F 2.1 Variables

Road Trip!

Dash needs to get to the gas station to fill up before a big road trip!

wonder workshop

F 2.1 Variables

1. To get to the gas station, Dash first needs to **drive 65 cm**. To drive a specific distance, **set** a **variable** to 65.

2. Then have Dash **drive** that distance.

3. Almost there! Now program Dash to make a **45-degree left turn**.

4. Finally, Dash needs to **drive 35 cm**. What blocks should you use?

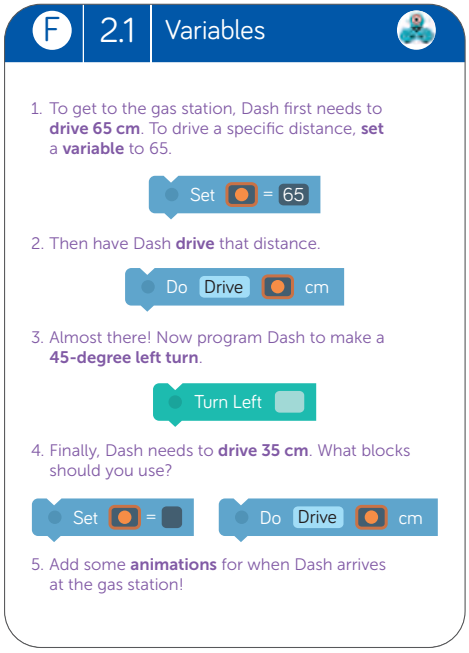
5. Add some **animations** for when Dash arrives at the gas station!

Road Trip!

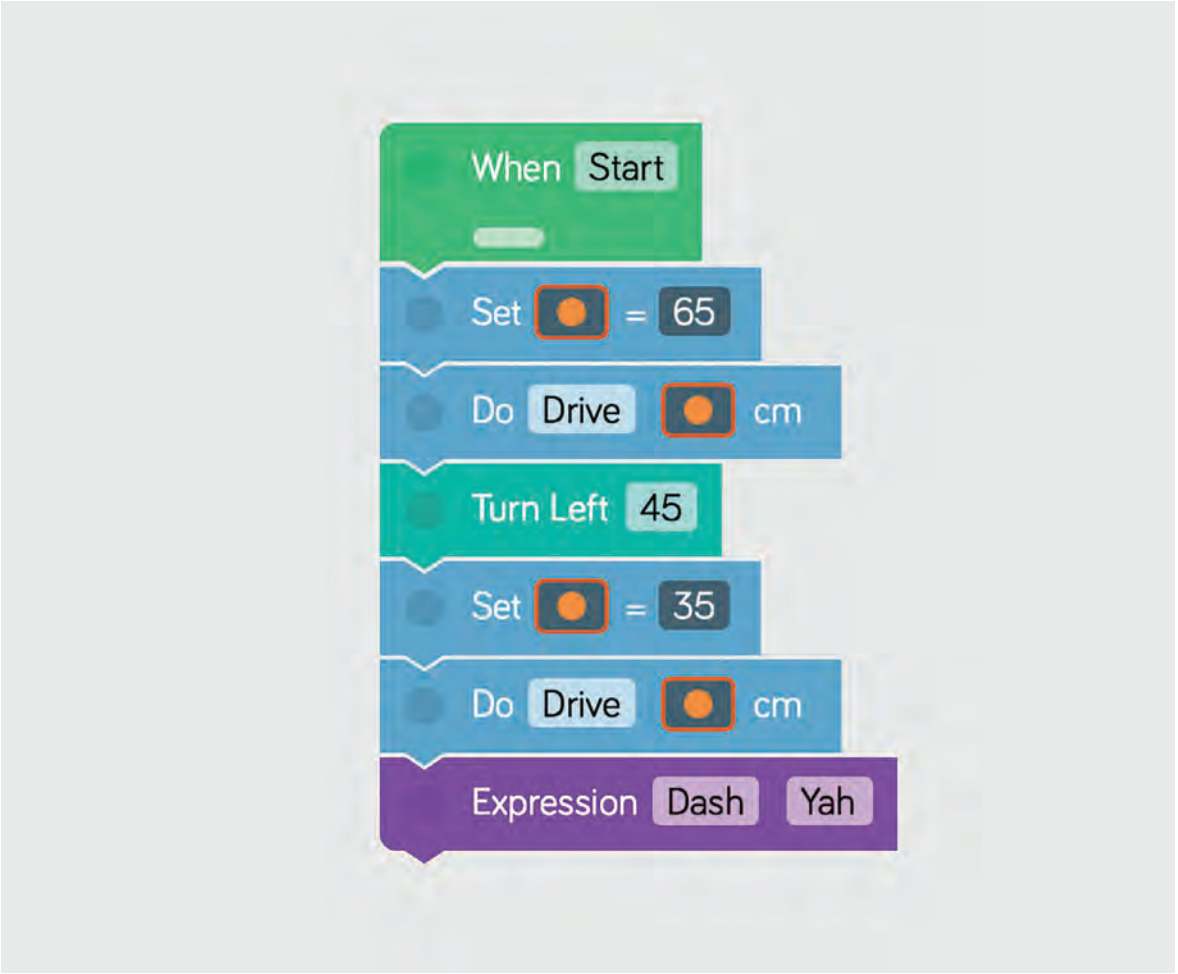
Time: 15 minutes

Hints

- You can find the **Set Variable** block and the **Do Drive Variable** block in the **Variables** menu.
- **Variables** allow us to store specific information in a program. In the **Blockly** app, the variables are represented by different fruits: orange, banana, apple, cherry, and watermelon.
- Make sure you use the same variable for the **Do Drive Variable** and **Set Variable** blocks.
- You will need **2 Set Variable** and **2 Do Drive** Variable blocks for this program because Dash needs to travel **2 distances**.



Suggested Solution:



Discussion Questions

1. What if you wanted to use a different variable to set the **35 cm distance** in the challenge? How would you change the program to include a second variable?

2. How could variables be used in other programs? For example, how could you use variables to keep track of how often something happens to Dash or Dot?

Cross-Curricular Connections

MATH

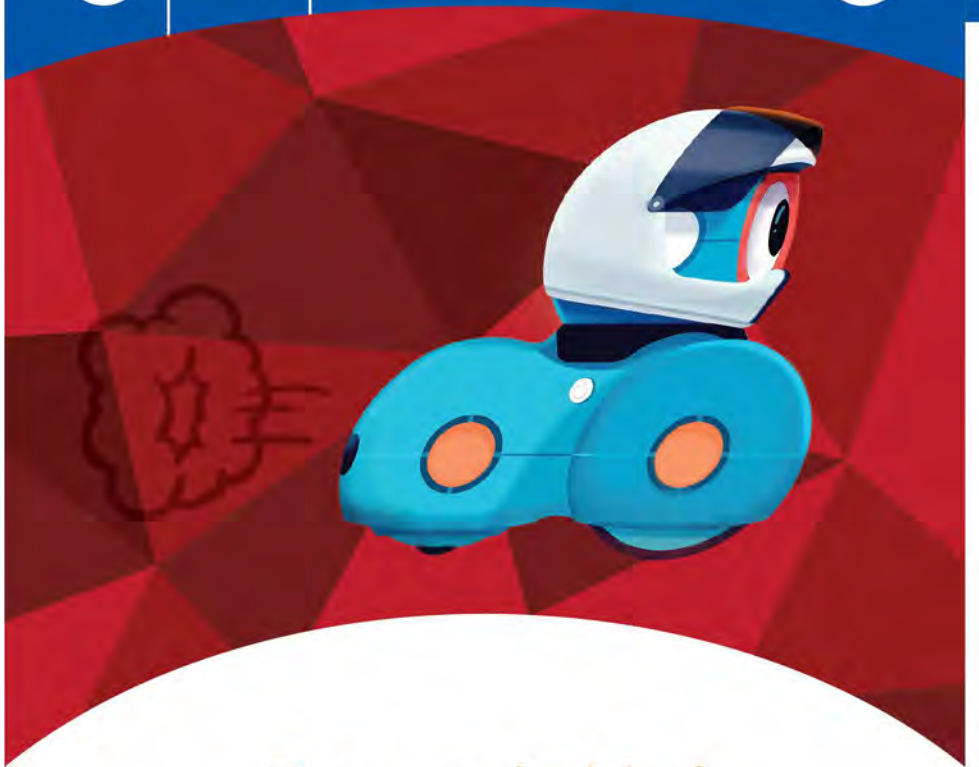
- Have students use a coordinate grid to mark Dash's starting point and the location of the gas station. Then have them plot out a path from Dash to the gas station and use coordinate numbers to describe the route. (CCSS.MATH.5.G.A.1)

- Have students design a new path to the gas station using at least 2 acute turns and 2 obtuse turns. Then have them calculate the sum of all of the angles Dash turned on the path. (CCSS.MATH.4.MD.C.5, CCSS.MATH.4.MD.C.6, CCSS.MATH.4.MD.C.7)

ELA

- Have students write a narrative that describes why and where Dash is going on the big road trip. Encourage them to use descriptive and sensory details. (CCSS.ELA-W.5.3)

NOTES:



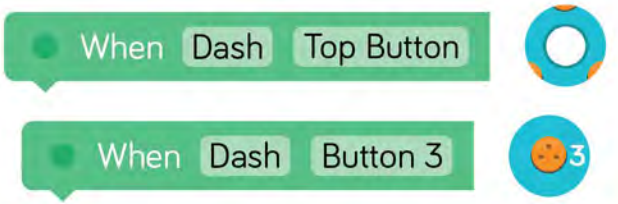
Pump It Up!

Dash needs to fill up the gas tank before heading out on the open road!

wonder workshop

F 2.2 Variables

1. Let's help Dash get ready for the road trip! Start with **2 When** blocks:



2. **When** the **Top Button** is pressed, use a **variable** to help fill up Dash's tank,

and then use the **eye lights** to show how much gas is in the tank.

3. **When Button 3** is pressed, program Dash to make an engine **sound** and **drive** the distance of the **variable**. Then **set** the variable back to **0**.

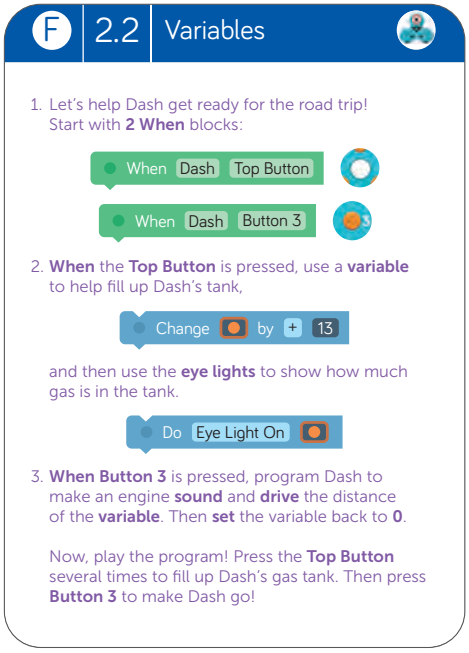
Now, play the program! Press the **Top Button** several times to fill up Dash's gas tank. Then press **Button 3** to make Dash go!

Pump It Up!

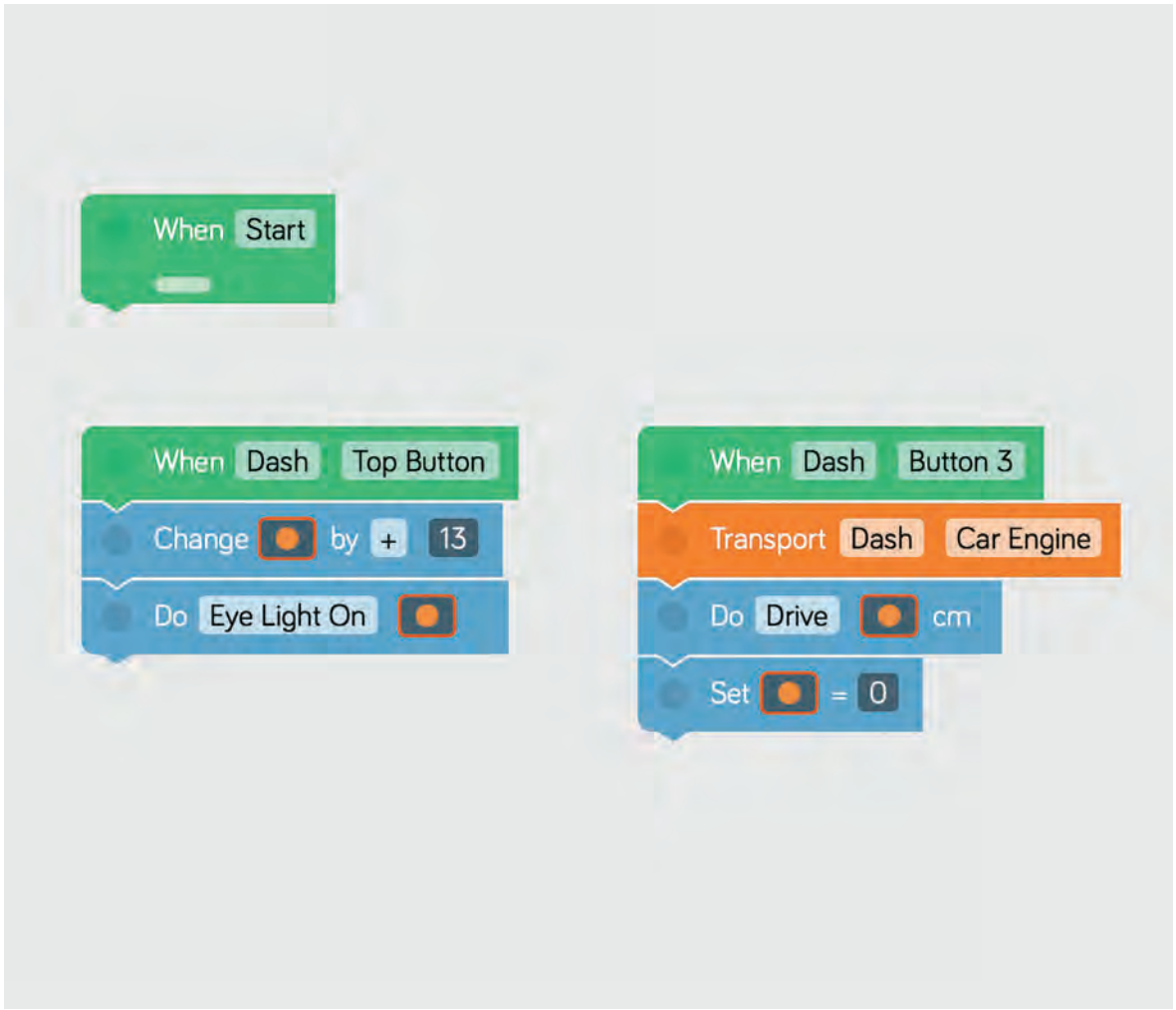
Time: 20 minutes

Hints

- To change the variable, tap the **Change Variable** block and enter **13** into the number pad.
- To select **Eye Light On**, tap on the **Do** block and select the last item. Then Dash's eye lights will show the variable number.
- Make sure you use the same variable for the **Change Variable**, **Do Eye Light On Variable**, **Do Drive Variable**, and **Set Variable** blocks.



Suggested Solution:



Discussion Questions

1. The **Do Eye Light On** Variable block uses Dash's eye lights to show the variable number. Why do you think the challenge has us add **13** to the variable each time the **Top Button** is pressed? (Hint: There are 12 eye lights. Each eye light represents a number. The top light represents the number 0 and then increases clockwise. The **Do Eye Light On Variable** block divides the **variable** by 12 and shows the remainder. For example, when the variable is 13, 13 ÷ 12 = 1 with a remainder of 1. Thus, the eye light for 1 is turned on.)

2. What would happen if you changed the variable using a different operator (e.g., subtraction, multiplication, division)? How would it affect the way Dash moved after **Button 3** is pressed?

Cross-Curricular Connections

MATH

- Give students random numbers between 13-900. Then have them predict how the eye light pattern will display each of the numbers, given that the **Do Eye Light On Variable** block divides the variable by 12 and shows the remainder. (CCSS.MATH.5.G.A.1)

- Have students press the **Top Button** 10 times and record the variable number each time. Then have them predict the values of the next 10-20 presses. Students can check their answers by running the program. (CCSS.MATH.5.OA.B.3)

ELA

- In real life, Dash runs on electric power, but in the story, Dash runs on gas. Have students write an opinion piece about the pros and cons of using electric versus gas-powered vehicles. (CCSS.ELA.W.5.1)

- Have students write a narrative that describes a road trip they've taken. If the students haven't been on a road trip, have them describe where they would go and what they would do on a dream road trip. Encourage them to use descriptive and sensory details. (CCSS.ELA.W.5.3)

NOTES:

F 2.3 Variables

On the Road!

Dash is on the road but keeps running out of gas! How can you help Dash know when the gas in the tank is getting low?

wonder workshop

F 2.3 Variables

1. Program Dash so that pressing the **Top Button**:

- **adds** gas to the tank and **changes** the **variable** by **+13**.
- uses the **eye lights** to **show** how much gas is in the tank.

2. Then program Dash so that pressing **Button 3:**

- has Dash **drive forward 50 cm**.
- **lowers** the amount of gas in the tank and **changes** the **variable** by **-50**.
- checks to see **if** the **variable** is **<0**.

If the tank is empty, then:

- turn **off** all **lights**.
- have Dash make a warning **sound**.
- **set** the **variable** back to **0**.

Now Dash knows when the gas tank needs to be filled back up! Vroooom!

On the Road!

Time: 25 minutes

Hints

- Use **Challenge Card F 2.2** to help you set up this program.
- To change the variable, tap the **Change Variable** block. Then you can add, subtract, multiply, or divide the variable. To **subtract**, tap the negative sign and then tap the number you want to subtract in the key pad.
- The **If Variable** block checks the value of the variable. Tap the **If Variable** block and change the operator to < in the menu. This will check if the variable is **less than 0**.

F 2.3 Variables

1. Program Dash so that pressing the **Top Button**:
   - **adds** gas to the tank and **changes** the **variable** by **+13**.
   - uses the **eye lights** to **show** how much gas is in the tank.
2. Then program Dash so that pressing **Button 3:**
   - has Dash **drive forward 50 cm**.
   - **lowers** the amount of gas in the tank and **changes** the **variable** by **-50**.
   - checks to see **if** the **variable** is **<0**.

If < 0

If the tank is empty, then:
- turn **off** all **lights**.
- have Dash make a warning **sound**.
- **set** the **variable** back to **0**.

Now Dash knows when the gas tank needs to be filled back up! Vroooom!

Suggested Solution: