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Let the Games Begin!

A LEGO® Education SPIKE™ Prime Program
Introductory Robotics Program

Let the Games Begin
Introductory SPIKE™ Prime Program

Middle School Robotics Overview:

This 5-day robotics program outline will provide students with STEM focused hands-on activities to promote 21st century skills as well as design engineering and computer science. Each day, students will participate in team building activities and opportunities for physical activity as well as receive a daily team briefing for daily challenges aligned to standards. Daily challenges will help students develop skills and knowledge to complete the culminating project of designing a solution for a problem.

Program at a Glance		
Day 1	**Orientation** Why do we use robots? What can a robot do that humans cannot? Learn how to program motors and sensors and create a small robot that moves without wheels.	• Exploring Robots • Start Programming • Make Your Motors Turn using Sensors • Make a Hopper
Day 2	**Moving and Grooving** How can robots be used with music/sound?	• Move with the Music • Create a Game
Day 3	**Faster, Faster** How can robots be used in games? What advantages and disadvantages are there in one-player versus two-player games?	• Create Your Own Game • Rhino Race • Rhino Workout
Day 4	**Race the Clock** What types of robots can help humans do things faster, yet accurately? Where can you find those robots being used locally?	• Cart Races • Keep It Safe • Brain Game

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Day 5	**Showcase**	- The LEGO Way - Showcase Discussion and Planning - Showcase Preparation - Showcase

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Prior to First Day:
1. Sort the sets.
2. Download and install the SPIKE™ App on devices to be used for the program.
3. Determine a naming convention for each set.
   Suggestions include school initials and a number (Example: Millcreek Elementary robotics set names could be MES1; MES2; MES3). Write the name on the SPIKE™ Prime hub and on the set.
4. Connect the SPIKE™ Prime hub to an iPad, Chromebook or computer and update the hub (as needed). Rename each hub on the computer to match the name you assigned to the set.
5. Gather any consumable materials needed for the week.
6. Make sure devices that will be used are fully charged, Bluetooth is enabled (if needed) and students can access the app.
7. If you will not be using the cables, charge the SPIKE™ Prime hubs. You will need to charge the hub each day after use if they are Bluetooth connected during the day.
8. Determine a procedure for when a LEGO element is dropped (everyone freeze; say LEGO down/LEGO found) and where to place LEGO elements that do not belong to the finder.
9. While teams are working, assign each group a SPIKE™ Prime set and a SPIKE™ Prime Expansion set to use for the week. The expansion sets will not be needed every day.

Materials:
- SPIKE™ Prime sets
- SPIKE™ Prime Expansion sets
- Devices with SPIKE™ App
- Chart paper
- Student journals (could be paper stapled together with students creating the outside of the journal using construction paper and other consumable materials)
- Various craft materials
- Tape – red, black, green, yellow, blue (optional – can use markers on paper, but tape works best)
- Pens
- Pencils
- Markers

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Let the Games Begin Day 1
Introductory SPIKE™ Prime Program
Orientation

Big Questions:
- Why do we use robots?
- What can a robot do that humans cannot?

Materials:
- SPIKE™ Prime sets
- Devices with SPIKE™ App
- Chart paper
- Student journals (could be paper stapled together with students creating the outside of the journal using construction paper and other consumable materials)
- Various craft materials
- Pens
- Pencils
- Markers

Outline of Day	Tasks	Time	Materials
9:00 - 10:30	Introductions	30 min	• LEGO bricks
	Establishing Group Rules and Expectations	15 min	• Chart paper • Markers • Pens
	Team Building Activity	15 min	• LEGO bricks
	Team Briefing 1	5 min	• None
	Partner Selection, Team Name and Team Badge	25 min	• Varies, based on the activity selected • Team badge templates • Markers • Pencils • Scissors
10:30 - 10:35	Break		
10:35 - 11:25	Workplace Wellness	10 min	• Varies, based on the activity selected

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	Design a Journal	20 min	- Student journals - Markers - Scissors - Construction paper - Other craft materials
	Reading and Wondering	20 min	- Book about robots - Student journals
11:25	Get ready for lunch		
11:30 - 12:00	Lunch		
12:00 - 2:10	Team Briefing 2	5 min	None
	Challenge 1: Start Programming	30 min	- Student journals - SPIKE™ Prime set - Devices with SPIKE™ App
	Challenge 2: Using a Sensor to Control a Motor	35 min	- Student journals - SPIKE™ Prime set - Devices with SPIKE™ App
	Challenge 3: Make a Hopper	60 min	- Student journals - SPIKE™ Prime set - Devices with SPIKE™ App
	Break	5 min	None
	Disassemble Models and Inventory Check	10 min	SPIKE™ Prime set
2:10 - 2:30	Daily Debrief and Wrap Up	10 min	Student journals

Introductions
Time: 30 minutes
Materials:
- Loose LEGO bricks

Using the LEGO bricks, have students build a model that shows something they really like to do and one thing they really hope to learn at this robotics program. When it is

time to share, have students say their names and share their models. The teacher can record what the group hopes to learn on a piece of chart paper.

Group Rules and Expectations
Time: 15 minutes
Materials:
- Chart paper
- Markers

Using a piece of chart paper, establish group rules and expectations for the week as a class. You can have students sign the chart paper and then place the rules and expectations in a location that can be reviewed each day.

Team Building Activity
Time: 15 minutes
Materials:
- Loose bricks

Explain to students that each day will include some kind of team building challenge. Working together is an important skill and just like other skills, we can practice it to get better and better.

Build the tallest tower
Have students work in pairs. Make sure each group has the same bricks or give a constraint of using a specific number of bricks. Challenge students to build the tallest tower they can within five minutes. At the end of the five minutes, encourage students to reflect on:
- What was challenging?
- How did you overcome the challenge?
- What was successful?
- How did you work together?
- If you were to do this tower build again, what would you change?

Team Briefing 1:
Time: 5 minutes
Materials: None

Welcome to orientation! Your first tasks for today are as follows:
- *Determine a partner for training exercises.*
- *Work with partner to determine a name for your design company and a logo.*
- *Design a journal for keeping important records this week.*
- *Explore different ways we use robots.*
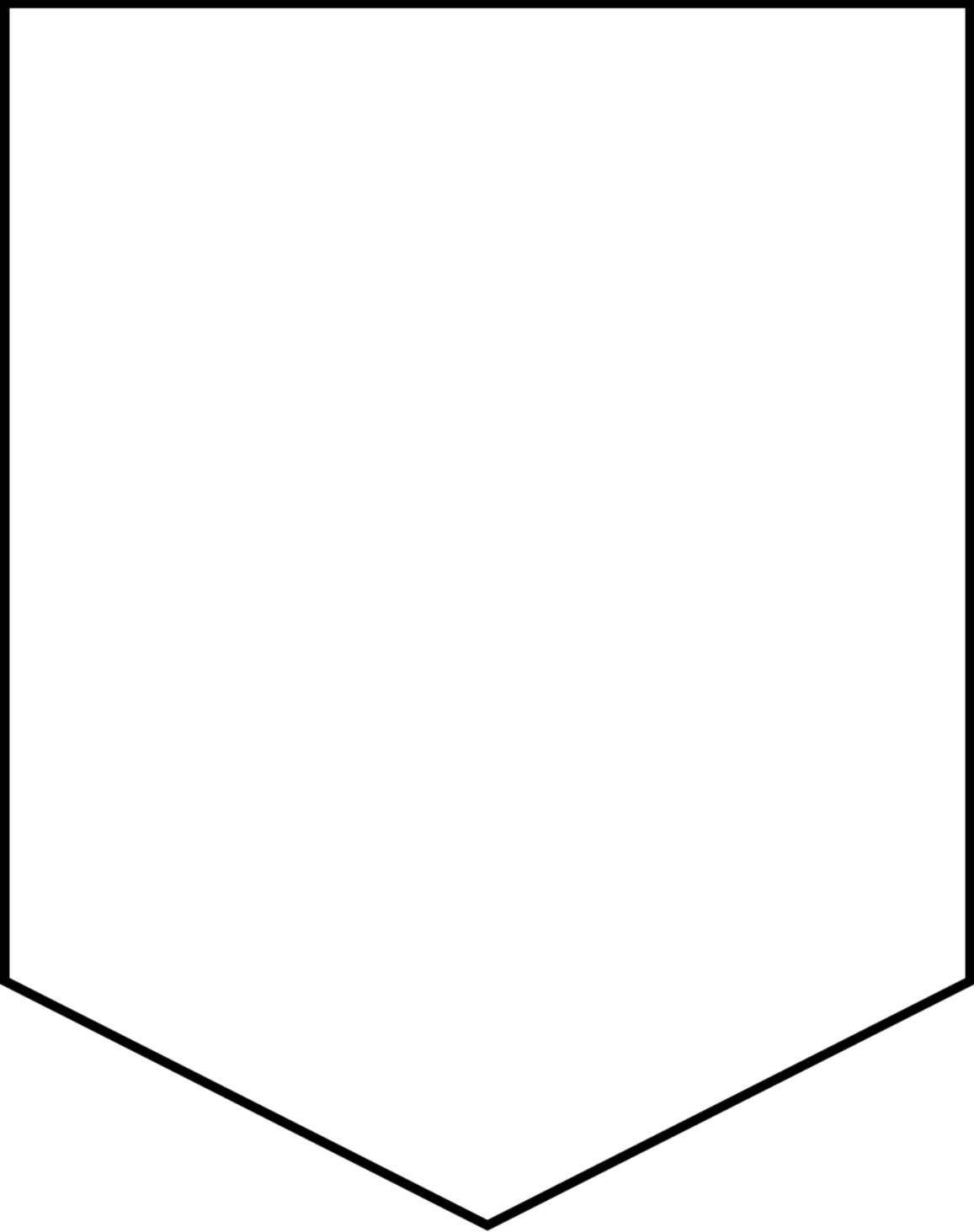
Partner Selection, Design Team Name and Logo
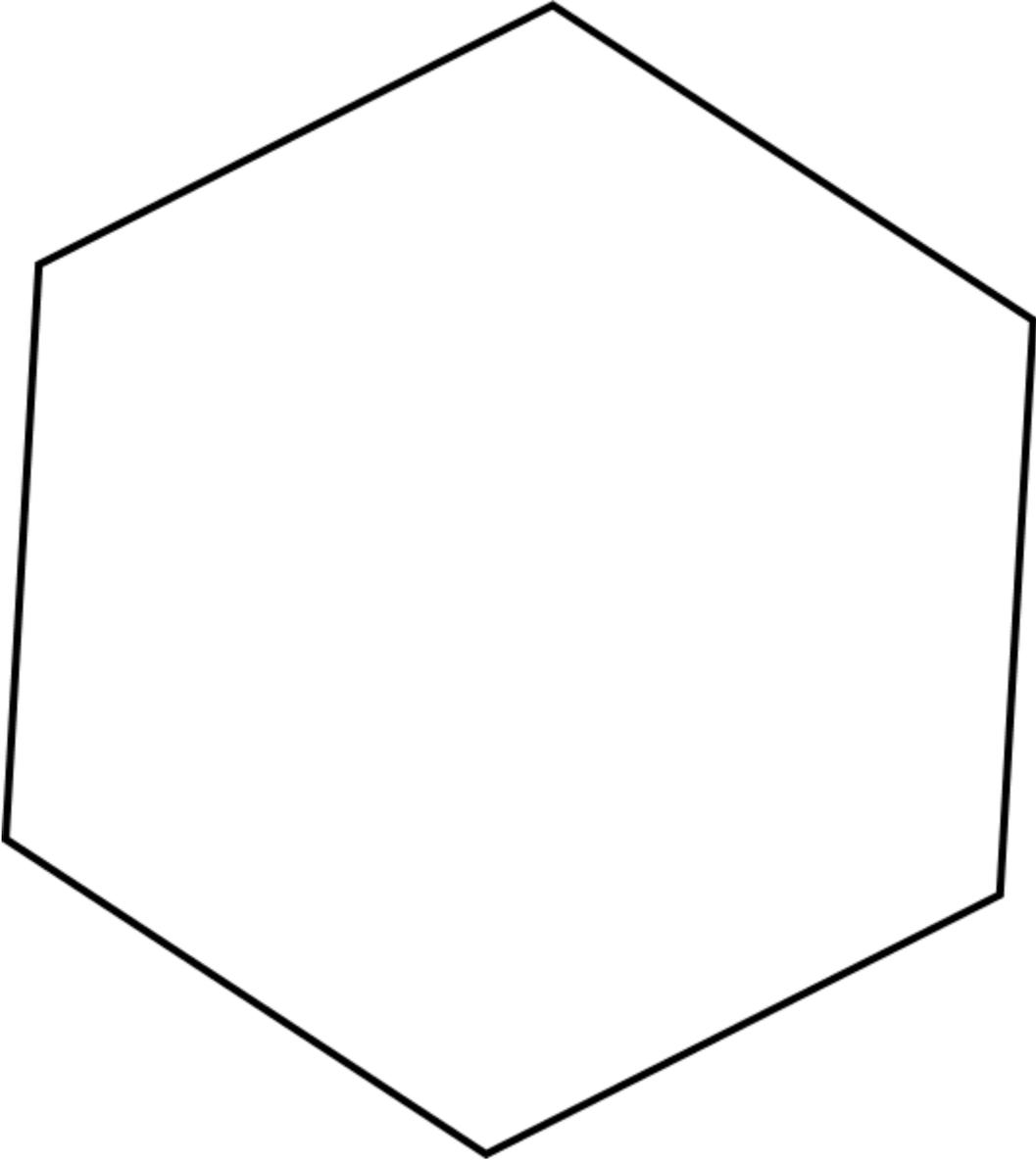Time: 25 minutes

Materials:
- Student journals (see note in materials section)
- Markers
- Scissors
- Construction paper
- Other craft materials

Once partners have been established, student teams can determine a design company name (team name) for their team and design a logo. Here are some example designs to start with:
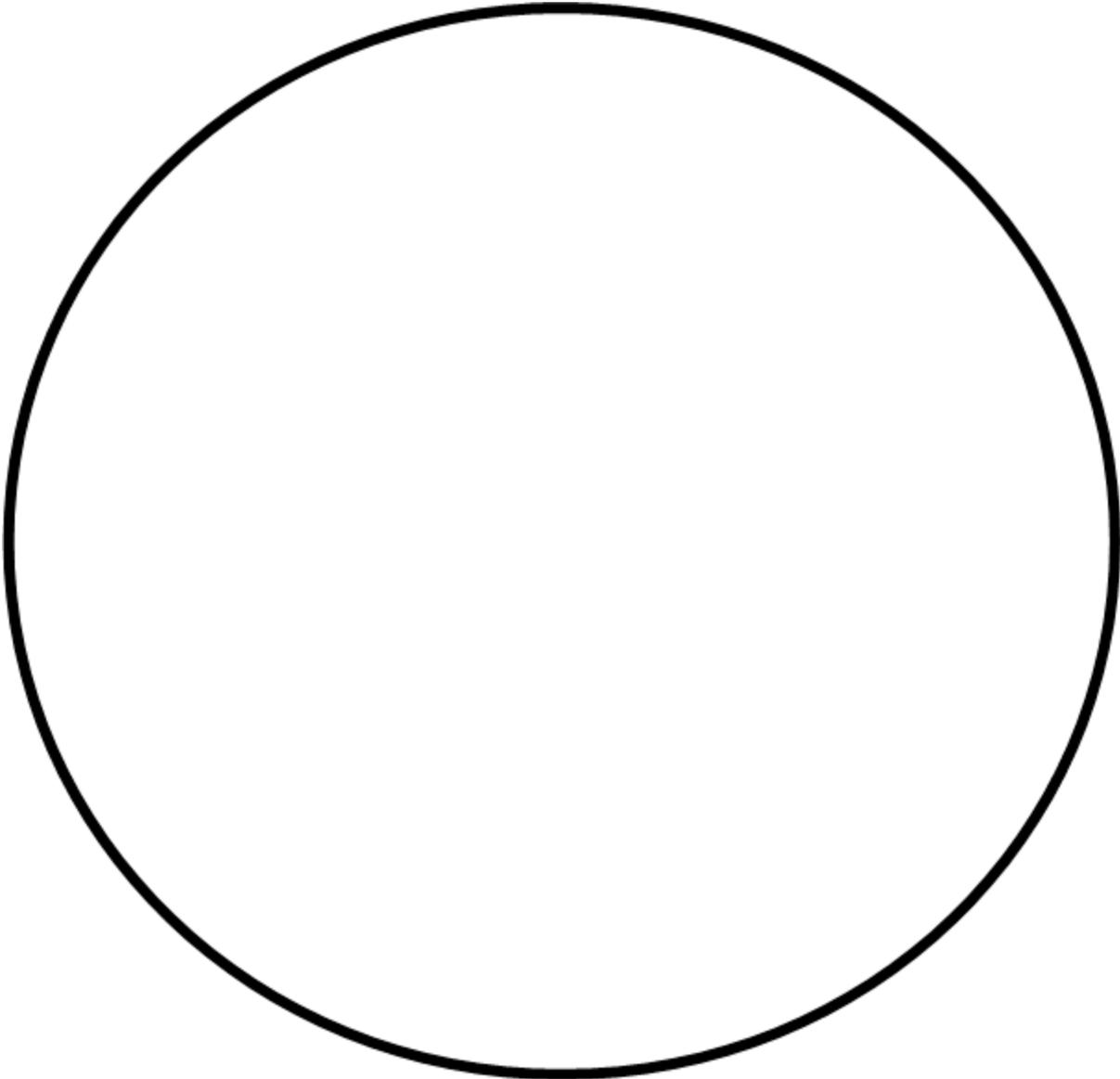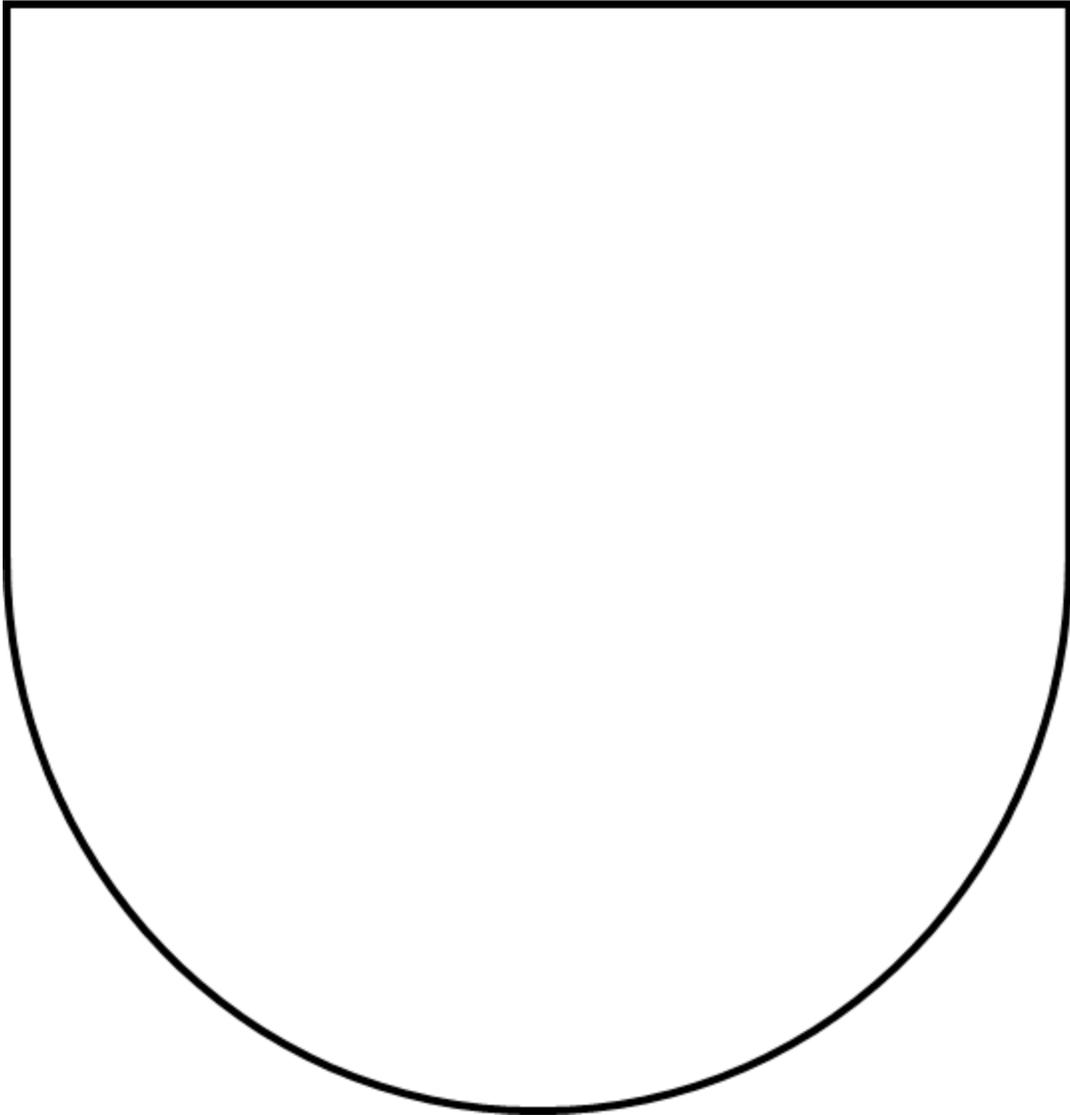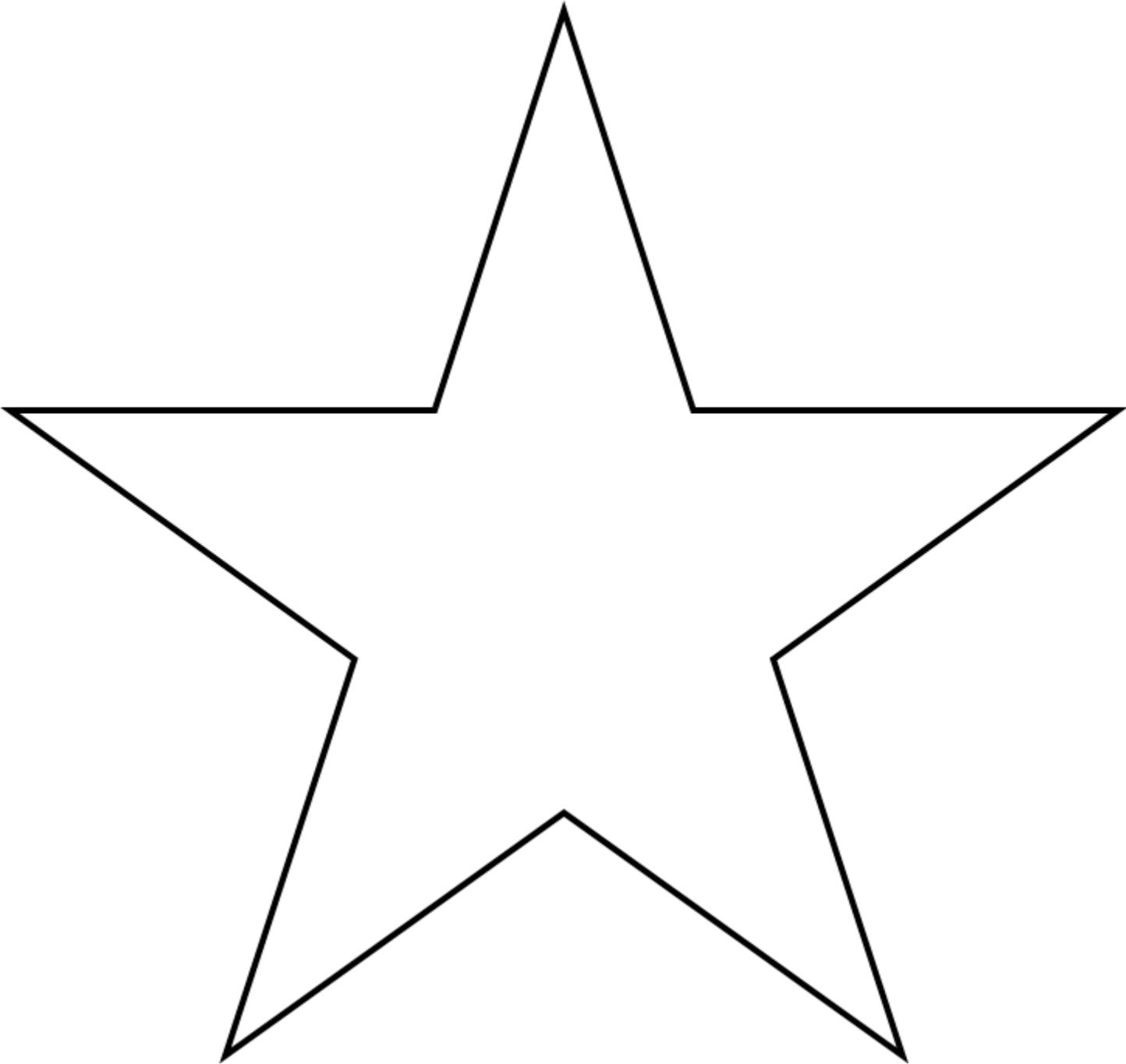
LOGO Template

LOGO Template

LOGO Template

LOGO Template

LOGO Template

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Break
Time: 5 minutes

Workplace Wellness
Time: 10 minutes
Materials:
- Vary depending on what activity is selected

Take a minute to complete a short physical activity. You may find several ideas for short physical activities for students through a simple web search. Ideas could include simple exercises like jumping jacks or running in place. Many companies encourage physical activity during the workday.

Design a Journal
Time: 20 minutes
Materials:
- Student journals (see note in materials section)
- Markers
- Scissors
- Construction paper
- Other craft materials

Have students create a journal to record notes, share wonderings, write reflections, and collect ideas. Ideas for types of journals can be found online.

Readings and Wonderings
Time: 20 minutes
Materials:
- Book or articles about robots

Read a book or a kid friendly journal article about robots and what robots can do that humans cannot. Have students write things they wonder about robots in their journals.

Lunch
Time: 30 minutes

Team Briefing 2:
Time: 5 minutes
Materials: None

Now that you have your team and have some background information about robots, you now have a new challenge. To be better prepared for the days ahead, you will need some basic training on the tools we will use this week. You mission this afternoon is to:
- *Explore how robots use motors and sensors to move and make decisions.*
- *Learn how to program a robot through using programming blocks.*

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Be sure to work together, take good notes and have fun!

Go over a few general guidelines for using the SPIKE^{TM} Prime sets.
- What do you do if you drop a piece on the floor?
- Where do you put a piece you have found?
- What does sharing look like?

Challenge 1 – Start Programming
Time: 30 minutes
Materials:
- SPIKE^{TM} Prime sets
- Device with SPIKE^{TM} App
- Student journals

Students will:
- Start programming with the SPIKE^{TM} Prime hub.
- Connect the model and device
- Program the hub/smart brick to make different patterns and sounds.

Have students complete the Start activities by selecting START when they open the app located in the top navigation bar. Students will complete 1. Start Here first by connecting the hub using either a cable or Bluetooth. Have students follow the prompts on the right side to complete the activity. Students should extend the learning by creating different patterns of light on the front of the hub. They should create programs that change the hub pattern 5 different times in a program. Additionally, they should change the sounds made in the program by changing the variables.

Next students should create a program to spell their team name using the lights on the hub.

Students should take notes in their journals.
They should be able to answer questions like:
- How can you change the pattern of light on a hub?
- What types of sounds can be made?
- How do you change the type of sound and the volume of the sound?

Note: At the end of this lesson, students will be prompted in the right side panel to go to the next lesson, which is challenge 2. You can have students go ahead here or by selecting the home button at the top left of the screen to return to the home page.

Challenge 2
Time: 35 minutes
Materials:

- SPIKE^{TM} Prime sets
- Device with SPIKE^{TM} App
- Student journals

Challenge 2: Using a Sensor to Control a Motor

Have students complete the second activity in Getting Started, 2. Motors and Sensors. Students will complete this module by connecting the large and medium motors, force sensor, color sensor, and ultrasonic sensor to the hub. Follow the directions located on the right side panel to program the motors and sensors and explore what they can do.

Students explore how to program a sensor and understand how sensors can be used to control motor movement. Students should take notes in their journals.

Students should be able to answer questions like:
- How does the motor move?
- Which programming blocks can control the motor?
- How can you change the movements of the motors?
- How does connecting other elements to the motor make the elements move?
- How does a sensor work to control the actions of a robot?
- Explain how you explored Action – Reaction.

Challenge 3

Time: 60 minutes
Materials:
- SPIKE^{TM} Prime sets
- Device with SPIKE^{TM} App
- Student journals

Challenge 3: Make a Hopper

Have students complete the last module in the Getting Started 3, Make It Move. Students create a hopper robot by following the prompts in the right side panel. See how fast it can travel 30 cm. Have a race! Allow students to make changes to their model and their program as time allows. Then, have students modify the models based on what they learned during the lesson.

There will be two more races – one that is 50 cm in length and the second at 100 cm. Based on time, you may be able to do only one or have half the students at each length. Ask students why the hoppers don't always move straight. How can they modify to make them go straighter?

Take the robots apart.

 Have students reflect in their journals:
- What was easy about this challenge?
- What was difficult about this challenge?
- What did I learn from this challenge?

Break
Time: 5 minutes

Disassemble and Inventory Check
Time: 10 minutes
Materials:
- SPIKE™ Prime set

Ask students to take apart their Hopper model. Then, working with a partner, students will work to conduct an inventory check of the pieces in their set to ensure all pieces are in the correct locations and that no pieces are missing.

For a full inventory check: Have students place elements from one tray compartment onto the lid of the box. Then, using the paper inventory sheet in the set (the one that is placed under the lid of the box) have students count and replace pieces back into the tray compartment. Teams should be able to complete two compartments in ten minutes. If pieces are missing, have students search other compartments, look to see if the piece is stuck in or on another piece in the bottom of the box, or check the LEGO lost and found area in your classroom.

For today, we suggest you conduct only a "quick inventory" of two sections in the tray that pieces from the Hopper model came from. Students will not need to count pieces from all sections. Two compartments will be a quicker check of their materials and give them the idea you are serious about keeping the sets in order.

The SPIKE™ hub should be turned off and stored in the bottom of the bin.

Daily Debrief and Wrap Up
Time: 10 minutes
Materials:
- Sticky notes
- Student journals
- Pencils
- Pens
- Markers

Devices should be powered off and plugged in or stored for the next day.

Have students use sticky notes to write down three things they really enjoyed about the day. Have students use a different sticky note to write down one thing they are still wondering about. Place the sticky notes in the student journals.

Let the Games Begin Day 2
Introductory SPIKE™ Prime Program
Moving and Grooving

Big Question:
- How can robots be used with music/sound?

Materials:
- SPIKE™ Prime sets
- Devices with SPIKE™ Prime App
- Chart paper
- Student journals
- Various craft materials
- Tape (Electrical or painters tape works well)
- Pens
- Pencils
- Markers

Day 2: Outline for the day

Outline of Day	Tasks	Time	Materials
9:00 – 9:50	Welcome	5 min	• Student journals
	Team building activity	15 min	• LEGO bricks • Bricktionary cards
	Review Group Rules Chart	5 min	• Group Rules Chart
	Team Briefing 1	5 min	• None
	Readings and Wonderings	20 min	• Book or journal article about robots in industry
9:50 – 11:25	Challenge 1: Move with the Music	95 min	• SPIKE™ Prime sets • Devices with SPIKE™ App • Student journals

11:25 – 11:30	Get ready for lunch		
11:30 – 12:00	Lunch		
12:00 – 12:15	Workplace Wellness	15 min	• Varies, based on the activity selected
12:15 – 12:20	Team Briefing 2	5 min	• None
12:20 - 2:10	Challenge 2: Create a Game	110 min	• SPIKE™ Prime set • Devices with SPIKE™ App • Student journal Tape
2:10 - 2:30	Daily Debrief and Wrap Up	20 min	• Student journals

Welcome
Time: 5 minutes
Materials:
   • Student Journals

Welcome students back. Have students take a minute to read over the sticky notes placed in their journals from the previous day. Have students share their favorite moments from the previous day with a partner.

Team Building Activity
Time: 15 minutes
Materials:
   • Loose bricks
   • Cards with objects to build

Place students in groups of 4-5 for team building activity — Bricktionary.

   Bricktionary:
   Have students play one round of Bricktionary. Students will draw a card from the stack without showing the word to their teammates. Then using bricks, students will build the object while teammates try to guess what it is. The game is over when everyone has had a turn. Below are some example cards you can use for the game.

Bricktionary Cards

Truck	Place
Bridge	TV
Flower	Tree
Boat	House

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Review Group Rules Chart
Time: 5 minutes
Materials:
- Group Rules Chart

Quickly review the group rules and expectations created on Day 1 by the students. Highlight positive moments from Day 1 (times when students helped each other, asking great questions, teamwork, helping to clean up…)

Team Briefing 1
Time: 5 minutes
Materials: None

Today we will be adding some music to our fun and games. The entire class will be working together to make all the robots to perform with music. First, the robots will need to do the same actions at the same time. Then, the robots will make a wave of motion. Then, half the robots will need to do the exact opposite of their partner robot. Choose your music and your moves. This is quite the challenge!

Readings and Wonderings
Time: 20 minutes
Materials:
- Internet research on companies that make, sell, or use robots that have sound
- Videos on robots that are used in industry, health care, or home
- Student journal

Read and discuss companies that make, sell or use robots that have sound. Can you think of any robots that you might interact with daily?

Inventory Check
Time: 5 minutes
Materials:
- SPIKE™ Prime set

Ask students to find their partner from Day 1.
Have students confirm the bricks in two trays are in the correct tray compartments.
Teacher chooses which two trays.

Challenge 1: Move with the Music
Time: 95 minutes (55 min, break, 35 min)
Materials:
- SPIKE™ Prime set
- Devices with SPIKE™ App

Complete Break Dance in the Life Hacks unit.

Now, have the entire class have all the robots move their arms and legs in the same motion in unison. How will you get everyone to start at the same time? Will you add a sensor? Choose music that you like to help with this. Use the beats of the music to regulate the time needed for movements. You will need to have movement for at least 20 seconds.

Next, you will need to vary the start by time so each robot starts at the same interval apart moving from left to right. You can then go in reverse from right to left. You must get this exactly right so that each robot starts on the beat of the music chosen. This time you need to work together to fill 60 seconds of music-filled time.

Finally, each team will find a partner team. Change the moves, but have Team B do the exact opposite of Team A. If Team A moves right, Team B moves left, and so on. Again, use music to get the robots on beat. You can choose whatever music you want. Make sure the moves are in a loop and that they are repeated enough for at least 20 seconds.

Showcase each set of teams so everyone can see the ideas.

When the showcase is complete, take apart the models and correctly place the elements into the trays.

Have students write in their journals.
- Which challenge was the most difficult and why?
- Which challenge was the most fun and why?
- How did teamwork affect the outcome?

Lunch
Time: 30 minutes

Workplace Wellness
Time: 15 minutes
Materials:
- Vary depending on what activity is selected

Take a minute to complete a short physical activity. You may find several ideas for short physical activities for students through a simple web search. Ideas include simple exercises like jumping jacks or running in place. Consider having students move like a robot to prepare them for the next challenge.

Team Briefing 2
Time: 5 minutes
Materials: None

This afternoon you are going to be challenged to create a game which includes music or sound, and present it to others to play. Are you ready?

Challenge 2: Create a Game
Time: 110 minutes (40 minutes, break, 60 minutes)
Materials:
- SPIKE™ Prime set
- Devices with SPIKE™ App
- Tape
- Craft Materials
- Sticky notes

Students should build the model from What is This? from Extra Resources in Start. Start with the model, and see what ideas for a game come to mind. You can modify the model or the program. Write the rules for your game in your journal. Play the game with each other at least 3 times and adjust the rules, model, and program as needed. Name your game. Write your game title at the top of sticky notes. You will need one note for each person in the room. Let the teacher know your game is ready to be tested/played by others. As others play the game, you may add/clarify the rules and modify the model or program after each round.

Allow teams to play each other's games. Teams should play at least 2 rounds with each game in the room.. Teams should give each player that comes to their group a sticky note with the name of their game on it. Have students use sticky-notes to write what they liked best about each game Have students place the sticky notes with their thoughts written on them in a parking lot area (area on the wall).

Daily Debrief and Wrap Up
Time: 20 minutes
Materials:
- Student journals
- Markers
- Colored pencils
- Crayons

Ask students to take apart their game model. The SPIKE™ hub should be turned off and stored in the bottom of the bin.

Go through the parking lot and read aloud some of the comments. Have teams collect their notes and add them to their journals.

Have students write one word that they feel reflects what they have learned today. Write and illustrate the word in their student journals.

Let the Games Begin Day 3
Introductory SPIKE™ Prime Program
Faster, Faster

Big Question:
How can robots be used in games?
What advantages and disadvantages are there in one-player versus two-player games?

Materials:
- SPIKE™ Prime sets
- Devices with SPIKE™ App
- Student journals
- Various craft materials
- Tape (Electrical and painters tape work well.)
- Pens
- Pencils
- Markers

Outline of Day	Tasks	Time	Materials
9:00 - 10:45	Welcome	5 min	• Student journals
	Team building activity	15 min	• LEGO bricks
	Review Group Rules Chart	5 min	• Group Rules Chart
	Team Briefing 1	5 min	• None
	Readings and Wonderings	10 min	• Internet research
	Inventory Check	5 min	• SPIKE™ Prime set
	Challenge 1: Create Your Own Game	60 min	• SPIKE™ Prime set • Device with SPIKE™ App • Craft materials • Tape
10:45 - 10:55	Break		

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Time	Activity	Duration	Materials
10:55 - 11:25	Challenge 1: Create Your Own Game continued	30 min	• SPIKE™ robot • Device with SPIKE™ App • Student journals • Craft materials • Tape
11:25 – 11:30	Get ready for lunch		
11:30 - 12:00	Lunch		
12:00 - 1:20	Workplace Wellness	15 min	• Varies, based on the activity selected
	Team Briefing 2	5 min	• None
	Challenge 2: Rhino Race	60 min	• SPIKE™ Prime set • Device with SPIKE™ App • Craft materials • Tape • Student journals
1:20 – 1:25	Break		
1:25 – 1:30	Team Briefing 3	5 min	• None
1:30 – 2:15	Challenge 3: Rhino Workout	45 min	• SPIKE™ robot • SPIKE™ Prime set • Device with SPIKE™ App • Craft materials • Tape • Student journals
2:15 - 2:30	Daily Debrief and Wrap Up	15 min	• Student journals

Welcome
Time: 5 minutes
Materials: Student Journals

Welcome students back. Have students take a minute to share their word they created in their journal the day before with a neighbor. Compile a list of the words as a group. You can create a word cloud to share on the last day of the program.

Team Building Activity
Time: 15 minutes
Materials: LEGO bricks

Place students in pairs.

Build a Bridge
Challenge students to build a LEGO bridge that spans two tables.

Extensions:
- Build the longest bridge
- Build the tallest bridge
- Build a bridge that can the most weight (use a bucket and some weights to test)

Review Group Rules and Expectations
Time: 5 minutes
Materials:
- Group Rules Chart

Quickly review the group rules and expectations created on Day 1 by the students. Highlight positive moments from Day 2 (times when students helped each other, asking great questions, teamwork, helping to clean up…)

Team Briefing 1
Time: 5 minutes
Materials: None

Hope you came today ready to play. You did a great job yesterday of creating a game. Today you will work with another team to create a game that you can play together. Your game may use gears or bricks as game pieces, will have a goal, and require two players. Perhaps you will have a shooting contest. Perhaps you will have a speed contest. The game is up to you.

Research and Wonderings
Time: 10 minutes
Materials:
- Student journals

What games are available that use a robot? Do these games require one person who plays alone or against a computer or do they require at least two people to play? What are the advantages and disadvantages of one player versus two player games?

Inventory Check
Time: 5 minutes
Materials:
- SPIKE™ Prime set

Ask students to find their partner from Day 1. Have students check to see all items in the bin are in the proper trays.

Challenge 1: Create a Game
Time: 90 min (60 min, break, 30 min)
Materials:
- SPIKE™ Prime sets
- Devices with SPIKE™ App
- Student journals
- Colored tape
- Paper
- Markers
- Sticky notes

Complete Goal! through step 3 in the Extra Resources in Start. You have seen how a game could be made. Now, make your own game and name it. Write the rules in your journals. You can work together as one or each team can create their own. Write your game's name on one sticky note per group.

Once the model and rules are finished, it is time to play. When you play, you may find you need to modify or add to the rules. As long as everyone agrees, change the rules. You may decide to change the rules for the next trial. You should play every game in the room at least twice. With your partners, write what you liked about each game on the sticky note. Place it in the parking lot.

Now that you have played all the games, rate your game – How fun was it? How easy was it? Could more teams play at the same time? What would you change/add now that you have seen other games? Write about your game in your student journals.

Take apart the models and correctly place the elements into the trays.

Lunch
Time: 30 minutes

Workplace Wellness
Time: 15 minutes
Materials:
- Vary depending on what activity is selected

Take a minute to complete a short physical activity. You may find several ideas for short physical activities for students through a simple web search. Ideas include simple

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exercises like jumping jacks or running in place.

Team Briefing 2
Time: 5 min
Materials: None

I hope you are ready to go fast because this challenge is a race. You will start with a given build and then modify it and the program to make your robot go forward, touch the wall and come back to the starting spot. It is a race – so make your robot really go fast.

Challenge 2: Rhino Race
Time: 60 min
Materials:
- Devices with internet access and SPIKE™ App
- SPIKE™ Prime set
- Student journals

Complete the Rhino build found under Build in the top navigation bar. Program it to go forward and when the touch sensor is pressed to go backward until it returns to the starting line. Now, what can you do to modify your build and your program to make your robot successfully do the challenge in the least amount of time? Can you change the gearing? Can you change the programming? How will you make it start? How will you make it stop?

Racing begins as soon as two teams have their robot and program. Then, send the robots back to the pits for an upgrade and see who can rapid prototype a winner!

All teams should race and learn from each other.

Leave your current models together.

Break: 5 minutes

Team Briefing 3
You have been racing each other. Now, you are going to try to coordinate with each other to move in unison. You will need to program your robots so they do some things at the same time and others are delayed. This requires a lot of cooperation and collaboration. Patience and kindness will make the challenge go smoothly.

Challenge 3: Rhino Workout
Time: 45 minutes
Materials:
- Devices with internet access and SPIKE™ App
- SPIKE™ Prime set
- Student journals
- Rhino model from Challenge 2

Your challenge is to do the following:

1) Begin at the same time behind the starting line
2) Program the robots to move to the wall, using the force sensor to make the robot stop when it is pressed. Then, reverse 10 centimeters. Stop and play a sound.
3) Starting at the left side of the line of robots, the first robot will turn around using the motor block, making your right wheel turn until the robot is facing directly away from the wall. At 1 second intervals, the rest of the robots will do the same. Each robot should play a different sound when they are facing away from the wall.
4) When all the robots are facing away from the wall, all robots move together for 40 centimeters and stop. Play a sound.
5) Have the robots reverse direction and face the wall.
6) Program the robots to move to the wall, using the force sensor to make the robot stop when it is pressed. Play the applause sound.

Hint: Start with step 1 and make sure EVERY robot can do step 1 at the same time BEFORE moving to step 2.

Note: You may allow the students to use a projector so they can work together on the programming and everyone can see what is being done. This will aid communication and participation.

Make a video of all the robots working together.

Write in your journals what was difficult and what was easy about this challenge. How well did the group work together? Were you patient and kind with the other people in the room?

Take apart the models and correctly place the elements into the tray.

Daily Debrief and Wrap Up
Time: 20 minutes
Materials:
- LEGO bricks
- Student journals
- Camera or something to take a picture

Have students use LEGO bricks to build a model that represents two things they learned today. Have students take a picture or draw a sketch of the model and write the two things they learned in their journals.

Let the Games Begin - Day 4
Introductory SPIKE™ Prime Program
Race the Clock

Big Question:
- How can you create a shortcut for coding?
- How can a robot pick up and place objects?

Materials:
- SPIKE™ Prime sets
- Devices with SPIKE™ App Student journals
- Chart paper
- Various craft materials
- Old magazines that can be cut up (optional)
- Pens
- Pencils
- Markers
- Glue sticks

Outline for Day	Tasks	Time	Materials
9:00 - 10:35	Welcome	5 min	• Student journals
	Team building activity	15 min	• LEGO bricks
	Review Group Rules Chart	5 min	• Group Rules Chart
	Team Briefing 1	5 min	• None
	Research and Wonderings	10 min	• Discussion • Internet research • Student journals
	Inventory Check	5 min	• SPIKE™ Prime sets
	Challenge 1: Cart Races	50 min	• SPIKE™ Prime sets • Advanced Driving Base • Devices with SPIKE™ App • Student journals

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10:35 - 10:40	Break		
10:40 - 10:45	Team Briefing 2	5 min	• None
10:45 - 11:25	Challenge 2: Keep It Safe	40 min	• SPIKE™ Prime sets • Devices with SPIKE™ App • Student Journals
11:25	Get ready for lunch		
11:30 - 12:00	Lunch		
12:00 - 2:15	Workplace Wellness	15 min	• Varies, based on the activity selected
	Challenge 2: Keep It Safe continued	60 min	• SPIKE™ Prime sets • Devices with SPIKE™ App • Student Journals
	Break		
	Team Briefing 3	5 min	• None
	Challenge 3: Brain Game	50 min	• SPIKE™ Prime sets • Devices with SPIKE™ App • Student journals
2:15 - 2:30	Daily Debrief and Wrap Up	15 min	• Student journals

Welcome
Time: 5 minutes
Materials:
- Student journals

Welcome students back. Have each student share their models from Day 3 with a friend.

Team Building Activity
Time: 15 minutes
Materials:
- LEGO bricks

Create a Creature
Using loose LEGO bricks, have each student create a LEGO creature. Have them give their creature a name and a special characteristic. Have students share their creature with their partner. Have the pair create a short story that includes both creatures.

Review Group Rules Chart
Time: 5 minutes
Materials:
- Group Rules Chart

Quickly review the group rules and expectations created on Day 1 by the students. Highlight positive moments from Day 3 (times when students helped each other, asking great questions, teamwork, helping to clean up…).

Team Briefing 1
Time: 5 minutes
Materials: None

Oh my! The cart for today's challenge is out of order. It was built correctly, but the programming is a mess. It doesn't stop in time to unload, it crashes into objects. Fix the cart and then see how many things you can pile into the cart and take to the recycling center in one minute.

Research and Wonderings
Time: 10 minutes
Materials:
- Student journals

What types of robots can help humans do things faster, yet accurately? Where can you find those robots being used locally?

Challenge 1: Cart Races
Time: 50 minutes
Materials:
- SPIKE™ Prime set
- Devices with internet access and SPIKE™ App
- Student journals
- Materials to recycle

Complete Out of Order in the Kickstart a Business unit. Next, program your robot to go to the recycling center from the start location and return for another load. Fill the cart

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with as much as you can, then send it on its way. Quickly empty the cart at the recycling center before it returns to get another load. Stop when one minute is up. Who carried the most material to the recycling center?

Break
Time: 5 minutes

Briefing 2
Time: 5 minutes
Materials: None

Are you ready to become a code cracker? A safe cracker? Well, here is your chance to learn how to get into the safe and then change the code to keep it even safer. Can you write good clues without giving exact directions? For example, turn the gear to the right 180 degrees sounds like a direction. But turn the gear so that the top is at the bottom and the bottom is at the top sounds a bit more like a clue. Or perhaps you give a clue like if you face east in the morning but by nightfall you face west. Make your gear mimic your move – would that be a clue that someone could follow? Think through many ideas and be sure the clues are not too tricky nor too easy. Have fun along the way!

Challenge 2: Keep it Safe
Time: 100 minutes (40 min, Lunch, 60 min)
Materials:
- SPIKE™ Prime set
- Devices with internet access and SPIKE™ App
- Student journals

Complete the Keep it Safe lesson in the Kickstart a Business unit. Then, move to Keep it Safer – look at what is added to the model and how the program has changed. Now you will create your own set of clues and your own program and model to be used by another team. This will take some planning – don't take your entire model apart – you won't have time, but you can add things to your model. Of course you will want to make the program longer to add more things that have to be done in order to get in!

Write clues for what must be done to open the safe. Make sure your program works flawlessly. Then, trade with another team. Remember, you want the other team to be able to open the safe, but you want to have good clues, not directions.

Take apart the models and correctly place the elements into the trays.

Lunch
Time: 30 minutes

Workplace Wellness
Time: 15 minutes
Materials:

- Vary depending on what activity is selected

Take a minute to complete a short physical activity. You may find several ideas for short physical activities for students through a simple web search. Ideas include simple exercises like jumping jacks or running in place.

Challenge 2: Keep it Safe continued
Time: 60 minutes
Materials:
- SPIKE™ Prime set
- Devices with internet access and SPIKE™ App
- Student journals

Break: 5 minutes

Team Briefing 3
Time: 5 min
Materials: None

Are your ready to test your brains? You will be playing a game with your partner – but you will not be able to see their work. You must work independently and secretly for this game to be fun.

Challenge 3: Brain Games
Time: 50 minutes
Materials:
- SPIKE™ Prime set
- Devices with internet access and SPIKE™ App
- Student journals

Complete the Brain Games lesson in the Life Hacks unit. When you are creating the candy, do NOT show your candy to your partner. Keep this secret! If you have time, you can play against another team – keeping your candy secret. Partner A would play Partner A of the other team and Partner B would play Partner B of the other team.

Daily Debrief and Wrap Up
Time: 15 minutes
Materials:
- Student journals
- Old magazines that can be cut up
- Colorful paper
- Markers
- Stickers
- Glue sticks

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Ask students to create a "self-portrait" collage that only uses positive words about themselves. Have them include words related to positive contributions they can make to a team! Place collage in their student journals.

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Let the Games Begin: Day 5
Introductory SPIKE™ Prime Program
Showcase

Big Question:
- How do people create new ideas and present them to others?

Outline for Day	Tasks	Time	Materials
9:00 - 10:10	Welcome and Team Building Activity	20 min	• LEGO bricks
	Review Group Rules Chart	5 min	• Group Rules Chart
	Team Briefing 1	5 min	• None
	Challenge 1: The LEGO Way	40 min	• SPIKE™ Prime sets • Devices • Craft materials • Tape
10:10 - 10:15	Break		
10:15 – 10:20	Team Briefing 2	5 min	• None
10:20 – 11:25	Showcase Discussion and Planning	45 min	• SPIKE™ Prime sets • SPIKE™ Prime Expansion sets • Student journals • Craft materials • Tape
11:25	Get ready for lunch		
11:30 - 12:00	Lunch		
12:00 - 12:45	Showcase Preparation	45 min	• SPIKE™ Prime sets • SPIKE™ Prime Expansion sets

			• Student journals • Craft materials • Tape
12:45 – 1:45	Showcase	60 min	• SPIKE^{TM} Prime sets • SPIKE^{TM} Prime Expansion sets • Student journals • Craft materials • Tape
1:45 - 2:30	Daily Debrief, Clean Up and Wrap Up	45 min	• SPIKE^{TM} Prime sets • Certificates of Completion

Welcome
Time: 5 minutes
Materials:
  • Student journals

Welcome students back. On a piece of chart paper, draw a really large light bulb. Have students write positive things they discovered about themselves during the program. Students can use their reflection on the end of Day 4 for ideas.

Team Building Activity
Time: 15 minutes
Materials:
  • LEGO bricks

Build Something That
  • Work in groups of 4-5.
  • Place the bricks in front of you.
  • The teacher will name a category.
  • As a group, build an 2-3 items that belongs in this category.
  • When done building, please explain why each item belongs in the category.

Build Something That
  • *can fly*
  • *is an animal*
  • *can be used for transportation*
  • *you can have for lunch or dinner*

Tip: Ideas for other categories: a movie, cartoon characters, buildings, etc.

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Review Group Rules Chart
Time: 5 minutes
Materials:
- Group Rules Chart

Quickly review the group rules and expectations created on Day 1 by the students. Highlight positive moments from Day 4 (times when students helped each other, asking great questions, teamwork, helping to clean up…).

Team Briefing 1
Time: 5 minutes
Materials: None

Let's start our day the LEGO Way. You will create an idea and a timer. Present your idea to the group. This will be a good practice for the showcase this afternoon.

Challenge 1: The LEGO Way
Time: 30 minutes
Materials:
- SPIKE™ Prime sets
- Devices with SPIKE™ App
- Various craft materials
- Tape

Complete The LEGO Way lesson from Extra Resources in Start. Present your ideas to the group. Did you laugh? Did you have fun?

Break
Time: 5 minutes

Team Briefing 2
Time: 5 minutes
Materials:
- Games

Rules for Game

This afternoon you will showcase the work you have done this week by having guests play your newly created games. You may choose to work as a team of 2 or as a team of 4. If you need two robots to interact, you will need to work with another group as a team of 4. The game will have the following constraints:
1) *There will be a 10 minute time limit. At 10 minutes whichever team is winning is the winner or the number of points received at 10 minutes is the total.*
2) *A sound must be used at the beginning, in the middle or at the end of the game. You may use more than one sound.*

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3) The hub must show something (word, numbers, emoji, etc.) at the beginning, during, or at the end of the game. You may use more that one display if you prefer.
4) The name, rules for play and scoring must be written in your journals.
5) You must be finished with creation and have played the game at least once before the showcase begins.

Do you have any questions?

Showcase Discussion and Planning
Time: 45 minutes
Materials:
- SPIKE™ Prime sets
- SPIKE™ Prime Expansion sets
- Devices with SPIKE™ App

Go over your expectations for the students at the showcase in the afternoon so students are prepared for guests.

Students will choose any activity they want. They must adhere to the rules. Use the time before lunch to plan. Make sure all groups have a plan before they go to lunch. Students are to build and program the robot and then be able to explain the game, show the rules, and then play the game before the guests arrive.

Lunch
Time: 30 minutes

Showcase Preparation
Time: 45 minutes
Materials: None

Students need to complete the preparation and practice presenting in front of another team. After 30 minutes, all teams should be playing the games and modifying the models, programs and rules so everything is ready on time. You will need to help some teams get prepared.

Showcase
Time: 60 minutes
Materials:
- SPIKE™ Prime robots
- Student journals
- Charts created during the week
- Pictures
- Videos from the week

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Students should be set up and ready when guests arrive.

Have each team present their games and then allow guests to move around the room to play the games.

Daily Debrief, Clean Up and Wrap Up
Time: 45 minutes
Materials:
- Student projects
- SPIKE™ Prime sets
- SPIKE™ Prime Expansion sets
- Certificates

Have students disassemble their robots and place the elements in the correct locations. Make sure sets have the SPIKE™ hub, motors, sensors and the sets are in good order. Make sure devices are powered off and stored.

Have students clean up materials from the showcase.

Students can take home their journals.
You can present each student with a certificate of completion.