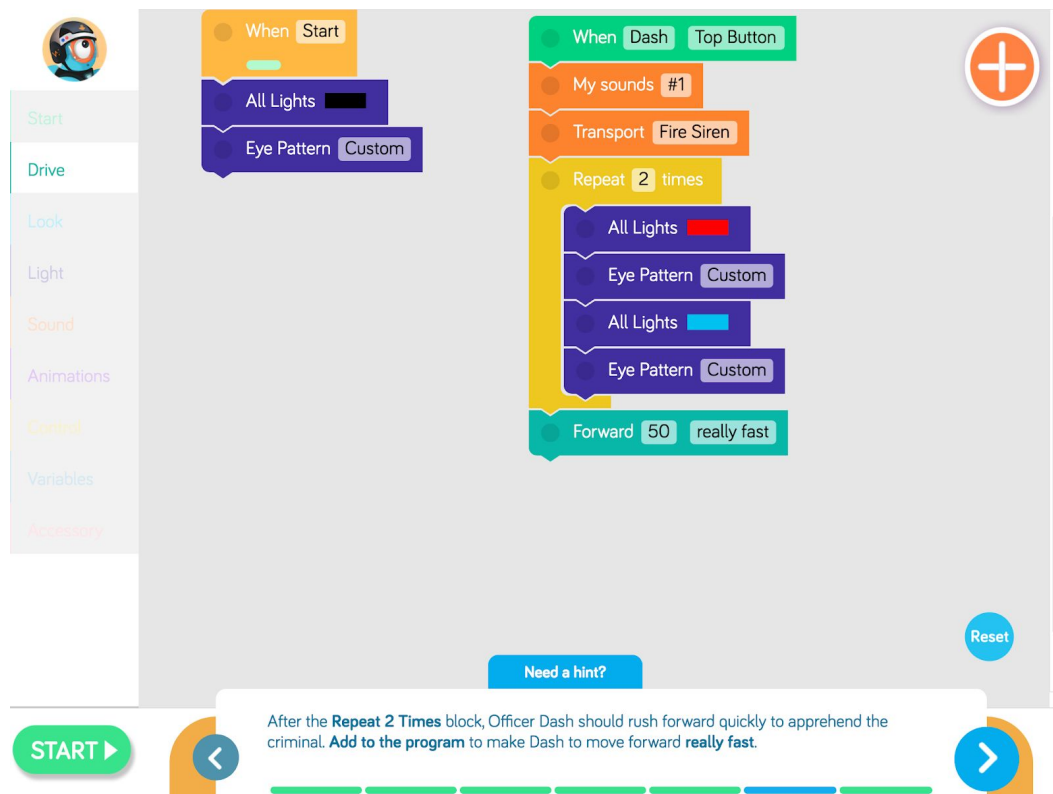
Can you figure out a way to make the flashing lights and eye patterns **repeat 2 times** by adding a **Repeat** block? You will need to edit the **Repeat** block.





## Challenge 6

After the **Repeat 2 Times** block, Officer Dash should rush forward quickly to apprehend the criminal. **Add to the program** to make Dash move forward **really fast**.



# Educational Standards

## **CC Mathematical Practices:**

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

## **CC Math Standards:**

4.OA.C.5

## **CC Language Arts Standards**

RI.2.5; RI.2.10; RI.3.4; RI.3.10; RI.4.4; RI.4.10; RI.5.4; RI.5.10

## **CSTA K-12 Computer Science Standards**

- 1A-DA-05 Store, copy, search, retrieve, modify, and delete information using a computing device and define the information stored as data.
- 1A-AP-08 Model daily processes by creating and following algorithms (sets of step-by-step instructions) to complete tasks.
- 1A-AP-10 Develop programs with sequences and simple loops, to express ideas or address a problem.
- 1A-AP-11 Decompose (break down) the steps needed to solve a problem into a precise sequence of instructions.
- 1B-AP-08 Compare and refine multiple algorithms for the same task and determine which is the most appropriate.
- 1B-AP-10 Create programs that include sequences, events, loops, and conditionals.
- 1B-AP-11 Decompose (break down) problems into smaller, manageable subproblems to facilitate the program development process.
- 1B-AP-12 Modify, remix, or incorporate portions of an existing program into one's own work, to develop something new or add more advanced features.

## **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.
- 3-5-ETS1-2 Generate and compare multiple possible solutions to a problem based on how well