

# Rainbow Arch Bridge

# STEM

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**RAINBOW  
BRIDGE**



**LOW PREP  
ST. PATRICK'S DAY  
STEM CHALLENGE**

**K-5<sup>TH</sup> GRADE**


CREATED BY BROOKE BROWN

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

## Rainbow Arch

The leprechaun wants to keep his pot of gold safe and out of reach.


Construct an arched bridge that will hold the heaviest pot of gold without falling off.







### MATERIALS:

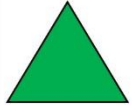







- Pipe cleaners
- Playdough
- Mini cup
- Pennies

## WORDS TO KNOW





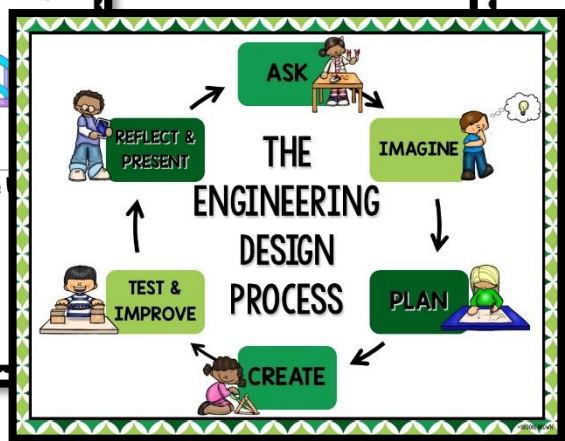
<h3>piers</h3>  <p>supports on the end of a bridge that withstand vertical pressure</p>	<h3>deck</h3>  <p>the main horizontal surface of a bridge</p>
<h3>arch</h3>  <p>a curved structure that goes over an opening</p>	<h3>support</h3>  <p>to hold weight</p>

## EXPLORE BRIDGES


<h3>STRONG BRIDGES</h3>  	<h3>TYPES OF BRIDGES</h3>  
<h3>FAMOUS BRIDGES</h3>  	<h3>THE ARCH</h3>  

## Rainbow Arch

<h3>REAL WORLD EXAMPLES</h3>  <p>What is similar? What is different?</p> <h3>Types of Bridges</h3>	<h3>Main Parts of a Bridge</h3>  <h3>How Bridges are</h3>
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## LET'S REFLECT!



What was most difficult about this challenge?

Why are bridges important and how do they solve problems?

Which bridge styles hold the most weight and why do you think so?

How does the bridge that you constructed compare to a real bridge?

What other types of structures use arches?

If you completed this challenge again, what would you do differently next time?

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

## LOWER GRADES

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

### MY BLUEPRINT

Draw a picture of your bridge.

Label the PIERS and ARCH.

How many pennies does your pot of gold hold without falling off?

TEST 1	
TEST 2	
TEST 3	

## UPPER GRADES

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

### BLUEPRINT

How many pennies does your pot of gold hold without falling off?

TEST 1	
TEST 2	
TEST 3	

Label the PIERS, DECK, and ARCH.

Which bridge design was strongest?  
Why do you think so?

## DIGITAL GOOGLE SLIDES NOTEBOOK

## Rainbow Arch

The leprechaun wants to keep his pot of gold safe and out of reach.

Construct an arched bridge that will hold the heaviest pot of gold without falling off.

**MATERIALS:**

- Pipe cleaners
- Playdough
- Mini cup
- Pennies

### 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 reflection 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: \_\_\_\_\_

### 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 Challenge, 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, \_\_\_\_\_

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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
Rainbow Arch	playdough	one 4 oz. or two 3 oz.	
	pipe cleaners	10	
	mini cup	1	
	pennies	30	

STANDARDS ALIGNMENT			
CHALLENGE	ENGINEERING	SCIENCE	MATH
Rainbow Arch	<a href="#">K-2-ETSI Engineering Design: K-2-ETSH-1, 3-5-ETSH-2, 3-5-ETSH-3</a> <a href="#">3-5-ETSI Engineering Design: 3-5-ETSH-1, 3-5-ETSH-2, 3-5-ETSH-3</a>	Tension and compression forces, measuring weight, balance and stability	<a href="#">MP1: Make sense of problems and persevere in solving them</a> <a href="#">MP2: Reason abstractly and quantitatively</a> <a href="#">MP3: Model with mathematics</a> <a href="#">MP5: Use appropriate tools strategically</a>

## SUPPLIES CHECKLIST & STANDARDS ALIGNMENT

### CHALLENGE OVERVIEW

### STEM CHALLENGE: Rainbow Arch

**OVERVIEW:** Students will discover the strength of arched bridges by constructing a rainbow-shaped bridge out of pipe cleaners and playdough. They will attempt to balance a "pot of gold" (mini cup) on top of the arch and add pennies to the cup to test the strength of their bridge.

**KEY SKILLS:** Engineering arched bridges, Weight distribution, Balance, Nonstandard weight measurement

**SUGGESTED READ ALOUDS:** [Building Bridges by Terry Enz](#), [Bridges! Amazing Structures by Carol A. Johnman](#), [A Book of Bridges by Cheryl Keely](#)

**MATERIALS PER GROUP:** playdough (one 4 oz. or two 3 oz. cans), 10 pipe cleaners, mini cup, 30 pennies

### KEY SKILLS

### MATERIALS



### STEP BY STEP INSTRUCTIONS

### LESSON PLAN

1. Activate students' prior knowledge by asking them to share what they already know about bridges. Ask them to share different styles of bridges they've seen and how the arched bridge might hold weight differently.
2. Share and discuss the videos on "Explore Bridges."
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 30-45 minutes with partners or small groups to construct their arched bridges and test their balance and strength with the pot of gold/pennies on the top.
8. Hold a whole class closing discussion and reflection, allowing students to share their arched bridge designs. Use the Let's Reflect! poster to guide the discussion.

### SUGGESTED READ ALOUDS