sphero GLOBAL CHALLENGE
PRESENTED BY STEM IT UP SPORTS

SPHERO
TIME TRAVELERS
SPHERO GLOBAL CHALLENGE

SPHERO GLOBAL CHALLENGE SEASON 5

COMPETITION RULES

BOLT: TIME TRAVEL ODYSSEY

EVENT DESCRIPTION

Have you ever wished that you could experience a different time in human history? Well, there's no time like the present to time travel. Grab your friends, two BOLT robots, and your Sphero Global Challenge Blueprint Kit and get ready for an adventure. Don't forget to bring your best teamwork, problem solving, and communication skills so that you can accomplish the ***Mission Objectives*** and make it safely back home!

The Mission Objectives will challenge you to take your BOLT programming skills to the next level:

- Use problem solving skills to creatively find solutions to programming and engineering challenges.
- Program two BOLT robots to move with accuracy around the ***Competition Field***.
- Design and build mechanisms with your Sphero Global Challenge Blueprint Kit.
- Create programs that allow your BOLT robots to gather information from their environments and communicate with one another.

BOLT: TIME TRAVEL ODYSSEY
GENERAL RULES

BOLT-G1 Teams may have up to five total students.

BOLT-G2 Teams considered ***Upper Elementary School Teams*** will be scored on three ***Mission Objectives*** and their Slide Presentation for a total of 400 points (300 from ***Mission Objectives***, and 100 from the presentation). See the ***Evaluation Rubric*** for more information on scoring.

a. ***Upper Elementary School Teams*** must complete one ***Mission Objective*** from each difficulty category:

- **Beginner:** Mission Objective #1,
- **Intermediate:** Mission Objective #2 OR #3
- **Advanced:** Mission Objective #4 OR #5.

b. Teams may choose to submit all five ***Mission Objectives***. If you choose to do this, your submission will still be scored on a scale of 400 points (300 from ***Mission Objectives***, and 100 from the presentation). However, in this case, the judges will score all five ***Mission Objectives*** and your final score will consist of points from ***Mission Objective #1***, the highest score from ***Mission Objective #2*** and ***#3***, the highest score from ***Mission Objective #4*** and ***#5***, and the Slide Presentation.

BOLT-G3 Teams considered ***Middle School Teams*** will be scored on five ***Mission Objectives*** and their Slide Presentation for a total of 600 points. (500 from ***Mission Objectives***, and 100 from their Slide Presentation.)

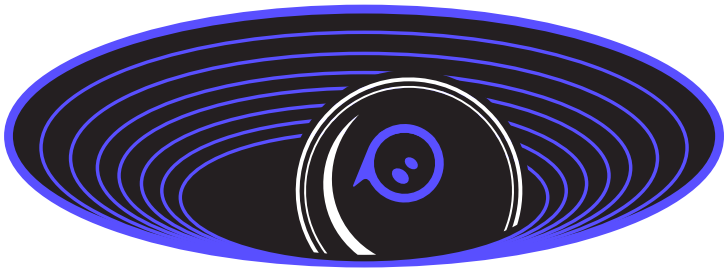
BOLT-G4 Teams will need to use parts from the Sphero Global Challenge Blueprint Kit to complete the ***Mission Objectives*** as outlined in the rules. The Kit includes the following parts:

- (6) 10x Pitch Trusses
- (8) 5x Pitch Trusses
- (12) 4x Pitch Trusses
- (12) 3x Pitch Trusses
- (8) 2x Pitch Trusses
- (40) Connectors
- (2) Turntables
- (6) Linear Motion Brackets
- (2) 45mm Pulleys
- (2) 3x Pitch Shafts
- (8) 0.5x Pitch Shaft Collars
- (4) 1x4 Plates
- (1) Removal Tool

Teams do not need to purchase the Sphero Global Challenge Blueprint Kit if they already have Blueprint parts from other kits. However, they may not use any parts in excess of the quantities listed above.

BOLT-G5 Coaches are to participate in a supervisory role and handle the registration, submission, and management of Team meetings. They are not allowed to actively participate alongside Students in the planning or completion of any ***Mission Objective***.

BOLT-G6 Once “Start” is pressed on any BOLT program, no human interaction can take place for the remainder of the program unless otherwise indicated in the ***Mission Objective*** rules.



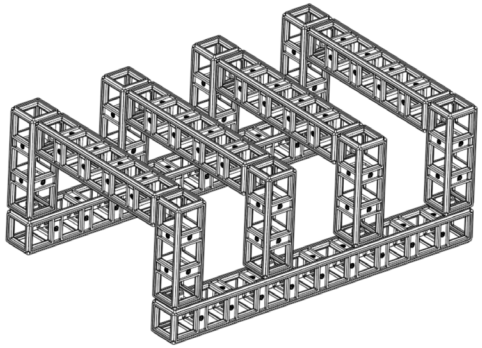
MISSION OBJECTIVE #1: READY, SET, PACK!

LEVEL: BEGINNER

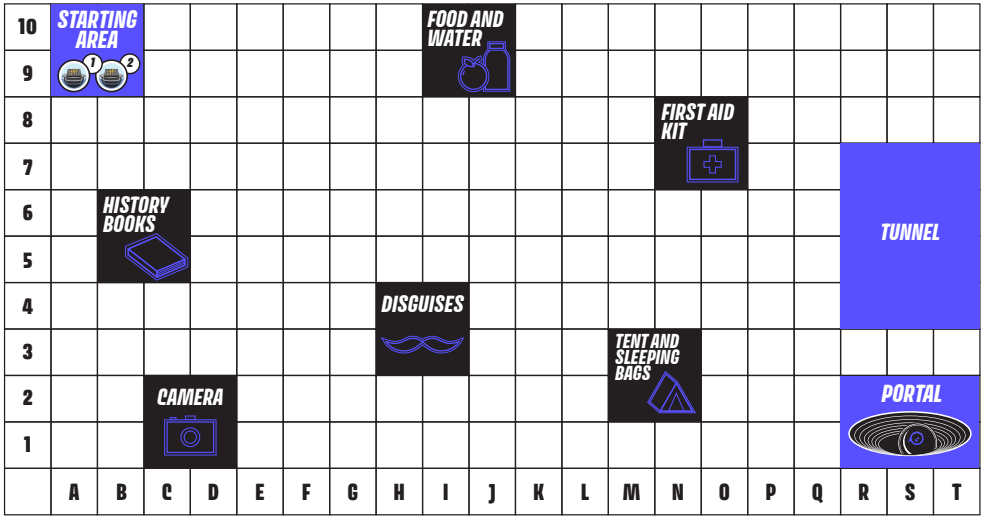
If you are going on a time travel adventure, you will need some ***Supplies***! What will you pack? Program your BOLT robots to race around the ***Competition Field*** and roll over your desired ***Supplies***. But hurry! You must make it through the ***Tunnel*** and to the ***Portal*** before it closes.

SET-UP

1. Use a printout or Code Mat as the ***Competition Field***. You can also create your own ***Competition Field*** using another method.
2. Build a time travel ***Tunnel*** that you'll program both BOLTs to pass under before stopping in the ***Portal***. To build the ***Tunnel***, you'll need:
   - (2) 10x Pitch Trusses
   - (4) 5x Pitch Trusses
   - (8) 3x Pitch Trusses
   - (16) Connectors



3. Place the ***Tunnel*** in the ***Competition Field's*** coordinates R4-T4, R5-T5, R6-T6, R7-T7. The ***Tunnel*** can be attached to the ***Competition Field*** with tape or other adhesive.
4. Mark the areas for ***Supplies*** on the ***Competition Field*** with markers, painter's tape or other method according to the following coordinates:
   - **camera:** C1, C2, D1, D2
   - **history books:** B5, B6, C5, C6
   - **disguises:** H3, H4, I3, I4
   - **food and water:** I9, I10, J9, J10
   - **tent and sleeping bags:** M2, M3, N2, N3
   - **first aid kit:** N7, N8, O7, O8



MISSION OBJECTIVE #1
RULES & DELIVERABLES

BOLT-M1-1 BOLT 1 and BOLT 2 must begin in the ***Starting Area***: A9, A10, B9, and B10.

BOLT-M1-2 Execution of the programs for BOLT 1 and BOLT 2 must begin at the same time.

BOLT-M1-3 BOLT 1 and BOLT 2 must travel around the ***Competition Field*** and pick up exactly two ***Supplies*** that they wish to bring with them on their time travel journey. To pick up a ***Supply***, a BOLT robot needs to roll over the associated coordinates on the ***Competition Field***. Once a ***Supply*** has been picked up by one BOLT, it cannot be picked up by the other BOLT. Five points will be deducted for each BOLT robot that does not pick up two ***Supplies***.

BOLT-M1-4 Once a ***Supply*** has been picked up, it can not be discarded. Five points will be deducted for each BOLT robot that picks up more than two ***Supplies***.

BOLT-M1-5 BOLT 1 and BOLT 2 must pass through the ***Tunnel*** and end the ***Mission Objective*** in the ***Portal***: R1, R2, S1, S2, T1, and T2.

BOLT-M1-6 The programs for BOLT 1 and BOLT 2 may take no longer than 30 seconds.

BOLT-M1-7 A one time penalty of five points will be deducted if a BOLT robot crosses the ***Competition Field Boundary Lines*** at any point during the program.

BOLT-M1-8 According to the ***Evaluation Rubric***, points may be added for creative use of lights and sounds, especially lights and sounds that represent the ***Supplies*** that the BOLT robots picked up.

DELIVERABLES

The ***Mission Objective*** will be scored according to the ***Evaluation Rubric***. Submit the following evidence of completion in the Google Slide Submission template (sphero.cc/SGC5-bolt-template).

1. **Video:** Submit a video of the ***Mission Objective***. The video must:
   a. be submitted in a .mp4, .mov, or .avi format
   b. be captured from top down perspective
   c. show both BOLTs for the entire ***Mission Objective***
2. **Code:** Submit a screenshot or image of the programs for both BOLT 1 and BOLT 2.
3. **Commentary:** Submit a written explanation for why your team chose the ***Supplies*** that it did for the time travel adventure.

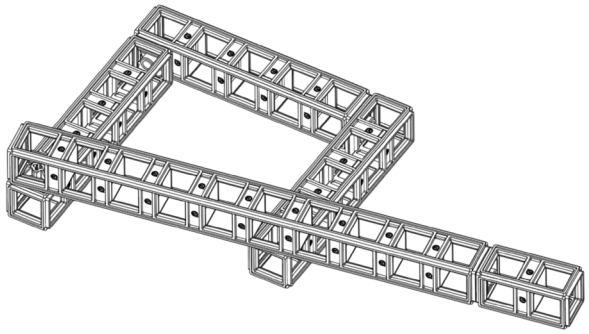
MISSION OBJECTIVE #2: STRIVIN' FOR SURVIVIN'

LEVEL: INTERMEDIATE

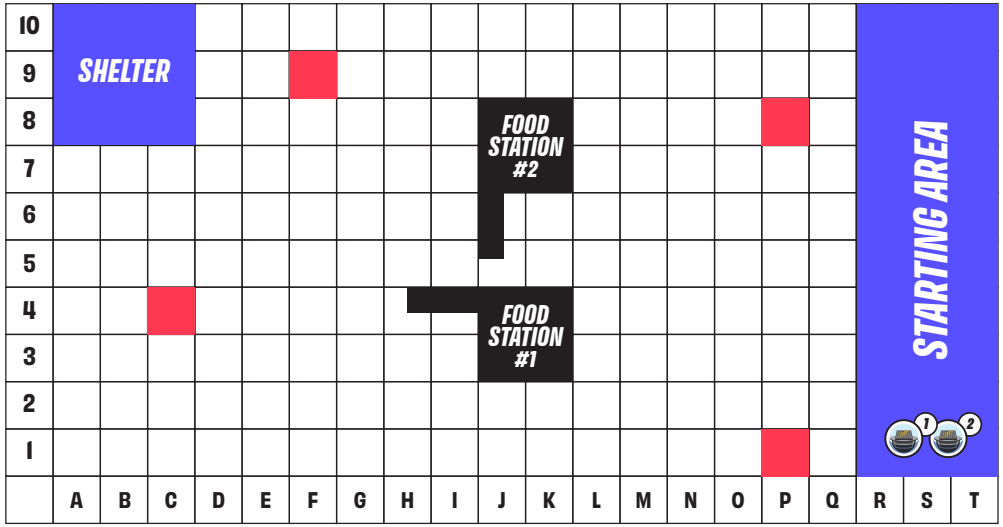
Your first stop in your time travel adventure is before the time of large civilizations, circa 50,000 years ago. You'll have to use your wits and your collaboration skills to survive the day and make it to your ***Shelter*** when night falls.

SET-UP

1. Use a printout or Code Mat as the ***Competition Field***. You can also create your own ***Competition Field*** using another method.
2. Build two ***Food Stations***. For each ***Food Station***, you'll need:
   - (1) 10x Pitch Truss
   - (3) 5x Pitch Trusses
   - (1) 2x Pitch Truss
   - (3) Connectors
   - (1) Turntable



3. Place the ***Food Stations*** on the ***Competition Field*** as shown in the image. The base of the ***Food Stations*** can be attached to the ***Competition Field*** with tape or other adhesive. Place one ping pong or golf ball in the center of each ***Food Station***.
   - ***Food Station #1:*** J3, J4, K3, K4 with the arm extending through I4 and into H4.
   - ***Food Station #2:*** J7, J8, K7, K8 with the arm extending through J6 and into J5.
4. Mark four ***Obstacles*** on the ***Competition Field***: Snake: F9, crocodile: C4, sabertooth tiger: P8, and poisonous berries: P1.



MISSION OBJECTIVE #2
RULES & DELIVERABLES

BOLT-M2-1 BOLT 1 and BOLT 2 must begin in the ***Starting Area***: rows R, S, and T.

BOLT-M2-2 Execution of the programs for BOLT 1 and BOLT 2 must begin at the same time.

BOLT-M2-3 BOLT 1 and BOLT 2 must work in coordination to open both ***Food Stations***.

BOLT-M2-4 For each ***Food Station***, 10 bonus points will be awarded if the ***Food*** is pushed all the way out of the ***Food Station*** footprint by the end of the ***Mission Objective***.

BOLT-M2-5 After releasing the ***Food***, both BOLT robots should pause and wait for dusk. When the light level is dimmed, the BOLTs should sense the change and move to the ***Shelter***. Ambient light levels can be controlled with room lights, lamps, and/or flashlights.

BOLT-M2-6 The BOLT+ robots must avoid grid squares marked as ***Obstacles*** on the ***Competition Field***. Five points will be deducted for each time a BOLT encounters an ***Obstacle***.

BOLT-M2-7 Upon reaching the ***Shelter***, both BOLT robots should display petroglyph art on their matrix.

BOLT-M2-8 The programs for BOLT 1 and BOLT 2 may take no longer than 60 seconds.

BOLT-M2-9 BOLT 1 and BOLT 2 must end the ***Mission Objective*** in the ***Shelter***: A8, A9, A10, B8, B9, B10, C8, C9, and C10.

DELIVERABLES

The ***Mission Objective*** will be scored according to the ***Evaluation Rubric***. Submit the following evidence of completion in the Google Slide Submission template (sphero.cc/SGC5-bolt-template).

1. **Video:** Submit a video of the ***Mission Objective***. The video must:
   - **a.** be submitted in a .mp4, .mov, or .avi format
   - **b.** be captured from top down perspective
   - **c.** show both BOLTs for the entire ***Mission Objective***
2. **Code:** Submit a screenshot or image of the programs for both BOLT 1 and BOLT 2.

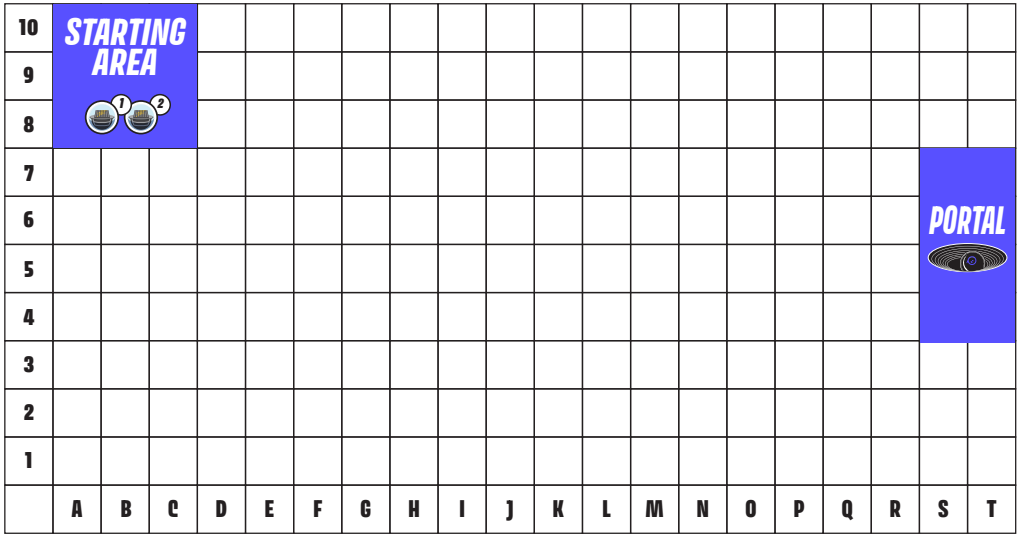
MISSION OBJECTIVE #3: GOING ANCIENT

LEVEL: INTERMEDIATE

Throughout human history, ancient civilizations have flourished in all corners of the globe. Choose one that your team is most passionate about, do research, and then design the ***Competition Field*** and build with Blueprint to represent some of the most important historical and cultural information. Then program your BOLT robots to travel through your model and give a tour!

SET-UP

1. Use a printout or Code Mat as the ***Competition Field***. You can also create your own ***Competition Field*** using another method.
2. Decorate the ***Competition Field*** with your Sphero Global Challenge Blueprint Kit and craft supplies to represent an ancient civilization of your choice.



MISSION OBJECTIVE #3
RULES & DELIVERABLES

BOLT-M3-1 BOLT 1 and BOLT 2 must begin in the ***Starting Area***: A8, A9, A10, B8, B9, B10, C8, C9, and C10.

BOLT-M3-2 Execution of the programs for BOLT 1 and BOLT 2 must begin at the same time.

BOLT-M3-3 BOLT 1 and BOLT 2 must be programmed to together share at least 5 facts about an ancient civilization. The programs must use blocks from the movement, light, sound, control, communication, and event categories.

BOLT-M3-4 Teams must use the Sphero Global Challenge Blueprint Kit to build objects and models that represent the ancient civilization. The Blueprint build(s) can be placed anywhere on the ***Competition Field*** and must include at least one moving part that a BOLT interacts with at some point during its program.

BOLT-M3-5 Teams may also use other craft supplies and materials to decorate the ***Competition Field*** for their ancient civilization.

BOLT-M3-6 BOLT 1 and BOLT 2 must end the ***Mission Objective*** in the Portal: S5-7 and T5-7.

BOLT-M3-7 The programs for BOLT 1 and BOLT 2 may take no longer than 90 seconds.

BOLT-M3-8 According to the ***Evaluation Rubric***, points may be added for creativity in both engineering design and programming.

DELIVERABLES

The ***Mission Objective*** will be scored according to the ***Evaluation Rubric***. Submit the following evidence of completion in the Google Slide Submission template (**sphero.cc/SGC5-bolt-template**).

1. **Video:** Submit a video of the ***Mission Objective***. The video must:
   a. be submitted in a .mp4, .mov, or .avi format
   b. be captured from top down perspective
   c. show both BOLTs for the entire ***Mission Objective***
2. **Code:** Submit a screenshot or image of the programs for both BOLT 1 and BOLT 2.
3. **Blueprint Builds:** Submit close up pictures of your Blueprint builds with explanations of how they represent your chosen ancient civilization.

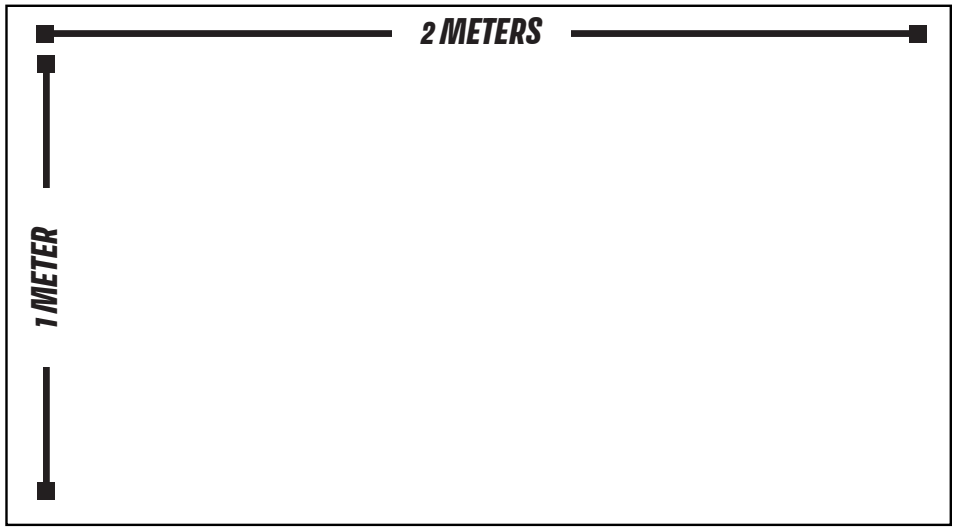
MISSION OBJECTIVE #4: TIMELESS MESSAGES

LEVEL: ADVANCED

Humans have long left messages for each other, whether words written on paper or pictures carved into wood or stone. Now on your time travel adventure, it's your turn. You have to design and build one or more ***Art Machines*** with Blueprint that your BOLT time travelers can operate. What message do you want to etch permanently in time? What will you build with Blueprint to make it happen?

SET-UP

1. The ***Competition Field*** from the other ***Mission Objectives*** is not required for this ***Mission Objective***. Instead use a piece of butcher paper that is at least 2 meters x 1 meter.
2. Build one or more ***Art Machines*** with your Blueprint Kit in accordance with BOLT-M4-1.



MISSION OBJECTIVE #4
RULES & DELIVERABLES

BOLT-M4-1 Teams must design and build one or more ***Art Machines*** to draw, paint, or otherwise record a message on the ***Competition Field***. The ***Art Machine(s)*** must be built according to the following constraints:

- **a.** The ***Art Machine(s)*** must be built with Blueprint parts from the Sphero Global Challenge Blueprint Kit.
- **b.** Pencils, markers, paint brushes and other tools can be attached to the ***Art Machine(s)*** with tape, rubber bands, or other adhesives.
- **c.** BOLT 1 and BOLT 2 should fit inside the ***Art Machine(s)*** so the ***Art Machine(s***) can be moved and manipulated.

BOLT-M4-2 BOLT 1, BOLT 2, and the ***Art Machine(s)*** may start the ***Mission Objective*** anywhere on the ***Competition Field***.

BOLT-M4-3 BOLT 1 and BOLT 2 must be programmed to operate the ***Art Machine(s)*** to record a message that is recognizable to others. The message may include words, letters, or pictures.

BOLT-M4-4 The Programs for BOLT 1 and BOLT 2 must take no longer than 60 seconds.

BOLT-M4-5 BOLT 1 and BOLT 2 may end the ***Mission Objective*** anywhere on the ***Competition Field***.

BOLT-M4-6 According to the ***Evaluation Rubric***, points may be added for the creativity and meaning of the message left on the ***Competition Field***.

DELIVERABLES

The ***Mission Objective*** will be scored according to the ***Evaluation Rubric***. Submit the following evidence of completion in the Google Slide Submission template (sphero.cc/SGC5-bolt-template).

1. **Video:** Submit a video of the ***Mission Objective***. The video must:
   - **a.** be submitted in a .mp4, .mov, or .avi format
   - **b.** be captured from top down perspective
   - **c.** show both BOLTs for the entire ***Mission Objective***
2. **Code:** Submit a screenshot or image of the programs for both BOLT 1 and BOLT 2.
3. **Art:** Submit a picture of your art along with an explanation of the message.

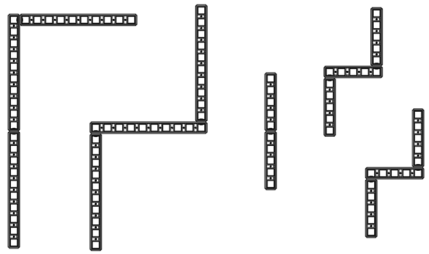
MISSION OBJECTIVE #5: LOST IN TIME

LEVEL: ADVANCED

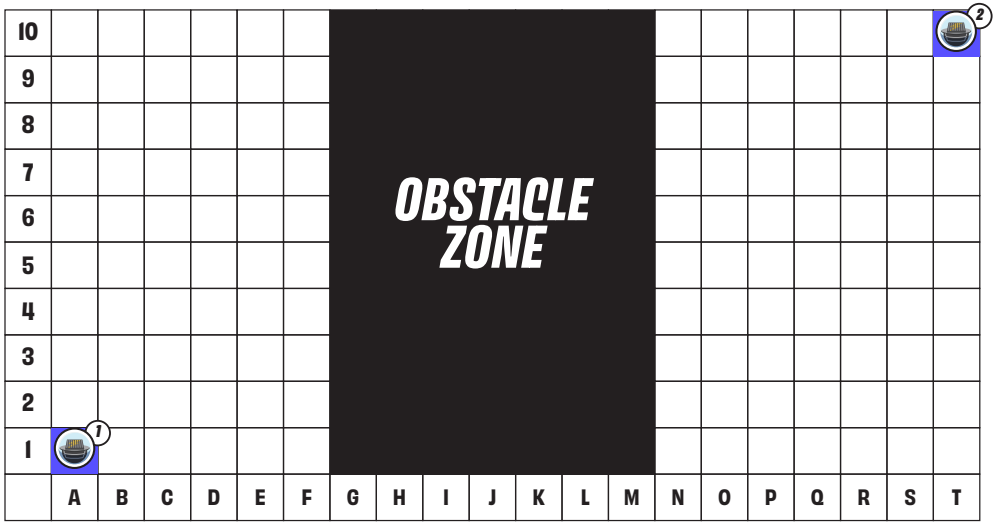
Your time travel journey is almost over but there has been a major hiccup on the journey home. BOLT 2 has made it safely, but BOLT 1 is still lost in the time travel continuum. BOLT 2 must send IR messages to BOLT 1 to guide it safely through the time jump avoiding ***Obstacles*** that threaten to keep the robot lost in time FOREVER!

SET-UP

1. Use a printout or Code Mat as the ***Competition Field***. You can also create your own ***Competition Field*** using another method.
2. Build five ***Obstacles*** with your Blueprint Kit. You'll need:
   - (6) 10x Pitch Truss
   - (8) 5x Pitch Trusses
   - (10) Connectors



3. Place these ***Obstacles*** in the ***Obstacle Zone*** in accordance with BOLT-M5-3. You may use tape or other adhesive to attach the ***Obstacles*** to the ***Competition Field***.



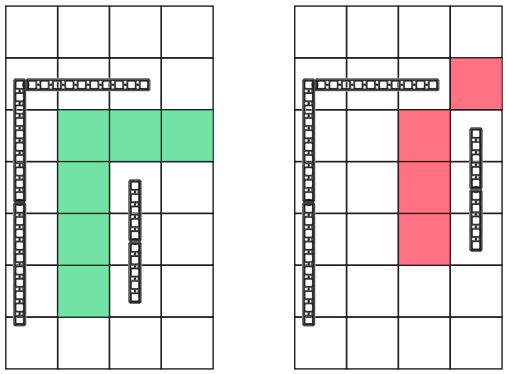
MISSION OBJECTIVE #5
RULES & DELIVERABLES

BOLT-M5-1 BOLT 1 must start in A1 and remain on the ***Competition Field*** for the entire program.

BOLT-M5-2 BOLT 2 must start in T10 and remain in T10 for the entire program.

BOLT-M5-3 The ***Obstacles*** must be placed within the ***Obstacle Zone***. They can placed anywhere within the zone according to the following constraints:

- **a.** ***Obstacles*** must be fully contained within the ***Obstacle Zone***.
- **b.** ***Obstacles*** may be flipped and rotated into any orientation but they must lie flat on the ***Competition Fied***.
- **c.** Each ***Obstacle*** must be at least 1 grid square from another ***Obstacle*** in every direction.



OK ***NOT OK***

- **d.** Each row on the ***Competition Field*** must be partially occupied by at least 1 ***Obstacle***.

BOLT-M5-4 This ***Mission Objective*** is complete when BOLT 1 rolls through the Obstacle Zone and stops in any of the squares adjacent to BOLT 2 (T9, S10, or S9).

BOLT-M5-5 BOLT 2's program must use the send message block to communicate with BOLT 1, and BOLT 1 must use those messages to move safely through the ***Obstacle Zone***.

BOLT-M5-6 BOLT 1's program must use a light block to indicate when it receives a message from BOLT 2.

BOLT-M5-7 BOLT 1's program can only use one movement block under each on message received event.

BOLT-M5-8 BOLT 2's program must use a variable to track how many messages it has sent to BOLT 1, and display that number on the LED matrix so that it counts up as messages are sent.

BOLT-M5-9 Both BOLTs must celebrate using lights and sounds when they reach each other.

BOLT-M5-10 ***Mission Objective*** points will be awarded based on the ***Evaluation Rubric***. Each time BOLT 1 leaves the grid area or rolls into an ***Obstacle***, 5 points will be deducted from the overall score.

DELIVERABLES

The ***Mission Objective*** will be scored according to the ***Evaluation Rubric***. Submit the following evidence of completion in the Google Slide Submission template (**sphero.cc/SGC5-bolt-template**).

1. **Video:** Submit a video of the ***Mission Objective***. The video must:
    a. be submitted in a .mp4, .mov, or .avi format
    b. be captured from top down perspective
    c. show both BOLTs for the entire ***Mission Objective***
2. **Code:** Submit a screenshot or image of the programs for both BOLT 1 and BOLT 2.

BOLT: TIME TRAVEL ODYSSEY

SUBMISSION REQUIREMENTS

BOLT-S1 Submissions should include all deliverables from each completed ***Mission Objective*** in a Slideshow, using the Google Slide template (**sphero.cc/SGC5-bolt-template**). The template is meant to help ensure you include all the submission requirements. You can get creative with layouts, fonts, number of slides, and details.

BOLT-S2 Videos for each ***Mission Objective*** may be embedded into the Slide Presentation, but also must be uploaded in the submission form. If you embed videos make sure the sharing permissions are changed to “anyone with the link”.

BOLT-S3 Submissions will be scored based on the ***Evaluation Rubric***.

RVR+: PORTAL THROUGH TIME

EVENT DESCRIPTION

RVR+ is a great companion for time travel! Starting in the present day, and moving through the past and to the future RVR+ will help you transport supplies, autonomously navigate through different terrains, and help you learn coding along the way.

RVR+: PORTAL THROUGH TIME
GENERAL RULES

RVR+-G1 Teams may have up to five total students.

RVR+-G2 Teams considered ***Upper Elementary School Teams*** will be scored on three ***Mission Objectives*** and their Slide Presentation for a total of 400 points (300 from ***Mission Objectives***, and 100 from the presentation). See the ***Evaluation Rubric*** for more information on scoring.

a. ***Upper Elementary School Teams*** must submit ***Mission Objective #1***, ***Mission Objective #2*** or ***#3***, and ***Mission Objective #4*** or ***#5***. This means the final submission will consist of one present, one past, and one future ***Mission Objective***.

b. Teams may choose to submit all five ***Mission Objectives***. If you choose to do this, your submission will still be scored on a scale of 400 points (300 from ***Mission Objectives***, and 100 from the presentation). However, in this case, the judges will score all five ***Mission Objectives*** and your final score will consist of points from ***Mission Objective #1***, the highest score from ***Mission Objective #2*** and ***#3***, the highest score from ***Mission Objective #4*** and ***#5***, and the Slide Presentation.

RVR+-G3 Teams considered ***Middle School Teams*** will be scored on five ***Mission Objectives*** and their Slide Presentation for a total of 600 points. (500 from ***Mission Objectives***, and 100 from their Slide Presentation.)

RVR+-G4 Teams will need to use parts from the Sphero Global Challenge Blueprint Kit to complete the ***Mission Objectives*** as outlined in the rules. The Kit includes the following parts:

- (6) 10x Pitch Trusses
- (8) 5x Pitch Trusses
- (12) 4x Pitch Trusses
- (12) 3x Pitch Trusses
- (8) 2x Pitch Trusses
- (40) Connectors
- (2) Turntables
- (6) Linear Motion Brackets
- (2) 45mm Pulleys
- (2) 3x Pitch Shafts
- (8) 0.5x Pitch Shaft Collars
- (4) 1x4 Plates
- (1) Removal Tool

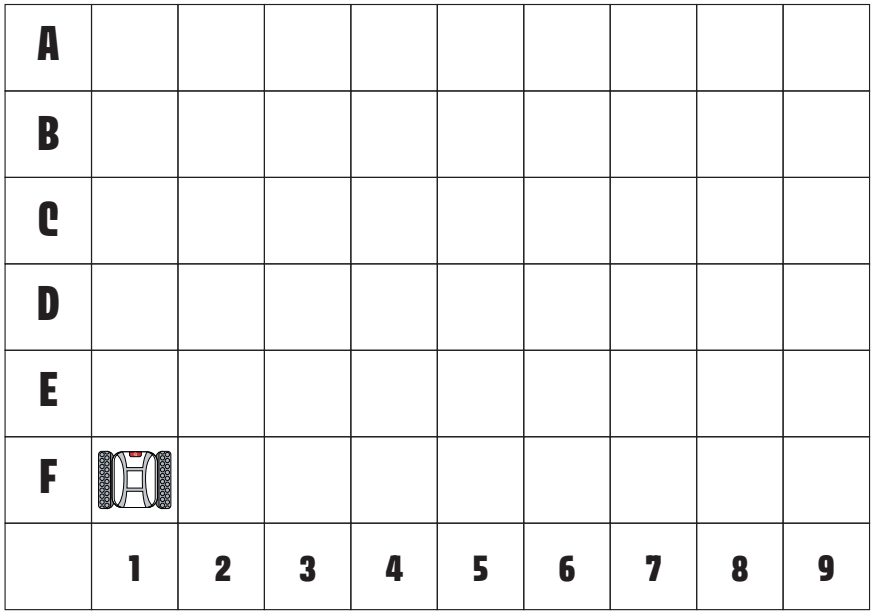
Teams do not need to purchase the Sphero Global Challenge Blueprint Kit if they already have Blueprint parts from other kits. However, they may not use any parts in excess of the quantities listed above.

RVR+-G5 Coaches are to participate in a supervisory role and handle the registration, submission, and management of Team meetings. They are not allowed to actively participate alongside Students in the planning or completion of any ***Mission Objective***.

RVR+-G6 All RVR+ ***Mission Objectives*** are meant to be completed fully through programming of RVR+. Once "Start" is pressed on any RVR program, no human interaction can take place for the reminder of the program.

RVR+-G7 RVR+: Portal Through Time ***Competition Field*** setup requirements for all ***Mission Objectives*** are listed below. We recommend teams find a space to set up the ***Competition Field*** semi-permanently so you do not have to re-build it every time you meet. Any Sphero coding mat may be used in lieu of making your own ***Competition Field***.

- ***Competition Field*** Size: 6' x 9' (1.829 m X 2.7432 m).
- Divide the ***Competition Field*** into 1' x 1' (304.8mm X 304.8mm) grid squares and label as seen in the image below.
- You can use any material to mark the ***Competition Field*** and grid squares (i.e painter's tape, PVC, 2x4s, etc.).

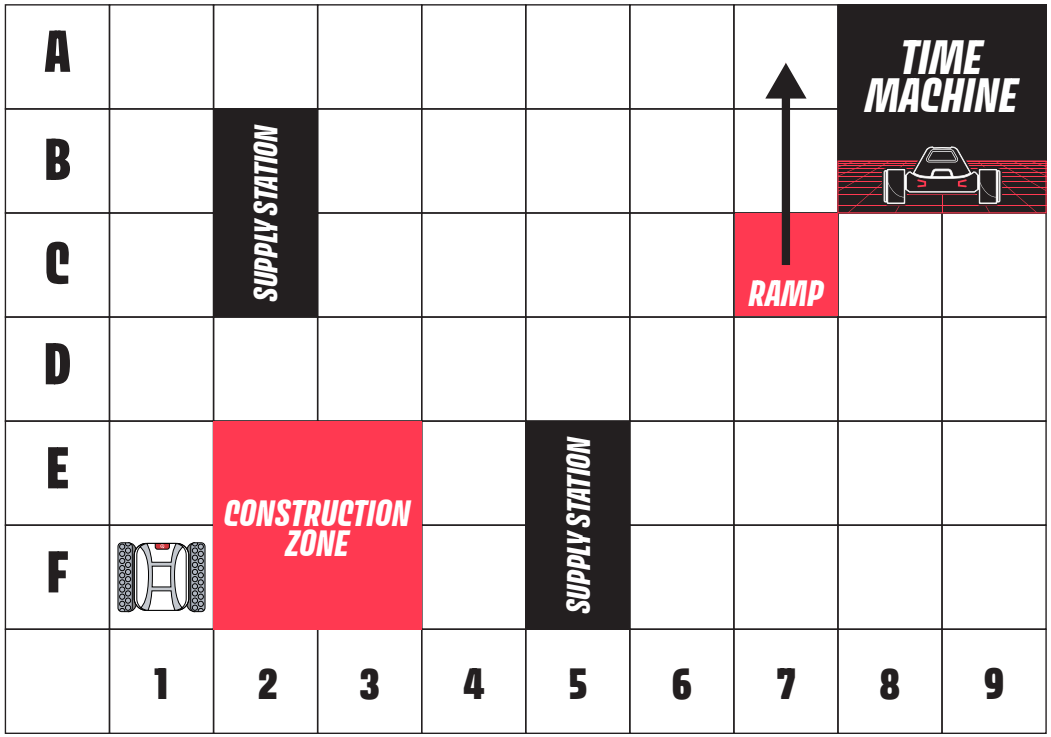


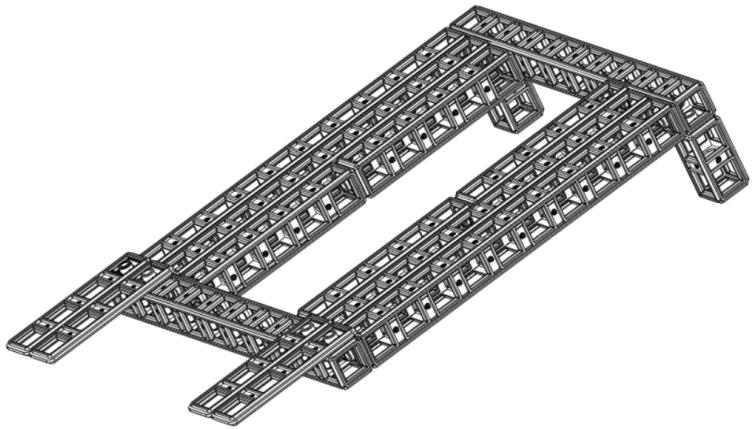
MISSION OBJECTIVE #1: NAVIGATE TO TIME MACHINE

PRESENT // LEVEL: BEGINNER

To start our time travel missions RVR+ must first get to the time machine! Everyday cars have more and more autonomous features, and RVR+ can drive fully autonomous too. Program RVR+ to navigate through the course without having a driver, and finish in the time machine!

SET-UP





BLUEPRINT RAMP

MISSION OBJECTIVE #1
RULES & DELIVERABLES

RVR+-M1-1 RVR+ must start in F1 and remain on the ***Competition Field*** for the entire ***Mission Objective***.

RVR+-M1-2 RVR+ must navigate to, and stop in both ***Supply Stations***, B2-C2 & E5-F5, for 5 seconds each. While at the ***Supply Stations*** RVR+ must:

- enter each station with all LEDs set to red
- exit each station with all LEDs set to green
- speak a sentence stating that all supplies have been collected

RVR+-M1-3 After both ***Supply Stations*** have been visited, RVR+ must move the Blueprint ramp from C7 to B7-A7.

RVR+-M1-4 RVR+ must end the ***Mission Objective*** by driving up the ramp and landing anywhere in the time machine area (A8, B8, A9, B9).

- no points will be deducted for leaving the ***Competition Field*** during this portion of the ***Mission Objective***.

RVR+-M1-5 While RVR+ is on the ramp, it must flash the LEDs. RVR+ must stop when it lands in the time machine area. See ***Evaluation Rubric*** to understand how this will be scored.

DELIVERABLES

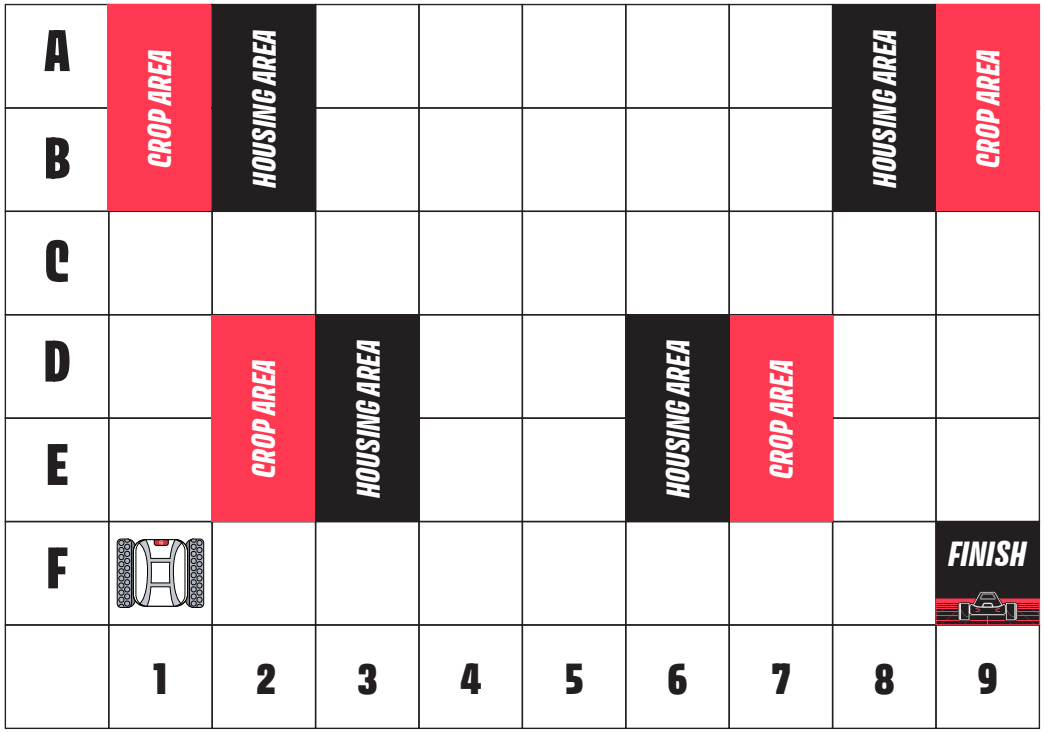
1. **Video** (.mp4, .mov, .avi) of the ***Mission Objective***
   a. Ideally a top down view
   b. RVR+ visible while its program is running
2. Picture of code for RVR+ included in the submission.

MISSION OBJECTIVE #2: ANCIENT EGYPT

PAST // LEVEL: INTERMEDIATE

RVR+ has been transported back to ancient Egypt and needs to set up an irrigation system to save their crops. There are four groups of crops on the ***Competition Field***. RVR+ must drive to all ***Crop Areas*** and pause on each to deliver enough water to help them grow while avoiding houses and buildings. Be fast, because this is a timed challenge!

SET-UP



MISSION OBJECTIVE #2
RULES & DELIVERABLES

RVR+-M2-1 RVR+ must start in F1 and remain on the ***Competition Field*** for the entire ***Mission Objective***.

RVR+-M2-2 RVR+ must navigate to, and stop in all four ***Crop Areas***, E2-D2, E7-D7, B1-A1, and B9-A9 for 2 seconds each. While inside ***Crop Areas*** RVR+ must:

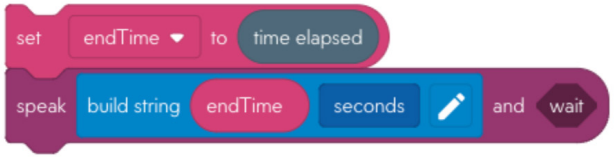
- enter each ***Crop Area*** with all LEDs set to blue
- exit each ***Crop Area*** with all LEDs off
- make a sound that relates to water from the sound library.

RVR+-M2-3 When entering each ***Crop Area*** a function must be used in your program to perform tasks listed in RVR+-M2-2.

RVR+-M2-4 RVR+ must not enter any of the four ***Housing Areas*** at any point in the challenge (E3-D3, E6-D6, B2-A2, and B8-A8). You should mark these areas off with tape, Blueprint pieces, or other objects.

RVR+-M2-5 RVR+ must end the ***Mission Objective*** in F9, after completing all tasks. Consider adding a celebration with movement, lights, and sounds when you finish.

RVR+-M2-6 Program runtime should not exceed 45 seconds, and RVR+ should speak the time it took to complete the ***Mission Objective*** once it has finished its celebration. The blocks below provide an example of how you can accomplish this with a variable:



DELIVERABLES

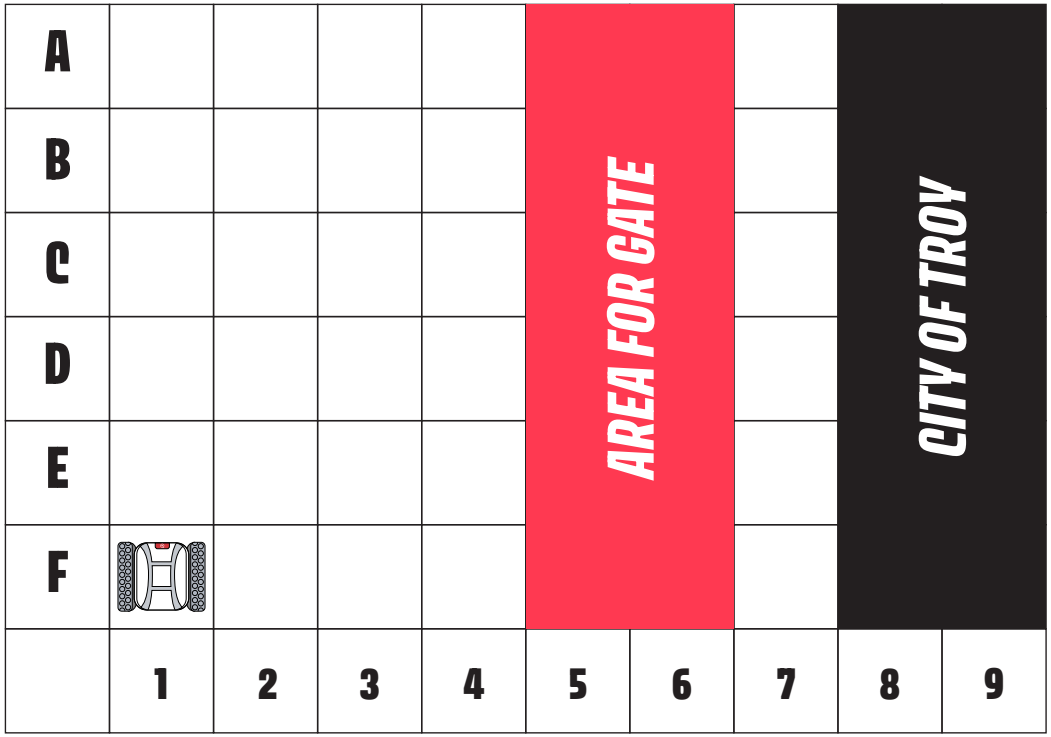
1. **Video** (.mp4, .mov, .avi) of the ***Mission Objective***
   a. Ideally a top down view
   b. RVR+ visible while its program is running
2. Picture of code for RVR+ included in the submission.

MISSION OBJECTIVE #3: ANCIENT GREECE

PAST // LEVEL: INTERMEDIATE

You've been transported back to ***Ancient Greece***, and RVR+ is being tasked to help create the Trojan Horse to help invade the city of Troy. Using Blueprint pieces design a ***Gate*** to the city of Troy, and a device to go on top of RVR+ to hold 20 soldiers. Program RVR+ to go through the ***Gate***, and deploy the soldiers on the other side!

SET-UP



MISSION OBJECTIVE #3
RULES & DELIVERABLES

RVR+-M3-1 RVR+ must start the ***Mission Objective*** anywhere inside the column A1-F1and must not leave the ***Competition Field*** for the entire ***Mission Objective.***

RVR+-M3-2 You must construct a ***Gate*** that can take up any area inside A5-F5 & A6-F6. The ***Gate*** must be built from Blueprint pieces contained in the Blueprint Competition Kit.

RVR+-M3-3 RVR+ must be able to open the ***Gate*** and end the ***Mission Objective*** inside the City of Troy (A8-F8 and A9-F9).

RVR+-M3-4 RVR+ must transport 20 people from its starting position to the city of Troy. The people can be represented by ping pong balls, golf balls, or other similar sized objects.

RVR+-M3-5 When building the transportation device on top of RVR+, only Blueprint pieces may be used, along with paper, cardboard, or other paper like material.

DELIVERABLES

1. **Video** (.mp4, .mov, .avi) of the ***Mission Objective***
   a. Ideally a top down view
   b. RVR+ visible while its program is running
2. Picture of code for RVR+ included in the submission.
3. A close up picture of the structure that was built on top of the RVR+ topper plate included in the submission slides.
4. A close up picture of the ***Gate*** that was built included in the submission slides.

MISSION OBJECTIVE #4: TERRAFORMING MARS

PAST // LEVEL: ADVANCED

RVR+ is now on Mars! The most important task the astronauts need to do is figure out where to grow plants and food. RVR+ must survey the entire area, and using the color sensor determine which areas have the right conditions to start planting. RVR+ must identify, remember, and report the areas back to the astronauts.

SET-UP

A			AREA 1				AREA 2		
B					AREA 4				AREA 3
C									
D		AREA 5				AREA 6		AREA 7	
E									
F	AREA 10				AREA 9		AREA 8		
	1	2	3	4	5	6	7	8	9

MISSION OBJECTIVE #4
RULES & DELIVERABLES

RVR+-M4-1 RVR+ must start the ***Mission Objective*** in A1, and remain in the ***Competition Field*** for the entire ***Mission Objective***.

RVR+-M4-2 RVR+ must drive through all grid spaces on the ***Competition Field*** during the ***Mission Objective***.

RVR+-M4-3 When RVR+ drives over one of the ten areas that it is surveying for it must:

- use a variable to keep track of how many black areas there are that are not suitable for crops.
- use a variable to keep track of how many color tiles there are that are suitable for crops.

RVR+-M4-4 Once RVR+ has finished its survey, and driven over every grid on the ***Competition Field***, it should speak how many areas were suitable for crops and how many were not, using the variables created.

DELIVERABLES

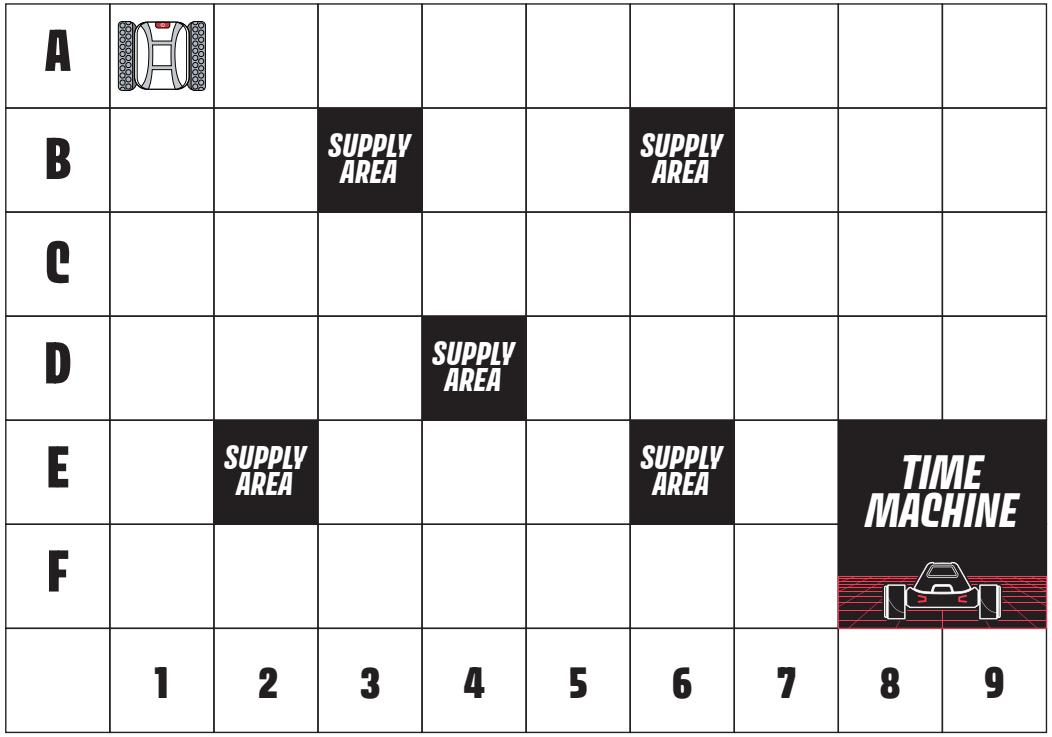
1. **Video** (.mp4, .mov, .avi) of the ***Mission Objective***
   a. Ideally a top down view
   b. RVR+ visible while its program is running
2. Picture of code for RVR+ included in the submission.

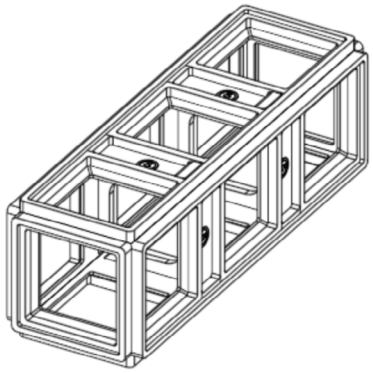
MISSION OBJECTIVE #5: FIX THE TIME MACHINE

PAST // LEVEL: ADVANCED

RVR+ is finished with time travel, and needs to get back to the present, but its time machine was damaged and needs to be fixed! Design a mechanism to go on top of RVR+ to gather materials and bring them back to the lab so RVR+ can come back to the present.

SET-UP





One ***Supply Box*** (a 3x Blueprint truss) should be placed in each ***Supply Area***.

MISSION OBJECTIVE #5
RULES & DELIVERABLES

RVR+-M5-1 RVR+ must start the ***Mission Objective*** in A1, and remain in the ***Competition Field*** for the entire ***Mission Objective***.

RVR+-M5-2 In each of the five ***Supply Collection Areas*** place a ***Supply Box***, shown in the set up portion of this ***Mission Objective***.

RVR+-M5-3 Build a device on top of the RVR+ that allows you to collect and move the ***Supply Boxes*** as you drive around the ***Competition Field***.

RVR+-M5-4 Only RVR+ and Blueprint pieces may touch the ***Supply Boxes***, no human interaction is permitted.

RVR+-M5-5 Once all ***Supply Boxes*** are collected, deliver them to the ***Time Machine Lab***. All ***Supply Boxes*** must end the ***Mission Objective*** inside the ***Time Machine Lab*** (E8, F8, E9, F9).

RVR+-M5-6 RVR+ must end the ***Mission Objective*** anywhere inside the ***Competition Field***, and must celebrate in some way when the ***Mission Objective*** is complete.

DELIVERABLES

1. **Video** (.mp4, .mov, .avi) of the ***Mission Objective***
   a. Ideally a top down view
   b. RVR+ visible while its program is running
2. Picture of code for RVR+ included in the submission.
3. A close up picture of your collection device on RVR+.

RVR+: PORTAL THROUGH TIME

SUBMISSION REQUIREMENTS

RVR+-S1 Submissions should include all deliverables from each completed ***Mission Objective*** in a Slideshow, using the Google Slide template (**sphero.cc/SGC5-rvr-template**). The template is meant to help ensure you include all the submission requirements. You can get creative with layouts, fonts, add slides, etc.

RVR+-S2 Videos for each ***Mission Objective*** may be embedded into the Slide Presentation, but also must be uploaded in the submission form. If you chose to embed videos make sure the sharing permissions are changed to “anyone with the link”.

RVR+-S3 Submissions will be scored based on the ***Evaluation Rubric***.

INDI: JURASSIC JOURNEY

EVENT DESCRIPTION

indi can do a lot of amazing things–but can indi travel through time!? In this year's Sphero Global Challenge, teams will create a time traveling machine to transport indi to the past where indi will follow a dinosaur around for a day. Teams will tap into their creativity and collaborate with others to learn about dinosaurs, design a beautiful landscape, and apply their computational thinking skills.

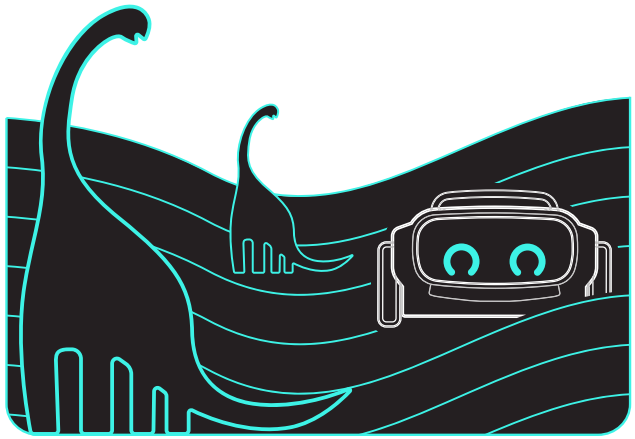
Designate an Android or iOS device that students can use as a programming device (optional). indi can be used in a screen-free environment and programming indi with the Sphero Edu Jr app is not a requirement for a successful solution to each ***Mission Objective***.

INDI: JURASSIC JOURNEY
GENERAL RULES

indi-G1 Teams may have up to five total students.

indi-G2 All participants must abide by the Sphero Global Challenge age requirements for ***Students*** and ***Early Elementary Students***.

indi-G3 ***Coaches*** are to participate in a supervisory role and handle the registration, submission, and management of ***Team*** meetings. Coaches can support ***Students*** in planning the ***Mission Objectives***, but ***Students*** should take on the primary role in completing them.



INDI: JURASSIC JOURNEY
MISSION OBJECTIVES & DELIVERABLES

MISSION OBJECTIVE #1: KNOW YOUR DINOSAUR

First things first: What dinosaur will indi see? In this ***Mission Objective***, students will select, research, and make a model of a dinosaur which will prepare them for their travel back in time.

indi-M1-1 Select a dinosaur and find answers to the following questions:

1. What did it eat?
2. Where might it sleep?
3. Did it live around other dinosaurs?
4. What type of environment did it live in?

Record the responses so they can be used in ***Mission Objective 2*** and ***Mission Objective 3***.

indi-M1-2 Use craft supplies, clay, playdough etc. to create a model of the dinosaur students selected.

- It must be at least 6 inches (15 cm) tall.

MISSION OBJECTIVE #2: DESIGN FOR TIME

With a dinosaur in mind, it's time to design a place for it to roam and a time machine for indi.

indi-M2-1 Design a habitat for the dinosaur. Depending on the type of dinosaur, this might be a desert, lake, jungle or something else.

1. Use whatever craft supplies you have available to create a place for your dinosaur to live and indi to drive around.
2. Your habitat should be at least 5 feet x 5 feet (1.5 x 1.5 meters).

indi-M2-2 Design a time machine. This might be a tunnel, portal, or phone booth indi drives through, or you might decorate indi itself to transform it into a mobile time machine.

MISSION OBJECTIVE #3: A DAY IN THE LIFE...OF A DINOSAUR

Finally, it's time for indi to make a leap in time. Create a path for indi to drive around the habitat to discover how dinosaurs lived.

indi-M3-1 indi should drive around the dinosaur habitat:

1. The path should include at least eight (8) tiles.
2. At least one team member should narrate what indi sees your dinosaur doing.

indi-M3-2 Once the day is over, travel back in time to the present. indi should return to the same spot it began.

DELIVERABLES

1. ***Mission Objective 1***: A picture of the dinosaur model.
2. ***Mission Objective 2***: A picture of the habitat
3. ***Mission Objective 3***: Video (.mp4, .mov, .avi) of indi traveling through the habitat and back to its starting position.
   a. Ensure indi is visible during the video.
   b. Ensure narration is audible in the video.
4. Optional: Pictures of any modifications made to indi in the Sphero Edu Jr. app, if applicable, is included in the submission.

INDI: JURASSIC JOURNEY
SUBMISSION REQUIREMENTS

indi-S1 Submissions should include all deliverables from the ***Mission Objective*** in a Google Slide Format, using the linked template (sphero.cc/SGC5-indi-template). The template is meant to help ensure you include all the submission requirements. You can get creative with layouts, fonts, add slides, etc.

indi-S2 Videos for each ***Mission Objective*** may be embedded into the Slide Presentation, but also must be uploaded in the submission form. If you chose to embed videos make sure the sharing permissions are changed to “anyone with the link”.

indi-S3 Submissions will be scored based on the ***Evaluation Rubric***.

GLOSSARY

Student — Anyone born after May 1, 2006.

Early Elementary School Student — Any Student born after May 1, 2016, meaning they will be 8 or younger when the Sphero World Championship is held.

Upper Elementary School Student — Any Student born after May 1, 2013, meaning they will be 11 or younger when the Sphero World Championship is held.

Middle School Student — Any student born after May 1, 2010.

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

Upper 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 must 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 that will handle the registration, submission, and management of Team meetings. Teams may have more than one ***Coach***.

Event — Sphero Global Challenge Season 5 comprises three unique ***Events***:

- indi: Jurassic Journey
- BOLT: Time Travel Odyssey
- RVR+: Portal Through Time

Mission Objectives — Each Event is broken up into ***Mission Objectives*** that Teams will be evaluated on based on the ***Evaluation Rubric***.

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

Competition Field — A defined space for each ***Event's Mission Objectives***.

The Indi ***Event*** does not have a ***Competition Field***.

Any Sphero Code Mat can be used as the ***Competition Field*** for the BOLT ***Event***. You can also print out and assemble a ***Competition Field*** from the ***Event*** resources.

The RVR+ ***Event*** should be played on a 6 ft. x 9 ft. area divided into 1 ft. x 1 ft. grid squares. Available at sphero.com or teams can make their own from other supplies.

Boundary Lines — The area outside of the ***Competition Field*** dimensions of each ***Event*** as defined in the rules section of this document.

Competition Rules — Detailed rules specific for each ***Event***. ***Competition Rules*** are contained within this document.

Event Score — Team's score for an individual ***Event***.

Finalist — Team invited to participate in the Sphero World Championship.

Starting Area The area of the ***Competition Field*** where robots begin a ***Mission Objective***.

Supply An area of the ***Competition Field*** that BOLT robots must roll over in ***Mission Objective 1*** to bring the object on their time travel adventure.

Tunnel A Blueprint model that BOLT robots must roll through to finish ***Mission Objective 1***.

Portal The area of the ***Competition Field*** where BOLT robots end a ***Mission Objective***.

Food A ping pong or golf ball that must be retrieved from a ***Food Station*** in BOLT ***Mission Objective 2***.

Food Station A Blueprint enclosure that contains ***Food*** in BOLT ***Mission Objective 2***.

Shelter The area of the ***Competition Field*** where BOLT robots end ***Mission Objective 2***.

Art Machine A device built with Blueprint parts and powered by a BOLT robot that can make art in BOLT ***Mission Objective 4***.

Obstacles Defined as any object placed in the ***Competition Field*** as part of the setup for a ***Mission Objective*** that should be avoided as outlined in the rules.

Obstacle Zone An area of ***Competition Field*** in BOLT ***Mission Objective 5*** for placing ***Obstacles***.

Supply Station The areas of the ***Competition Field*** that RVR+ must drive through in RVR+ ***Mission Objective 1***.

Crop Area The areas of the ***Competition Field*** that RVR+ must drive through in RVR+ ***Mission Objective 2***.

Housing Area The areas of the ***Competition Field*** that RVR+ must avoid in RVR+ ***Mission Objective 2***.

Gate A structure built with Blueprint parts that is placed on the ***Competition Field*** in RVR+ ***Mission Objective 3***.

Supply Boxes Structure consisting of one Blueprint 3x truss that is placed on the ***Competition Field*** in RVR+ ***Mission Objective 5***.

Supply Collection Area The areas of the ***Competition Field*** that supply boxes are placed in and RVR+ must drive through in ***Mission Objective 5***.

Time Machine Lab The area of the ***Competition Field*** that RVR+ must deliver ***Supply Boxes*** to in ***Mission Objective 5***.

sphero.com/pages/global-challenge