# Sleeping Dash Prank

## Summary

### **Description**

In this puzzle, students will program Dash to play a prank, appearing as if asleep (sleep mode or powered down) and then surprising observers by suddenly waking up.

### **Learning Procedure**

Students will learn how to edit variables, so that when these conditions are met, Dash will turn on lights, make sounds and say something. The random variables will be set in various ways throughout **7 challenges:** as a wide set of numbers, narrow set of numbers and an exact number.

## **Concepts Covered**

- Eye Pattern students will learn to turn off Eye Pattern blocks.
- All Lights
  - o students will edit **All Lights** off to appear as if Dash is asleep.
  - o students will edit color of All Lights, e.g., red.
- When block students will set an event in the When block, e.g., Obstacle in Front.
- **Set block** students will learn how to edit a set of random variables in the **Set** block, e.g., 1-3.
- **Variables** students will learn how the value of a variable can be selected from a random set of numbers.
- If block
  - students will learn to create a statement with a variable.
  - students will understand that when an IF statements is true, a command is executed.

## In App

### Vocabulary

Variable: a value that can change

Random number: generation of a number in no particular order

**Set block:** assigns a value to a variable. This block creates the variable if it does not exist

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

### **Reflections Questions**

- 1. What type of program would call for you to edit the random variable to be selected from a wide range of numbers, .e.g., (1-100)?
- 2. What type of program would call for you to edit the random variable to be selected from a narrow range of numbers, .e.g., (1-3)?
- 3. What type of program would call for you to edit a specific value for an action, e.g., Sound will play when variable = 3.
- 4. What would happen if a random value was set in the **If** block, e.g., 5, but that number is NOT randomly selected?
- 5. If you were to play the Sleeping Dash program 3 times, what is the probability that it would select the number 2? If you were to play the program 6 times what is the probability it will select 2?

## **Activity Extensions**

Feeling sleepy? Great, because it's time for Dash's Sleepover Party. These fun games will reinforce the concept of probability with students.

### 1. M&M Madness

Time for Dash's Slumber party to begin. Dash is handing out M&M's, your favorite! Have students work in pairs. Explain that the Mars Corporation produces M&M's in 6 different colors: blue, brown, green, orange, red, and yellow. In this activity, students will be challenged to determine the probability that a given color will be picked from their candy bag. Explain that the words "most likely" and "least likely" relate to probability. Have students count the total number of M&Ms and then divide into different color piles. Students record the total and individual number of each color in a table. Which color(s) do they have the most of? least of? Explain how to create a fraction to represent each color's relationship to the whole. The numerator is the number of a particular color and the denominator is the total number of M&M's in the bag. Ask students to compare the relationship between the numerator and the denominator. The **more likely** something is, the closer to the value of one the probability will be. Standard: CC MP 1-8; 3.NF.A.1

#### 2. Dash the Prankster

Now you have a robot prankster. Challenge students to enhance their Dash Prankster program with other special effects that Dash can do after pretending to wake up. Require students to program a random set of variables in the Set block, e.g., 1-5, so the unsuspecting passer by never knows when Dash will say or do something next!

Standard: CC MP 1-8

#### 3. Hundred Yard Dash

Are your students ready for a Dash race? For this activity, students will need more than one Dash robot. Each team will have one Dash-car in the race. Using one die, each team rolls a die over 8 times. Each time, the team must program Dash to move forward that exact number of cm. Before beginning, ask students which number they predict the die will land on most often. Have one student from each group record the number of times the die actually lands on each number in a data table. While programming: Students must use the numbers they've been randomly given by the die toss, but may use any of the programming blocks they've learned in order to improve their chances of winning, e.g., using loops and functions. Now have students race their Dash-cars. The team whose Dash-car travels the farthest is the winner. Discuss the results of the random die-toss across groups. Standard: CC MP 1-8

#### 4. Dash is Quite a Card!

It's almost time for bed and Momma Dash suggests a quiet game of cards. In this activity, students will continue to explore probability and beating the odds. Begin with a 52 card deck, but then pull all of the Kings and number cards from the deck that are less than 6 and place them in one pile. Each group of 3-4 players should have 24 cards and 4 Kings. Explain that ¼ of the cards are Kings. That means you have a one in six chance of drawing a King. Have each group of students shuffle their cards, spread them out face down, and then have one player draw 6 cards. Record how many Kings are drawn. Shuffle and repeat with each player in the group. The student with the most Kings wins. Ask if any of the students beat the odds. If a student pulled more than one King, he or she has beaten the odds. Beyond: Try this online Random Numbers Spinner with students. <a href="http://www.visnos.com/demos/random-spinners">http://www.visnos.com/demos/random-spinners</a> Standards: 1.MD.C.4; 3.NF.A.1

### **Educational Standards**

#### **Common Core Mathematical Practices**

- 1. Make sense of problems and persevere in solving them
- 2. Reason abstractly and quantitatively
- 3. Construct viable arguments and critique the reasoning of others
- 4. Model with mathematics
- 6. Attend to precisions

**NCTM Standards and Expectations** \*Although probability is not begun until 7th grade in the CC, it is an important part of problem solving and reasoning in the NCTM.

- Compute probabilities for simple compound events, using such methods as organized lists, tree diagrams, and area models.
- Collect data using observations, surveys, and experiments.
- Propose and justify conclusions and predictions that are based on data and design studies to further investigate the conclusions or predictions.

- Describe events as likely or unlikely and discuss the degree of likelihood using such words as certain, equally likely, and impossible.
- Predict the probability of outcomes of simple experiments and test the predictions.

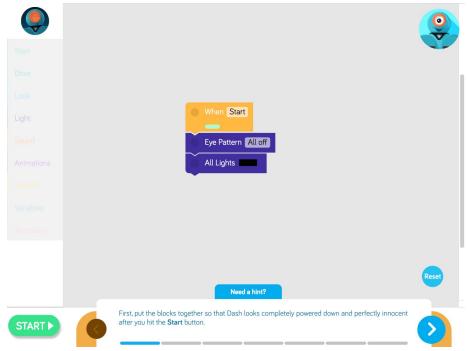
#### **CSTA K-12 Computer Science Standards**

- 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.

## **Solutions**

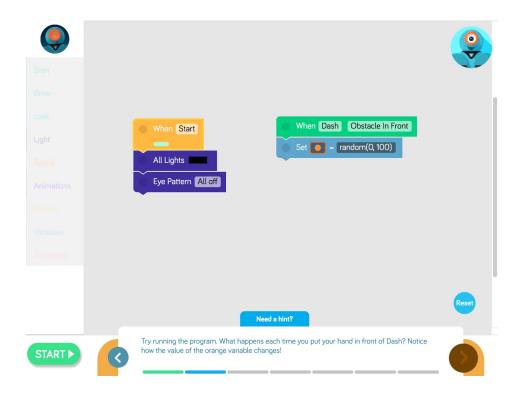
### Challenge 1

First, put the blocks together so that Dash looks completely powered down and perfectly innocent after you hit the Start button.



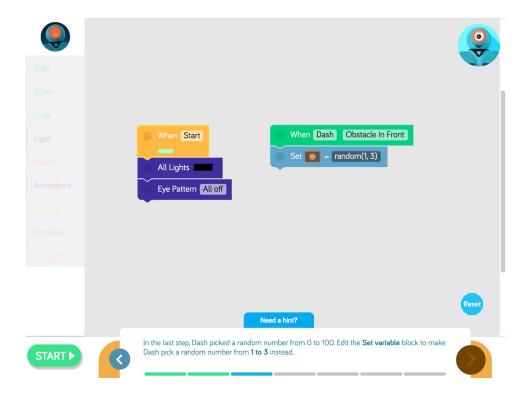
### Challenge 2

Try running the program. What happens each time you put your hand in front of Dash? Notice how the value of the orange variable changes.



In the last step, Dash picked a random number between 0-100. Edit the **Set variable** block to make Dash pick a random number from **1 to 3** instead.





When Dash detects an **obstacle in front**, make Dash turn **red**, turn eye lights **on**, look **up** and say something, look **straight**, and then turn all lights **off** to go back into sleep mode.



Now add an **If** block around the **sound** block. Edit the **If** block so that Dash does the sound you just recorded **if** the **variable = 1**.



### Challenge 6

Add a second **If** block and **My sounds** block right below the other **If** block. Record a new sound. Program Dash to say **sound 1** if the random number **= 1** and **sound 2** if the random number **= 2**.



Add to the program. Make Dash do weird beeps if the random number = 3.

