

# september

# STEM

## LOW PREP

## Back to School Challenges

**OFF TO  
SCHOOL**



**POM  
POPPER**



**SHARED  
SUPPLIES**



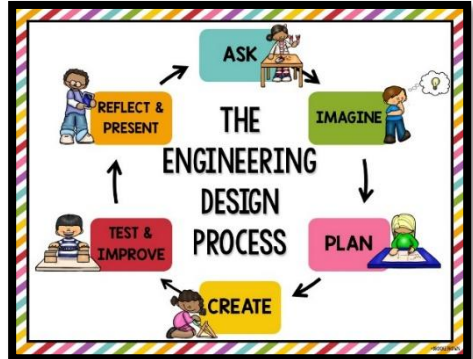
CREATED BY BROOKE BROWN

# 3 LOW PREP STEM CHALLENGES + BONUS BRAINBUILDER ACTIVITY





- ✓ SIMPLE SUPPLIES
- ✓ INTERACTIVE ANCHOR CHARTS
- ✓ VISUAL VOCABULARY
- ✓ QR CODE RESEARCH



### Off to School

Your school needs a new and improved mode of transportation that will travel to and from school.

Construct a vehicle with wheels and axles that carries weight and uses magnetism to roll.

**MATERIALS:**

- Vehicle template
- Cup of Fruit Loops cereal
- 2 straws
- Tape
- 2 magnets
- Scissors
- Small school supplies

### Pom Pom Popper

You've been asked to create a new toy for children.

Construct a popper that will launch a pom pom the farthest distance.

**MATERIALS:**

- Plastic cup
- Balloon
- Pom pom ball
- Scissors
- Tape measure or yardstick

### Shared supplies

You and your classmates need a way to organize school supplies for your table.

Create a table caddy that stores and carries a variety of school supplies.

**MATERIALS:**

- 5 sheets of paper
- Tape
- Scissors
- Variety of school supplies such as pencils, crayons, markers, and

### BRAINBUILDER Maker Mindset

Work with your team and use the materials in your baggie to create a useful tool or toy.

You will have \_\_\_\_\_ minutes to complete this challenge.

You will present your invention idea when time is up.

### Off to School

REAL WORLD EXAMPLES	Other Examples of VEHICLES
What is similar? What is different? Things with WHEELS and AXLES	Label the WHEEL and AXLE.

### Pom Pom Popper

PROJECTILE TOYS	Examples of PUSHES and PULLS
What is similar? What is different? Examples of Stored (Potential) Energy	Examples of Working (Kinetic) Energy

### Shared supplies

REAL WORLD EXAMPLES	Types of 3D Solids
What is similar? What is different? School Supplies to Organize	Our Design Ideas

### EXPLORE VEHICLES

HOW WHEELS WORK	LET'S GET ROLLING
 MAGNETS	 FRICTION

### EXPLORE 3D SOLIDS

3D SOLIDS	3D SOLIDS SONG
 NETS OF SHAPES	 STRONG STRUCTURES

### EXPLORE ENERGY

PUSHES AND PULLS	ENERGY
 POTENTIAL AND KINETIC ENERGY	 PROJECTILE MOTION

### WORDS TO KNOW

<b>vehicle</b> a machine used for transporting goods or people 	<b>simple machine</b> a basic device that applies force 
<b>wheel</b> a circular object that revolves around an axle and allows a vehicle to move 	<b>axle</b> a rod that passes through the center of the wheel 

### WORDS TO KNOW

<b>force</b> a push or pull upon an object 	<b>projectile</b> an object that is launched, propelled, or thrown 
<b>potential energy</b> stored energy in an object or system 	<b>kinetic energy</b> working energy when an object is in motion 

### WORDS TO KNOW

<b>container</b> an object used to hold or transport something 	<b>volume</b> the amount of space taken up by an object 
<b>prism</b> a 3D solid with rectangular faces and two bases that are exactly the same 	<b>net</b> a flattened out 3D solid 

# DIFFERENTIATED RECORDING SHEETS FOR K-5<sup>TH</sup> GRADE

**Off to School** Name: \_\_\_\_\_

**BLUEPRINT**

Label the WHEEL and AXLE.

How do wheels and axles make work easier?

Examples of objects with wheels and axles:

List 3 school supplies:

1
2
3

**Off to School** Name: \_\_\_\_\_

**MY BLUEPRINT** Label the WHEEL and AXLE.

Draw a picture of your vehicle.

Does your vehicle ROLL? YES NO YES NO

Did you use magnets to push your vehicle? YES NO YES NO

Draw the school supplies that your vehicle can carry.

**LET'S REFLECT!**

- What was most difficult about this challenge?
- What are the key features of your vehicle that make it "work"?
- How do these features relate to a real vehicle?
- What school supplies did your vehicle carry?
- How do wheels and axles work together to make work easier?
- Where are other wheels and axles found in the world?
- How did you use magnetism to make your vehicle move?
- How are magnets useful in our world?
- How is friction related to this activity?
- If we completed this challenge again, what would you do differently next time?

**LET'S REFLECT!**

- What was most difficult about this challenge?
- What made your pom pom ball travel the farthest distance?
- How are pushes and pulls related to this activity?
- How is potential (stored) energy and kinetic (working) energy related to this activity?
- How could projectile tools be used to help make work easier?
- How could you improve your popper toy to launch larger and heavier objects?
- If we completed this challenge again, what would you do differently next time?

**pom pom popper** Name: \_\_\_\_\_

**MY BLUEPRINT**

Draw an example of a PUSH. Draw an example of a PULL.

Draw a picture of your slingshot.

How far did your pom pom travel?

**pom pom popper** Name: \_\_\_\_\_

**BLUEPRINT**

Examples of POTENTIAL (STORED) ENERGY:

Examples of KINETIC (WORKING) ENERGY:

Examples of projectile tools or toys:

How far did your pom pom travel?

TEST 1: \_\_\_\_\_

TEST 2: \_\_\_\_\_

TEST 3: \_\_\_\_\_

**shared supplies** Name: \_\_\_\_\_

**MY BLUEPRINT**

Color the 3D solids that you used in your supply caddy design.

Draw a picture of your supply caddy.

Color the 3D solids that you used in your supply caddy design.

**shared supplies** Name: \_\_\_\_\_

**BLUEPRINT**

Draw and label a blueprint of your supply caddy.

Color and name the 3D solids that you used in your supply caddy design.

List the school supplies that your supply caddy holds.

What makes your supply caddy useful and unique?

**Hit the Target!**

Launch a pom pom at the target.

How many points can you score in 5 shots?

10  
25  
50  
100

**LET'S REFLECT!**

- What was most difficult about this challenge?
- Which 3D solids were the most effective in your design? Why do you think that is?
- Which school supplies did your caddy hold?
- What features make your supply caddy useful and unique?
- What other materials might be useful for this challenge?
- If we completed this challenge again, what would you do differently next time?

**Maker Mindset** Name: \_\_\_\_\_

**BLUEPRINT**

What did you create?

How is your creation useful?

## DIGITAL GOOGLE SLIDES NOTEBOOK



**STEM Challenge Assessment Rubric**

Challenge: \_\_\_\_\_

Date: \_\_\_\_\_

Student Name: \_\_\_\_\_

3	2	1
Student followed all instructions for challenge.	Student followed some instructions for challenge.	Student did not follow instructions for challenge.
Student used best effort and perseverance on challenge.	Student used some effort and perseverance on challenge.	Student did not show effort or perseverance on challenge.
Student completed assigned blueprint and reflection sheet.	Student partially completed assigned blueprint and reflection sheet.	Student did not complete assigned blueprint and recording sheet.
Student showed accuracy in testing, calculating, and measuring.	Student showed some accuracy in testing, calculating, and measuring.	Student did not show accuracy in testing, calculating, or measuring.
Student fully cooperated with group members and contributed fairly.	Student partially cooperated with group members and contributed fairly.	Student struggled to cooperate with group members and/or failed to contribute.
Student fully participated in class discussions.	Student somewhat participated in class discussions.	Student did not participate in class discussions.
TOTAL POINTS: _____ /18		
Comments: _____		

**My September STEM Journal**

NAME: \_\_\_\_\_

Draw a picture of a school bus.

**We Need STEM Supplies!**

Dear Families,

We are learning all about Science, Technology, Engineering, and Math through STEM lessons, and we need your help! If you are able to donate any of the following supplies for our STEM Challenges, please detach and return the form below and send back to school with your child. We greatly appreciate your support and generosity!

We are in need of the following items by \_\_\_\_\_:

Thank you so much for helping to make our STEM lessons possible! Please contact me at \_\_\_\_\_ with any questions.

Sincerely, \_\_\_\_\_

All you are able to donate, please detach and return the form below.

Parent Name(s): \_\_\_\_\_

Child's Name: \_\_\_\_\_

I am able to donate: \_\_\_\_\_



# SAY Hello TO STRESS-FREE STEM!

## SUPPLIES CHECKLIST

STEM CHALLENGE	ITEM	NUMBER PER GROUP	I HAVE IT
Off to School	vehicle template	1	
	scotch tape	1 roll	
	straws	2	
	Fruit Loops cereal	1 cup	
	scissors	1	
Pom Pom Popper	magnets	2	
	markers and crayons (optional to decorate)	small tub	
	plastic cup (any size)	1	
	balloon (large enough for cup)	1	
	pom pom	1-2	
Shared Supplies	tape measures or meter sticks	1	
	scissors	1	
	markers (optional to decorate)	small tub	
	paper target	1	
	copy paper or construction paper	20 sheets per group	
BONUS BRAINBUILDER: Maker Mindset	tape	1 roll	
	various school supplies such as pencils, crayons, scissors, and glue sticks	at least 12 items	
	Markers and crayons (optional to decorate)	small tub	
	Baggie with various items and supplies inside such as a plastic spoon, paper plate, rubber band, craft stick, pipe cleaner, construction paper, cup, straw, tape, scissors etc.	1 bag	

## STANDARDS ALIGNMENT

SEPTEMBER STANDARDS ALIGNMENT			
CHALLENGE	ENGINEERING	SCIENCE	MATH
Off to School	K-2-ETS1 Engineering Design K-2-ETS1-4, 3-5-ETS1-2, 3-5-ETS1-3	K-PS2 Motion and Stability: Forces and Interactions 3-PS2 Motion and Stability: Forces and Interactions 5-PS2 Motion and Stability: Forces and Interactions	18B Make sense of problems and persevere in solving them 18A Reason abstractly and quantitatively 18C Model with mathematics 18D Use appropriate tools strategically
Pom Pom Popper	K-2-ETS1 Engineering Design K-2-ETS1-4, 3-5-ETS1-2, 3-5-ETS1-3	K-PS2 Motion and Stability: Forces and Interactions 3-PS2 Motion and Stability: Forces and Interactions 5-PS2 Motion and Stability: Forces and Interactions	18B Make sense of problems and persevere in solving them 18A Reason abstractly and quantitatively 18C Model with mathematics 18D Use appropriate tools strategically
Shared Supplies	K-2-ETS1 Engineering Design K-2-ETS1-4, 3-5-ETS1-2, 3-5-ETS1-3	2 Structure and Properties of Matter	18B Make sense of problems and persevere in solving them 18A Reason abstractly and quantitatively 18C Model with mathematics 18D Use appropriate tools strategically 18F Look for and make use of structure
BONUS BRAINBUILDER: Maker Mindset	K-2-ETS1 Engineering Design K-2-ETS1-4, 3-5-ETS1-2, 3-5-ETS1-3	2 Structure and Properties of Matter	18B Make sense of problems and persevere in solving them 18A Reason abstractly and quantitatively 18C Model with mathematics 18D Use appropriate tools strategically 18F Look for and make use of structure

## CHALLENGE OVERVIEW

### STEM CHALLENGE: Off to School



**OVERVIEW:** For this challenge, students will explore wheels/axes and magnetism by creating a simple rolling vehicle of their choice. A foldable template is provided for the body of the vehicle, and students will use Fruit Loops cereal for the wheels and straws for the axles. Make sure that students search for Fruit Loop pieces with larger holes that will be a better fit for the straws. They will attach the wheels and axles to the bottom part of the vehicle body by taping paper flaps over them, ensuring that the wheels and axles still rotate freely. (See photos on following page.) They will then place a magnet inside the body of the vehicle and use the other magnet to repel it and push the vehicle forward. Once the vehicle is rolling effectively, students will place a variety of small school supplies inside the body of the vehicle to see if it carries weight.

**KEY SKILLS:** Simple Machines (Wheels and Axles), Engineering vehicles, Friction, Magnetism

**SUGGESTED READ ALOUDS:** *Pete the Cat: The Wheels on the Bus* by James Dean, *If I Built a Car* by Chris van Dusen, *Tires, Spokes, and Sprockets: A Book About Wheels and Axles* by Michael Dahl, *Don't Let the Pigeon Drive the Bus* by Mo'Willems

**MATERIALS PER GROUP:** 1 vehicle template, Scotch tape, 2 straws, small cup of Fruit Loops cereal, 2 magnets, scissors. **OPTIONAL:** markers or crayons to decorate vehicles

## KEY SKILLS

## MATERIALS

## LESSON PLAN

1. Activate students' prior knowledge by asking them to share what they already know about vehicles, specifically wheels and axles and how they make work easier.
2. Share and discuss the videos on "Explore Vehicles."
3. Hold a class discussion, using the teacher chart and real world examples to guide student thinking. (You can project the chart on an interactive whiteboard or document camera.) Record their ideas on the teacher chart.
4. Introduce the STEM challenge and permitted materials.
5. Introduce and discuss key vocabulary cards related to the challenge.
6. Have students sketch blueprints of their designs on their recording sheets.
7. Distribute materials and allow students 45-60 minutes with partners or small groups to construct their vehicles, test them with magnets, and test their vehicles' ability to hold the weight of various small school supplies.
8. Hold a whole class closing discussion and reflection, allowing students to share their designs. Use the "Let's Reflect" poster to guide the discussion.

© BROOKE BROWN

## SUGGESTED READ ALOUDS

## STEP BY STEP INSTRUCTIONS

# CHECK OUT MY ALL YEAR BUNDLE WITH 9 MONTHS OF STEM ACTIVITIES!

OVER  
**40%  
OFF!**

