

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.

Standard: CC MP 1-8

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?

Standard: CC MP 1-8

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?”

Standards: 3.3.B; 4.3.B; 5.3.B

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.

Standards: W.1.2; W.2.2; W.3.2; W.4.2; W.5.2.

Educational Standards

CC Mathematical Practices:

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

CC Math Standards:

4.OA.C.5

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.
- 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

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 the Dash Blockly programming environment. On the left is a category menu with options: Start, Drive, Look, Light, Sound, Animations, Control, Variables, and Accessory. The main canvas contains a script starting with a 'When Start' block, followed by 'All Lights' and 'Eye Pattern Custom' blocks. A 'Need a hint?' button is visible in the bottom right of the canvas. At the bottom of the screen, a 'START' button is on the left, and a hint box is centered. The hint box 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!"'. Below the hint box is a progress bar with seven segments, the first of which is highlighted in green. Navigation arrows are also present.

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 screenshot shows the Dash robot programming environment. On the left is a vertical menu with categories: Start, Drive, Look, Light, Sound, Animations, Control, Variables, and Accessory. The 'Sound' category is selected. The main canvas contains two script blocks. The first block is a 'When Start' block (orange) with a 'When Start' block (orange) containing an 'All Lights' block (black) and an 'Eye Pattern' block (purple) set to 'Custom'. The second block is a 'When Dash Top Button' block (green) containing a 'My sounds' block (orange) set to '#1'. At the bottom, there is a 'Need a hint?' button and a 'Reset' button. A 'START' button is on the left, and navigation arrows are on the right. A hint box at the bottom reads: '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!"'

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?

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.

When Start

- All Lights []
- Eye Pattern Custom

When Dash Top Button

- My sounds #1
- Transport Fire Siren
- All Lights []
- All Lights []
- Eye Pattern Custom
- Eye Pattern Custom

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.

START

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.

When Start

- All Lights []
- Eye Pattern Custom

When Dash Top Button

- My sounds #1
- Transport Fire Siren
- Repeat 2 times
 - All Lights []
 - All Lights []
 - Eye Pattern Custom

Need a hint?

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.

START

When Start

All Lights

Eye Pattern Custom

When Dash Top Button

My sounds #1

Transport Fire Siren

Repeat 2 times

All Lights

Eye Pattern Custom

All Lights

Eye Pattern Custom

Need a hint?

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.

START

Reset

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**.

Forward 50 fast

All Lights

Eye Pattern Custom

When Dash Top Button

My sounds #1

Transport Fire Siren

Forward 50 cm really fast

Need a hint?

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

START

Reset

When Start

- All Lights []
- Eye Pattern Custom

When Dash Top Button

- My sounds #1
- Transport Fire Siren
- Repeat 2 times
 - All Lights []
 - Eye Pattern Custom
 - All Lights []
 - Eye Pattern Custom
- Forward 50 really fast

Need a hint?

START ▶

◀ ▶

Reset

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