sphero

GLOBAL CHALLENGE

OFFICIAL RULES
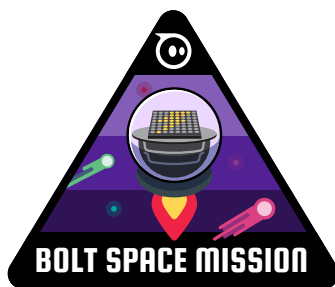
Table of Contents

Definitions

- **Student -** Anyone born after May 1, 2005

- **Elementary School Student -** Anyone born after May 1, 2009

- **Middle School Student -** Any Student that is not an Elementary School Student

- **Elementary School Division -** Teams competing in this division must consist of only Elementary School Students and at least one Coach.

- **Middle School Division -** Teams competing in this division may consist of Elementary School Students, Middle School Students, or both, and at least one Coach.

- **Coach -** An adult in a supervisory role for the students and will handle the registration, submission, and management of Team meetings. Teams may have more than one Coach.

- **Event -** Sphero Global Challenge comprises three unique Events:
  - littleBits Invent 4 Good: Mission Earth
  - RVR+littleBits: Mars Mission
  - BOLT: Space Mission

  Each Event is evaluated individually, and Teams can compete in one or up to all three Events.

- **Mission Objectives -** Each event has been broken up into mission objectives that teams will be evaluated on based on the event rubrics.

- **Program -** A program is the code file used to control a robot during the Mission Objectives. Programs must be written with block code or javascript from the Sphero Edu App, littleBits Code Kit App, or FUSE App.

- **Evaluation Rubric -** Rubrics are the official evaluation criteria provided for each Event & Mission Objective so that Teams can accurately predict their performance on each mission and know how they are being evaluated.

- **Competition Field -** RVR+littleBits Mission Mars Competition Field as defined in rule #RVR1.

  BOLT Space Mission uses the Space Code Mat as a Competition Field. While it's not required, it is highly recommended.

  littleBits Invent for Good does not have a specific Competition Field.

- **Obstacles -** Defined as any object placed in the competition field as part of the setup for a mission objective and not to be interacted with by the robot or invented elements as outlined in mission objectives.

- **Boundaries -** The outside area of a competition field as defined in the competition guides section of the Coaches Guide.

- **Event Rules -** Detailed rules specific for each Event. Event Rules are contained within this SGC Rules document.

- **Schematic -** A workspace from the FUSE app for each littleBits invention used with callouts to identify how each bit is used as part of the mission objective.

    OR

    A picture of your invention with callouts to identify each bit and how it is used as part of the Mission Objective.

    OR

    A detailed drawing of your invention with callouts to identify each bit and how it is used as part of the Mission Objective.

- **Infographic -** An infographic is a visual representation of an idea, process, or a dataset. Each event requires the submission of an infographic as outlined in event specific rules.

- **Event Score -** Team's score for an individual Event. Maximum possible Event Score is 1,000 points per Event.

- **Overall Performance Score -** Sum of Each Event Score attained by the Team. For the 2020-2021 season the maximum Overall Performance Score is 3,000 points.

- **Cargo -** 6" x 3.5" x 2" (15.25 cm x 8.9 cm x 5 cm) cardboard box used for RVR+littleBits Mars Mission Objective #3. If using the Sphero Craft Pack, the premade cardboard boxes are the correct sizes.

- **Debris -** 1.5" foam or ping pong balls used for RVR+littleBits Mars Mission Objective #2. If using the Sphero Craft Pack, the foam balls are the correct size for Debris.

- **Martian Friend -** Figurines (2) created from craft supplies for RVR+littleBits Mars Mission Objective #4. Figurines should measure at least 2" x 4" x 1" (5 cm x 10 cm x 2.5 cm).

- **Semi-Autonomously -** A robot completing a Mission Objective without intervention from a user in the course of a Mission Objective attempt.

sphero

RVR + littleBits
MARS
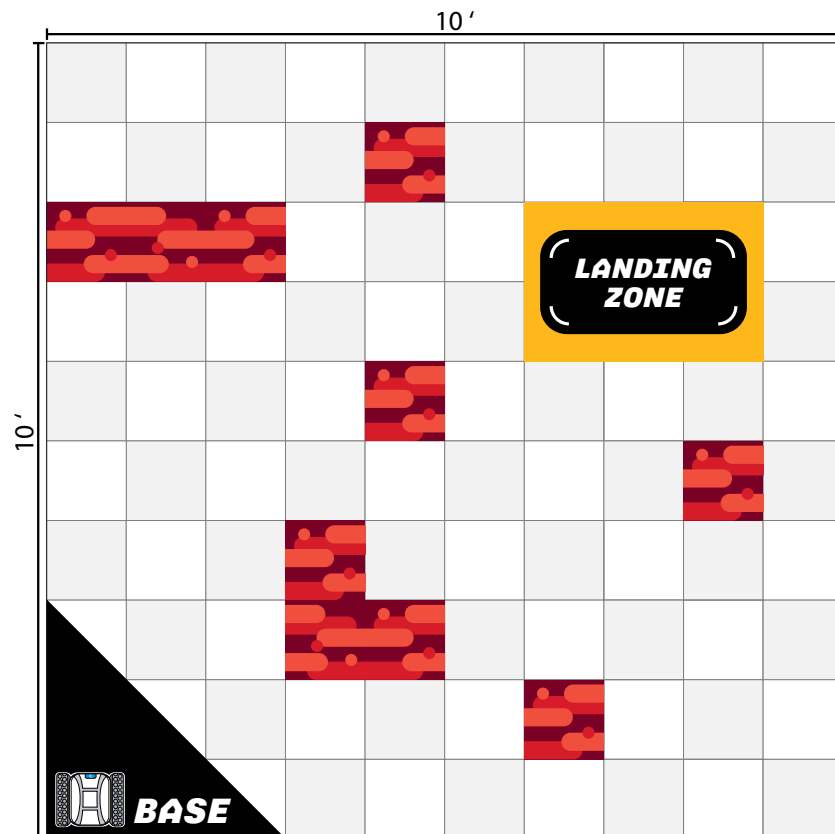## MISSION

EVENT SPECIFIC RULES

Competition Field Set Up

We recommend finding a way to have a semi permanent installation of the competition field so that you don't have to spend time setting it up each time your team plans to work on the mission objectives.

RVR-F1.

RVR+littleBits Mission Mars Competition Field Setup requirements are listed below.

- **a.** Competition Field Size: 10' x 10' (3.048 m X 3.048 m)

- **b.** Each grid on the field map is 1' x 1' (304.8mm X 304.8mm)

- **c.** You can use any material to mark the competition field

- **d.** Mark the space with Painter's tape, PVC, 2x4s, etc. Except for the exterior boundary of the competition field, use the outer perimeter to measure out spaces.

- **e.** The red areas are Martian Terrain that RVR cannot navigate across/through or over, except as outlined in RVR-M1f. Establish this area by using tape/paper/markerto mark the boundary of these areas.

- **f.** The black triangle in the lower corner is the RVR Martian Base and starting point. Establish this area by using tape/paper/marker to mark the triangle.

- **g.** The Landing Zone is an area of the competition field that will be used in some of the Mission Objectives. RVR can navigate through/across this area at any time during the completion of a Mission Objective.

General Rules

- **RVR-G1.** RVR's treads may not pass over a Boundary line or an area labeled as "Martian Terrain".

- **RVR-G2.** A littleBits invention needs to be included in every Mission Objective.

- **RVR-G3.** For mission objectives 2-4, the littleBits invention must be attached to RVR.

- **RVR-G4.** On mission objectives that are timed, a variable must be established to announce the end time as the last blocks of your program; see example below:
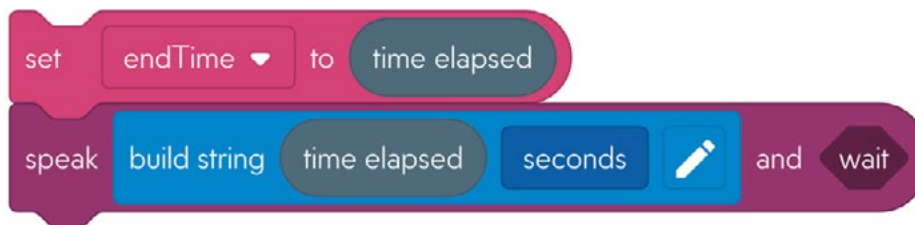
- **RVR-G5.** If using micro:bit to control RVR, you must use the littleBits micro:bit adapter.

- **RVR-G6.** Additional objects can be placed on to the Competition Field for visual aesthetics and creativity as long as they don't interrupt or create unfair benefits for the completion of the Mission Objectives.

Mission Objectives

RVR-M1. Mission Objective #1 - Survey & Patrol Your Base

RVR must Semi-Autonomously navigate the Competition Field to each orange area as specified in RVR-M1a-f.

    a. Mission Objective RVR-M1 required Competition Field setup

        i. RVR must start completely within the Base.
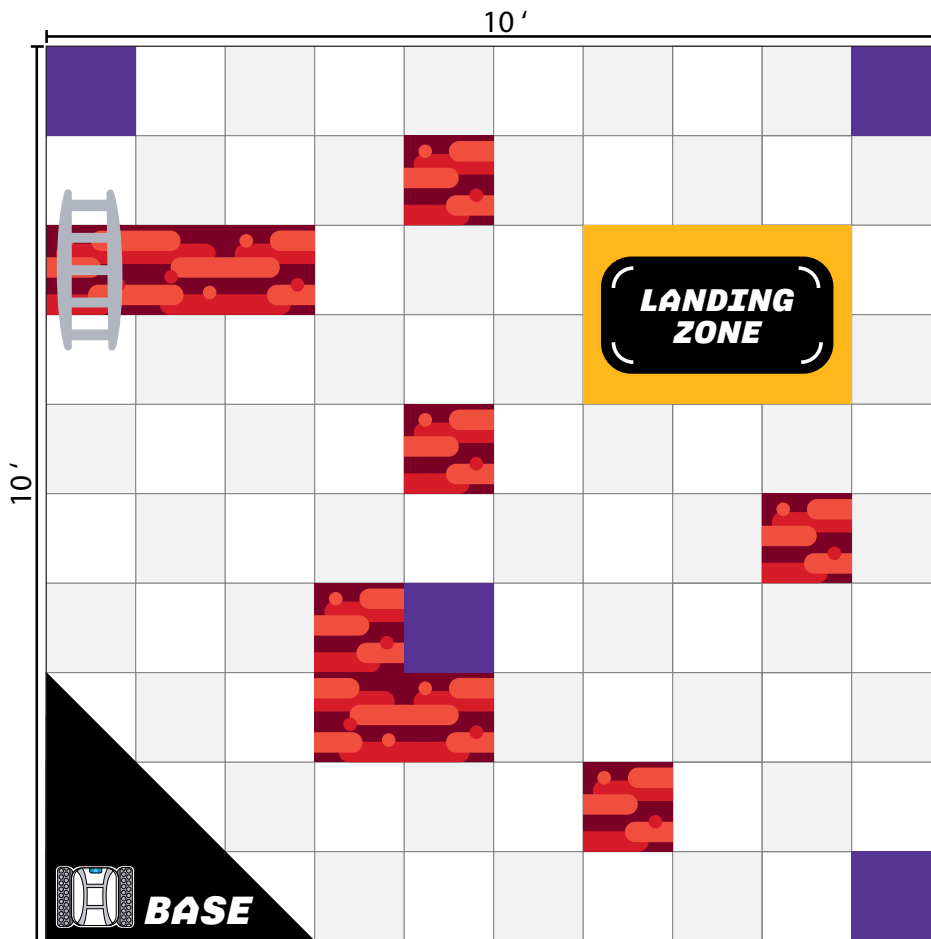
    b. RVR must Semi-Autonomously navigate to each orange area specified in RVR2a in the quickest path without crossing over any Martian Terrain Areas defined in RVRF1e.

c. A littleBits invention must be placed somewhere in the Competition Field that RVR needs to interact with (status lights, door to the base, etc.) A littleBits invention must be placed somewhere in the Competition Field but not on top of RVR. RVR must interact with the littleBits invention during the course of its navigation on the Competition Field as part of RVR-M1.

d. RVR must return to base by the end of the program.

e. This is a timed Mission. Students must include the endTime sequence, per rule RVR-G4, and have their program audibly announce the endTime.

f. Bonus: Teams may build a bridge over martian terrain to speed up the program. Bridges must rise a minimum distance of 5 inches (127mm) off of the ground to be counted for bonus points on the rubric. To achieve the Bonus points, RVR must travel completely over the student-created bridge.

RVR-M2. Mission Objective #2 - Prepare the Landing Zone

RVR must Semi Autonomously navigate to the landing zone and, using a littleBits invention, clear the Debris from the Landing Zone as specified in RVR-M2a-c.

a. Mission Objective RVR-M2 required Competition Field setup

    i. Place 15 pieces of Debris evenly distributed in the Landing Zone.

    ii. RVR and littleBits invention must start completely within the Base.
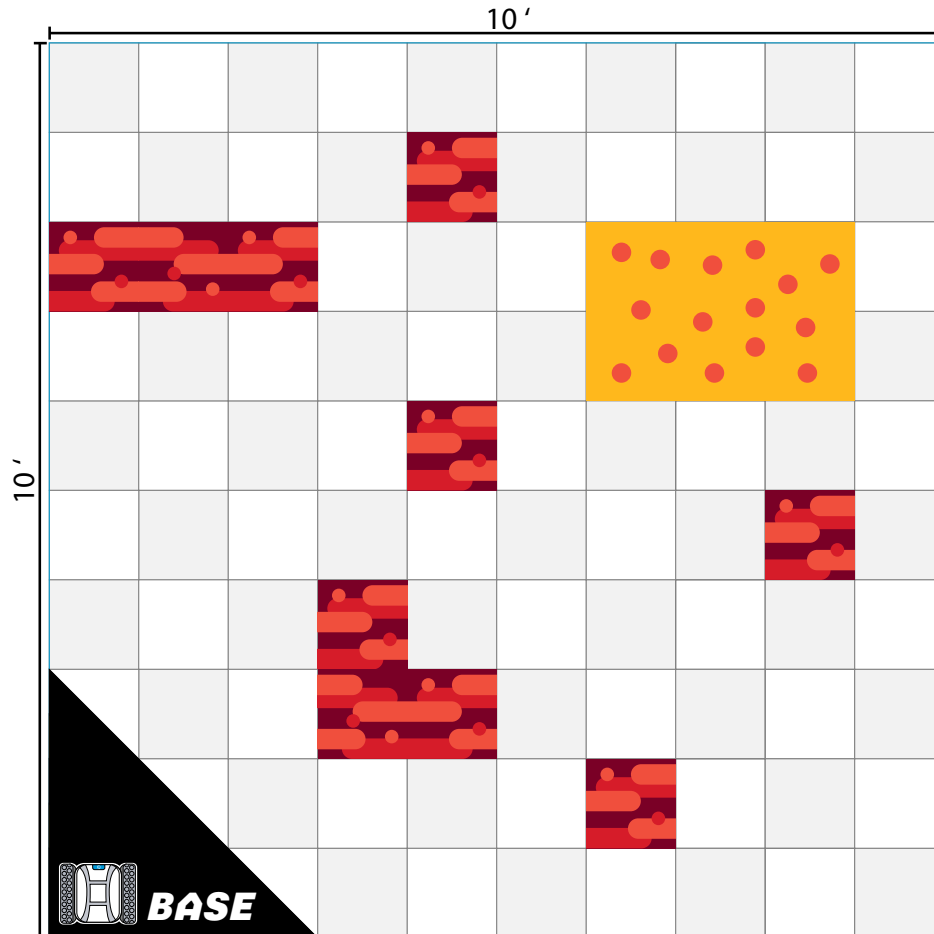
b. A littleBits invention must be used to clear the Debris. RVR cannot directly touch the Debris in the Landing Zone.

c. All Debris must be completely cleared from the specified Landing Zone for a successful Mission.

RVR-M3. Mission Objective #3 - Relocate Supply Cargo

RVR must Semi-Autonomously navigate to the Landing Zone and, using a littleBits invention, relocate each of the Cargo into the blue Cargo Areas as specified in RVRo-M3a-(d).

a. Mission Objective RVR-M3 required Competition Field setup

    i. Place 4 pieces of Cargo centered, and 2 inches (51mm) apart, in the Landing Zone.

    ii. RVR and littleBits invention must start completely within the Base.
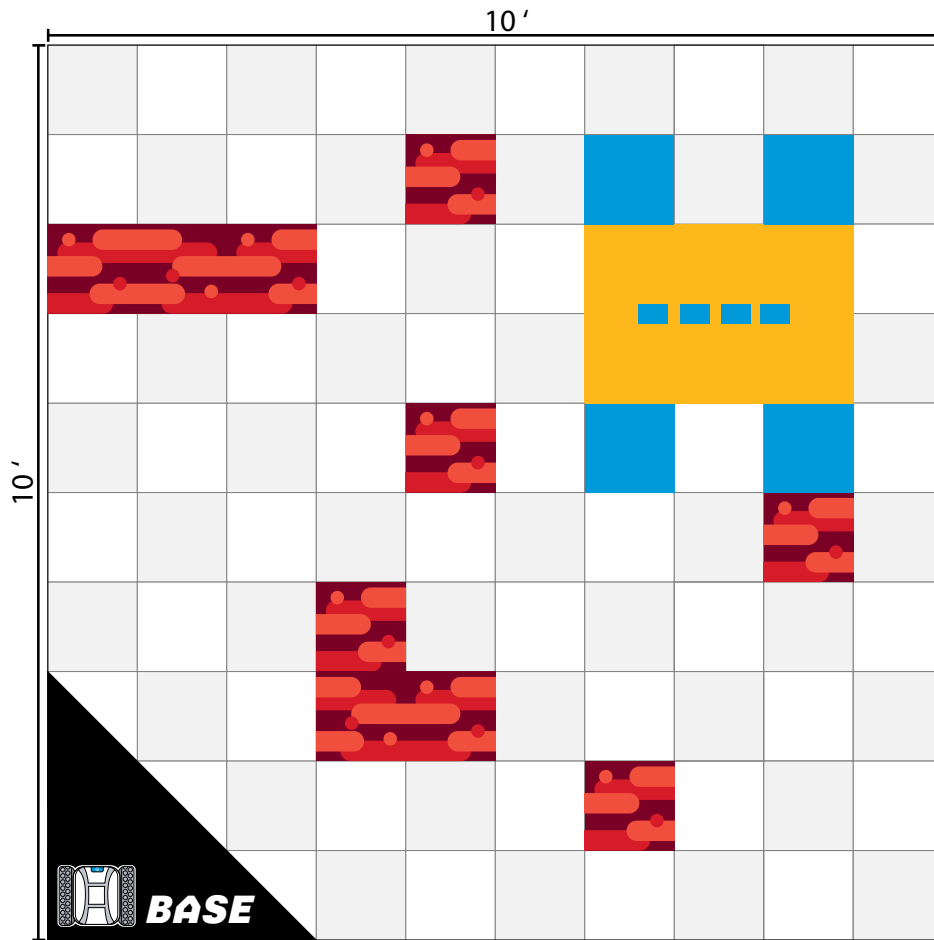
b. Only one (1) Cargo allowed per Cargo Area.

c. RVR can not directly contact the Cargo.

d. RVR must return to Base.

RVR-M4. Mission Objective #4 - Rescue Your Martian Friends

RVR must Semi-Autonomously pick up your Martian friends with a littleBits invention and return them to base as specified in RVR-M4a-d.

    a. Mission Objective RVR-M4 required Competition Field setup

        i. Students are responsible for creating Martian Friends by using craft supplies as part of their Mission.

        ii. Place one student-created Martian Friend in the center of each of the green areas of the Competition Field, as shown below, for a total of 2 Martian Friends to be rescued.

        iii. RVR must start completely in the Base.
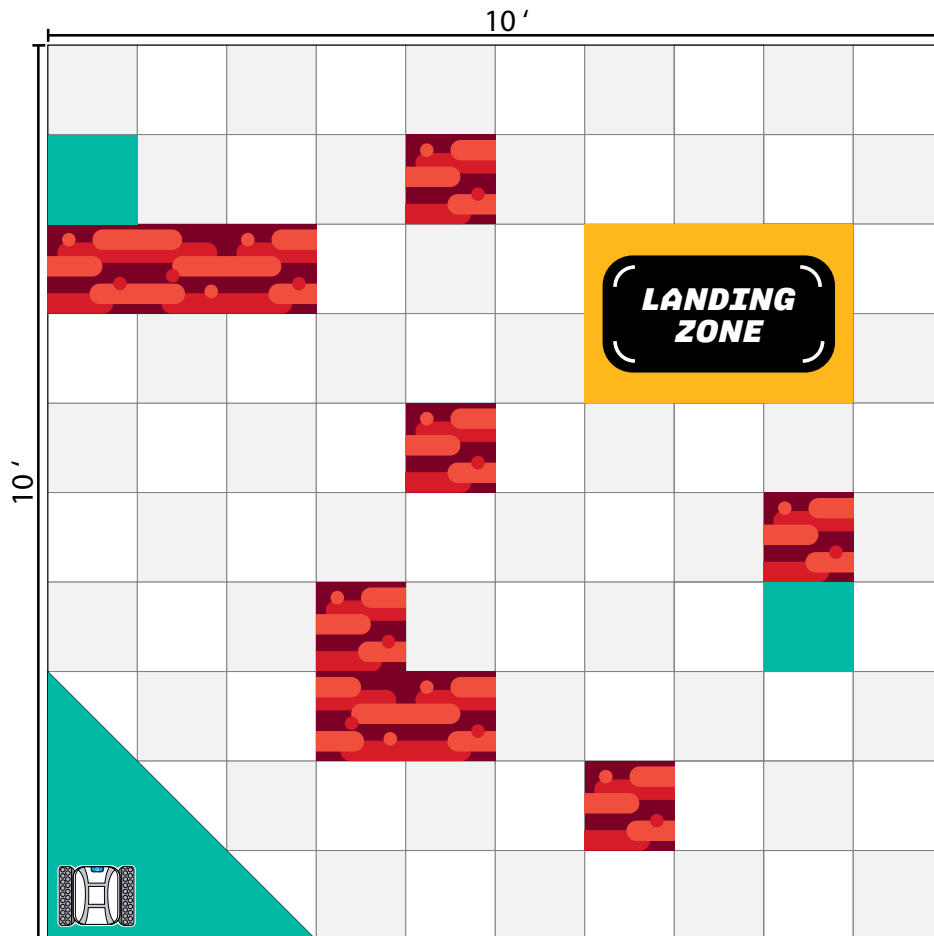
    b. RVR must pick up your Martian Friends and return them to the Base.

    c. At the end of the program, once RVR has returned the Martian Friends to the Base, the time elapsed sensor, as specified in rule RVR-G4, has to be used to announce how long it took to complete the objective.

RVR-M5. Mission Objective #5 - Creative Simulation

This is an open ended challenge. Teams are tasked to come up with a computational model or simulation of a scenario/problem for using the sensors of RVR and interacting with a littleBits invention as specified in RVR-M5a-b.

    a. Mission Objective RVR-M5 required Competition Field setup

        i. Field setup is standard as specified in RVR-F1.

        ii. RVR must begin in the base.

    b. Teams will develop the situation, a littleBits invention, and a program that moves RVR around in the competition field while avoiding martian terrain.

Submission Guidelines

Teams will be required to submit three items: a program file, video, and code and engineering design packet. Please see the detailed rubric document for specifics on how each submission will be evaluated and judged.

- **RVR-SG1.**

  Program File must be submitted as specified in RVR-SG1a-b.

  a. Program file must contain a function for each Mission Objective.

  b. Use the following naming convention for your functions on the final code submission:

  - **i.** rvrMo1
  - **ii.** rvrMo2
  - **iii.** rvrMo3
  - **iv.** rvrMo4
  - **v.** rvrMo5

- **RVR-SG2.**

  Video of each Mission Objective combined into one video and submitted as specified in RVR-SG2a-e.

  a. Students can film their program for mission objectives as many times as they need—there are no penalties for trying things multiple times. They are only evaluated on the final video that they submit.

  b. Each Mission must be filmed individually.

  c. Video must track the moving robots and keep the robots in the field of view at all times.

  d. After all Mission Objective videos have been recorded, please compile them using a video editing software into one (1) video.

  e. Video Editing rules and guidelines:

  - **i.** Titles, subtitles, and/or captions: may be used as long as they do not interfere with the view of the mission objectives being filmed.
  - **ii.** Sound Effects: cannot be used over the recording of the mission objectives to allow for sound effects to be heard in the video.
  - **iii.** Music: Any music used should be copyright/royalty free selections. Music should not be used to cover up any programmed sound effects, including speak blocks as required in RVR-G4.
  - **iv.** Individual Mission Objective videos should not be edited or spliced. Individual Mission Objectives should be filmed in one take. Editing of mission objectives is prohibited except as outlined in RVR-SG2e.

- **RVR-SG3.**

  Code and Engineering Design Packet must be submitted as specified in RVR-SG3a-b.

  a. An infographic of the learning process must be submitted as part of the code and engineering design packet. Infographic must be submitted as a .pdf file.

  i. An infographic is a visual representation of an idea, process, or a dataset. You are responsible for creating an infographic that demonstrates the learning process over the course of the event.

  1. How did the team work together?

  2. How did you iterate on your ideas?

  3. What was a struggle?

  4. What was easy?

  5. What did your team learn throughout the process?

  b. One page description with one of the following for each Mission Objective.

  i. A workspace from the FUSE app for each littleBits invention used with callouts to identify how each bit is used as part of the mission objective.

  OR

  ii. A picture of your invention with callouts to identify each bit and how it is used as part of the Mission Objective.

  iii. On the schematic for RVR-M5, include the scenario/situation for the computational model or simulation as developed for RVR-M5.

Evaluation and Judging

The Sphero Global Challenge rubric will be used to evaluate your submissions. Please refer to the official rubric for the most up to date detailed description of each judging criteria.

- **RVR-J1. Code + Engineering Design Packet (300 points)**

    a. Code + Engineering Design Infographic submitted in proper format (pass/fail)

    b. Creativity: 0-100 points

    i. Points are awarded on the basis of design choices, originality and quality of the infographic.

    c. Content: 0-100 points

    i. Does the Code + Engineering Design Infographic contain all of the necessary information?

    d. littleBits Schematics: 0-100 points

    i. Do the littleBits schematics match the video? Are there callouts to each bit and how it is used in the Mission Objective?

- **RVR-J2. Mission Objectives (500 points)**

    a. Program file contains functions calls as specified in RVR-SG1 (pass/fail)

    b. Program file contains variables as outlined in each Mission Objective (pass/fail)

    c. Mission Objective #1 (0-100 points)

    i. Competition field set up accurately.

    ii. littleBits invention is placed in the Competition Field and RVR interacts with it.

    iii. Mission Objective is completed as specified in RVR-M1.

    d. Mission Objective #2 (0-100 points)

    i. Competition field set up accurately.

    ii. littleBits invention is attached to RVR.

    iii. Mission Objective is completed as specified in RVR-M2.

    e. Mission Objective #3 (0-100 points)

    i. Competition field set up accurately.

    ii. littleBits invention is attached to RVR.

    iii. Mission Objective is completed as specified in RVR-M3.

f. Mission Objective #4 (0-100 points)

    i. Competition field set up accurately.

    ii. littleBits invention is attached to RVR.

    iii. Mission Objective is completed as specified in RVR-M4.

g. Mission Objective #5 (0-100 points)

    i. Competition field set up accurately.

    ii. littleBits invention is attached to RVR.

    iii. Mission Objective is completed as specified in RVR-M5.

• RVR-J3. Video Submission (200 points)

a. Video submitted in proper format (pass/fail)

b. Video Creativity and Content

    i. All of the mission objectives are filmed and present in the video.

sphero

BOLT
SPACE MISSION

EVENT SPECIFIC RULES

Competition Field Set Up

We recommend finding a way to have a semi-permanent installation of the Competition Field so that you don't have to spend time setting it up each time your team plans to work on the Mission Objectives.

BOLT-F1.

Competition Field: Competition Field Size: 6.56' x 3.28' (2m X 1m)

a. The Outer Space Code Mat is the ideal competition field for the BOLT Space Mission:

b. If you do not have the Outer Space Code Mat, you may use tape to mark the grids every 10 cm like in the Code Mat. Or, print the Bolt Space Mission Grid printable.

c. Specific Mission Objectives will refer to grid coordinates in order to allow anyone with or without a Code Mat to compete.

d. For each Mission Objective, pay attention to the Competition Field setup for references to grid coordinates and the placement of BOLTs, Obstacles, and other items.

General Rules

- **BOLT-G1.** BOLT may not fully pass the boundary line of the code mat or Competition Field.

- **BOLT-G2.** On mission objectives that are timed, a variable must be established to announce the end time as the last blocks of your program; see example below.

- **BOLT-G3.** Additional objects can be placed onto the competition field for visual aesthetics as long as they don't interrupt the completion of the Mission Objectives.

- **BOLT-G4.** On mission objectives that are timed, a variable must be established to announce the end time as the last blocks of your program; see example below:
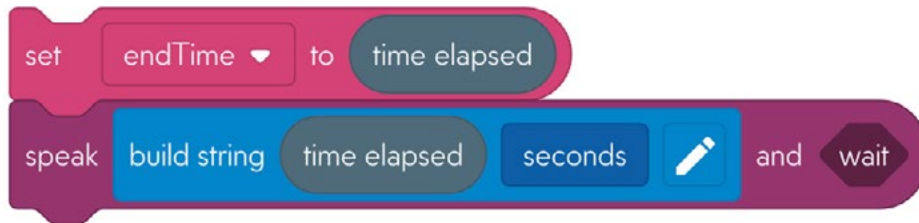
Mission Objectives

BOLT-M1. Mission Objective #1 - Ambient Light Sensor

Teams must program BOLT to navigate on the Competition Field to test the light intensity (luminosity) as specified in BOLT-M1a-g.

**a.** Mission Objective BOLT-M1 required Competition Field setup:

b. Establish a bright light source (the Sun) and place the light source in the A1 corner of the competition field.

c. Engineer an enclosure for BOLT to navigate under/inside to demonstrate the darkness of deep space. Enclosure must not be bigger than 8"x 8" x 5" and will be placed over Pluto (Grid S10).

d. Program BOLT to read 3 different light intensity values on the competition field:

    i. Earth (I2), Pluto (S10), and the Sun (A1)

e. Program must have 3 variables called light1, light2, light3 that store the light intensity value (luminosity) at each location: light1 = Sun, light2 = Earth, light3 = Pluto

f. Program must contain an if/else statement that evaluates if variable light1 is a greater value than variables light2 and light3.

g. If light1 is the greatest value, the program must have a mission complete message to note success.

BOLT-M2. Mission Objective #2 - Asteroid Belt

Students will program BOLT to spin out of control, lose calibration, re-aim, and navigate on the Competition Field as specified in BOLT-M3a-e.

a. Mission Objective BOLT-M2 required Competition Field setup:
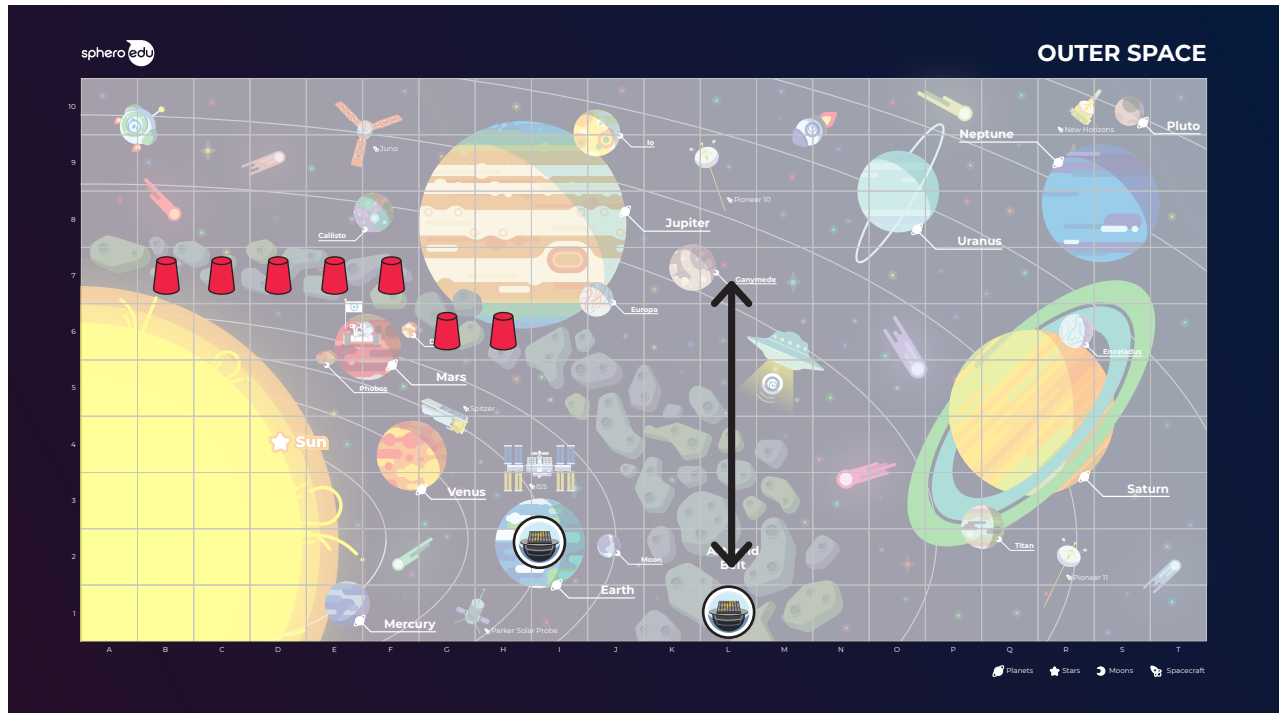
    i.   Place one BOLT on Earth (Grid I2).

    ii. Place second BOLT on L.

    iii. Place 18 oz cups on the following grids as stationary asteroids to navigate between:

        • B7, C7, D7, E7, F7, G6, H6

b. BOLT #1 is travelling to deep space, and must go from Earth (I2) to Pluto (S10) and return to Mercury (E1) while passing through the asteroid belt.

c. BOLT #2 is acting as an asteroid and must be programmed to move between L1 & L7 at a speed of 100.

d. BOLT #1 must be programmed to navigate through the asteroid belt without hitting any objects or BOLT #2.

e. BOLT #1 must have a raw motor block used to mess with the navigation system of the BOLT when it hits the asteroid belt (See layout for specific grids).

BOLT-M3. Mission Objective #3 - IR Communications

BOLT #2 will send infrared communications that BOLT #1 will interpret to determine which region of the competition field it is in as specified in BOLT-M3a-b.

a. Mission Objective BOLT-M3 required Competition Field setup:
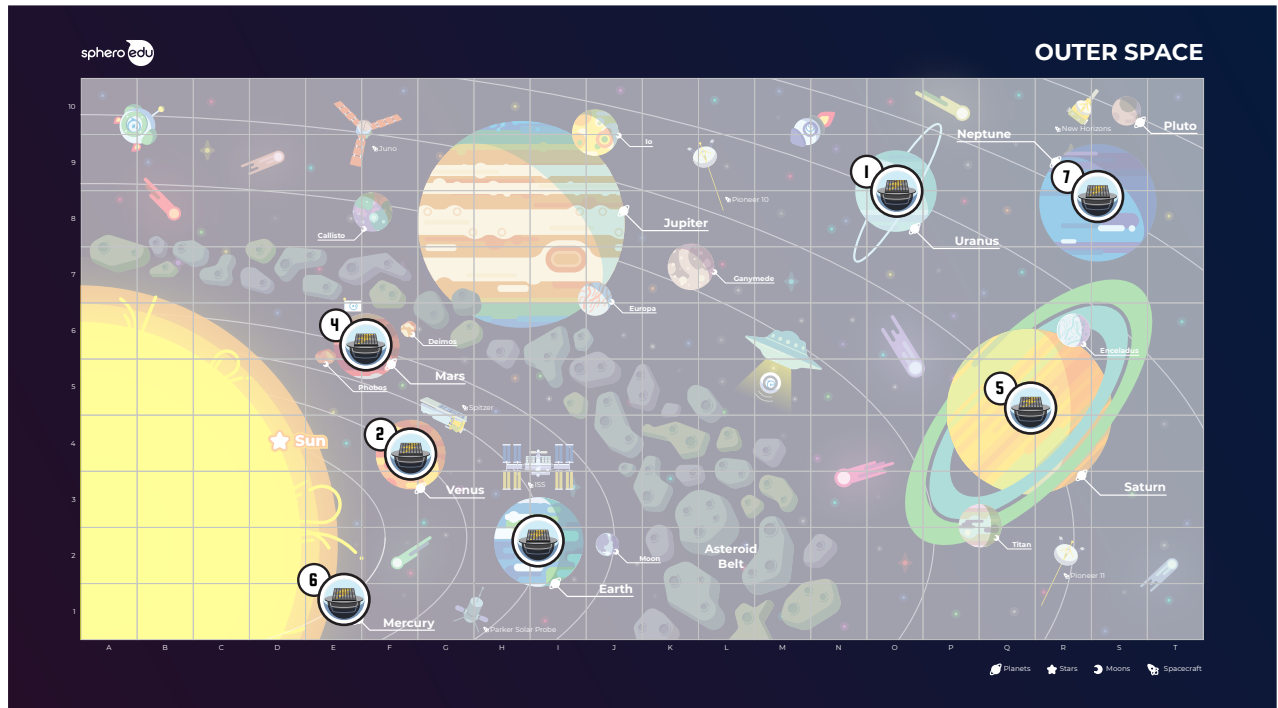
ii. BOLT #2 will be placed by hand on each planet in the following order so that the BOLT #1 can receive the signals to determine what region it is in.

1. Uranus (O8)

2. Venus (F4)

3. Jupiter (H9)

4. Mars (F6)

5. Saturn (R5)

6. Mercury (E1)

7. Neptune (S9)

BOLT-M4. Mission Objective #4 - Rescue Mission

BOLT #1 must navigate the Competition Field without coming into contact with any obstacles and lead BOLT #2 back to the starting point as specified in BOLT-M4a-d.

a. Mission Objective BOLT-M4 required Competition Field setup:
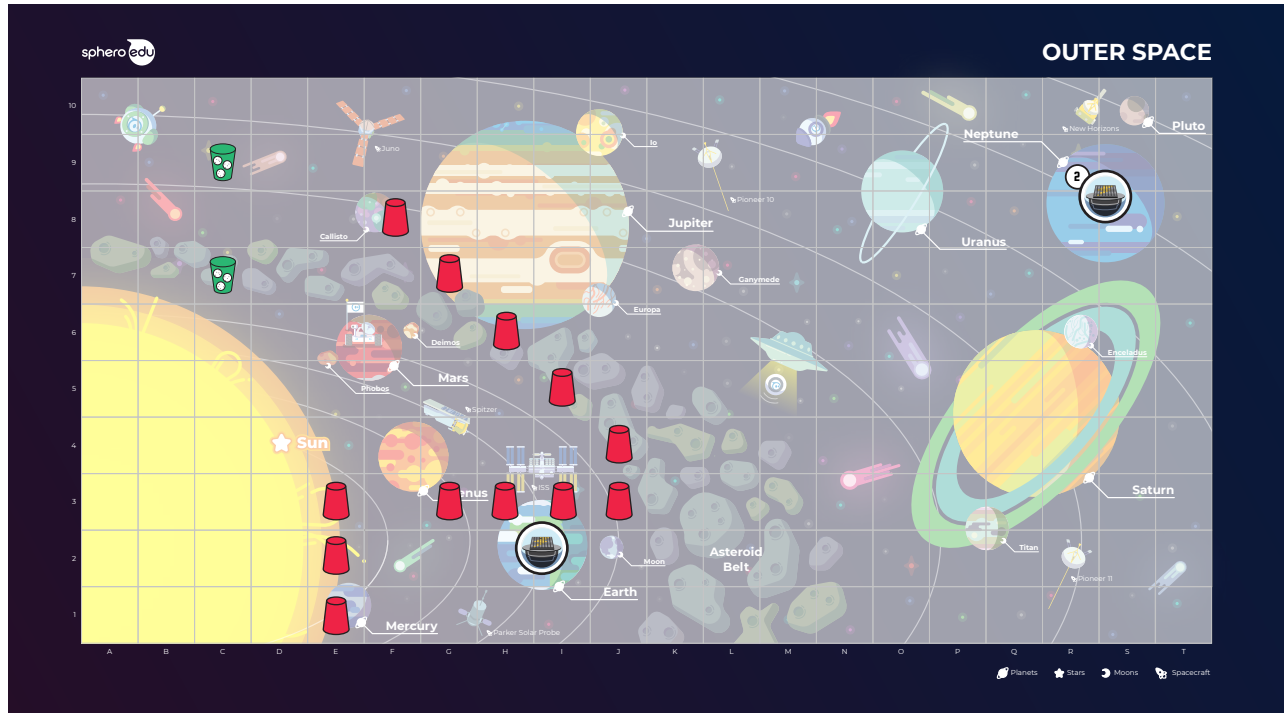
i. Place 18 oz cups on the following 12 grid coordinates:

1. E1

2. E2

3. E3

4. F8

5. G3

6. G7

7. H3

8. H6

9. I3

10. I5

11. J3

12. J4

ii. Place 2 small cups with 3 pieces of Debris each on C7 & C9

iii. BOLT #1 will begin on Earth (I2)

iv. BOLT #2 will begin on Neptune (S8)

b. BOLT #1 must travel between the obstacles at F3 and around the obstacles at F8 to get to BOLT #2.

c. BOLT #1 must communicate with BOLT #2 to lead/guide it back to the starting position of I2

d. Bonus: If BOLT #1 can knock the Debris out of the 2 cups, points will be awarded for each piece of Debris that makes it out of the cup and stays on the Competition Field. The cups must begin within the grids specified in the setup directions, but any craft materials can be used to engineer a solution for knocking the balls over.

BOLT-M5. Mission Objective #5 - Engineering Challenge

Engineer a chariot for BOLT to carry payload from the starting point on the setup to the final position as specified in BOLT-M5a-g.

a. Mission Objective BOLT-M5 required Competition Field setup:
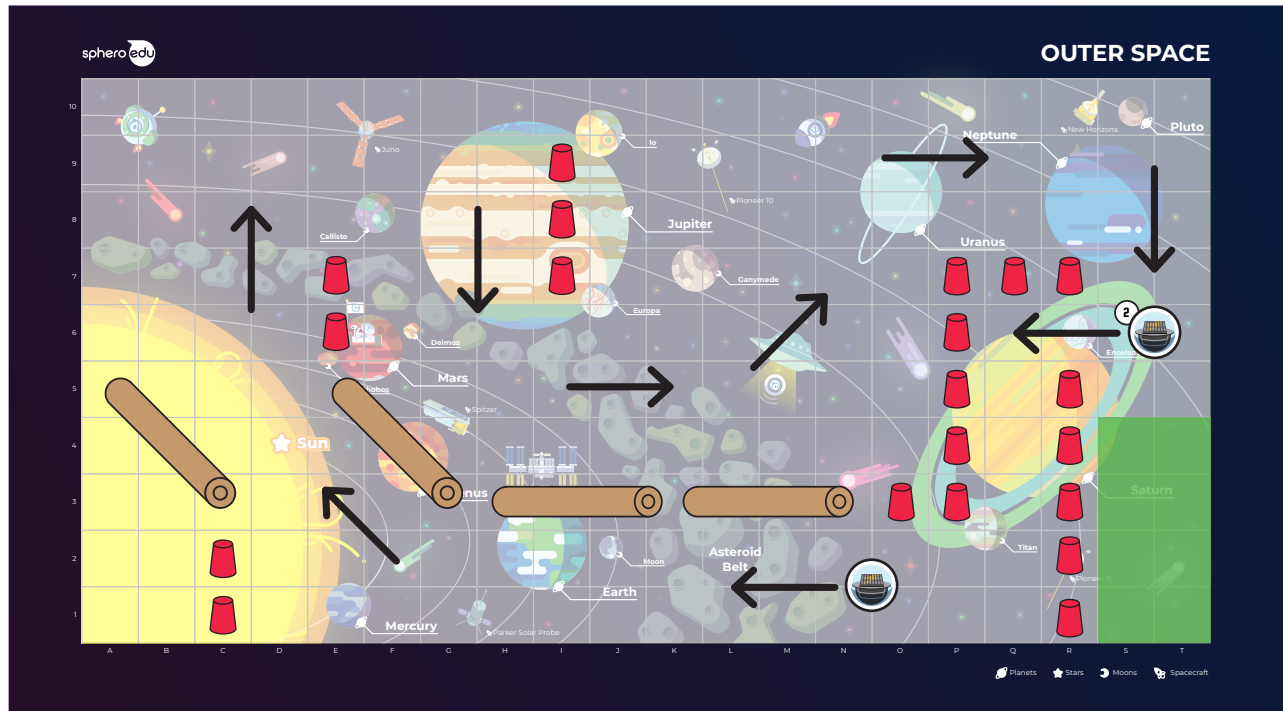
i. BOLT #1 must begin in N1, N2, O1, or O2 coordinates.

ii. BOLT #2 must begin on the line between S6 and T6.

ii. Using cardboard tubes, and cups, establish the correct path on the competition field.

ii. The following grids should be used to establish the path for BOLT #1 & #2 to travel:

1. C1, C2, C3	**7.** H3	**13.** N3
2. B4	**8.** I3, I7, I8, I9	**14.** O3
3. A5	**9.** J3	**15.** P3, P4, P5, P6, P7
4. E5, E6, E7	**10.** K3	**16.** Q7
5. F4	**11.** L3	**17.** R1, R2, R3, R4, R5, R7
6. G3	**12.** M3	

b. BOLT #1 must navigate through the obstacle course while carrying the engineered chariot and payload.

c. Chariot must be built within the supplied budget restrictions, and need to be able to carry 25 small paper clips.

d. BOLT #1 must get to BOLT #2 and send a message to move BOLT #2.

e. BOLT #2 must move to Q7 without hitting an obstacle allowing BOLT #1 to pass into the landing zone.

f. BOLT #1's program must contain a variable called "boltMO5time" that announces the elapsed time of the program after BOLT #1 finishes in the landing zone.

g. You have a Engineering budget of $30, and your engineering build list and budgeting must be included on your infographic.

h. Engineering Supplies

    i. All of the following items can be found in the Sphero Craft Pack. Teams may use craft supplies from around the home or classroom, but they must be from the list of items to use and they need to adhere to the dimensions and quantities allowed for the price. See checklist on page 27.

Engineering Supplies Checklist

Items	Quantity	Price
Cardboard Box	1	$20
18 oz Plastic Cup	1	$15
Paper cups	1	$10
Cardboard	1 sheet (12"x12")	$7
Craft Foam Sheets	1 sheet	$7
String	30 cm	$6
Ruler	1	$5
Pencil	1	$5
Paper Tube (3" diameter)	1	$5
Paper Tube (2" diameter)	1	$5
Wood Blocks	1 block	$5
Rubber Bands	2	$4

Items	Quantity	Price
Masking Tape	30 cm	$20
Popsicle Sticks	4	$15
Straws	4	$10
Glue Dots	1 sheet (12 dots)	$7
Toothpicks	6	$7
Paper Clips	4	$6
Pipe Cleaners	4	$5
Felt Sheet	1 sheet	$5
Foam Balls	2	$5
Sticky Notes	10	$5
Tissue Paper	1 sheet	$5
Construction Paper	1 sheet	$4

Submission Guidelines

Teams will be required to submit three items. Please see the rubric document for specifics on how each submission will be evaluated and judged.

- **BOLT-M6. Program File**

    a. Program file must contain a function for each Mission Objective.

    b. Use the following naming convention for your functions on the final code submission:

    i. boltMo1

    ii. boltMo2a, boltMo2b

    iii. boltMo3a, boltMo3b

    iv. boltMo4a, boltMo4b

    v. boltMo5

- **BOLT-M7. Video Submission**

    a. Students can film their program for mission objectives as many times as they need—there are no penalties for trying things multiple times. They are only evaluated on the final video that they submit.

    b. Each Mission must be filmed individually.

    i. Video must track the moving robots and keep the robots in the field of view at all times.

    ii. Individual mission objective videos should not be edited or spliced. Individual Mission Objectives should be filmed in one take.

    - Exception: If filming with two cameras and tracking 2 robots, on opposite sides of the competition field, a side by side edit can be used to show both robots at the same time. An attempt to show continuity must be present if showing two robots at once.

    c. After all mission objective videos have been recorded, please compile them using a video editing software to be one video file.

    d. Video Editing rules and guidelines:

    i. Titles, subtitles, and/or captions: may be used as long as they do not interfere with the view of the mission objectives being filmed.

    ii. Sound Effects: cannot be used over the recording of the mission objectives to allow for sound effects to be heard in the video.

    iii. Music: Any music used should be copyright/royalty free selections. Music should not be used to cover up any programmed sound effects, including speak blocks as required

    iv. Splicing/editing of Mission Objectives: all Mission Objectives must be filmed in one take; editing of Mission Objectives is prohibited except as outlined in BOLT-M7b.ii

• BOLT-M8. Code and Engineering Design Infographic

a. Infographic must be submitted as a .pdf file.

b. The size of your infographic must be 8.5"x11" or 11"x17"

c. You can use one of the supplied templates for your infographic or you can create your own.

d. An infographic is a visual representation of an idea, process, or a dataset. You are responsible for creating an infographic that demonstrates the learning process over the course of the event.

   1. How did the team work together?

   2. How did you iterate on your ideas?

   3. What was a struggle?

   4. What was easy?

   5. Show the iterations that you made during the engineering challenge and include the budget of your chariot.

• BOLT-M9. Evaluation and Judging

The Sphero Global Challenge rubric will be used to evaluate your submissions. Please refer to the rubric for the most accurate description of each judging criteria.

a. Code + Engineering Design Infographic (200 points)

   i. Code + Engineering Design Infographic submitted in proper format (pass/fail)

   ii. Creativity: 0-100 points

      • Points are awarded on the basis of design choices, originality and quality of the infographic.

   iii. Content: 0-100 points

      • Does the Code + Engineering Design Infographic contain all necessary information?

b. Mission Objectives (500 points)

   i. Program file contains functions calls as outlined in section BOLT-M6b (pass/fail)

   ii. Program file contains variables as outlined in each Mission Objective (pass/fail)

   iii. Mission Objective #1 (0-100 points)

      1. Competition field set up accurately

      2. Variables are used according to Mission Objective

      3. Mission Objective is completed as outlined in BOLT Mission Objective section of the rules document.

  iv. Mission Objective #2 (0-100 points)

    1. Competition field set up accurately

    2. Mission Objective is completed as outlined in BOLT mission objective section of the rules document.

  v. Mission Objective #3 (0-100 points)

    1. Competition field set up accurately

    2. Mission Objective is completed as outlined in BOLT mission objective section of the rules document.

  vi. Mission Objective #4 (0-100 points)

    1. Competition field set up accurately

    2. Mission Objective is completed as outlined in BOLT mission objective section of the rules document.

  vi. Mission Objective #5 (0-100 points)

    1. Competition field set up accurately

    2. Mission Objective is completed as outlined in BOLT mission objective section of the rules document.

c. Video Submission (200 points)

  i. Video submitted in proper format (pass/fail)

  ii. Video Creativity and Content

   • All of the mission objectives are filmed and present in the video

sphero littleBits

INVENT 4 GOOD

EVENT SPECIFIC RULES

General Rules

The littleBits Invent For Good Competition is a competition to help the next generation begin their journey towards solving the world's big problems. Teams are required to solve a problem of their own choosing by inventing a product/solution that can help those in need in their communities. In essence they will be Inventing For Good.

- **LB-G1.** Competitors must use littleBits electronics in conjunction with other materials and follow the littleBits Invention Cycle: Invent, Play, Remix, Share, to develop their solution. Teams must showcase their invention, via both video and infographic, to illustrate and explain why it is an effective and efficient solution to their chosen problem. Here are some examples of competition prompts. These are examples to get you thinking about ideas. You do not have to use these prompts and are encouraged to think about additional problems to solve.

  ### Examples

  a. The elderly face a multitude of challenges in their daily lives; what can you do to help them?

  b. Our society for the most part was designed with able bodied people in mind; what can you do to make things for accessible for those who have difficulties? (e.g. hearing impairments, visual impairments, missing limbs, etc.)

  c. When people get sick they face multiple obstacles; what can you do to help them?

  d. Local wildlife shelters take care of sick, injured, and abandoned animals; how can you help them tend to these animals?

  e. Our society produces an incredible amount of waste; what can you do to help reduce the amount of waste and/or better reuse items in your community?

  f. Education and the ability to attend school is crucial to the life of every child. What can you do to make education more accessible in your community?

  g. The recent pandemic has affected many communities in different ways. What can you do to help members of your community most affected by COVID-19?

- **LB-G2.** All participants must abide by the Sphero Global Challenge age requirements for Students, Elementary Students, and Middle School Students.

- **LB-G3.** The only motor, servo, and electrical components that can be used are electrical components from the litleBits Design System, a littleBits compatible power source, and the Micro:bit.

- **LB-G4.** If the Micro:bit is used, then it must be used with the littleBits Micro:bit adapter Bit (w34).

- **LB-G5.** No other motors, servos, or electronics may be used.

- **LB-G6.** There are no restrictions on the use of any mechanical components as long as no other rules are violated. Mechanical parts from other robotics kits or general household items (e.g. wood, cardboard, plastics, craft materials) are all examples of acceptable building materials.

Submission Guidelines

- **LB-SG1. Invention Video**

Teams are required to create a 90-180 second video documenting and showcasing their invention as specified in LB-SG1a-e.

a. Videos must be at least 90 seconds long and no more than 180 seconds long.

b. If the video has music, then it must be royalty or copyright free music.

c. Videos must utilize a 16:9 "widescreen" aspect ratio.

d. The video submission is a medium to allow teams to showcase their problem and invention solution; the video should focus on the problem, invention, and its various iterations, while addressing the requirements per LB-SG3.

e. Videos may consist of any, or some, combination of:

1. Video footage

2. Still photographs

3. Text overlays

4. Music or audio commentary

5. Animation

- **LB-SG2. Invention Infographic**

Teams are required to create a 1 page PDF/JPG/PNG file, in an infographic style, documenting and showcasing their invention as specified in LB-SG2a-d.

a. Infographics must be submitted as a PDF/JPG/PNG file.

b. Infographics must be approximately 24 inches [610mm] x 36 inches [915mm].

c. Infographics should consist of a balance of text, images, and graphics that fulfill the requirements ofLB-SG3 in an easy to digest and aesthetically pleasing format.

d. Infographics can be created digitally, or can be created by hand and submitted as a high resolution digital photograph.

- If submitting a digital photograph, teams must ensure that all text is easily legible.

Evaluation and Judging

The Sphero Global Challenge rubric will be used to evaluate your submissions. Please refer to the official rubric for the most up to date detailed description of each judging criteria.

- **LB-J1. CREATE (200 points)**

    a. Definition of the chosen problem (0-100 points)

       i. Points are awarded on the basis of how clearly defined the problem is and if it's suitable for the Invent 4 Good theme

    b. Analysis of the problem and research on existing and/or attempted solutions (0-100 points)

- **LB-J2. PLAY (400 points)**

    a. The invention follows all materials usage rules in Section 3b (pass/fail)

    b. Inventions must use a minimum of 1 Power Bit, 1 Input Bit, and 1 Output Bit (pass/fail)

    c. How effective is the invention at solving the chosen problem? (0-200 points)

    d. How effectively has the team used coding to enhance the invention? (0-50 points)

    e. Overall aesthetic and artistic appeal of the invention (0-100 points)

    f. Bit Creativity (0 - 50 points)

       i. Points are awarded based on creative use of Bits beyond the minimum Power-Input-Output Bits.

       ii. Creative combinations of Logic Bits used in coordination with the basic Bits will earn the most points.

- **LB-J3. REMIX (200 points)**

    a. Has the team demonstrated and/or described the various iterations, including failed iterations, leading up to the final invention? (0-100 points)

    b. Has the team explained how they would improve their invention given more resources? (0-100 points)

• LB-J4. SHARE (200 points)

a. The Invention Video follows all submission rules in Section 3c (pass/fail)

b. The Invention Infographic follows all submission rules in Section 3d (pass/fail)

c. How effectively does the Invention Video communicate and demonstrate the criteria listed in Section 2, while also being well produced and appealing? (0-100 points)

d. How effectively does the Invention Infographic communicate and demonstrate the criteria listed in Section 2, while being clear, concise, and visually striking? (0-100 points)

Sphero Global Challenge Advancement Criteria

The Sphero Global Challenge consists of two rounds of competition for each Event. The first round of competition is completely virtual, where Teams work on their Missions at home, at school, or at their extracurricular club and submit them to the Sphero Global Challenge submission site on robotevents.com. Each Event submission will be evaluated by the Sphero Global Challenge Judges based on a maximum score per event of 1,000 points.

The second and final round of competition is the Sphero Global Championship, which will be an in person competition located in Denver, Colorado. Finalists from round 1 will be invited to Championship based on either their Event Score or their Overall Performance Score based on the following guidelines.

- **AC-1.** Seventy percent (70%) of the Finalists will be selected based on their Overall Performance Score.

- **AC-2.** Teams in the top ten percent (10%) based on Overall Performance Score are guaranteed to be selected as Finalists.

- **AC-3.** The #1 Team per country, based on Overall Performance Score is guaranteed to be selected as a Finalist.

- **AC-4.** Additional Teams may be selected as Finalists based on their Overall Performance Score and the Championship venue capacity.

- **AC-5.** The remaining thirty percent (30%) of the Finalists will be determined by individual Event performance.

    a. Top Teams from littleBits Invent for Good: Mission Earth will represent 10% of Finalists.

    b. Top Teams from RVR+littleBits Mission Mars will represent 10% of the Finalists.

    c. Top Teams from BOLT Space Mission will represent 10% of the Finalists.

    d. Teams in the top 10% of each Event, based on their Event Score, are guaranteed to be selected Finalists.