



LEGO Spike **Essential** Teacher Guide





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The Fast Lane

Our Story Blog

Support

....

The Fast Lane

Help Leo enter the amusement park with the Fast Lane!

() 30-45 min.

🖞 Beginner

 $\mathfrak{G}_{2}^{\mathsf{Grades 1-}}$



Teacher Support

Key objectives

Students will:

- Practice brainstorming to generate ideas
- Practice helping a story character
- Describe key ideas or details from a text

Things you will need

(one for every two students)

- LEGO[®] Education SPIKE[™] Essential Set
- Device with the LEGO[®] Education SPIKE[™] App installed

Additional resources

Building instructions Meet the Team: Minifigure Bios Assessment Rubric

Educational standards

- CSTA 1A-AP-10
- NGSS K-2 ETS 1-1
- ISTE 1.4a
- CCSS.ELA-LITERACY.SL.2.2

Language Arts Extension

CCSS.ELA-LITERACY.SL.2.5

Prepare

- Review the *Fast Lane* lesson in the LEGO[®] Education SPIKE[™] App.
- If necessary, pre-teach these related vocabulary words: *brainstorm*, *build*, *challenge*, *create*, *program*, and *upgrade*.

- Consider the abilities and backgrounds of all your students. Differentiate the lesson to make it accessible to everyone. See the *Differentiation* section below for suggestions.
- If time allows, plan and facilitate the language arts extension. See the *Extension* section below for more information.

Engage

(Whole Class, 5 Minutes)

- Facilitate a quick discussion about brainstorming.
 - Talk with your students about going to an amusement park and seeing a long line to enter.
 - Ask questions, like: What could you do to make standing in line more fun? How could you avoid standing in that long line?
- Introduce your students to the story's main characters and the first challenge: turning on the Fast Lane's light.
- Distribute a brick set and a device to each group.

Explore

(Small Groups, 30 Minutes)

- Have your students use the LEGO[®] Education SPIKE[™] App to guide them through their first challenge:
 - Create and test the program that turns on the light when Leo shows his yellow ticket to the Color Sensor.
- Have your students iterate and test their models to complete the next two challenges in the app:
 - Program the Fast Lane to react to the yellow ticket in a different way when Leo shows his yellow ticket to the Color Sensor.
 - Upgrade the Fast Lane for Leo.
- You can find coding and building support in the *Tips* section below.

Explain

(Whole Class, 5 Minutes)

- Gather your students together to reflect on their completed challenges.
- Ask questions, like: *What did you do for Leo? How did you upgrade the Fast Lane?*

Elaborate

(Whole Class, 5 Minutes)

- Prompt your students to discuss and reflect on how brainstorming helped them come up with ways to upgrade the Fast Lane.
- Ask questions, like: How did you come up with ideas for upgrading the Fast Lane? Why do you think it's important to come up with more than one idea?
- Have your students clean up their workstations.

Evaluate

(Ongoing Throughout the Lesson)

 Ask guiding questions to encourage your students to "think aloud" and explain their thought processes and reasoning in the decisions they've made while building and programming.

Observation Checklist

- Measure your students' proficiency in brainstorming new ideas.
- Create a scale that matches your needs. For example:
 - 1. Needs additional support
 - 2. Can work independently
 - 3. Can teach others

Self-Assessment

- Have each student choose the brick that they feel best represents their performance.
 - Yellow: I think I can brainstorm new ideas.
 - Blue: I can brainstorm new ideas.
 - Green: I can brainstorm new ideas, and I can help a friend do it too.

Peer-Feedback

- In their small groups, have your students discuss their experiences working together.
- Encourage them to use statements like these:
 - I liked it when you...
 - I'd like to hear more about how you...

Tips

Coding Tip

- After your students complete their first challenge, they'll be provided with three Inspiration Coding Blocks to help them modify their programs.
- The Inspiration Coding Blocks are intended to spark their imaginations as they experiment to find their own solutions.





Model Tip

- After your students complete their second challenge, they'll be provided with three Inspiration Images and an open-ended prompt for improving their models.
- The Inspiration Images are to help spark their imaginations as they experiment and change their models.



There aren't any building instructions for this challenge.

Differentiation

Simplify this lesson by:

- Shortening the lesson to only include the first challenge
- Selecting one Inspiration Image to help your students change their models

Increase the difficulty by:

- Adding different Color Sensor Blocks to the Programming Canvas to react to different-colored tickets
- Exploring new and different Coding Blocks in the program

Extension

• Have your students create videos of different things Leo can do while he's waiting in line to enter the amusement park.

If facilitated, this will extend beyond the 45-minute lesson.

Language Arts: CCSS.ELA-LITERACY.SL.2.5



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REQUEST A MEETING










































....

Classic Carousel

Create a new spinning ride for Sofie to try!

(b) 30-45 min.

🛱 Beginner

 $\Theta \frac{\text{Grades 1-}}{2}$

Teacher Support

Key objectives

Students will:

- Improve and refine a prototype as part of the design process
- Practice helping a story character
- Describe key ideas or details from a text

Things you will need

(one for every two students)

- LEGO[®] Education SPIKE[™] Essential Set
- Device with the LEGO[®] Education SPIKE[™] App installed

Additional resources

<u>Building instructions</u> <u>Meet the Team: Minifigure Bios</u> <u>Assessment Rubric</u>

Educational standards

- CSTA 1A-AP-12
- NGSS K-2 ETS 1-1
- ISTE 1.4c
- CCSS.ELA-LITERACY.SL.2.2

Language Arts Extension

• CCSS.ELA-LITERACY.W.2.3

Prepare

• Review the *Classic Carousel* lesson in the LEGO[®] Education SPIKE[™] App.



- If necessary, pre-teach these related vocabulary words: *design*, *improve*, *prototype*, *refine*, and *test*.
- Consider the abilities and backgrounds of all your students. Differentiate the lesson to make it accessible to everyone. See the *Differentiation* section below for suggestions.
- If time allows, plan and facilitate the language arts extension. See the *Extension* section below for more information.

Engage

(Whole Class, 5 Minutes)

- Facilitate a quick discussion about making improvements.
 - Talk with your students about going to an amusement park and wanting to make a fun ride even better.
 - Ask questions, like: What would you do if you had the chance to change a ride? How could you change it?
- Introduce your students to the story's main characters and the first challenge: making the carousel spin.
- Distribute a brick set and a device to each group.

Explore

(Small Groups, 30 Minutes)

- Have your students use the LEGO[®] Education SPIKE[™] App to guide them through their first challenge:
 - Create and test the program that makes the carousel spin.
- Have your students iterate and test their models to complete the next two challenges in the app:
 - Change the program to improve the carousel.
 - Upgrade the carousel for Sofie.
- You can find coding and building support in the *Tips* section below.

Explain

(Whole Class, 5 Minutes)

- Gather your students together to reflect on their completed challenges.
- Ask questions, like: *How did you make the carousel spin? How did you upgrade the carousel?*

Elaborate

(Whole Class, 5 Minutes)

- Prompt your students to discuss and reflect on the process of making improvements and refinements.
- Ask questions, like: What were you thinking about when you decided to improve the carousel? How did you know when you'd made enough improvements?
- Have your students clean up their workstations.

Evaluate

(Ongoing Throughout the Lesson)

 Ask guiding questions to encourage your students to "think aloud" and explain their thought processes and reasoning in the decisions they've made while building and programming.

Observation Checklist

- Measure your students' proficiency in improving a prototype.
- Create a scale that matches your needs. For example:
 - 1. Needs additional support
 - 2. Can work independently
 - 3. Can teach others

Self-Assessment

- Have each student choose the brick that they feel best represents their performance.
 - Yellow: I think I can improve a prototype.
 - Blue: I can improve a prototype.
 - Green: I can improve a prototype, and I can help a friend do it too.

Peer-Feedback

- In their small groups, have your students discuss their experiences working together.
- Encourage them to use statements like these:
 - I liked it when you...
 - I'd like to hear more about when you...

Tips

Coding Tip

- After your students complete their first challenge, they'll be provided with three Inspiration Coding Blocks to help them modify their programs.
- The Inspiration Coding Blocks are intended to spark their imaginations as they experiment to find their own solutions.





Model Tip

- After your students complete their second challenge, they'll be provided with three Inspiration Images and an open-ended prompt for improving their models.
- The Inspiration Images are to help spark their imaginations as they experiment and change their models.

Classic Carousel



There aren't any building instructions for this challenge.

Differentiation

Simplify this lesson by:

- Shortening the lesson to only include the first challenge
- Selecting one Inspiration Image to help your students change their models

Increase the difficulty by:

- Exploring new and different Coding Blocks in the program
- Adding the Color Sensor or Light to the model

Extension

• Have your students write a story about Sofie's experience at the amusement park. Ask them to include temporal words to indicate the order of events.

If facilitated, this will extend beyond the 45-minute lesson.

Language Arts: CCSS.ELA-LITERACY.W.2.3



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REQUEST A MEETING










































































Blog

Support

The Perfect Swing

Maria doesn't want a ride that goes too fast. Do you think



the swing will be a perfect fit?

30-45 \cap min.

Beginner

Grades 1-

Teacher Support

Key objectives

Students will:

- Gather information about the needs or wants of others ٠
- Change a solution to meet the needs or wants of others
- Practice helping a story character •
- Describe key ideas or details from a text

Things you will need

(one for every two students)

- LEGO[®] Education SPIKE[™] Essential Set
- Device with the LEGO[®] Education SPIKE[™] App installed

Additional resources

Building instructions Meet the Team: Minifigure Bios Assessment Rubric

Educational standards

- CSTA 1A-AP-10
- NGSS K-2 ETS 1-2
- ISTE 1.4c
- CCSS.ELA-LITERACY.SL.2.2

Language Arts Extension

CCSS.ELA-LITERACY.L.2.1

Prepare

- Review the *Perfect Swing* lesson in the LEGO[®] Education SPIKE[™] App.
- If necessary, pre-teach these related vocabulary words: *change*, *need*, *rotate*, *solution*, and *want*.
- Consider the abilities and backgrounds of all your students. Differentiate the lesson to make it accessible to everyone. See the *Differentiation* section below for suggestions.
- If time allows, plan and facilitate the language arts extension. See the *Extension* section below for more information.

Engage

(Whole Class, 5 Minutes)

- Facilitate a quick discussion about making changes to include things that others need or want.
 - Talk with your students about two friends who want to go on the same ride at an amusement park. One wants to go fast, but the other doesn't.
 - Ask questions, like: *How could it be possible that they both like going on the same ride? What would happen if they rode the ride at the same time?*
- Introduce your students to the story's main characters and the first challenge: making the swing move.
- Distribute a brick set and a device to each group.

Explore

(Small Groups, 30 Minutes)

- Have your students use the LEGO[®] Education SPIKE[™] App to guide them through their first challenge:
 - Create and test the program that makes the swing move.
- Have your students iterate and test their models to complete the next two challenges in the app:
 - Change the program to make the swing better for a friend who wants a more exciting ride.
 - Upgrade the swing for Maria and her friend.

• You can find coding and building support in the *Tips* section below.

Explain

(Whole Class, 5 Minutes)

- Gather your students together to reflect on their completed challenges.
- Ask questions, like: What did you change to make the swing perfect for Maria and her friend? How did changing the program make the ride different?

Elaborate

(Whole Class, 5 Minutes)

- Prompt your students to discuss and reflect on the importance of making changes to include things that others need or want.
- Ask questions, like: Why do you think it's important to include things that other people need or want when you're creating something new? How do you feel when something that you need or want is included?
- Have your students clean up their workstations.

Evaluate

(Ongoing Throughout the Lesson)

 Ask guiding questions to encourage your students to "think aloud" and explain their thought processes and reasoning in the decisions they've made while building and programming.

Observation Checklist

• Measure your students' proficiency in changing a solution to meet the needs or wants of others.

- Create a scale that matches your needs. For example:
 - 1. Needs additional support
 - 2. Can work independently
 - 3. Can teach others

Self-Assessment

- Have each student choose the brick that they feel best represents their performance.
 - Yellow: I think I can make changes to include things that others need or want.
 - Blue: I can make changes to include things that others need or want.
 - Green: I can make changes to include things that others need or want, and I can help a friend do it too.

Peer-Feedback

- In their small groups, have your students discuss their experiences working together.
- Encourage them to use statements like these:
 - I liked it when you...
 - I'd like to hear more about how you...

Tips

Coding Tip

- After your students complete their first challenge, they'll be provided with three Inspiration Coding Blocks to help them modify their programs.
- The Inspiration Coding Blocks are intended to spark their imaginations as they experiment to find their own solutions.



Model Tip

- After your students complete their second challenge, they'll be provided with three Inspiration Images and an open-ended prompt for improving their models.
- The Inspiration Images are to help spark their imaginations as they experiment and change their models.



There aren't any building instructions for this challenge.

Differentiation

Simplify this lesson by:

- Shortening the lesson to only include the first challenge
- Selecting one Inspiration Image to help your students change their models

Increase the difficulty by:

- Adding the Color Sensor and including it in the program that starts the swing
- Adding more friends to the ride and changing the program to meet their needs and wants

Extension

• Have your students interview their classmates to find out what they like and don't like about different amusement park rides.

If facilitated, this will extend beyond the 45-minute lesson.

Language Arts: CCSS.ELA-LITERACY.L.2.1



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REQUEST A MEETING
























































































































Our Story

Blog

Support

....

Snack Stand

Oh, no! Daniel dropped his snack. Help him get a new one from the snack stand.

(b) 30-45 min.

🛱 Beginner

 $\Theta \frac{\text{Grades 1-}}{2}$



Teacher Support

Key objectives

Students will:

- Practice testing prototypes to ensure that they meet a need
- Modify and remix a solution
- Practice helping a story character
- Describe key ideas or details from a text

Things you will need

(one for every two students)

- LEGO[®] Education SPIKE[™] Essential Set
- Device with the LEGO[®] Education SPIKE[™] App installed

Additional resources

Building instructions Meet the Team: Minifigure Bios Assessment Rubric

Educational standards

- CSTA 1A-AP-11
- NGSS K-2 ETS 1-3
- ISTE 1.4c
- CCSS.ELA-LITERACY.SL.2.2

Math Extension

• CCSS.MATH.CONTENT.2.MD.D.10

Prepare

- Review the Snack Stand lesson in the LEGO[®] Education SPIKE[™] App.
- If necessary, pre-teach these related vocabulary words: effective, serve, and tool.

Snack Stand

- Consider the abilities and backgrounds of all your students. Differentiate the lesson to make it accessible to everyone. See the *Differentiation* section below for suggestions.
- If time allows, plan and facilitate the math extension. See the *Extension* section below for more information.

Engage

(Whole Class, 5 Minutes)

- Facilitate a quick discussion about the importance of testing to make sure an object works as it should.
 - Talk with your students about objects that need to work properly when they're eating.
 - Ask questions, like: *How could you test to make sure a table is flat so that your food won't roll off? If the table isn't flat, what could you do to fix it?*
- Introduce your students to the story's main characters and the first challenge: serving another snack to Daniel.
- Distribute a brick set and a device to each group.

Explore

(Small Groups, 30 Minutes)

- Have your students use the LEGO[®] Education SPIKE[™] App to guide them through their first challenge:
 - Create and test the program that serves another snack to Daniel when he shows his blue ticket to the Color Sensor.
- Have your students iterate and test their models to complete the next two challenges in the app:
 - Change the program to improve the snack stand.
 - Upgrade the snack stand for Daniel. Make sure he can still reach his snack.
- You can find coding and building support in the *Tips* section below.

Explain

(Whole Class, 5 Minutes)

- Gather your students together to reflect on their completed challenges.
- Ask questions, like: What did you do to upgrade the snack stand? How did you make sure that Daniel could still get his snack from the upgraded snack stand?

Elaborate

(Whole Class, 5 Minutes)

- Prompt your students to discuss and reflect on the importance of testing a prototype to ensure that it works as intended.
- Ask questions, like: Why is it important to test and make sure your prototype works as you want it to? What happens when your upgraded prototype fails and doesn't work as you wanted?
- Have your students clean up their workstations.

Evaluate

(Ongoing Throughout the Lesson)

 Ask guiding questions to encourage your students to "think aloud" and explain their thought processes and reasoning in the decisions they've made while building and programming.

Observation Checklist

- Measure your students' proficiency in testing an upgraded prototype to ensure that it works as intended.
- Create a scale that matches your needs. For example:
 - 1. Needs additional support
 - 2. Can work independently

3. Can teach others

Self-Assessment

- Have each student choose the brick that they feel best represents their performance.
 - Yellow: I think I can test an upgraded prototype to make sure it does what I want it to.
 - Blue: I can test an upgraded prototype to make sure it does what I want it to.
 - Green: I can test an upgraded prototype to make sure it does what I want it to, and I can help a friend do it too.

Peer-Feedback

- In their small groups, have your students discuss their experiences working together.
- Encourage them to use statements like these:
 - I liked it when you...
 - I'd like to hear more about how you...

Tips

Coding Tip

- After your students complete their first challenge, they'll be provided with three Inspiration Coding Blocks to help them modify their programs.
- The Inspiration Coding Blocks are intended to spark their imaginations as they experiment to find their own solutions.



Model Tip

Snack Stand

- After your students complete their second challenge, they'll be provided with three Inspiration Images and an open-ended prompt for improving their models.
- The Inspiration Images are to help spark their imaginations as they experiment and change their models.



There aren't any building instructions for this challenge.

Differentiation

Simplify this lesson by:

- Shortening the lesson to only include the first challenge
- Selecting one Inspiration Image to help your students change their models

Increase the difficulty by:

- Adding other colors for the Color Sensor to react to
- Adding more items to the menu for Daniel to order and eat

Extension

Snack Stand

 Have your students use the collected data from the snack stand to create a bar graph on paper or using different manipulatives. Guide your students in a discussion about which color was used the most, least, etc.

If facilitated, this will extend beyond the 45-minute lesson.

Math: CCSS.MATH.CONTENT.2.MD.D.10



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REQUEST A MEETING





































































Twirling Teacups

Grades 1-

2



Twirling Teacups

Round and round! Sofie and Leo are excited to try this new spinning ride today.



30-45 \cap min.

Beginner

Teacher Support

Key objectives

Students will:

- Modify a solution while considering a specific goal or outcome •
- Refine and improve the prototype
- Practice helping a story character •
- Describe key ideas or details from a text

Things you will need

(one for every two students)

- LEGO[®] Education SPIKE[™] Essential Set
- Device with the LEGO[®] Education SPIKE[™] App installed

Additional resources

Building instructions Meet the Team: Minifigure Bios Assessment Rubric

Educational standards

- CSTA 1A-AP-08
- NGSS K-2 ETS 1-1
- ISTE 1.4d
- CCSS.ELA-LITERACY.SL.2.2

Language Arts Extension

CCSS.ELA-LITERACY.W.2.7

Prepare

- Review the *Twirling Teacups* lesson in the LEGO[®] Education SPIKE[™] App.
- Consider the abilities and backgrounds of all your students. Differentiate the lesson to make it accessible to everyone. See the *Differentiation* section below for suggestions.
- If time allows, plan and facilitate the language arts extension. See the *Extension* section below for more information.

Engage

(Whole Class, 5 Minutes)

- Facilitate a quick discussion about how to consider a specific goal or outcome when refining and improving an existing object.
 - Talk with your students about how a spinning amusement park ride works.
 - Ask questions, like: *If you were adding new seats to a spinning ride, what would those new seats have to be able to do? What would you have to think about as you added the new seats?*
- Introduce your students to the story's main characters and the first challenge: starting the teacup ride.
- Distribute a brick set and a device to each group.

Explore

(Small Groups, 30 Minutes)

- Have your students use the LEGO[®] Education SPIKE[™] App to guide them through their first challenge:
 - Create and test the program that starts the teacup ride.
- Have your students iterate and test their models to complete the next two challenges in the app:
 - Change the program to improve the teacup ride.
 - Upgrade the teacup ride to fit more friends. Make sure that all of the seats can move or spin!

• You can find coding and building support in the *Tips* section below.

Explain

(Whole Class, 5 Minutes)

- Gather your students together to reflect on their completed challenges.
- Ask questions, like: How did you upgrade the teacup ride? How did you make sure that the new seats moved when the ride was spinning?

Elaborate

(Whole Class, 5 Minutes)

- Prompt your students to discuss and reflect on why it's important to keep the desired outcome or goal in mind when modifying a prototype.
- Ask questions, like: Why is it important to know why you're modifying your prototype, and what your goal is? How do you keep that goal in mind when you're improving or upgrading a prototype?
- Have your students clean up their workstations.

Evaluate

(Ongoing Throughout the Lesson)

 Ask guiding questions to encourage your students to "think aloud" and explain their thought processes and reasoning in the decisions they've made while building and programming.

Observation Checklist

• Measure your students' proficiency in refining and improving potential prototypes with a specific goal or outcome in mind.
- Create a scale that matches your needs. For example:
 - 1. Needs additional support
 - 2. Can work independently
 - 3. Can teach others

Self-Assessment

- Have each student choose the brick that they feel best represents their performance.
 - Yellow: I think I can refine and improve prototypes with a specific goal or outcome in mind.
 - Blue: I can refine and improve prototypes with a specific goal or outcome in mind.
 - Green: I can refine and improve prototypes with a specific goal or outcome in mind, and I can help a friend do it too.

Peer-Feedback

- In their small groups, have your students discuss their experiences working together.
- Encourage them to use statements like these:
 - I liked it when you...
 - I'd like to hear more about how you...

Tips

Coding Tip

Your students will use a Message Block when completing their first challenge.

- The Message Blocks allow your students to run multiple blocks in parallel.
- Whenever a Send Message Block (closed envelope icon) is used, the Received Message Block (same-colored open envelope icon) is activated.
- After your students complete their first challenge, they'll be provided with three Inspiration Coding Blocks to help them modify their programs.
- The Inspiration Coding Blocks are intended to spark their imaginations as they experiment to find their own solutions.



Model Tip

- After your students complete their second challenge, they'll be provided with three Inspiration Images and an open-ended prompt for improving their models.
- The Inspiration Images are to help spark their imaginations as they experiment and change their models.



There aren't any building instructions for this challenge.

Differentiation

Simplify this lesson by:

- Shortening the lesson to only include the first challenge
- Selecting one Inspiration Image to help your students change their models

Increase the difficulty by:

- Exploring new and different Coding Blocks in the program
- Investigating how to make the seats spin in different directions

Extension

• Have your students research different rides in an amusement park, select their favorite, and write a persuasive paragraph about why it's the best ride.

If facilitated, this will extend beyond the 45-minute lesson.

Language Arts: CCSS.ELA-LITERACY.W.2.7



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REQUEST A MEETING

5/12/24, 6:26 PM

Twirling Teacups



























































































Grades 1-

Our Story

Blog

Support

The Spinning **Ferris Wheel**

The team wants to ride the Ferris Wheel together. How

Beginner



can you help them?

30-45 min.

Teacher Support

Key objectives

Students will:

- Modify an existing solution to make it work properly
- Practice helping a story character
- Describe key ideas or details from a text

Things you will need

(one for every two students)

- LEGO[®] Education SPIKE[™] Essential Set
- Device with the LEGO[®] Education SPIKE[™] App installed •

Additional resources

Building instructions Meet the Team: Minifigure Bios Assessment Rubric

Educational standards

- CSTA 1A-AP-14
- NGSS K-2 ETS 1-3
- ISTE 1.4a
- CCSS.ELA-LITERACY.SL2.2
- CCSS.MATH.CONTENT.2.G.A.3

Math Extension

CCSS.MATH.CONTENT.2.G.A.3

Prepare

- Review the Spinning Ferris Wheel lesson in the LEGO[®] Education SPIKE[™] App.
- Consider the abilities and backgrounds of all your students. Differentiate the lesson to make it accessible to everyone. See the *Differentiation* section below for suggestions.
- If time allows, plan and facilitate the math extension. See the *Extension* section below for more information.

Engage

(Whole Class, 5 Minutes)

- Facilitate a quick discussion about modifying a solution to make it work properly.
 - Talk with your students about what happens when something isn't working as it should.
 - Ask questions, like: If the roller coaster is moving slowly and doesn't have the energy to climb its steep inclines, what could you do to make improvements and fix it? What would you have to think about in order to make improvements?
- Introduce your students to the story's main characters and the first challenge: starting the Ferris Wheel.
- Distribute a brick set and a device to each group.

Explore

(Small Groups, 30 Minutes)

- Have your students use the LEGO[®] Education SPIKE[™] App to guide them through their first challenge:
 - Create and test the program that starts the Ferris Wheel.
- Have your students iterate and test their models to complete the next two challenges in the app:
 - Change the program to make the Ferris Wheel better.
 - Upgrade the Ferris Wheel for the team.

• You can find coding and building support in the *Tips* section below.

Explain

(Whole Class, 5 Minutes)

- Gather your students together to reflect on their completed challenges.
- Ask questions, like: How did you make the Ferris Wheel stop after a quarter turn to make sure the team could get on and off? How did you upgrade the Ferris Wheel?

Elaborate

(Whole Class, 5 Minutes)

- Prompt your students to discuss and reflect on how they modify solutions in order to fix them.
- Ask questions, like: What do you think about when you're trying to make modifications to fix a solution? How can you tell if your idea will work?
- Have your students clean up their workstations.

Evaluate

(Ongoing Throughout the Lesson)

 Ask guiding questions to encourage your students to "think aloud" and explain their thought processes and reasoning in the decisions they've made while building and programming.

Observation Checklist

- Measure your students' proficiency in modifying a solution in order to fix it.
- Create a scale that matches your needs. For example:
- 1. Needs additional support
- 2. Can work independently
- 3. Can teach others

Self-Assessment

- Have each student choose the brick that they feel best represents their performance.
 - Yellow: I think I can modify a solution to fix it.
 - Blue: I can modify a solution to fix it.
 - Green: I can modify a solution to fix it, and I can help a friend do it too.

Peer-Feedback

- In their small groups, have your students discuss their experiences working together.
- Encourage them to use statements like these:
 - I liked it when you...
 - I'd like to hear more about how you...

Tips

Coding Tip

- To successfully debug their programs, your students will have to add a Wait Block.
 - Adding a Wait Block will allow the Ferris Wheel to stop long enough for the team to get on and off.
- After your students complete their first challenge, they'll be provided with three Inspiration Coding Blocks to help them modify their programs.
- The Inspiration Coding Blocks are intended to spark their imaginations as they experiment to find their own solutions.





Model Tip

- After your students complete their second challenge, they'll be provided with three Inspiration Images and an open-ended prompt for improving their models.
- The Inspiration Images are to help spark their imaginations as they experiment and change their models.



There aren't any building instructions for this challenge.

Differentiation

Simplify this lesson by:

- Shortening the lesson to only include the first challenge
- Selecting one Inspiration Image to help your students change their models

Increase the difficulty by:

• Exploring new and different Coding Blocks in the program

• Programming the Light to flash as a countdown before the Ferris Wheel starts

Extension

 Have your students practice partitioning the Ferris Wheel into circles of equal and unequal shares. Ask them to record their data and recreate the angles using different materials.

If facilitated, this will extend beyond the 45-minute lesson.

Math: CCSS.MATH.CONTENT.2.G.A.3



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Support

The Most Amazing Amusement Park

It's time to create your very own amusement park ride!

Teacher Support

Key objectives

Students will:

- Apply their engineering design skills to solve a problem
- Practice helping a story character
- Describe key ideas or details from a text

Things you will need

(one for every two students)

- LEGO[®] Education SPIKE[™] Essential Set
- Device with the LEGO[®] Education SPIKE[™] App installed
- OPTIONAL: Additional materials for brainstorming (e.g., notebook paper, science notebook, etc.)

Additional resources

Meet the Team: Minifigure Bios Assessment Rubric

Educational standards

- All previously-listed
- ISTE 1.4a, 1.4c, 1.4d

Language Arts Extension

• CCSS.ELA-LITERACY.W.2.3



Prepare

NOTE: This lesson will extend over two 45-minute class sessions.

- Review the Most Amazing Amusement Park lesson in the LEGO[®] Education SPIKE[™] App.
- Consider the abilities and backgrounds of all your students. Differentiate the lesson to make it accessible to everyone. See the *Differentiation* section below for suggestions.
- If time allows, plan and facilitate the language arts extension. See the *Extension* section below for more information.

PART A (45 minutes)

Engage

(Whole Class, 10 Minutes)

- Facilitate a quick discussion about designing something new.
 - Talk with your students about what they think is missing from the amusement park that Sofie, Maria, Daniel, and Leo have been visiting.
 - Ask questions, like: What would be a fun ride for the team? How could we brainstorm a new ride for the team?
- Introduce your students to the team and the challenge: brainstorming a new ride for the amusement park.
- Distribute a brick set, any additional brainstorming materials, and a device to each group.

Explore

(Small Groups, 25 Minutes)

- Have your students use the LEGO[®] Education SPIKE[™] App to guide them through their first challenge:
 - Create a new ride for the amusement park. Use at least one motor or sensor (i.e., Color Sensor or Light).
- Your students can use the LEGO bricks supplemented with additional materials to brainstorm. Encourage them to come up with multiple solutions.

Explain

(Whole Class, 10 Minutes)

• Gather your students together and facilitate a sharing session where they present their initial ideas and provide feedback and suggestions to their peers.

PART B (45 minutes)

Elaborate

(Small Groups, 30 Minutes)

- Have your students build, program, and test the prototypes and ideas they came up with during the brainstorming session in Part A of this lesson.
- Remind them to use at least one motor or sensor.
- Encourage them to test and refine their models and programs over 2-3 iterations.
- You can find coding and building support in the *Tips* section below.

Evaluate

(Whole Class, 15 Minutes)

- Ask guiding questions to encourage your students to "think aloud" and explain their thought processes and reasoning in the decisions they've made while building and programming.
- Have your students clean up their workstations.

Observation Checklist

- Measure your students' proficiency in applying their engineering design skills to complete the given task.
- Create a scale that matches your needs. For example:
 - 1. Needs additional support
 - 2. Can work independently
 - 3. Can teach others

Self-Assessment

- Have each student choose the brick that they feel best represents their performance.
 - Yellow: I think I can design, build, and program a solution.
 - Blue: I can design, build, and program a solution.
 - Green: I can design, build, and program a solution, and I can help a friend do it too.

Peer-Feedback

- In their small groups, have your students discuss their experiences working together.
- Encourage them to use statements like these:
 - I liked it when you...
 - I'd like to hear more about how you...

Tips

Coding Tip

- There are no coding instructions or Inspiration Coding Blocks for this lesson.
 - Encourage your students to experiment and find their own solutions.

Model Tip

- There are no building instructions or Inspiration Images for this lesson.
 - Encourage your students to create their own models.

- If they need additional guidance, refer them to the building instructions for previous lessons in this unit.
- There's no right or wrong model for this lesson.
 - Your students can create entirely new models, find inspiration in the models from previous lessons, or simply recreate models from earlier lessons.

Differentiation

Simplify this lesson by:

- Working together as a class to brainstorm new ideas for the amusement park
- Giving your students the building instructions from previous lessons to use as inspiration for their new rides

Increase the difficulty by:

- Using two motors or sensors
- Creating two unique programs to make the ride move in two different ways

Extension

• Have your students write a description of their amusement park rides, explaining why they're fun and exciting.

If facilitated, this will extend beyond the 90-minute lesson.

Language Arts: CCSS.ELA-LITERACY.W.2.3



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Our Story Blog S

Support

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Cave Car

Daniel wonders what lives inside a dark cave. What do you think is hiding in the dark?

 ➡ 30-45 min.

🛱 Beginner

 $\Theta \frac{\text{Grades 1-}}{2}$



Teacher Support

Key objectives

Students will:

- Describe a program's sequence of events, goals, and expected outcome
- Explore objects that can be seen if light is available
- Practice helping a story character
- Participate in collaborative conversations

Things you will need

(one for every two students)

- LEGO[®] Education SPIKE[™] Essential Set
- Device with the LEGO $^{\otimes}$ Education SPIKE TM App installed

Additional resources

Building instructions Meet the Team: Minifigure Bios Assessment Rubric

Educational standards

- CSTA 1A-AP-12
- NGSS 1-PS4-2
- ISTE 1.5d
- CCSS.ELA-LITERACY.SL.1.1

Language Arts Extension

• CCSS.ELA-LITERACY.W.1.2

Prepare

• Review the *Cave Car* lesson in the LEGO[®] Education SPIKE[™] App.

- If necessary, pre-teach these related vocabulary words: *cave*, *dark*, *light*, *sequence*, and *try*.
- Consider the abilities and backgrounds of all your students. Differentiate the lesson to make it accessible to everyone. See the *Differentiation* section below for suggestions.
- If time allows, plan and facilitate the language arts extension. See the *Extension* section below for more information.

Engage

(Whole Class, 5 Minutes)

- Facilitate a quick discussion about helping a friend when they have a problem.
 - Talk with your students about what they could do for a friend who needs help seeing in the dark.
 - Ask questions, like: What could you do to help a friend see something in the dark? How would you describe what you're doing to help?
- Introduce your students to the story's main characters and the first challenge: turning on the cave car's light.
- Distribute a brick set and a device to each group.

Explore

(Small Groups, 30 Minutes)

- Have your students use the LEGO[®] Education SPIKE[™] App to guide them through their first challenge:
 - Make and try the program that turns on the cave car's light.
- Have your students iterate and test their models to complete the next challenge in the app:
 - Change the program for Daniel's next trip.
- You can find coding support in the *Tips* section below.

Explain

(Whole Class, 5 Minutes)

- Gather your students together to reflect on their completed challenges.
- Ask questions, like: What's Daniel's goal in the story? What happened to the light after you made a program for it?

Elaborate

(Whole Class, 5 Minutes)

- Prompt your students to discuss and reflect as they describe the process of creating a program to solve a problem.
- Ask questions, like: What did you expect would happen when you changed the program for the light? Did your light do what you expected? How would you describe what you did to change the light?
- Have your students clean up their workstations.

Evaluate

(Ongoing Throughout the Lesson)

 Ask guiding questions to encourage your students to "think aloud" and explain their thought processes and reasoning in the decisions they've made while building and programming.

Observation Checklist

- Measure your students' proficiency in describing a program's sequence of events and its outcome.
- Create a scale that matches your needs. For example:
 - 1. Needs additional support
 - 2. Can work independently

3. Can teach others

Self-Assessment

- Have each student choose the brick that they feel best represents their performance.
 - Yellow: I think I can describe a program's sequence of events and its outcome.
 - Blue: I can describe a program's sequence of events and its outcome.
 - Green: I can describe a program's sequence of events and its outcome, and I can help a friend do it too.

Peer-Feedback

- In their small groups, have your students discuss their experiences working together.
- Encourage them to use statements like these:
 - I liked it when you...
 - I'd like to hear more about how you...

Tips

Coding Tip

- After your students complete their first challenge, they'll be provided with three Inspiration Coding Blocks to help them modify their programs.
- The Inspiration Coding Blocks are intended to spark their imaginations as they experiment to find their own solutions.



Differentiation

Simplify this lesson by:

- Reading the Cave Car story and instructions from the LEGO[®] Education SPIKE[™] App aloud to your students
- Shortening the lesson to only include the first challenge

Increase the difficulty by:

- Creating a new version of the cave car
- Building what Daniel meets after he lights up the cave

Extension

• Have your students write an informational paragraph about the fictional creatures that live in the cave. Ask them to describe what they look like, what they eat, and what they do for playtime.

If facilitated, this will extend beyond the 45-minute lesson.

Language Arts: CCSS.ELA-LITERACY.W.1.2



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