

 sphero<sup>®</sup>

**BOLT**<sup>™</sup> 

*CHALLENGE CARDS*

# BOLT+ CHALLENGE CARDS

## *WELCOME*

Each of these 20 challenge cards is a short introduction to **programming BOLT+** on the **Block Canvas**, requiring about 15 minutes. Find a digital version of the cards at: [sphero.cc/bplus-cc](https://sphero.cc/bplus-cc)

**Challenge cards are two-sided and divided into three sections:**



### **1. PROGRAM**

Rebuild a program from an image.



### **2. PROBLEM SOLVE**

Run the program and adjust the program to solve a problem.



### **3. PLAY**

Explore related prompts.

# CHALLENGE #1

## *GET ROLLIN'*

Explore the difference between:

roll 0° at 0 speed for 0s

and

roll 0° at 0 max speed for 0 cm



### 1. PROGRAM

on start program

roll 0° at 100 speed for 3s

delay for 1s

roll 180° at 100 max speed for 100cm



## CHALLENGE #1

### 2. PROBLEM SOLVE

1. Run the program.
2. Change the numbers in the blocks to make BOLT+ end where it started.

### 3. PLAY

- Set BOLT+ to **max speed**. *How fast can it go?*
- See how BOLT+ moves on different surfaces.
- Decide your favorite:

roll  at  speed for

or

roll  at  max speed for  cm

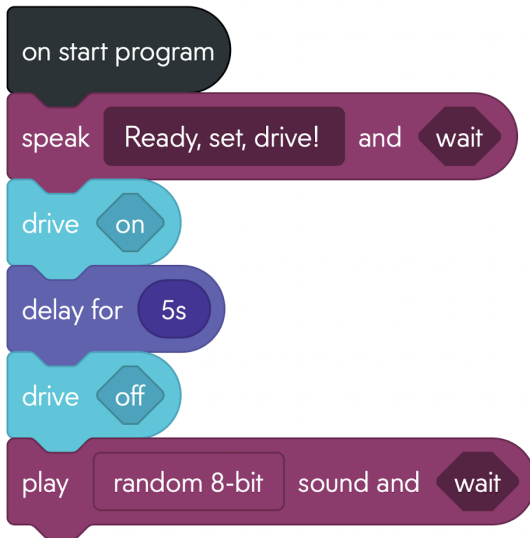
# CHALLENGE #2

## ***READY, SET, DRIVE!***

*Learn how to turn on and off drive in a program.*



### **1. PROGRAM**



**Hint:** Look at your programming device to drive your robot!



## CHALLENGE #2

### 2. PROBLEM SOLVE

1. Place BOLT+ on the floor and run the program.
2. Drive BOLT+ around your desk. *Can you make it all the way around in time?*
3. Modify the program to give you enough time.

### 3. PLAY

- Try  when drive is turned on.

*What happens?*

- Add  to make your program more fun.

# CHALLENGE #3

## ***SOUND TIMING***

*Learn to control how your BOLT+ program plays sounds.*



### **1. PROGRAM**

```
on start program
  play amusement park sound and continue
  roll 0° at 100 speed for 2s
  delay for 1s
  roll 0° at -100 speed for 2s
```

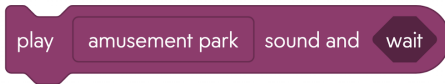
Turn the **volume up** on your programming device so you can hear the sound.



## CHALLENGE #3


### 2. PROBLEM SOLVE

1. Run the program and watch what happens.
2. Select **continue** in the sound block to change it to **wait**.



1. Run the program again. *What's the difference?*

### 3. PLAY

- Try other sounds besides 
- Play two sounds at the same time. *Can you?*

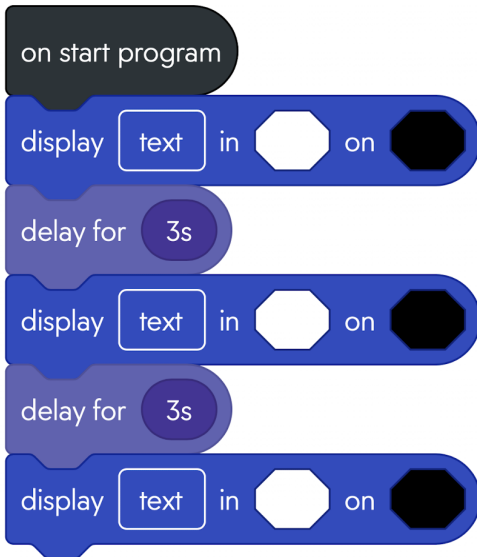
# CHALLENGE #4

# TWO TRUTHS & A LIE

Learn how to show text on BOLT+'s display.



## 1. PROGRAM



## CHALLENGE #4



### 2. PROBLEM SOLVE

1. Come up with 2 facts and 1 lie about yourself.
2. Type them into the **display text blocks**.
3. Find a friend and run the program. *Can they guess which one is the lie?*



### 3. PLAY

- Change the color of the text and the background.
- Add a block to clear the display at the end of the program.
- Program BOLT+ to tell the answer.

# CHALLENGE #5

## MATRIX PICTURES

Program your own picture with:

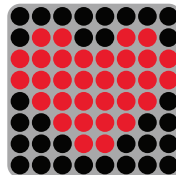
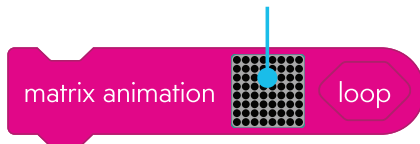


### 1. PROGRAM

on start program




**Hint:** Select the matrix, then select the heart Sphero animation.



## CHALLENGE #5

### 2. PROBLEM SOLVE

1. Run the program. *What happens?*
2. Select the  in the matrix animation editor and draw a picture.



A face?



A pet?



Something else?

### 3. PLAY

- Add frames to animate your picture.
- Try all the buttons in the matrix animation editor.



# CHALLENGE #6

## ***FADE TO BLACK***

Learn how to fade the LEDs from one color to another.

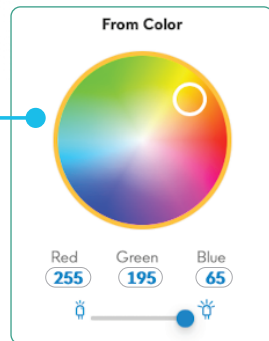


### 1. PROGRAM

on start program

fade from  to  over 2s

fade from  to  over 2s



**Hint:** For the color black, set Red, Green, and Blue values to 0.



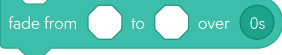
BEGINNER 

## CHALLENGE #6

### 2. PROBLEM SOLVE


1. Run the program. *What happens?*
2. Modify the program so that BOLT+ shows a different color.

### 3. PLAY

- Use  to show your three favorite colors.

- Set **red** to **255**, **blue** to **255**, and **green** to **0**.

*Which color does that make?*

- Drag  from the **operators category** into the color input. *What happens?*

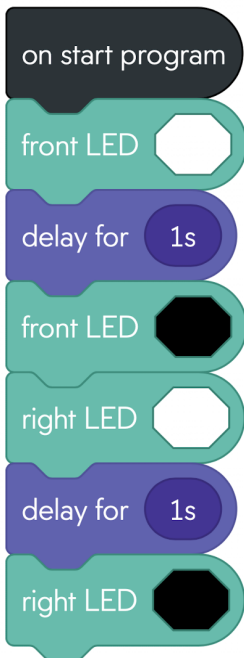
# CHALLENGE #7

## ***A RING OF LIGHTS***

*Program BOLT+ to turn on and off LEDs to make a light show.*



### **1. PROGRAM**




## CHALLENGE #7

### 2. PROBLEM SOLVE

1. Run the program. *What happens?*
2. Add blocks to the program so that the lights continue around the robot.

### 3. PLAY

- Change the color of the LEDs to your favorite color.
- Change the time in  so the lights move faster or slower.
- Add a block from the **controls category** to make the ring of light repeat forever.

# CHALLENGE #8

## **FOUR CORNERS**

*Learn how to program individual LEDs on the matrix.*



### **1. PROGRAM**

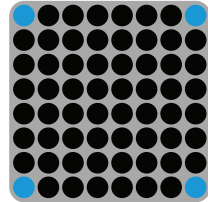
```
on start program
  stabilization off
  matrix pixel [LED] at 4 , 6
```




## CHALLENGE #8

### 2. PROBLEM SOLVE

1. Run the program. *What happens?*
2. Modify your program so that there is a pixel highlighted in each of the four corners of the BOLT+ matrix.



### 3. PLAY

- Create your first initial on the matrix.
- Experiment with other blocks that make it easier to display your initial.
- Turn . *What happens?*

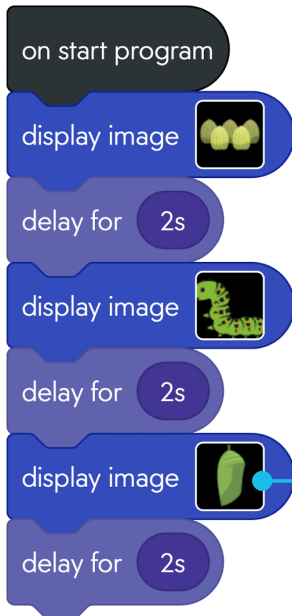
# CHALLENGE #9

# **METAMORPHOSIS**

Explore the BOLT+ image library.



## 1. PROGRAM



**Hint:** Select to change image.




## CHALLENGE #9

### 2. PROBLEM SOLVE

1. Run the program. *What do you see?*
2. Add one more block to end the display sequence with a butterfly.

### 3. PLAY

- Show a different life cycle on the BOLT+ display.
- Try  in the program.
- Add a block to clear the display.

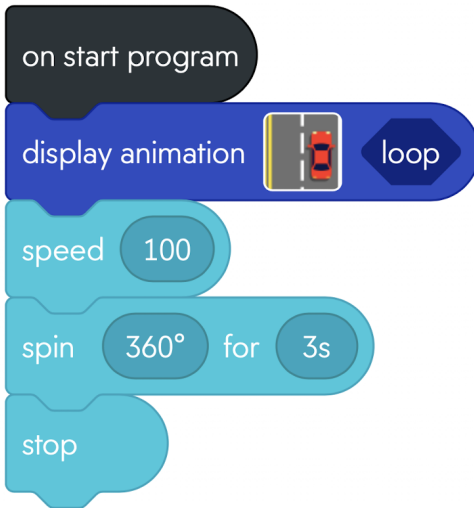
# CHALLENGE #10

## **PROGRAM A CIRCLE**

*Learn how to make BOLT+ roll and spin at the same time.*



### **1. PROGRAM**




## CHALLENGE #10

### 2. PROBLEM SOLVE

1. Run the program and watch what happens.
2. Modify the numbers in the blocks to make BOLT+ roll in a larger circle.

### 3. PLAY

- Find another way to modify the program to make a larger circle.
- Remove . What happens?
- Modify the program to make BOLT+ roll in a circle in the opposite direction.

# CHALLENGE #11

## ***RANDOM ROLLER***

Make BOLT+ roll in random directions forever.



### 1. PROGRAM

```
on start program
loop forever
roll random int from 0 to 360 at 100 speed for 2s
delay for 0.5s
```

**Hint:** Drag the **random int** block into the first circle in the **movement** block.

```
on start program
loop forever
roll random int from 0 to 360 at 100 speed for 2s
delay for 0.5s
```






## CHALLENGE #11

### 2. PROBLEM SOLVE

1. Run the program and get ready to chase BOLT+!
2. Add two more **random int blocks** to the speed and duration inputs to add more randomness.



### 3. PLAY

- Remove . *What happens?*
- Change the numbers in .
- Add  to other blocks.

# CHALLENGE #12

## **DATA BALL**

*Learn how to make BOLT+ show sensor values on its display.*



### **1. PROGRAM**

on start program

stabilization  off

display Total Accelerometer ▾ data



## CHALLENGE #12

### 2. PROBLEM SOLVE

1. Run the program and look at the BOLT+ display.
2. Move BOLT+. When is the G-force:  
> 1?                      < 1?                      = 1?

### 3. PLAY

- Choose orientation in **display sensor data block**.  
*What data is BOLT+ reading now?*
- Select something else from the drop down menu.  
*What do you notice?*

# CHALLENGE #13

## ***DRIVE COUNTDOWN***

*Learn how to use an event to change BOLT+'s behavior after it has traveled a certain distance.*



### **1. PROGRAM**

on start program

speed 100

on total distance is 100cm

stop

exit program



## CHALLENGE #13

### 2. PROBLEM SOLVE

1. Run the program. *How far does BOLT+ travel?*
2. Modify the program to make BOLT+ roll twice as far.

### 3. PLAY

- Change the **speed** to **50**. Change the **speed** to **200**.  
*What's the difference?*
- Swap the **on total distance block** for an **on time elapsed block**.

# CHALLENGE #14

# ***KNOCK-KNOCK MACHINE***

*Learn how to run blocks of code with the push of a button.*



## **1. PROGRAM**

```
on start program
display image [Smiling Face]

on button 1
display Knock, knock ... in [Lightbulb] on [Darkbulb]

on button 2
display Broken pencil ... in [Lightbulb] on [Darkbulb]

on button 3
display Ah, forget it. It's pointless. in [Lightbulb] on [Darkbulb]
```


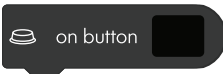


## CHALLENGE #14

### 2. PROBLEM SOLVE

1. Start the program.
2. Press the buttons on your device. *Which order should you press the buttons to deliver the joke?*
3. Modify the program to tell your own knock-knock joke.

### 3. PLAY

- See how many  events you can add to a program.
- Use an  event to trigger a different BOLT+ behavior.

# CHALLENGE #15

## **BOLT+ FEELS SICK**

Learn how to trigger blocks with an  on gyro max event.



### 1. PROGRAM

```
on start program
  stabilization off
  display animation [eyes] loop


on gyro max
  play vomit sound and continue
  display animation [nausea] loop
  delay for 3s
  display animation [eyes] loop
```



## CHALLENGE #15

### 2. PROBLEM SOLVE

1. Run the program. *What does your BOLT+ show?*
2. Move and manipulate BOLT+ to make the robot play the vomit sound and show the dizzy eyes.

**Hint:** Long press or right click on  on gyro max and select "block help" to learn more about how to trigger the event.

### 3. PLAY

- Turn  . *What happens?*
- Try other **event blocks** like:



- Look at the sensor data. *What does it tell you about when the **event blocks** are triggered?*

# CHALLENGE #16

## ***LIGHT AT THE END OF THE TUNNEL***

Program BOLT+ to read sensor values and execute different **speak blocks**.

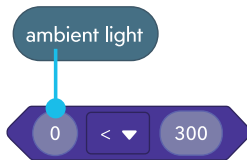


### 1. PROGRAM

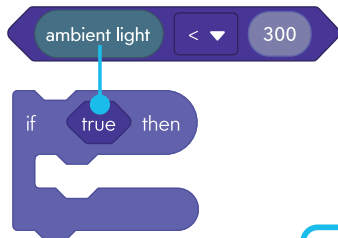


**Hint:** Block construction

1.



2.



## CHALLENGE #16

### 2. PROBLEM SOLVE

1. Run the program. *Which text does BOLT+ say?*
2. Adjust the value in the **comparator block** so that BOLT+ thinks it's dark when you cover it up and light when it's in the light.



### 3. PLAY

- Change the loop to something that won't go on for... forever.
- Change what the program says in different light conditions.
- Add sounds and images to go with the **speak blocks** in this program.

# CHALLENGE #17

## A BOLT+ TIMER

Use the **time elapsed** sensor to control when BOLT+ exits a loop.



### 1. PROGRAM

```
on start program
  loop until [time elapsed] > 10
    strobe [ ] for 0.5s 1 times
  display animation [bell icon] loop
  play [applause] sound and wait
exit program
```



## CHALLENGE #17

### 2. PROBLEM SOLVE

1. Execute the program. *How long does it take for BOLT+ to show the bell?*
2. Modify the program to change BOLT+ into a 20-second timer.

### 3. PLAY

- Make the program show a different animation or play a different sound.

- Experiment with the inputs on 

- Invent a game you could play with

the 

# CHALLENGE #18

## A POLYGON ALGORITHM

Modify an algorithm to program a different polygon.



### 1. PROGRAM

```
on start program
  loop 3 times
    roll heading + 120 at 100 max speed for 100cm
    delay for 0.5s
```

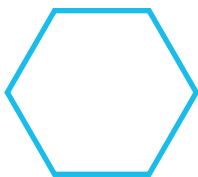
**Hint:** Block construction



## CHALLENGE #18

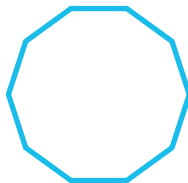
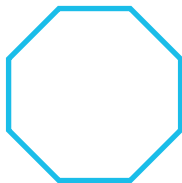
### 2. PROBLEM SOLVE

1. Run the program. *What shape does it make?*
2. Modify the program to make BOLT+ roll in a hexagon.



### 3. PLAY

- Modify the program to make polygons with longer sides.
- Make other polygons like squares, octagons, or decagons.



# CHALLENGE #19

## **FLYING BOLT+**

*Figure out how to make BOLT+ play a sound like it is flying!*



### 1. PROGRAM

```
on start program
if total velocity > 1 then
  play whee sound and wait
```



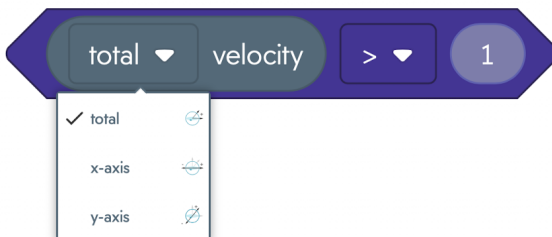
## CHALLENGE #19

### 2. PROBLEM SOLVE

1. Run the program. Right now, your program says "Whee!" once at the beginning if BOLT+ is moving and won't say anything if BOLT+ is very still.
2. Modify your program so that it says "Whee!" anytime BOLT+ is moved.

### 3. PLAY

- Adjust the **velocity value** to something other than 1.
- Adjust the **total velocity** to the **x-axis** or **y-axis**. *Can you tell the difference?*



# CHALLENGE #20

# RED LIGHT GREEN LIGHT

Explore how to adjust the number in a **loop x times block** to program a game.



## 1. PROGRAM

```
on start program
  loop 1 times
    drive on
    delay for random int from 2 to 4
    drive off
    delay for random int from 2 to 4
```



## CHALLENGE #20

### 2. PROBLEM SOLVE

1. Run the program. *How long could you drive BOLT+?*
2. Change the loop to loop **10 times**. *Is that enough times for you to drive your BOLT+ from one side of the room to the other?*

### 3. PLAY

- Add images or animations to go along with the **drive on** and **drive off blocks**.
- Make this into a game you play against a partner.