



# Get Moving with Sports

A LEGO® Education BricQ Motion Essential  
Introductory STEAM Program

# Get Moving with Sports

## LEGO® Education BricQ Motion Essential

### Elementary STEAM Program Overview:

This outline will provide students with STEAM focused hands on activities to promote 21st century skills as well as apply language arts, mathematics and social and emotion learning to science. Each day, students will participate in team building activities and opportunities for physical activity as well as receive a briefing for daily challenges aligned to standards. Daily challenges will help students develop skills and knowledge to complete the culminating project, to design a game that requirement movement.

Program at a Glance		
Day 1	<b>Welcome</b> <b>Obstacle Course and Track and Field</b> What are ways that people or animals use force when playing sports or going through an obstacle course?	Obstacle Course Track and Field
Day 2	<b>Moving Around</b> How does a push move a ball? How does the wind move a vehicle?	Free Throw Sail Car
Day 3	<b>Cold Weather Sports</b> What causes a bobsled to slide down? What force can be used to push an object?	Bobsled Hockey Practice Get Up and Dance
Day 4	<b>Culminating Project: Create a Game</b> How do parts of a game move?	Create a game that requires a model to move.

### Prior to First Day of the Program:

1. Sort the sets.
2. Determine a naming convention for each set.  
Suggestions include school initials and a number ( Example: Millcreek Elementary kits names could be MES1; MES2; MES3).
3. Write the name of the set on the box.
4. Gather any consumable materials needed for the week.

5. Determine a procedure for when a LEGO piece is dropped (everyone freeze; say LEGO down/LEGO found) and where to place LEGO pieces if found and does not belong to the finder.

Information for the teacher:

Getting started with BricQ Motion Essential can be found at  
<https://education.lego.com/en-us/start/bricq-motion-essential#Introduction>

Lessons used in this camp can be found at:  
<https://education.lego.com/en-us/lessons?products=BricQ+Motion+Essential>

## Get Moving with Sports Day 1

### Obstacle Course & Track and Field

#### Big Questions:

What are ways that people or animals use force when playing sports or going through an obstacle course?

#### Materials needed for the day:

- BricQ Motion Essential sets
- Building Instruction booklets
- Chart paper
- Student notebooks or journals (could be paper stapled together with students creating the outside of the journal using construction paper and other consumable materials)
- Various craft materials
- Cardstock or heavy paper
- Pens
- Crayons
- Pencils
- Markers
- Team badge templates
- Book or videos about track and field events and obstacle courses

#### Day 1: Outline for the Day

Outline of Day	Tasks	Time	Materials
9:00 - 10:30	Introductions	30 min	<ul style="list-style-type: none"> <li>● BricQ Motion Essential sets</li> </ul>
	Establishing Group Rules and Expectations	15 min	<ul style="list-style-type: none"> <li>● Chart paper</li> <li>● Markers</li> <li>● Pens</li> </ul>
	Team Building Activity	15 min	<ul style="list-style-type: none"> <li>● BricQ Motion Essential sets</li> </ul>
	Morning Huddle	5 min	<ul style="list-style-type: none"> <li>● None</li> </ul>
	Partner Selection, Team Name and Team Badge	25 min	<ul style="list-style-type: none"> <li>● Varies, based on the activity selected</li> </ul>

			<ul style="list-style-type: none"> <li>• Team badge templates</li> <li>• Markers</li> <li>• Pencils</li> <li>• Scissors</li> </ul>
10:30 - 10:35	Break		
10:35 - 11:25	Workplace Wellness (physical activity)	10 min	<ul style="list-style-type: none"> <li>• Varies, based on the activity selected</li> </ul>
	Design a Journal	20 min	<ul style="list-style-type: none"> <li>• Student journals (see note in materials section)</li> <li>• Markers</li> <li>• Scissors</li> <li>• Construction paper</li> <li>• Other craft materials</li> </ul>
	Reading and Wondering	20 min	<ul style="list-style-type: none"> <li>• Book or videos about toys</li> </ul>
11:25	Get ready for lunch		
11:30 - 12:00	Lunch		
12:00 - 2:10	Afternoon Huddle	5 minutes	<ul style="list-style-type: none"> <li>• None</li> </ul>
	Challenge 1 - Tower building	30 min	<ul style="list-style-type: none"> <li>• BricQ Motion Essential sets</li> <li>• Building Instruction booklets</li> <li>• Student journals</li> </ul>
	Challenge 2 - Principle Model: Gears	60 min	<ul style="list-style-type: none"> <li>• BricQ Motion Essential sets</li> <li>• Building Instruction booklets</li> <li>• Student journals</li> </ul>

			<ul style="list-style-type: none"> <li>• Teacher notes</li> </ul>
	Break	5 min	<ul style="list-style-type: none"> <li>• None</li> </ul>
	Challenge 3: Spinning Top	30 min	<ul style="list-style-type: none"> <li>• BricQ Motion Essential sets</li> <li>• Building Instruction booklets</li> <li>• Student journals</li> </ul>
2:10 - 2:30	Daily Debrief and Wrap Up	20 min	<ul style="list-style-type: none"> <li>• Student journals</li> </ul>

### Introductions

Time: 30 minutes

Materials:

- BricQ Motion Essential sets

Purpose: For students to get to know each other

Using the LEGO® elements in the set, have students build a model that shows something they really like to do and one thing they hope to learn during the STEM program. When 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 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:

- BricQ Motion Essential sets

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 5 minutes. At the end of the 5 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?

### Morning Huddle:

Time: 5 minutes

Materials: None

Say:

*Welcome to Get Moving with Sports. This week you will be learning about force and motion and how they are used in sports. This morning you will:*

- *Determine a partner for training exercises*
- *Work with partner to determine a team name and design a team patch*
- *Design a journal for keeping important records this week*

### Partner Selection, Team Name and Team Badge

Time: 25 minutes

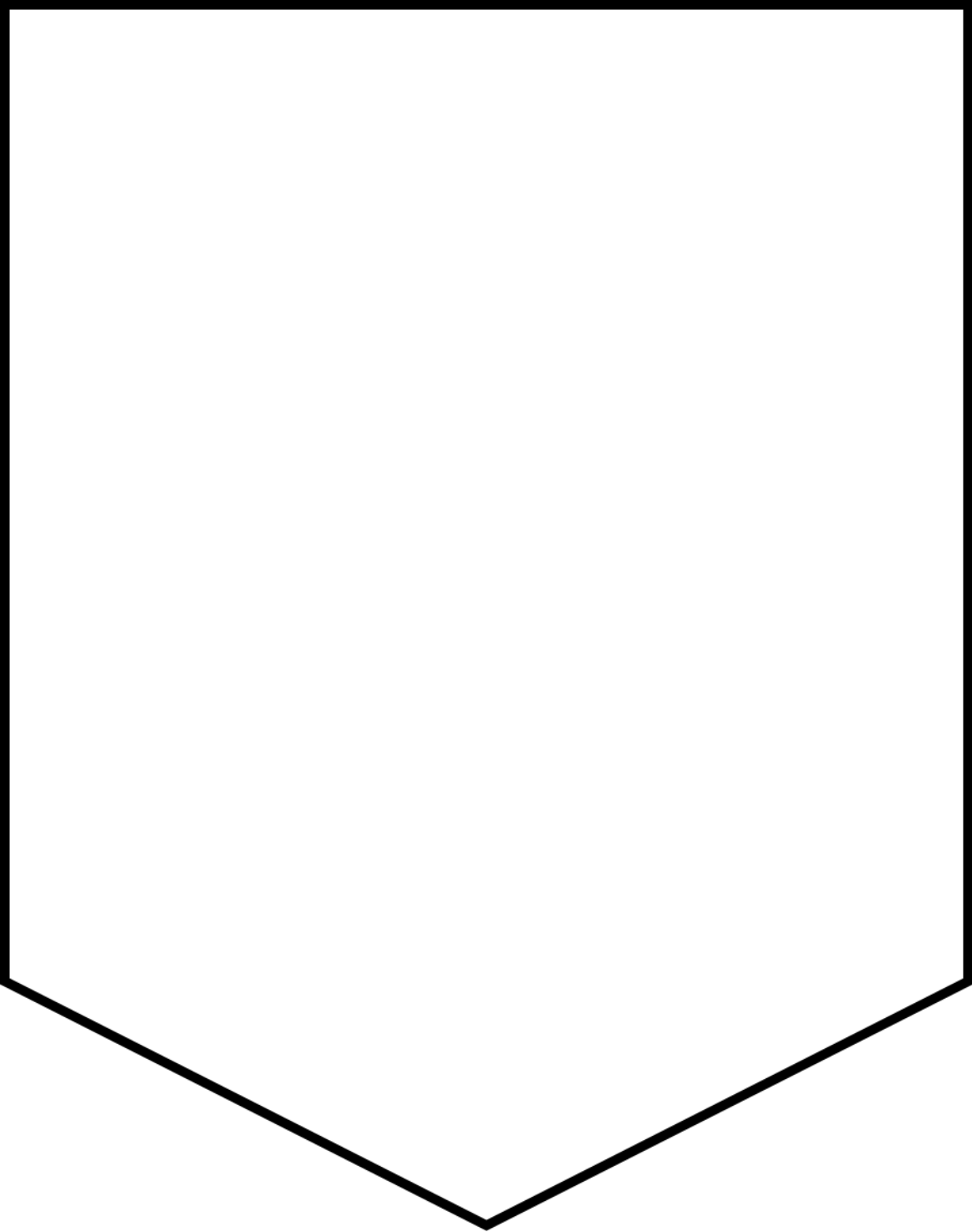
Materials:

- Student Journals (see note in materials section)
- Markers
- Scissors
- Construction paper
- Other craft materials

You can use several different activities to help students find a partner to work with for the week. Some ideas can be found through a quick internet search. After partners have been established, student teams can determine a name for their team and design a badge.

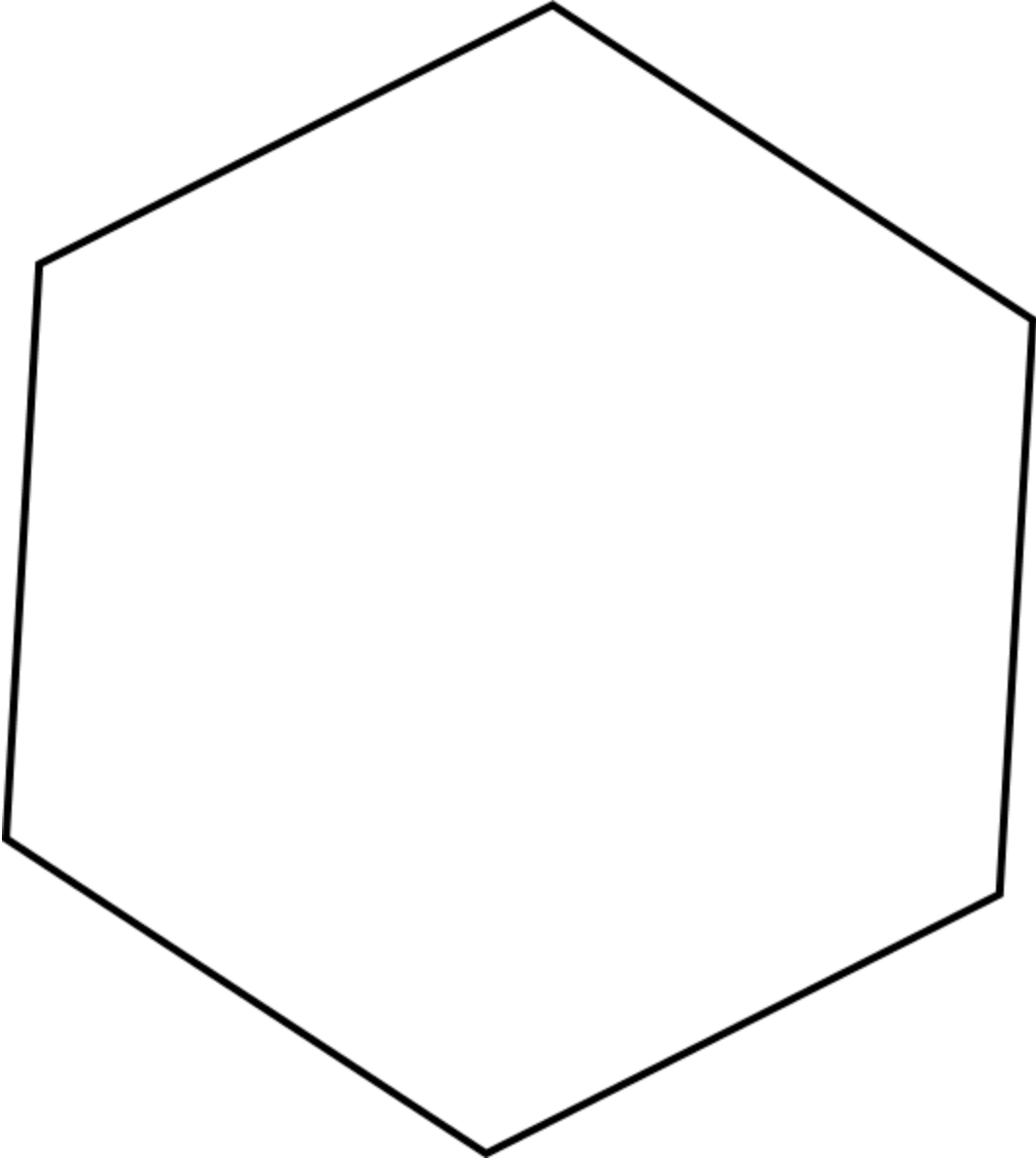
While teams are working, assign each group a Simple Machines kit to use for the week.

Badge Template

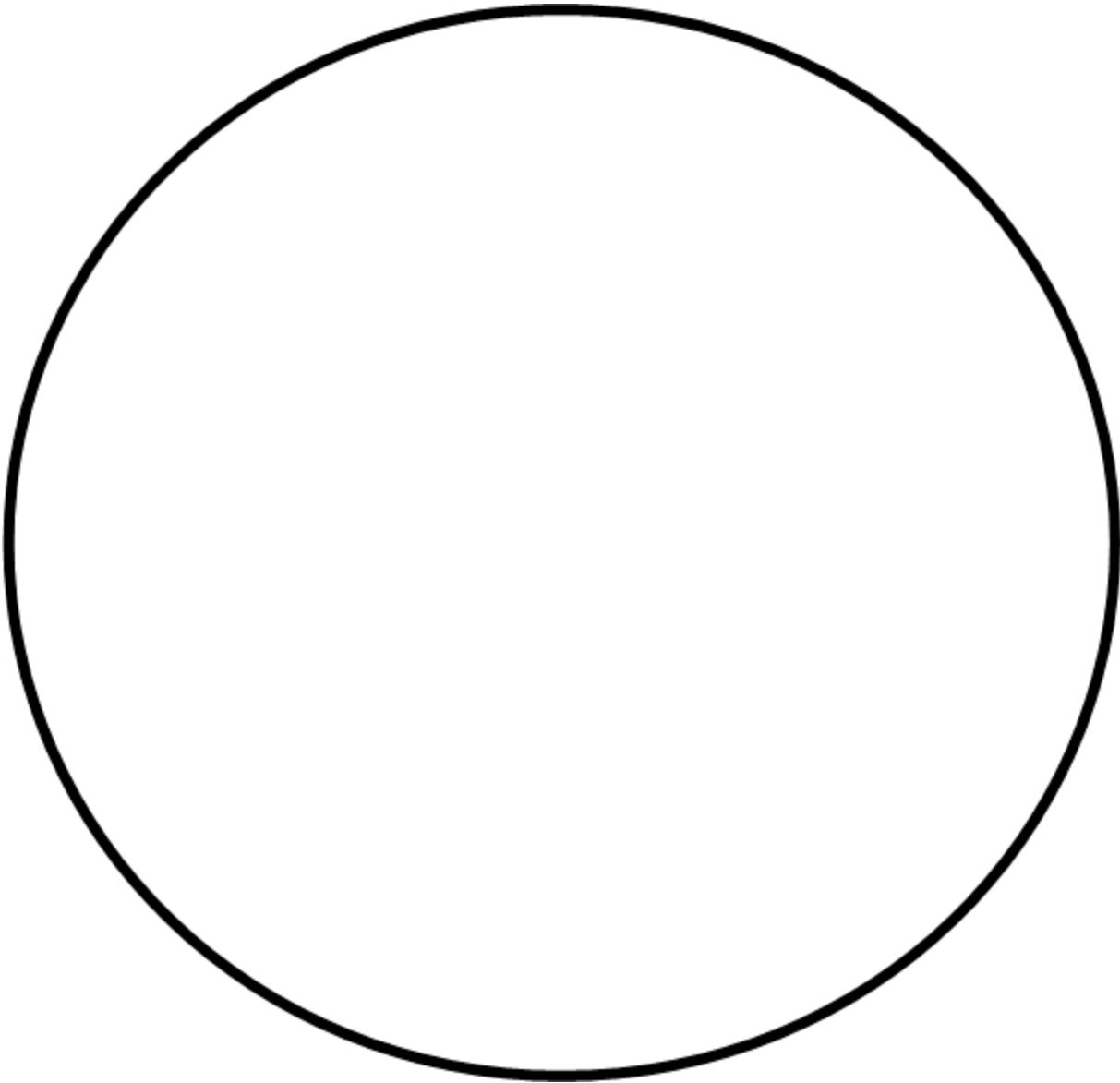




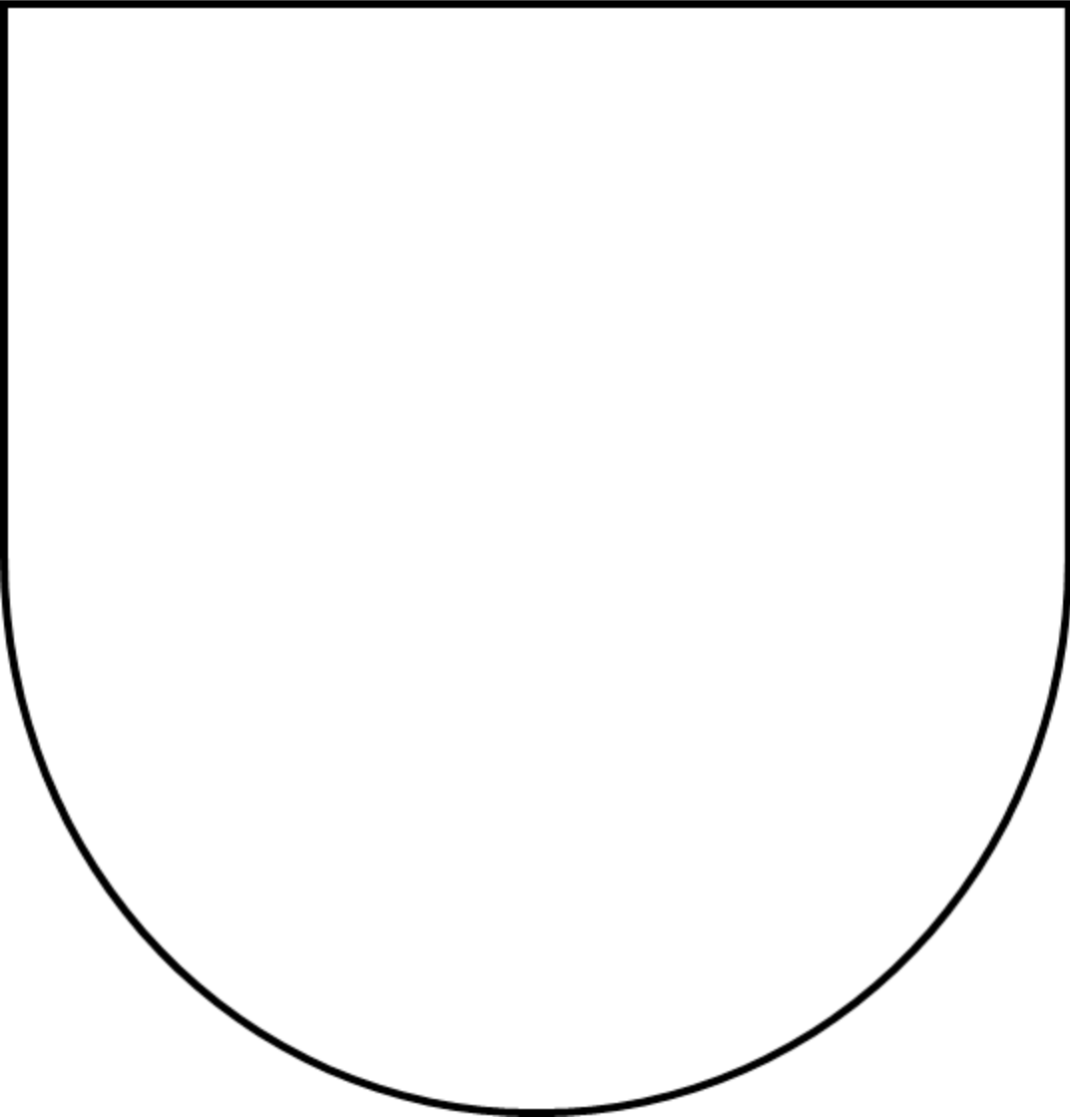
Badge Template



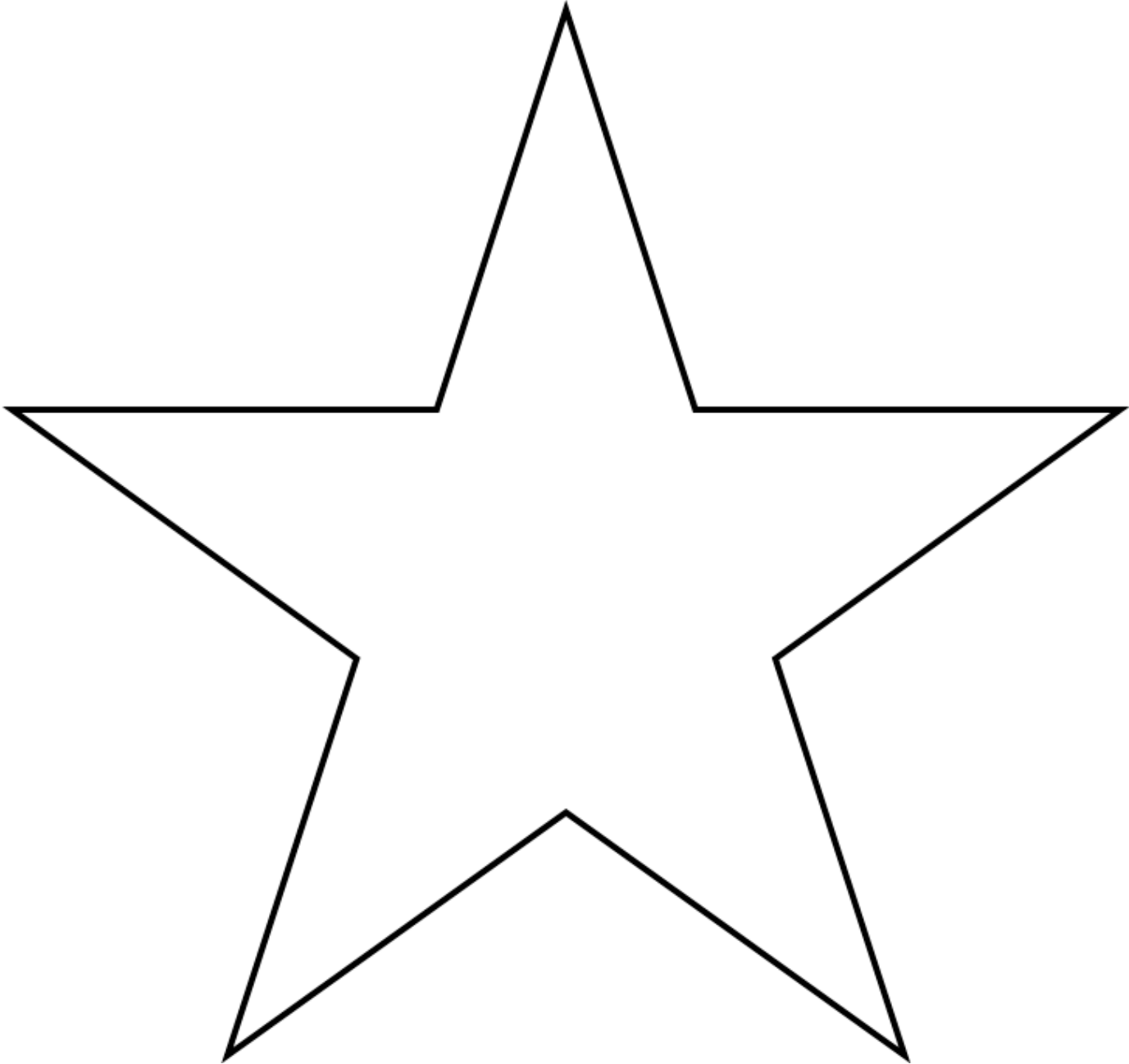
Badge Template



Badge Template



Badge Template



## **Break**

Time: 5 minutes

## **Workplace Wellness**

Time: 10 minutes

Materials:

- May vary depending on what activity is selected

Take a minute to complete a short physical activity. You can find several ideas for quick physical activities design for kids through an internet search.

## **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 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 videos about people participating in track and field events and obstacle courses for animals.
- There are several magazines about track and field that can be accessed in print or online.
- Students may research the athletes that compete in Olympic track and field events from the United States and other countries.
- Some students may prefer to learn about dog agility courses.

Read a book, a kid friendly journal article or watch a quick video about people participating in track and field events and obstacle courses for animals. Have students research an event or participant. Ask students to write things they find interesting about these events in their journals.

Ask students to share some of their findings with the class.

## **Lunch**

Time: 30 minutes

## Afternoon Huddle

Time: 5 minutes

Materials: None

*Now that you have your team and have some background information about track and field events and obstacle courses, 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. Your mission this afternoon is to:*

- *Explore LEGO bricks and elements to become familiar with how they fit together.*
- *Build an obstacle course and give play-by-play action of the dog.*
- *Think about the force used by a dog in a course.*
- *Be sure to work together, take good notes and have fun!*

Go over a few general guidelines for using the BricQ Motion Essential sets (what to do if you drop a piece on the floor, where do you put a piece you have found, what does sharing look like)

## Obstacle Course for a Dog

Time: 30 minutes

Materials:

- BricQ Motion Essential sets
- Building Instruction A booklets
- Student journals

Students will:

- Build an obstacle course for a dog
- Explain the actions of the dog in the obstacle course
- Explore the elements in the set.
- Work in pairs

Show students the video in the engage section of the Dog Obstacle Course Lesson.

<https://education.lego.com/en-us/lessons/bricq-motion-train-to-win/dog-obstacle-course#engage>

Ask students:

- To describe the dogs' movements
- How do you train a dog?
- What types of training obstacles did you see in the video?
- How did the dogs react to them?

Tell students their job is to build an obstacle course for dogs, that they will only have 10 minutes, and they are not given building instructions. Tell students they may use the pictures on Page 1 in the Building Instruction A booklet as inspiration.

**Note:** There are not enough elements in the set to build all the models shown at the same time.

When time is up, have the students line up their obstacles and run the dog through it. Each partner should take a turn running the dog through the course. While one partner is moving the dog, the other partner should provide an oral description of what is happening. You may need to model this experience for the class prior to having them complete the activity.

- Ask students questions like: How does the dog move through your obstacle course? (e.g., push/pull, up/down, over/under, through, across, around.)
- Which obstacles require a push? (e.g., In the "fetch" obstacle, you pull back the spring to push and launch the ball.)
- Which obstacles require pulling? (e.g., In the "dog sled" obstacle, where the dogs pull the sled along.)
- Have you seen any other push and pull forces today?

Have students write some of the descriptive words used to tell about the dog going through the course.

Ask students to take apart the models and put the elements into the correct tray locations.

## **Track and Field**

Time: 45 minutes

Materials:

- BricQ Motion Essential sets
- Building Instruction B booklets
- Student journals

Show students the video in the engage section of the Track and Field Lesson.

<https://education.lego.com/en-us/lessons/bricq-motion-winning-with-science/track-and-field#prepare>

Facilitate a discussion about which forces are involved in running, jumping, and throwing during track and field events.

Ask questions like:

- Which forces are needed to make the athletes move when they're doing track and field events? (Athletes push with their bodies, using their muscles to run, jump, and throw.)

Tell students that they'll be building a mechanism that can represent a track and field event. Explain that they won't be given building instructions but should instead use the pictures on pages 2-3 in Building Instructions B booklet as inspiration. Tell students that each team should create at least two track and field event models with moving parts.

Have students explain in their journals what the events are, how the models work, and their rating of difficulty for each event from 1 (easy) to 5 (very difficult).

### **Break**

Time: 5 minutes

### **Track and Field – Sharing the Events.**

Time: 45 minutes

Materials:

- BricQ Motion Essential sets
- Building Instruction booklets
- Student journals

Have each team share their models with the class.

Ask questions, like:

- How did your models represent the events that you chose? (e.g., move fast, make something jump, etc.)
- Which forces or types of forces are at work in your model? (e.g., push, pull, balanced, unbalanced, gravity)

Pair up teams and have them try the events. Have the teams move to different groups and try some additional events.

Have students write a paragraph about each of their events and a play-by-play action narrative of a person in the event. Encourage use of descriptive words.

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

### **Daily Debrief and Wrap Up**

Time: 20 minutes

Materials:

- Sticky notes
- Student journals
- Pencils
- Pens
- Markers



Have students reflect in their journals:

- What was fun about the challenges today?
- What did I learn from these challenges?
- What types of force and motion were included in the models I made?

Have students use sticky notes to write down three things they really enjoyed about the day. Place sticky notes on chart paper labeled Track and Field. Read several of the sticky notes aloud.

## Get Moving with Sports Day 2

### Moving Around

#### Big Question:

How does a push move a ball?

How does the wind move a vehicle?

Materials needed for the day:

- BricQ Motion Essential sets
- Building Instruction booklets
- Student journals
- Graph paper
- Scissors
- Tape
- Tape measures
- Student worksheet (Free Throw) for each team  
<https://education.lego.com/v3/assets/blt293eea581807678a/blt40c0dec0ed2557b3/5eabfb81e6f6795e530a2446/U2L3-worksheet.pdf>
- Student worksheet (Sail Car) Two for each person  
<https://education.lego.com/v3/assets/blt293eea581807678a/blt84f4ef1161b9130d/5eabfb612b79652f27c32705/U1L6-worksheet.pdf>
- Optional Materials to make sails
  - Paper, tag board, waxed paper, aluminum foil, thin cardboard
  - Markers
- 

Outline for Day	Tasks	Time	Materials
9:00 - 10:40	Welcome	5 min	<ul style="list-style-type: none"> <li>• Student Journals</li> </ul>
	Team Building Activity	15 min	<ul style="list-style-type: none"> <li>• BricQ Motion Essential sets</li> <li>• Bricktionary Cards</li> </ul>
	Review Group Rules Chart	5 min	<ul style="list-style-type: none"> <li>• Group Rules Chart</li> </ul>
	Morning Huddle	5 min	<ul style="list-style-type: none"> <li>• None</li> </ul>

	Readings and Wonderings	20 min	<ul style="list-style-type: none"> <li>• Book or journal article about exploration; satellites</li> <li>• Student Journals</li> </ul>
	Workplace Wellness (physical activity)	10 min	<ul style="list-style-type: none"> <li>• Varies, based on the activity selected</li> </ul>
	Challenge 1: Free Throw	40 min	<ul style="list-style-type: none"> <li>• BricQ Motion Essential sets</li> <li>• Building Instruction booklets</li> <li>• Student journals</li> </ul>
10:40 - 10:45	Break		
10:45 - 11:45	Challenge 2: Change the Distance	35 min	<ul style="list-style-type: none"> <li>• BricQ Motion Essential sets</li> <li>• Building Instruction booklets</li> <li>• Student journals</li> </ul>
	Challenge 3: More Hoops	25 min	<ul style="list-style-type: none"> <li>• BricQ Motion Essential sets</li> <li>• Building Instruction booklets</li> <li>• Student journals</li> </ul>
11:45 – 11:50	Get ready for lunch		
11:50 - 12:20	Lunch		
12:20 - 2:10	Afternoon Huddle	5 min	<ul style="list-style-type: none"> <li>• None</li> </ul>
	Challenge 4: Sail Cars	50 min	<ul style="list-style-type: none"> <li>• BricQ Motion Essential sets</li> <li>• Building Instruction booklets</li> <li>• Student journals</li> </ul>

	Break	5 min	<ul style="list-style-type: none"> <li>• None</li> </ul>
	Challenge 5: Using Data	50 min	<ul style="list-style-type: none"> <li>• BricQ Motion Essential sets</li> <li>• Building Instruction booklets</li> <li>• Student journals</li> <li>• Graph paper</li> </ul>
2:10 - 2:30	Clean Up	5 min	
	Daily Debrief and Wrap Up	15 min	<ul style="list-style-type: none"> <li>• Student journals</li> </ul>

### Welcome

Time: 5 minutes

Materials:

- Student journals

Welcome students back! Have students take a minute to read over the notes placed in their journals from the previous day. Have students share their favorite moments from the previous day with a partner. (See link on Day 1 for ideas regarding partnering of students.)

### Team Building Activity

Time: 15 minutes

Materials:

- BricQ Motion Essential sets

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

### Bricktionary:

Have students play one round of Bricktionary. Similar to Pictionary™, 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.

Bricktionary Cards

Truck	Place
Bridge	TV
Flower	Tree
Boat	House



## **Review Group Rules and Expectations**

Time: 5 minutes

Materials:

- Group Rules Chart (from Day 1)

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...)

## **Morning Huddle**

Time: 5 minutes

Materials: None

*Welcome back for more sports fun. This morning you will be shooting hoops – that is creating a machine that will shoot baskets. You will be adjusting variables and keeping track of the number of baskets you each make.*

## **Readings and Wonderings**

Time: 20 minutes

Materials:

- Books or journal articles about basketball or sail cars
- Student journal

Read a book or a kid friendly journal article about gears. Have students research the height of a basketball hoop and the size of the hoop. Ask students to record their findings in their journals. Some students may wish to research sail cars and where they race in the United States. They may wish to research types, shapes, and sizes of sails.

## **Workplace Wellness**

Time: 10 minutes

Materials:

- Varies depending on what activity is selected

Take a minute to complete a short physical activity. You can find several ideas for quick physical activities design for kids through an internet search.

## **Challenge 1: Free Throw**

Time: 40 minutes

Materials:

- BricQ Motion Essential sets
- Building Instruction booklets
- Student journals
- Student worksheet for each team

Show students the video in the engage section of the Free Throw lesson.

<https://education.lego.com/en-us/lessons/bricq-motion-winning-with-science/free-throw#engage>

Facilitate a quick discussion about which forces your students have seen in action when playing sports like basketball or volleyball.

Ask questions, like:

- Which force(s) makes the ball move? (Push/Pull)
- Which force makes the ball come back down? (Gravity)
- What's a "three-pointer?" (A "three-pointer" is scored from any basket shot taken from outside the three-point line.)

Tell the students that they'll be building a basketball model, which they'll use in experiments to recognize a pattern in the motion of a ball.

Have teams build the Free Throw model which can be found starting on page 20 of Building Instruction B booklet.

Explain the parts of the model to the class showing the three variables:

- Pivot position
- Throw distance
- Basket height

Remind student that only one variable at a time can be changed to have a good experiment. Discuss with the students why a fair test can only be done when changing one variable at a time and holding all other things constant.

Have the students test their models to see if they can score a basket with the model set to pivot position 1, throw distance 2, and basket height 1 on the blue numbered tiles.

Discuss the worksheet with the class and explain the table. Show students how to place check marks or tic marks in each square. Because each student will have five tries at each location, show students how to record all five tries in one box.

Have each student use the model 5 times and record the number of baskets scored using a check mark or a tic mark in the box showing Distance (gear) of 1 and Basket Height of 1.

Tell students to change the throw distance to position 4. Remind them not to change the lever position or basket height.

Have each student use the model 5 times and record the number of baskets scored

using a check mark or a tic mark in the box showing Distance (gear) of 4 and Basket Height of 1.

Ask students to compare the results. Were you able to score as many baskets?

As a class, discuss the results.

Ask questions, like:

- When was the force balanced/unbalanced? (When the throwing arm is still, the force is balanced. When it's let go, the weighted brick drops and the force on the ball will become unbalanced. The force will remain unbalanced until the ball and throwing arm have stopped moving).
- What makes the weighted brick fall? (Gravity)
- Why were you able to score every time whenever the basket height was set to position 1?
- Were you able to score every time whenever the basket height was set to position 4? Explain your findings.

## **Break**

Time: 5 minutes

## **Challenge 2: Change the Distance**

Time: 40 minutes

Materials:

- BricQ Motion Essential sets
- Building Instruction booklets
- Student journals
- Student worksheet for each team

### **Changing the Throwing Distance (Your Variable)**

Tell students to change the throw distance to position 6. Remind them not to change the lever position or basket height.

Have each student use the model 5 times and record the number of baskets scored using a check mark or a tic mark in the box showing throwing distance (gear) of 6 and Basket Height of 1.

### **Changing the Distance Again**

Tell students to change the throw distance to position 8. Remind them not to change the lever position or basket height.

Have each student use the model 5 times and record the number of baskets scored



using a check mark or a tic mark in the box on the worksheet showing the throwing distance (gear) of 8 and Basket Height of 1.

Ask students to look at their data for all trials at throwing distances of 2, 4, 6, and 8. Have students discuss their conclusions and then write them in their journals.

### Changing the Basket Height to 2

Have them change the basket height to 2. Hold this height constant.

### Change the Throwing Distance (Your Variable)

Tell students to change the throw distance to position 2. Remind them not to change the lever position or the basket height (stays at position 2). Ask students to predict how many baskets they will make in the 5 tries.

Have each student use the model 5 times and record the number of baskets scored using a check mark or a tic mark in the box showing throwing distance (gear) of 2 and Basket Height of 2.

Ask students to predict how many baskets they will make in the 5 tries. Ask students to change the throw distance to 4 and repeat the trial.

Ask students to predict how many baskets they will make in the 5 tries. Ask students to change the throw distance to 6 and repeat the trial.

Ask students to predict how many baskets they will make in the 5 tries. Ask students to change the throw distance to 8 and repeat the trial.

Ask students to look at their data for all trials at throwing distances of 2, 4, 6, and 8. Have students discuss their conclusions and then write them in their journals.

### Challenge 3: More Hoops

Time: 20 minutes

Materials:

- BricQ Motion Essential sets
- Building Instruction booklets
- Student journals
- Student worksheet for each team

### Changing the Basket Height to 3

Have them change the basket height to 3. Hold this height constant.

Ask students to change the throw distance to 4, then 6, and then 8 and repeat the trial 5 times at each distance. Record the number of baskets on the worksheet.

Ask students if they made any baskets. Ask students what patterns they recognize in the motion of the ball as the distance changed for each basket height? (As the distance and height increased, it became more difficult to score a basket.)

### Change the Lever Position

Ask students to keep the basket height at 3 and the distance at 6. Allow students to change the lever position. Ask students what position of the lever allows them to make a basket?

Ask students to explain their findings.

Have students take apart the models and place the elements into the correct locations.

### Lunch

Time: 30 minutes

### Afternoon Huddle

Time: 5 minutes

Materials: None

*Welcome back . This afternoon you will be racing sail cars. You will use a fan or your box lid to create the necessary wind to make your cars go.*

### Challenge 4: Sail Cars

Time: 50 minutes

Materials:

- BricQ Motion Essential sets
- Building Instruction booklets
- Student journals
- Scissors
- Measuring tapes
- Tape
- Fan
- Student worksheet 2 for each person  
<https://education.lego.com/v3/assets/blt293eea581807678a/blt84f4ef1161b9130d/5eabfb612b79652f27c32705/U1L6-worksheet.pdf>
- Optional Materials to make sails
  - Paper, tag board, waxed paper, aluminum foil, thin cardboard
  - Markers

Set up a sail car testing area:

- You'll need a smooth surface of about 3 yards long and 1 yard wide.
- Use masking tape to mark the starting line.
- If you don't have electric fans, have your students wave their storage box lids or blow on their sails to create "wind" instead.

Show students to video from the engage section of the Sail Car lesson.  
<https://education.lego.com/en-us/lessons/bricq-motion-train-to-win/sail-car#engage>

Ask questions, like:

- How does a sail car move? (*The wind pushes it.*)
- Can you see the wind? (*No, but you can see the effects of the wind.*)
- How many different sail shapes did you see in the video?
- Which shape and size sail do you think will work best?

Have each team build the sail car model. The instructions begin on page 62 in Building Instruction A booklet.

Each partner should make a sail for the sail car. Ask students to determine the area of each sail. Students who are not proficient in calculating area can count the number of complete squares used in the sail and estimate how the partial squares might add to complete squares.

Rectangular sails and right triangle sails make the calculation of area easier. Area is length x width for a rectangle. The area for a right triangle is  $\frac{1}{2}$  length x width.

Tell students to create a table in their journals to hold the data they will gather about their sail cars. An example is shown below:

Trial	Prediction	Distance in cm
1		
2		
3		
4		
5		

### Part 1

When at least one sail is complete, have students predict how far their sail car will go with each type of sail. Ask students to write the predictions in their journals. Tell them to put a brick or a Minifigure next to the testing area to mark where they think their sail car will stop during each trial. Have them use a tape measure to obtain the distance the car traveled.

Each student should have 5 trials for the sail car using his or her sail. Students should record the distances in their journals. Make sure they record their actual results after each trial in their journals.

Ask students to calculate the average distance traveled by each sail car. Have students compare the two averages.

Ask students:

- To compare the distances the two sail cars traveled.
- Did one sail car go farther than the other one?
- Did the size (area) of the sail make a difference?
- Did the material of the sail make a difference?
- To explain their conclusions.

Ask students to write in their journals their findings.

### **Break**

Time: 5 minutes

### **Challenge 5: Using the Data**

Time: 50 minutes

Materials:

- BricQ Motion Essential sets
- Building Instruction booklets
- Student journals
- Graph paper
- Scissors
- Measuring tapes
- Tape
- Fan
- Student worksheet 2 for each person  
<https://education.lego.com/v3/assets/blt293eea581807678a/blt84f4ef1161b9130d/5eabfb612b79652f27c32705/U1L6-worksheet.pdf>
- Optional Materials to make sails
  - Paper, tag board, waxed paper, aluminum foil, thin cardboard
  - Markers

### **Sail Car Part 2**

Tell students they have a lot of data in their journals from the last test. They should take that information and design a new sail that will make their sail car move farther.

Have a class discussion on what materials seem to work best and why. Ask students what conclusions they drew on the size of the sail.

Ask students to create another table in their journal to hold the data they will gather.

Type of Material –	Distance in cm
--------------------	----------------

Trial	
1	
2	
3	
4	
5	

Have each student design a new sail and determine the area. Ask students to do the following:

- Test their sail cars at least 5 times each.
- Record the distance for each trial in the table.
- Calculate the average for each car.
- Compare the two averages.
- Explain the results.

Tell the students that they are going to hold the size and shape constant but use material as a variable. That means each student should create the same shape and size sail as they just used, but make it from a different material. Have students create a new table in their journals.

Type of Material – Trial	Distance in cm
1	
2	
3	
4	
5	

Ask students to do the following:

- Test their sail cars at least 5 times each.
- Record the distance for each trial in the table.
- Calculate the average for each car.

Ask students to graph the distances their cars traveled in the last experiment and in this experiment. Compare the data gathered from the testing of the sails with the same size and shape but made from different materials. Write your conclusions in your journal.

Ask students to:

- Explain what shape and size (area) sail made the car travel the farthest and why.
- Explain what materials worked better when size and shape were the same.
- Explain why they chose the final design.
- Explain what they would try next if they had more time.

## **Clean Up**

Time: 5 minutes

Have students disassemble their models, throw away trash and return the LEGO pieces correctly to the proper trays in their BricQ Motion Essential sets.

## **Daily Debrief and Wrap Up**

Time: 15 minutes

Materials:

- Student Journals
- Markers
- Colored pencils
- Crayons

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

## Get Moving with Sports Day 3

### Cold Weather Sports

#### Big Question:

What causes a bobsled to slide down?

What force can be used to push an object?

Materials needed for the day:

- BricQ Motion Essential sets
- Building Instruction booklets
- Student journals
- Scissors
- Tape
- Tape measures
- Student worksheet
- Student worksheet
- Optional Materials to make sails
  - Paper, tag board, waxed paper, aluminum foil, thin cardboard
  - Markers

Outline for Day	Tasks	Time	Materials
9:00 - 10:30	Welcome	5 min	• Student Journals
	Team building activity	15 min	• BricQ Motion Essential sets
	Review Group Rules Chart	5 min	• Group Rules Chart
	Morning Huddle	5 min	• None
	Readings and Wonderings	10 min	• Various books or articles on pulleys
	Inventory Check	5 min	• BricQ Motion Essential sets
	Challenge 1: Bobsled Race	45 min	• BricQ Motion Essential sets • Building Instruction

			<ul style="list-style-type: none"> <li>booklets</li> <li>Student journals</li> </ul>
10:35 - 10:40	Break		
10:40 - 11:25	Challenge 2: Adding Mass	45 min	<ul style="list-style-type: none"> <li>BricQ Motion Essential sets</li> <li>Building Instruction booklets</li> <li>Student journals</li> </ul>
11:25	Get ready for lunch		
11:30 - 12:00	Lunch		
12:00 - 2:10	Workplace Wellness (physical activity)	10 min	<ul style="list-style-type: none"> <li>Varies, based on the activity selected</li> </ul>
	Afternoon Huddle	5 min	<ul style="list-style-type: none"> <li>None</li> </ul>
	Challenge 3: Move the Puck Hockey Practice	60 min	<ul style="list-style-type: none"> <li>BricQ Motion Essential sets</li> <li>Building Instruction booklets</li> <li>Student journals</li> </ul>
	Challenge 4: Get Up and Move	55 minutes	<ul style="list-style-type: none"> <li>BricQ Motion Essential sets</li> <li>Building Instruction booklets</li> <li>Student journals</li> </ul>
2:10 - 2:30	Daily Debrief and Wrap Up	20 min	<ul style="list-style-type: none"> <li>Student Journals</li> </ul>

## Welcome

Time: 5 minutes

Materials:

- Student Journals



Welcome students back! Have students take a minute to share their word they create 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:

- BricQ Motion Essential sets

Place students in pairs.

### **Build a Bridge**

Challenge students to build a LEGO bridge that spans two books that are at least 6 inches apart.

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 Chart**

Time: 5 minutes

Materials:

- Group Rules Chart (from Day 1)

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...)

### **Morning Huddle**

Time: 5 minutes

Materials: None

Say this:

*Hello! This morning, your job is to investigate the forces that make a sled or bobsled move. You will build a bobsled and do several experiments. Keep warm!*

### **Readings and Wonderings**

Time: 20 minutes

Materials:

- Various books or materials on sledding or bob sleds.

Read a book or a kid friendly journal article about bobsleds or sleds. Have students research bobsleds and the Olympic event of bobsled racing.

Discuss as a class some of their findings. Ask students to write interesting facts in their journals.

### **Inventory Check**

Time: 5 minutes

Materials:

- BricQ Motion Essential sets

Ask students to check the inventory in the green and the yellow sections of their sets.

Have students place LEGO bricks and elements from the green and yellow sections of the set on the lid. Have students use the inventory sheet on the insert card to verify the number of pieces of each type that belong in the compartment. Students should find all of one element, count them to verify the number is correct and put the elements into the tray. Continue until all the parts have been returned to the green and yellow sections. Teams should be able to complete this task in five minutes. If pieces are missing, have students search other compartments, look to see if the piece is stuck in or on another piece, or check the LEGO lost and found area in your classroom.

### **Challenge 1: Bobsled Race**

Time: 45 minutes

Materials:

- BricQ Motion Essential sets
- Building Instruction booklets
- Student journals
- Scissors
- Tape
- Tape measures

Show students the video from the engage section of the Bobsled lesson.

<https://education.lego.com/en-us/lessons/bricq-motion-winning-with-science/bobsled#engage>

Facilitate a quick discussion about which forces the students have seen in action when they've been sledding or watching sledding or bobsledding.

Ask questions, like:

- Which force makes the bobsled move? (Push)
- What else makes the bobsled move? (Gravity is the force that pulls the mass down. The more mass an object has, the faster it'll move. This is called

"momentum." Momentum will make an object in motion stay in motion longer or give it more force. So, if you add mass, you get more momentum. And that makes the bobsled slide farther.)

Tell the students that they're going to build a bobsled and ice track, and then explore how they can make the bobsled go farther by increasing its mass.

Have the students work in pairs to build the Bobsled model. The instructions begin on page 40 of Building Instruction B booklet.

Have students create a table in their journals so they can record the distance the bobsled travels.

Ask students to place the tape measure so the 0 mark is at the end of the ice track.

Have each partner test the ice track with the Minifigures and bobsled 5 times. Tell students to turn the handle to launch the bobsled. Ask them to measure the distance the bobsled traveled from the base of the ice track. Tell them to record the distances on their tables in their student journals.

Calculate the average for the 10 trials – five for each partner.

Gather your students together and facilitate a group discussion about what they have observed.

Ask questions, like:

- Which force made the bobsled slide down the ice track? (*Gravity*)

Ask students to find the two 2 x6 regular black bricks. Ask them to connect the two bricks. Tell the students to hold the Minifigures in one hand and the two connected black bricks in the other. Ask them which is heavier (i.e., has more mass) and which one will make the bobsled slide farther. Ask them to explain their predictions and then write their predictions in their journals.

Have students use the two connected 2 x 6 bricks in place of the minifigures on the bobsled. Have each partner test the ice track with the modified bobsled 5 times. Tell students to turn the handle to launch the bobsled. Ask them to measure the distance the bobsled traveled from the base of the ice track. Tell them to record the distances on their tables in their student journals.

Calculate the average for the 10 trials – five for each partner. Ask students how the average for the bobsled containing two bricks compares with the average for the bobsled containing minifigures. Ask them to explain their findings.

Ask students what variable(s) can help a bobsled go faster and farther down the ice track. (A good push at the start will help, and a heavier bobsled has the advantage. A smooth bottom to the bobsled and a smooth ice track will reduce friction.)

### **Break**

Time: 5 minutes

### **Challenge 2: Adding Mass**

Time: 45 minutes

Materials:

- BricQ Motion Essential sets
- Building Instruction booklets
- Student journals
- Scissors
- Tape
- Tape measures
- Optional: scales to measure the mass of three small objects

Ask students to find the weighted black 2 x 6 brick. Tell the students to hold the weighted brick in one hand and the two connected black bricks in the other. Ask them to compare the two items. Ask how they are different and how they are alike. Ask students which one will make the bobsled slide farther. Ask them to explain their predictions and then write their predictions in their journals.

Have students use the weighted bricks in place of the two connected bricks on the bobsled. Have each partner test the ice track with the modified bobsled 5 times. Tell

students to turn the handle to launch the bobsled. Ask them to measure the distance the bobsled traveled from the base of the ice track. Tell them to record the distances on their tables in their student journals.

Calculate the average for the 10 trials – five for each partner.

Have students graph the information from the three trials using three colors for the three different bobsleds. Tell students to clearly label their graphs. Have them make the horizontal axis the average distance traveled.

Ask students how the average for the bobsled containing the weighted brick compares with the average for the bobsled containing the two connected bricks. Ask them to explain their findings. (Optional: If you have access to a scale, allow the class to weigh the three bobsleds and determine the mass of each. Use these measurements as the vertical axis.)

**Optional activity:** Allow two teams to work together and share their weighted bricks and repeat the test using two weighted bricks. Be sure each team has one weighted brick in their set when the experiments are over. Ask students to explain what happened.

Have students take their models apart and place the elements in the correct locations in the bin.

## **Lunch**

Time: 30 minutes

## **Workplace Wellness**

Time: 10 minutes

Materials:

- Varies depending on what activity is selected

Take a minute to complete a short physical activity. Ideas for different types of short, age appropriate physical activities can be found through a quick internet search.

## Afternoon Huddle

Time: 5 minutes

Materials: None

*Are you ready to play a game? You will need to use strategy and be quick. You are going to play hockey, but you will not need a coat because you will play on the table.*

## Challenge 3: Move the Puck

Time: 60 minutes

Materials:

- BricQ Motion Essential sets
- Building Instruction booklets
- Student journals
- Scissors
- Tape
- Tape measures

Show the students video from the engage section of the Hockey Practice lesson.

<https://education.lego.com/en-us/lessons/bricq-motion-train-to-win/hockey-practice#prepare>

Facilitate a discussion about the push and pull forces that are at play in a hockey game. Introduce the terms puck, player, goalie, making and blocking shots, and force.

Introduce the concepts of slow, medium, and fast push/pull forces.

Ask questions, like:

- What is hockey?
- How does the puck move? (*i.e., How do the players move the puck?*)
- How do the players make the puck move at different speeds (*i.e., fast and slow*)?
- Tell the students that they'll be building a hockey player and a goal with a goalie.

Have students work in pairs to build the Hockey Practice models. The instructions begin on page 12 of Building Instruction A booklet.

Have the teams place their models about 30 centimeters (*12 inches*) apart on a smooth surface (*i.e., uncarpeted floor or tabletop*). Students should keep score of how many points they earned during their five shots as a player. Students should also keep track of how many shots they blocks (they must have touched the puck) during their time as a goalie. Each puck into the goal earns 1 point.

Tell students to take turns being the player and goalie recording their scores after every 5 shots. Ask students to start with slow pull force for 15 shots each. Then, after both players have had a turn at being goalie and player, ask students to use a medium pull force for 15 shots each. Next, ask students to use a fast pull force for 15 shots each.

Gather your students together to share what they've built.

Ask questions, like:

- What happens when you push the handle? Why?
- How does the hockey player move when you pull the handle? Why?
- What did you notice about how the puck moved with the different types of forces?
- Did you notice anything about the number of goals scored or missed when you used the different types of forces? (Explain that a bigger push makes things speed up or slow down more quickly. A soft or medium push may be all that's needed to make or block a goal.)

### **Break**

Time: 10 minutes

### **Challenge 4: Get Up and Dance**

Time: 65 minutes

Materials:

- BricQ Motion Essential sets
- Building Instruction booklets
- Student journals
- Scissors
- Tape
- Tape measures

Ask students if they missed having fans at the game – someone to cheer them to victory! What do fans do when the music plays? They get up and dance – or at least move to the music.

Show students the video from the engage section of the Get Up and Dance lesson.  
<https://education.lego.com/en-us/lessons/bricq-motion-train-to-win/get-up-and-dance#engage>

Facilitate a quick discussion about which type of forces can move gears.

Ask the students to describe gears:

- What do they look like? (e.g., round, with lots of teeth around the edge)
- How do they start turning? (e.g., with force, such as a push)
- Which ways can they turn? (e.g., clockwise, counterclockwise)

Tell the students that they'll be building a moving dance floor with gears, a DJ Minifigure to push the gears, and Minifigure dancers.

Have students build the model starting on page 4 of the Building Instruction A booklet. Ask students to design and build Minifigure dancers to add to the gears.

Ask students to play a game of freeze where they move their dancers when the music plays and stop when the music stops. Tell students to observe how the models move.

Ask students to turn the large green gear. Ask students to describe how the blue and purple gears turn. (faster, they are meshed, the two blue gears turn in opposite directions, the blue and purple gears meshed with the green gear turn the opposite direction of the green gear.)

Tell students the gear that the student turns becomes the driver gear and all the other gears become the driven gear. Tell students that two gears meshed together turn in opposite directions.



Ask students to use the green gear as the driver gear and determine how they should turn it in order to make the farthest blue gear turn counterclockwise. (The green gear must turn counterclockwise.)

Ask students to use the farthest blue gear as the driver gear and determine how they should turn it to make the purple gear turn clockwise. (Farthest blue gear should turn counterclockwise to make purple gear turn clockwise.)

Tell students to focus on the size of gears as they turn a gear. Have them turn a smaller gear next to a larger gear. (students turn a blue or purple gear). Ask the student if the big gear turns faster or slower than the smaller gear. (slower) Tell students that a small gear turning a larger gear is called gearing down.

Ask students how to make gears perform gearing up. (a larger gear turning a small gear)

Ask students how two gears of the same size (blue gears) behave when one turns the other. (move at the same speed)

Have students to rebuild the dance floor by moving the gears to different positions.

Ask students questions like:

- Which gear is the driver gear?
- Are any gear combinations gearing up?
- Are any gear combinations gearing down?

Have students take the models apart and place the elements in the correct storage trays.

Tell teams to locate the large green gear. Ask them to use LEGO bricks from the set to cover half the gear's studs.

Ask students:

- How many studs are on the entire gear? (24)
- How many studs did you cover? (12)
- What fractional part did you cover? (  $12/24$  which is  $\frac{1}{2}$  in lowest terms)
- How many studs would you cover if you covered  $1/4^{\text{th}}$  of the studs? (6)
- What fractional part did you cover? ( $6/24$  which is  $\frac{1}{4}$  in lowest terms)
- How many lines of symmetry can you find on the green gear? (at least 2, preferably 4)

Tell students to put away the gears and elements into the correct location.

### Daily Debrief and Wrap Up

Time: 20 minutes

Materials:

- Sticky notes
- Student Journals
- Chart paper titled Get Up and Move
- Chart paper titled Bobsled
- Chart paper titled Hockey Game

Have students use 3 sticky notes each to write one thing they learned from each of the models they build and used today. Have students put one of their notes in their journal and put the other two on chart paper with the name of the activities completed.

## Get Moving with Sports Day 4

### Culminating Project: Create A Game

Let's Share What We've Learned!

Outline for Day	Tasks	Time	Materials
9:00 - 10:30	Welcome	5 min	<ul style="list-style-type: none"> <li>Brick Q Motion Essential Set</li> </ul>
	Team Building Activity	15 min	<ul style="list-style-type: none"> <li>Brick Q Motion Essential Set</li> </ul>
	Review Group Rules Chart	5 min	<ul style="list-style-type: none"> <li>Group Rules Chart</li> </ul>
	Morning Huddle	5 min	<ul style="list-style-type: none"> <li>None</li> </ul>
	Challenge 1: Cheering on the Game	60 min	<ul style="list-style-type: none"> <li>BricQ Motion Essential sets</li> <li>Building Instruction booklets</li> <li>Student journals</li> </ul>
10:35 – 10:40	Break		
10:40 – 11:25	Culminating Project: Create a Game	45 min	<ul style="list-style-type: none"> <li>Chart paper</li> <li>Markers</li> <li>Student journals</li> </ul>
11:25	Get ready for lunch		
11:30 – 12:00	Lunch		
12:00 – 2:00	Culminating Project: Completing the Game	45 min	<ul style="list-style-type: none"> <li>BricQ Motion Essential sets</li> <li>Building Instruction</li> </ul>

			booklets <ul style="list-style-type: none"> <li>• Student journals</li> <li>• Scissors</li> <li>• Tape</li> <li>• Tape measures</li> <li>• Craft materials used in previous lessons</li> </ul>
	Culminating Project: Try My Game	15 min	<ul style="list-style-type: none"> <li>• Student Games</li> <li>• Student journals</li> </ul>
	Showcase: Culminating Project – Play My Game	60 min	<ul style="list-style-type: none"> <li>• Brick Q Motion Essential Set</li> </ul>
2:00 – 2:30	Daily Debrief, Clean Up and Program Wrap Up	30 min	<ul style="list-style-type: none"> <li>• Brick Q Motion Essential Set</li> <li>• Certificates of Completion</li> </ul>

### 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.

### Team Building Activity

Time: 15 minutes

Materials:

- BricQ Motion Essential set.

### Create a Creature

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 (from Day 1)

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...)

### **Morning Huddle**

Time: 5 minutes

Materials: None

*Today, you are going to start to get a crowd cheering about the game you will create and play this afternoon. This morning you will be Cheering On the Game.*

### **Challenge 1: Cheering on the Game**

Time: 60 minutes

Materials:

- BricQ Motion Essential sets
- Building Instruction booklets
- Student journals

Ask students if they missed having fans at the game – someone to cheer them to victory!

Show the students the video from the engage portion of the Cheering Crowd lesson. <https://education.lego.com/en-us/lessons/bricq-motion-winning-with-science/cheering-crowd#engage>

Facilitate a quick discussion about what your students observed in the video as the people celebrated the win.

Ask questions, like:

- How were the people moving? (*jumping, waving, giving a high five*)
- Think back to the mechanisms in previous lessons. How can you use what you've already learned about forces and motion to create mechanisms that imitate some of these actions?

Tell the students that they're going to design and build a mechanism(s) to make an automated cheering crowd. Ask students what are some actions that cheerleaders do? (jump, cartwheels, build a pyramid of people, move together in rhythm, and so forth)

Ask the students to invent a mechanism that represents a cheering crowd or celebration. Have them sketch and build their ideas. Encourage them to make models with as many interconnected moving parts as possible. Tell the students to discuss and sketch their ideas before they start building. Each team should build at least one mechanism that has movement. Tell students they are not trying to replicate what was shown, but create something new. You might consider playing some music that you might hear at a pep rally or a game to get the fans fired up.

When students have completed the models, have all models placed so they make two sides of stadium, field, or field house. Put on some music and let the cheering begin. Have each team show their cheering crowd mechanisms to the class and explain how it works.

Have students take the models apart and place the elements in the correct storage trays.

### **Break**

Time: 5 minutes

### **Culminating Project: Create a Game**

Time: 45 minutes

Materials:

- Chart paper
- Markers
- Student journals

Tell students they are going to create a game that contains moving parts. They will need to brainstorm ideas, create a name, directions, rules, and how to win. Then they will create and test the models.

Ask students to tell about games they like to play and what they enjoy about the games. Have students take notes in their journals when they hear something important.

Tell students they will brainstorm ideas in groups of 4. Then, they will bring their ideas to the whole class. Remind them that in brainstorming they will write down all the ideas.

Have students work in groups of 4 and allow 15 minutes for brainstorming. Give each group a piece of chart paper and 4 markers. Have them discuss and write all their ideas.

When time is up, call the class together and hand the chart papers in the room. Have a spokesperson for each group read the ideas. Ask students to write any new ideas they hear that sound promising in their journals.

Put students into teams. Each team should discuss the ideas that appealed to the partners and start formulating one idea for a game. They should take notes in their journals of what they like and what they do not like or want to do.

Tell each team that by lunch time, they should have a plan that includes a name for the game and a sketch of a model and a rough idea of the way to play the game.

### **Lunch**

Time: 30 minutes

### **Culminating Project: Completing the Game**

Time: 45 minutes

Materials:

- BricQ Motion Essential sets
- Building Instruction booklets
- Student journals
- Scissors
- Tape
- Tape measures
- Craft materials used in previous lessons

**Optional:** If guest (parents) will be coming to the showcase, remind students that guests will be playing their games as well as other teams.

Tell students they should build the model and test it to make sure their models work well.

Tell students they need to write a description of the game and the directions to play it. They need to write the rules and how to determine a winner.

When they have everything complete, the two partners should play the game and make any modifications so it is ready for other teams to play.

### **Culminating Project: Try My Game**

Time: 15 minutes

Materials:

- Student Games
- Student journals

Pair teams together. Tell students they are going to play each game once. Help each other to clarify rules and directions and make sure the models work well.

### **Showcase of Culminating Projects: Play My Game**

Time: 60 minutes

Materials:

- Student Games
- Student journals

You may wish to have parents join for the game day. If so, remind students that guests will be playing their games as well as other team members.

Set up the room so there is enough space for everyone to play. Have students set up their games with written instructions so their game can be played by anyone. Assign an order for a rotation. Have teams move clockwise so they will all be able to play as many games as possible in the time remaining. Guests can be placed with a team or they can move throughout the room as a team.

When time is up, ask everyone to cheer for all the great games that were created!

### **Daily Debrief, Clean Up and Wrap Up**

Time: 30 minutes

Materials:

- Student Games
- BricQ Motion Essential sets
- Student Journals
- Certificates of Completion

Have students disassemble their models and place the pieces into the proper locations. Tell all teams to do a complete inventory.

Students can take home their journals.

You can present each student with a Certificate of Completion.