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Let's Compete!

A LEGO® Education SPIKE™ Prime Program
Advanced Robotics Program

Let's Compete
Advanced SPIKE™ Prime Program

Middle School Robotics Overview:
This five-day robotics camp 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 team briefing for 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 in a career area and pitching the solution to stakeholders.

Program at a Glance		
Day 1	**Orientation** Why do we use robots? What can a robot do that humans cannot?	• Pass the Brick Relay • Driving Around
Day 2	**Move Like a Robot** Why do we explore? What tools do scientists use to explore?	• Play with Objects • Boomerang • Clean Up Race
Day 3	**Reactions and Turns** How can robots react to color? Why are different types of turns used?	• Reacting to Line • Build an Advanced Driving Base
Day 4	**Bots and Blocks** How can you create a shortcut for coding? How can a robot pick up and place objects?	• My Code, Our Code • Time for an Upgrade
Day 5	**Showcase**	• Creating the Obstacle Course • Programming the Robot • Perfecting the Robot • Showcase

Prior to First Day:
(If the Advanced Camp follows the Intro Camp, checking the sets and devices may be the only thing needed.)

1. Sort SPIKE™ Prime sets.
2. Download and install the SPIKE™ App on devices to be used for camp.
3. Determine a naming convention for each set.
   Suggestions include school initials and a number. (Example: Millcreek Elementary robotics sets names could be MES1; MES2; MES3.)
4. 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.
5. Connect SPIKE™ Prime to iPad, Chromebook or computer. Update the hub and rename each hub to match the name you assigned to the set.
6. Gather any consumable materials needed for the week.
7. Make sure devices are fully charged, Bluetooth is enabled (if needed) and students can access the app.
8. Determine the procedure for when a LEGO piece is dropped (everyone freeze; say LEGO down/LEGO found) and where to place LEGO pieces found 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.

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Let's Compete
Advanced Camp 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
- Tape – electrical or painters tape in various colors
- Pens
- Pencils
- Markers

Outline of Day	Tasks	Time	Materials
9:00 - 10:30	Introductions	30 min	• LEGO bricks
	Establishing Group Rules Chart	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 Wonderings	20 min	• Book about robots • Student journals
11:25 - 11:30	Get ready for lunch		
11:30 -12:00	Lunch		
12:00 - 2:10	Team Briefing 2	5 min	• None
	Challenge 1: Pass the Brick Relay	60 min	• Student journals • SPIKE™ Prime set • Devices with SPIKE™ App
	Break	5 min	• None
	Workplace Wellness	10 min	• Varies, based on the activity selected
	Team Briefing 3	5 min	• None
	Challenge 2: Driving Around	45 min	• Student journals • SPIKE™ Prime set • Devices with SPIKE™ App
2:10 - 2:30	Daily Debrief and Wrap Up	20 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 robotics camp. When it is time to share, have students say their name and share their model. The teacher can record what the group hopes to learn on a piece of chart paper.

Group Rules Chart
Time: 15 minutes
Materials:
- Chart paper, markers

Using a piece of chart paper, establish Group Rules Chart 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
- Weight – could be books, weights, etc.

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 Strongest 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. Show them how you will test each tower's strength. Will you use books, weights, etc.?

Challenge students to build the strongest tower they can within five minutes. Have students stop building and bring their towers to a testing zone.

How many books or other objects can it hold. Test each tower in the same way.

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 build a tall tower build again, what would you change?

Write at least three sentences about the activity in the student journals.

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*

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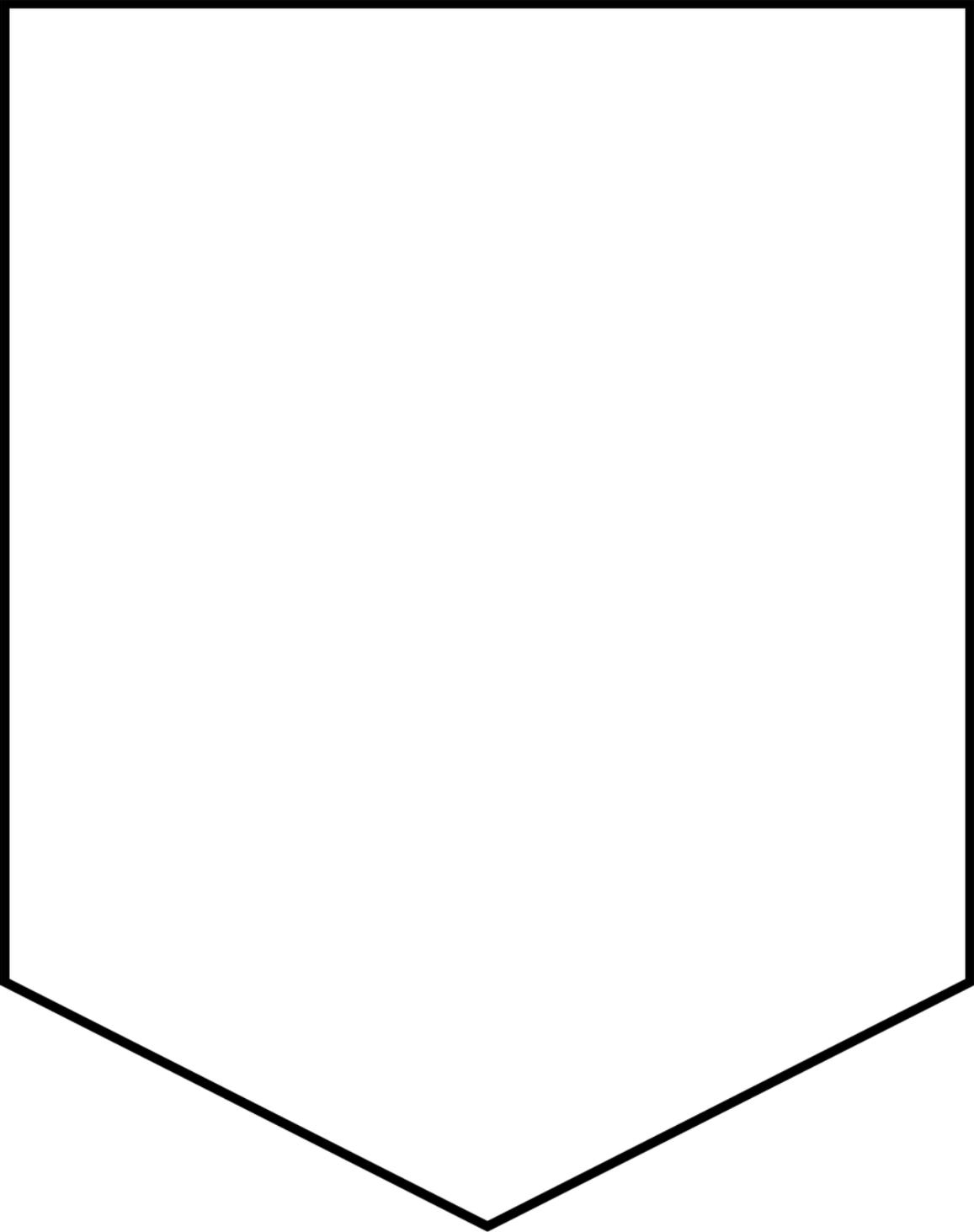**Partner selection, design company name and logo**
Time: 25 minutes
Materials:
- Student journals (see note in materials section)
- Markers
- Scissors
- Construction paper
- Other craft materials

You can use one of several different activities to help students find a partner to work with for the week. A simple web search for creative ways to group students may provide appropriate resources for you to review.

Once partners have been established, student teams can determine a design company name (team name) for their team and design a logo.
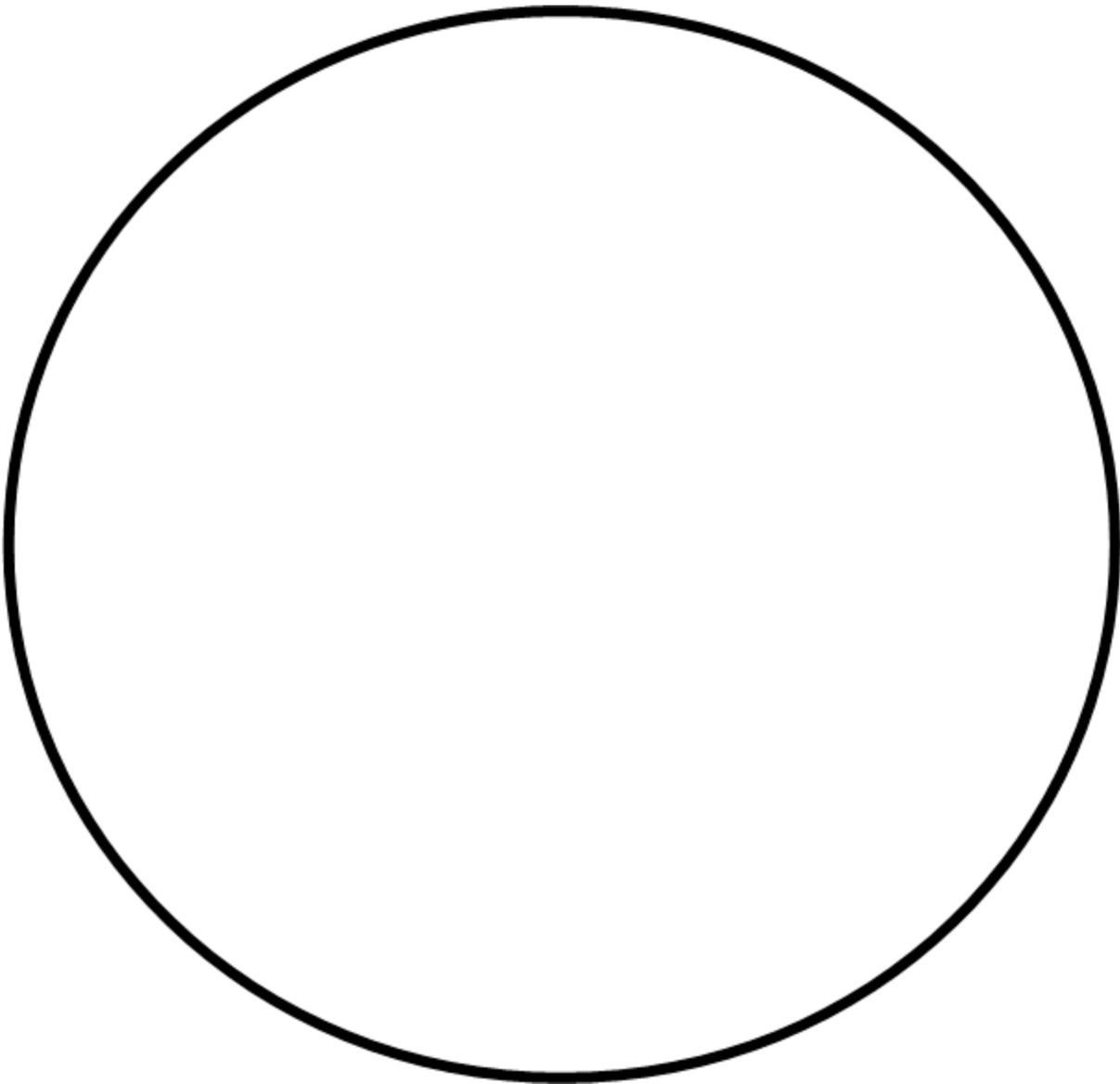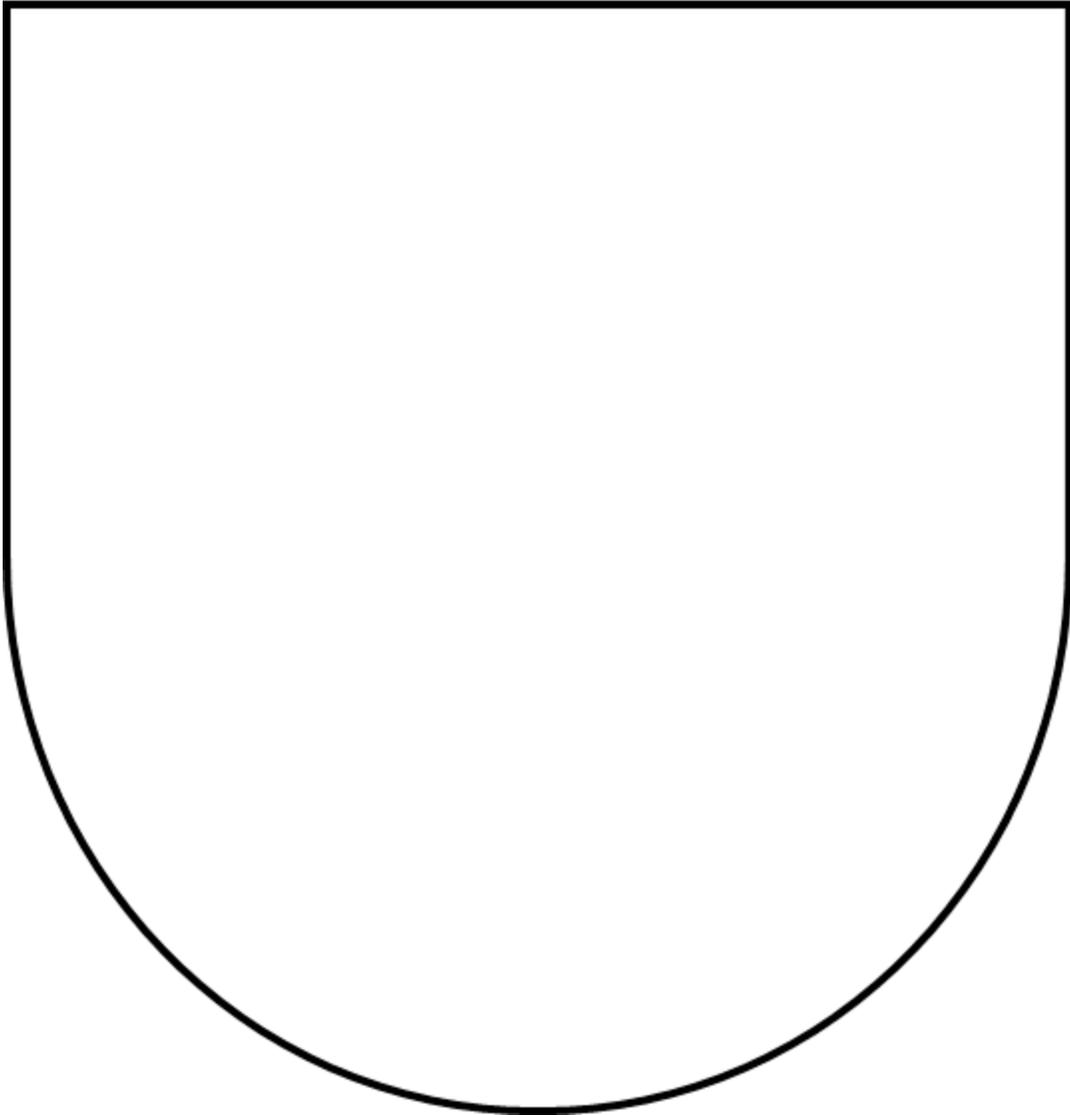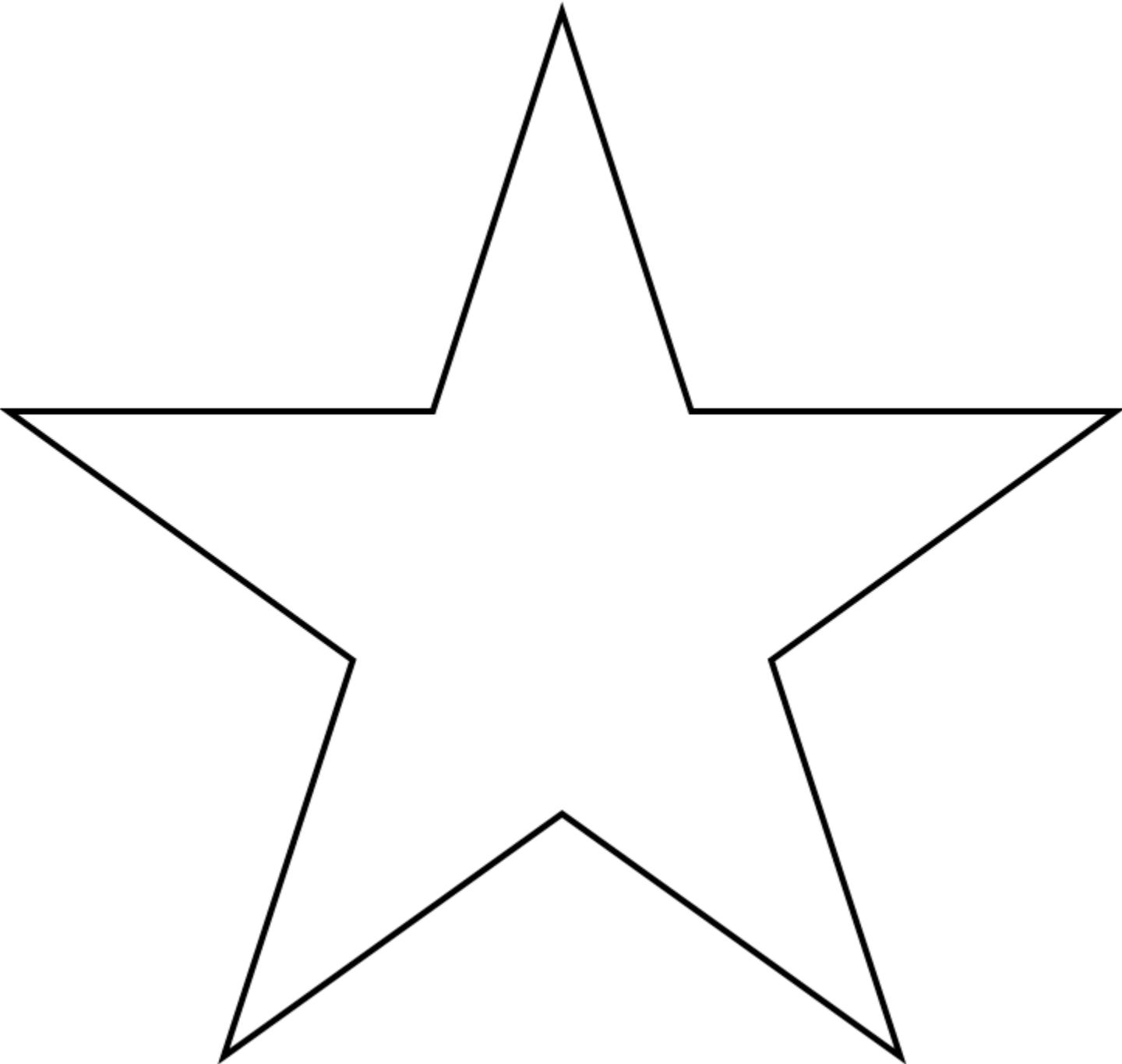
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LOGO Template

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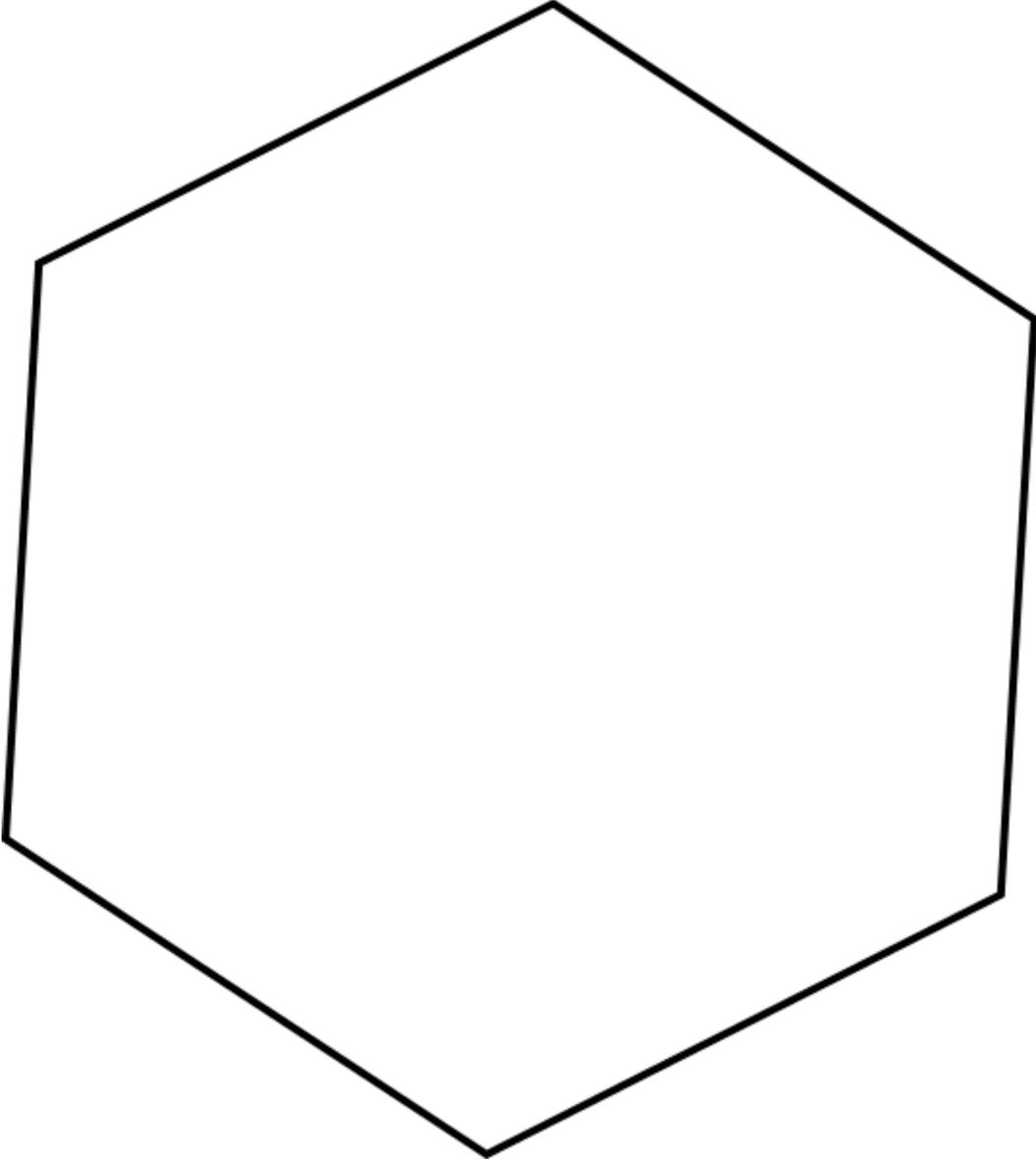
Break
Time: 5 minutes

Workplace Wellness
Time: 10 minutes
Materials:
- Materials may 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. Companies often 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 design journal to take 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

Hello, fellow engineers! Your task is to build and program a device to help you quickly pass bricks from location to location. You should think how you can make it better and how programming could improve the way it works.

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Challenge 1: Pass the Brick Relay Race
Time: 60 minutes
Materials:
- SPIKE™ Prime sets
- Device with SPIKE™ App
- Student journals

Complete Pass the Brick in the Supplemental Lessons section in Units.
Then, have students modify the program to improve the device's performance.

Complete each race. Then, have students create two more races including the rules. Have all teams participate in the races.

Have students write a brief reflection on the activity in their design journals.
- Which race was most challenging and why?
- Which race was the most fun to do and why?
- Did the way team members work together (or not) affect the outcome of the race? Why or why not?

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

Break
Time: 5 minutes

Workplace Wellness
Time: 15 minutes
Materials:
- Materials may 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 3
Time: 5 minutes
Materials: None

Now that you have investigated some fun games that can be played with a robot that doesn't have wheels, you are going to build a robot that moves autonomously. Your programming will be very important here, so pay attention to the details.

Challenge 2: Driving Around
Time: 45 minutes
Materials:
- SPIKE™ Prime Sets
- Device with SPIKE™ App
- Student journals

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- Mini-figures
- Tape

Complete Training Camp 1: Driving Around from the Competition unit.

While the students are building, ask them question about how the robot is designed. Ask students to think about how the motors are attached. How do they anticipate the robot will move based on the way it is built? Have students begin to discuss ways that the robot could be programmed to move. (Forward, backward, one wheel moves, both wheels move, and so forth).

As students finish building, allow them to start programming the robot to move and investigate their ideas.

Have students move their robots in a configuration you have created. It could be a figure 8 or the first initials of each partner. Ask students questions about how the robot moves.

Have students write a brief reflection on the activity in their design journals.
- What was easy about this challenge?
- What was difficult about this challenge?
- What did I learn from this challenge?

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

Daily Debrief and Wrap Up
Time: 20 minutes
Materials:
- Sticky notes
- Student journals
- Pencils
- Pens
- Markers

Devices have been 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 sticky notes in student design journals.

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Let's Compete Day 2
Advanced Camp SPIKE™ Prime Program
Move Like a Robot

Big Questions:
- Why do we explore?
- What tools do scientists use to explore?

Materials:
- SPIKE™ Prime sets
- Devices with SPIKE™ App
- Chart paper
- Student journals
- Various craft materials
- Pens
- Pencils
- Markers
- Bottles of water
- Sticky notes (See teambuilding activity.)

Outline for Day	Tasks	Time	Materials
9:00 - 10:45	Welcome	5 min	• Student journals
	Team Building Activity	15 min	• LEGO bricks • Water bottles with lids
	Review Group Rules Chart	5 min	• Group Rules Chart
	Team Briefing 1	5 min	• None
	Research and Wonderings	10 min	• Discussion • Internet research
	Inventory Check	5 min	• SPIKE™ Prime sets
	Challenge 1: Playing with Objects	60 min	• SPIKE™ Prime sets • Devices with SPIKE™ App Student journals
10:45 - 10:55	Break		

10:55 – 11:25	Challenge 1: Playing with Objects continued	30 min	• SPIKE™ Prime sets • Devices with SPIKE™ App • Student journals
11:25 - 11:30	Get ready for lunch		
11:30-12:00	Lunch		
12:00-2:10	Briefing 2	5 min	• None
	Challenge 2: Boomerang	55 min	• SPIKE™ Prime sets • Devices with SPIKE™ App • Student journals
	Break		
	Briefing 3	5 min	• None
	Challenge 3: Clean Up Race	50 min	• SPIKE™ Prime sets • Devices with SPIKE™ App • Student journals • Water bottles with lids
2:20-2:30	Daily Debrief and wrap up	10 min	• Student journals

Welcome
Time: 5 minutes
Materials:
• Student journals

Welcome students back to camp. Have students share what they enjoyed from Day 1 and the debrief from their journal with a friend.

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

Have students work in groups of 4-6 students.

Tower Build — Bottoms Up
Provide each group with a container of loose bricks. Have students work together to build the tallest tower that will hold an unopened upside down water bottle. The water bottle should be placed with the cap side down. Hopefully, students will apply some of the knowledge learned previously to the build.

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

Quickly review the Group Rules Chart created on Day 1 by the students.
Highlight positive moments from previous day (times when students helped each other, asking great questions, teamwork, helping to clean up…)

Team Briefing 1
Time: 5 minutes
Materials: None

Now that you have investigated why people want to explore and you have built a tool used for exploration, I am presenting you with a new challenge. Now you are ready to build and program a robot that can interact with objects.

Research and Wonderings
Time: 10 minutes
Materials:
- Internet research
- Student journal

Have students investigate how robots are used in space. Discuss why robots are used. You may wish to focus on Mars.

Challenge 1: Playing with Objects
Time: 90 minutes (60 min, break, 30 min)
Materials:
- SPIKE™ Prime sets
- Device with SPIKE™ App
- Student journals
- Mini-figures
- Tape

Complete Training Camp 2: Playing with Objects lesson in the Competition Ready unit. Ask student to think of other ways that robots can interact with objects as they are completing the lesson.

Ask students to keep their robot together at the end of this challenge to use in the next challenge.

Lunch
Time: 30 minutes

Team Briefing 2
Time: 5 minutes
Materials: None

Have you ever heard of a boomerang? What does a boomerang do? It comes back to you when you throw it. Today you will use the Driving Base you built in challenge 1 as your boomerang. You will program it to come back to you.

Challenge 2: Boomerang
Time: 55 minutes
Materials:
- Driving base from Training Camp 2 (Challenge 1)
- SPIKE™ Prime set
- SPIKE™ Prime Expansion set
- Device with SPIKE™ App
- Student journals

Teacher Preparation:
Create a starting area (about a foot square) with tape and place a chair or trash can or box about three feet away from the starting area. Students will need to go around the object and return to the starting area.

Create a new program to move your robot from the starting area to go around the object and return to the starting area. Test your program and document your results.

If time remains after a team has completed the challenge on the floor, move the challenge area to a different surface – for example from carpet to tile or tile to concrete. Students may have to adjust their programs based on friction.

> **Note:** Small variations in where the robot starts (slightly left or right instead of straight forward) will drastically affect the end position).

Briefing 3
Time: 5 minutes
Materials: None
> *Now you are ready to get things cleaned up. Of course, we would like to use robots to help clean up – we want to be fast and effective. You will be able to modify a tool and then work together with other teams to pick up water bottles and move them in a relay race.*

Challenge 3: Clean Up Races
Time: 50 minutes
Materials:
- SPIKE™ Prime set
- SPIKE™ Prime Expansion set
- Student journals
- Plastic bottles with lids
- Water
- Buckets

Preparation: Each team will need four plastic bottles with lids that are half full of water. Marking each bottle will help to ensure all bottles contain the same amount of water.

Build the Grabber model with Grabber 2 attachment from Super Cleanup in the Invention Squad unit. After you test the grabber, you may improve it through modification of the model and the program. You are going to pick up four plastic bottles that are half-full of water. You must take them from the floor to a bucket and empty them. You will probably be working outside. The bottles will have lids on them until you reach the bucket. Partner 1 will use the grabber to pick up and bring the bottle to the bucket. The Partner 2 will open the lid and Partner 1 will empty the bottle. Then, Partner 2 takes the grabber and goes to get a second bottle. The first (now empty) bottle returns to the start area. All four bottles must be carried to the bucket and emptied and the bottles returned to the start area. The first team to empty all four and return it to the start area wins!

Have students take apart the models and correctly place the elements into the trays.

Students should write in their journals what was difficult and what was easy about this challenge.

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

Take a minute to clean up the room from the day. Make sure hubs are turned off and the SPIKE™ Prime sets are properly maintained. Devices should be plugged in to charge overnight.

Once the room is clean, have students write the following reflection in their Student journals:
Ask students to reflect on the day and select their "super-hero moment"- a time during the day when they accomplished something great. Have students design a cape in their Student journals and write their "super-hero moment" underneath.

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Let's Compete Day 3
Advanced Camp SPIKE™ Prime Program
Reactions and Turns

Big Question:
How can robots react to color?

Materials:
- SPIKE™ Prime sets
- devices with SPIKE™ App
- chart paper
- Student journals or journals
- Various craft materials
- Pens
- Pencils
- Markers
- Index Cards
- Book and/or articles about career areas

Outline for 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: Training Camp 3 – Reacting to Lines	60 min	• SPIKE Prime sets • Devices with SPIKE™ App • Student journals
10:45 - 10:50	Break		
10:50 - 11:25	Challenge 1: Training Camp 3 – Reacting to Lines (continued)	30 min	• SPIKE™ Prime sets • Devices with SPIKE™ App • Student journals
11:25 - 11:30	Get ready for lunch		

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11:30 - 12:00	Lunch		
12:00 - 2:10	Workplace Wellness	10 min	• Varies, based on the activity selected
	Team Briefing 2	10 min	• Student journals
	Challenge 2: Assemble an Advanced Driving Base	60 min	• SPIKE™ Prime sets • Devices with SPIKE™ App • SPIKE™ Prime Expansion sets • Student journals
	Break	5 min	• None
	Challenge 2: Assemble an Advanced Driving Base (continued)	45 min	• SPIKE™ Prime sets • Devices with SPIKE™ App • SPIKE™ Prime Expansion sets • Student journals
2:10 - 2:30	Daily Debrief and Wrap Up	20 min	• Student journals

Welcome
Time: 5 minutes
Materials:

• Student journals

Welcome students back to camp. Have students share their super-hero creations with a peer. Create a chart on the wall with a picture of a large super-hero cape and capture student ideas shared from their journals.

Team Building Activity
Time: 15 minutes
Materials:

• LEGO bricks
  Note: You will need identical sets of 12-20 bricks – one set for each team and one for teacher use.

Relay race
• Create teams of 4-5 participants.
• Introduce the relay race activity as described below.
• Build and hide model using 12-15 LEGO bricks, you decide how it looks – remember, it should not be too easy to copy.

- Give the participants approximately 10 minutes to complete the activity.

  The goal is to copy the hidden model as fast as possible.
  1. Teams line up and one member from each team runs to see the model.
  2. When the team member returns to the base, he/she can place one brick, then the next team member runs to see the model, etc.

  Note: A member can only add or take away one brick on his or her turn.

  Tip: Variation — The teams cannot talk while working on building the model.

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

Quickly review the Group Rules Chart. 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

Hello! This morning, your task is to investigate different ways that robots can use a color sensor. We will stop at different colors and follow a line. How fast can you go and still be accurate?

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

Lead a discussion and Internet search on local area businesses that use, make, or sell robots with a sensor that detects color and reacts to it. Do these robots have to make turns? Why or why not?

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. Students will be adding to their driving base today.

Challenge 1: Training Camp 3 – Reacting to Lines
Time: 90 minutes (60 min, break, 30 min)
Materials:
- SPIKE™ Prime sets
- Devices with SPIKE™ App
- Student journals
- Colored tape

- Paper
- Markers

Complete Training Camp 3 – Reacting to Lines in the Competition Ready unit.

Use a line that is ½-inch wide. It can be a piece of colored tape or you can draw your lines with markers.

Have students run their program at multiple different power levels and write their observations. Does the robot's sensor move past the line or does it stop on the line? They should see that the robot is much more accurate at lower power levels than at higher levels. Speed is in opposition to accuracy.

Next, have students do the same measurements at different power levels again, but with only a ¼-inch to 1/3-inch line. How did the speed affect the accuracy when using a narrower line?

Lunch
Time: 30 minutes

Workplace Wellness: Physical Fitness
Time: 10 minutes
Materials:
- Materials may 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 an activity that leads into the next challenge.

Team Briefing 2
Time: 10 minutes
Materials:
- Student journals

Today you will make an advanced driving base and program it to do different types of turns. You will want to take notes on these three types of turns.

    There are three types of turns:
- *Point – one motor (wheel) turns clockwise, the other motor (wheel) turns counterclockwise; this is the tightest turn like on a zero-turn radius mower*
- *Pivot – one motor (wheel) turns, the other motor (wheel) does not turn; this is a turn like a basketball player uses when she has the ball*
- *Arc – both motors (wheels) turn in the same direction, but each motor turns at a different power level; this is the turn your car makes with the front tires*

Stand side-by-side as partners and lock arms – Partner A use your right arm, Partner B use your left arm. Now, each of you are the wheels on a robot. Make a point turn. One partner should move forward and the other backward.

Make a pivot turn. One partner stands still and the other partner can move forward or backward.

Make an arc turn. Both partners move in the same direction, but one partner moves faster than the other.

Challenge 2: Assemble an Advanced Driving Base
Time: 105 minutes (60 min, break, 45 min)
Materials:
- SPIKE™ Prime sets
- SPIKE™ Prime Expansion sets
- Devices with SPIKE™ App
- Student journals
- Colored tape
- Paper
- Markers

After students have worked about an hour, allow students a quick break, then let them continue the challenge.

Complete Assemble an Advanced Driving Base in the Competition Ready unit.

Now, you will program your robot to make different turns.

Program your robot using the motor blocks.
   a. Turn clockwise for 90 degrees
        o Point turn
        o Pivot turn
        o Arc turn

   b. Turn counterclockwise for 90 degrees
        o Point turn
        o Pivot turn
        o Arc turn

Program your robot using movement blocks.
   c. Turn the robot clockwise 180 degrees.
        o Point turn
        o Pivot turn
        o Arc turn

Program your robot using movement blocks.
   d. Turn the robot counterclockwise 120 degrees.
        o Point turn
        o Pivot turn
        o Arc turn

Answer the following in your journal:
- How are the three turns different? Do you start and stop at the same place for each turn?

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Note: Create the start positions using tape on the floor before the students begin the challenge. See Challenge 3 for more information.

Leave the Advanced Driving Base together. Do not have students disassemble.

Daily Debrief and Wrap Up
Time: 15 minutes
Materials:
- Student journals
- Markers
- Crayons
- Colored pencils

Let's Give a Shout Out!
Have students trace their hand in their student journals. On the hand, have students give themselves a shout out for the day for any achievement. Take a minute to talk about why positive feedback from our friends is good for us and encourages us to work even harder. Have students share some comments that would be positive to tell a friend in class.

Have students trace their hand again in their student journals. Have students pair up and give each other shout outs in their journals for positive things they noticed.

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Let's Compete Day 4
Advanced Camp SPIKE™ Prime Program
Blocks and Bots

Big Questions:
- 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
- Chart paper
- Student journals
- Various craft materials
- Pens
- Pencils
- Markers
- Book and/or articles about career areas

Outline for Day	Tasks	Time	Materials
9:00 - 10:30	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: My Code, Our Code	50 min	• SPIKE™ Prime sets • Devices with SPIKE™ App • Student journals
10:15 - 10:20	Break		
10:20 – 10:25	Team Briefing 2	5 min	• None
10:25 - 11:25	Challenge 2: Time for an Upgrade	60 min	• SPIKE™ Prime sets

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			• Devices with SPIKE™ App
			• Student journals
11:25 - 11:30	Get ready for lunch		
11:30 - 12:00	Lunch		
12:00 - 2:10	Workplace Wellness	10 min	• Varies, based on the activity selected
	Challenge 2: Time for an Upgrade (continued)	55 min	• SPIKE™ Prime sets • Devices with SPIKE™ App • Student journals
	Team Briefing 3	5 min	• None
	Challenge 3: Drive the Distance	60 min	• SPIKE™ Prime sets • Devices with SPIKE™ App • Student journals
2:10 - 2:30	Daily Debrief and Wrap Up	20 min	• Student journals

Welcome
Time: 5 minutes
Materials:
- Student journals

Welcome students back to camp. Take a minute to have students read over their shout outs from the previous day. Then have students high five each other with a positive word to start the morning.

Team Building Activity
Time: 15 minutes
Materials:
- Sets of identical LEGO bricks Each pair of students will need the same set of six bricks; sets may vary among groups.

Pair students together. Designate one student as Designer and one student as Builder

Back to Back
Students will sit back to back. Designer will build a model using the bricks they have without letting their partner see. When model is complete, Designer will communicate to Builder the steps to create the exact same build. Builder cannot look at Designer's model. Builder may ask questions. The goal is for the students to have the same models.

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

Quickly review the Group Rules Chart. Highlight positive moments (times when students helped each other, asking great questions, teamwork, helping to clean up…).

Team Briefing 1
Time: 5 minutes
Materials: None

Programmers use short cuts for programming. When using SPIKE™ Prime, you can create your own blocks that can represent many lines of code. With just one block you can represent a subsection of a program or an entire program. Today, you will learn how to utilize My Blocks.

Research and Wonderings
Time: 10 minutes
Materials:
- Discussion and internet research
- Student journals

Determine what companies in the area make, sell, or use robots that return to a start position after pushing, pulling, or carrying objects. There are a variety of videos available that show robots in warehouses and shipping areas.

Inventory Check
Time: 5 minutes
Materials: Advanced Driving Base

Ask students to find their partner from Day 1. Have students confirm that the Advanced Driving Base is in working condition.

Challenge 1: My Code, Our Code
Time: 60 minutes
Materials:
- Advanced Driving Base
- SPIKE™ Prime set
- SPIKE™ Prime Expansion set
- Device with SPIKE™ App
- Student journals

Complete My Code, Our Program in the Competition Ready unit. Students should create My Blocks for at least six different subcomponents of a program. Examples include:

- Point turn of 180 degrees

- Pivot turn of 90 degrees
- Drive in a two-foot square
- Move forward until a color is sensed
- Move forward until an object is sensed
- Follow a black line

Do not take the driving base apart. You will continue to use it.

Break
Time: 5 minutes

Team Briefing 2
Time: 5 minutes
Materials: None

Have you seen robots pick up and place things in other locations? Have you seen a video of a LEGO warehouse or other locations that store and ship things? Today you will add attachments to your driving base so your robot can pick and place objects.

Challenge 2: Time for an Upgrade
Time: 115 minutes (60 min, lunch, 55 min)
Materials:
- Advanced Driving Base
- SPIKE™ Prime set
- SPIKE™ Prime Expansion set
- Device with SPIKE™ App
- Student journals

Complete Time for an Upgrade in the Competition Ready unit.

If time allows, have students try picking up multiple frames and taking them to a specified location. Have students take frames around other objects to a specific location. Students should be using some My Blocks in their programs.

Students will leave the Advanced Driving Base model built for the next challenge.

Lunch
Time: 30 minutes

Workplace Wellness: Physical Fitness
Time: 10 minutes
Materials:
- Materials may 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: Time for an Upgrade (continued)
Time: 55 minutes (60 min, lunch, 55 min)
Materials:
- Advanced Driving Base
- SPIKE™ Prime set
- SPIKE™ Prime Expansion set
- Device with SPIKE™ App
- Student journals

Finish the Time for an Upgrade lesson in the Competition Ready unit.

Do not take apart the driving base. You will use it with the next challenge.

Team Briefing 3
Time: 5 minutes
Materials: None

Your next challenge is to be very exact. You will drive your robot as close as you can to an object without knocking it over. Work with your partner. Listen to each other and collaborate. You are going to need to use math so help each other with the calculations.

Challenge 3: Drive the Distance
Time: 60 minutes
Materials:
- SPIKE™ Prime set
- SPIKE™ Prime Expansion set
- Devices with internet access and SPIKE™ App
- Student journals

Complete Going the Distance in Supplemental Lessons in Units. Use the model you just built. Do not build a different driving base.

Keep the driving base for use tomorrow. Do not take it apart.

Write in your journals what you found difficult and how you overcame obstacles and issues. How successful was your team?

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

Have students draw a light bulb in their student journals. Inside the light bulb, have students write one or two things they discovered about themselves during camp.

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Let's Compete Day 5
Advanced Camp SPIKE™ Prime Program
Showcase

Outline for Day	Tasks	Time	Materials
9:00 - 10:20	Welcome and Team Building Activity	10 min	• LEGO bricks
	Review Group Rules Chart	5 min	• Group Rules Chart
	Team Briefing 1	5 min	• None
	Challenge 1: Creating the Obstacle Course	60 min	• SPIKE™ Prime sets • Devices •
10:20 - 10:25	Break		
10:25 - 11:25	Challenge 2: Programming the Robot	60 min	• SPIKE™ Prime sets • SPIKE™ Prime Expansion sets • Devices • Student journals
11:25 - 11:30	Get ready for lunch		
11:30 - 12:00	Lunch		
12:00 - 1:30	Perfecting the Robot	45 min	• SPIKE™ Prime sets • SPIKE™ Prime Expansion sets • Devices • Student journals
	Showcase	45 min	• SPIKE™ Prime sets • SPIKE™ Prime Expansion sets • Devices • Student journals

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1:45 - 2:30	Daily Debrief, Clean Up and Wrap Up	45 min	• SPIKE™ Prime sets • SPIKE™ Prime Expansion sets • Devices • Student journals • Certificates of completion

Welcome
Time: 5 minutes
Materials:
- Student journals

Welcome students back to camp. On a piece of chart paper, draw a very large light bulb. Have students write positive things they discovered about themselves during camp.

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 and your group will build 2-3 items that belongs in this category.
- When done building, please explain why this item belongs in the category.
  Build something that:
    o *can fly*
    o *is an animal*
    o *can be used for transportation*
    o *you can have for lunch or dinner*
  Tip: Ideas for other categories include a movie, cartoon characters, buildings, and so forth.

Team Briefing 1
Time: 5 minutes
Materials: None

Today you will have one last challenge that leads to the showcase. You will build an obstacle course as a class or in two groups. Each team should provide some part of the obstacle course. You will need to determine the order that the challenges will be met during the course. Remember to make the course wide enough for the robots to get through.

Challenge 1 – Creating the Obstacle Course
Time: 60 minutes
Materials:
- SPIKE™ Prime sets

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- SPIKE™ Prime Expansion sets
- Devices with SPIKE™ App
- Bricks
- Various craft materials
- Tape

Students will work together to create one or two obstacle courses (depending on group size) There should be no more than 8 obstacles in the course. Students will have 60 minutes to set up the course using craft materials, tape, bricks, etc. They should create the course that can be completed in one continuous program. There should be a starting location and a clear path that the robot will follow.

Team Briefing 2
Time: 5 minutes
Materials: None

Now that the obstacle course is ready, you can begin to program your robot. You will need to take turns trying your robot in the course. Be patient and help each other. The goal is for every team to make a perfect run in the obstacle course.

Challenge 2: Programming the Robot
Time: 60 minutes
Materials:
- SPIKE™ Prime sets
- SPIKE™ Prime Expansion sets
- Devices with SPIKE™ App

Explain to students that they can review all the activities that they have done this week. Each team should explain the activity they created in the obstacle course. Use the Advanced Driving Base that is already built. Remind students to use My Blocks to hold a successful program subunit, then put together the My Blocks to create a long program.

> **Hint:** The students should program one section at a time in their teams. Once the team has a solid program that consistently runs the first section, then they can move to the second section. Students can cut and paste programs together to form a long program OR they can send messages from one subunit to another as the robot completes a section.

Lunch
Time: 30 minutes

Challenge 3: Perfecting the Robot
Time: 45 minutes
Materials:
- SPIKE™ Prime sets
- SPIKE™ Prime Expansion sets
- Devices with SPIKE™ App

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Students continue to perfect their programs. Discuss your expectations for the showcase and the order in which teams will show their work.

> **Hint:** The students should program one section at a time in their teams. Once the team has a solid program that consistently runs the first section, create a My Block called "Section 1" then they can move to the second section. Students can cut and paste programs together to form a long program or they can send messages from one subunit to another as the robot completes a section. The use of My Blocks and messages can be very helpful.

Showcase
Time: 45 minutes
Materials:
- SPIKE™ Prime sets
- SPIKE™ Prime Expansion sets
- Devices with SPIKE™ App
- Space Challenge set
- Student work
- Charts you've created during the week
- Pictures
- Any videos you have taken
- Students should be set up and ready when guests arrive.

Teams should attempt the obstacle course in the order chosen during preparation. Each team will have one attempt. If there is time after all teams have made an attempt, continue to allow teams to run the course.

Daily Debrief, Clean Up and Wrap Up
Time: 45 minutes
Materials:
- Student projects
- Certificates

Have students disassemble their SPIKE™ Prime models. Students should correctly place the elements into the trays. Make sure sets have the SPIKE™ Prime hub, motors, sensors and sets are in good order. Hubs should be turned off. Make sure devices are powered off and stored.

Have students clean up materials from the showcase.

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

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