

# December

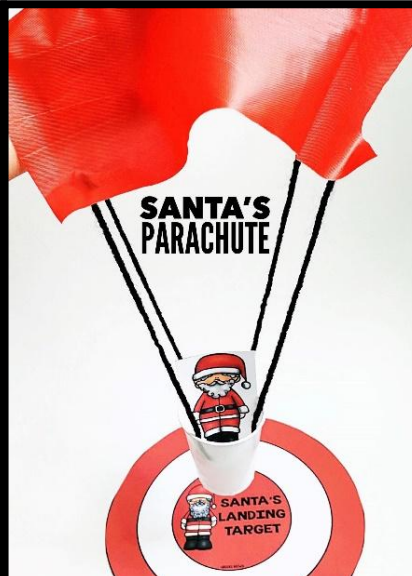
# STEM

## LOW PREP

## christmas challenges



**SHELF FOR THE ELF**

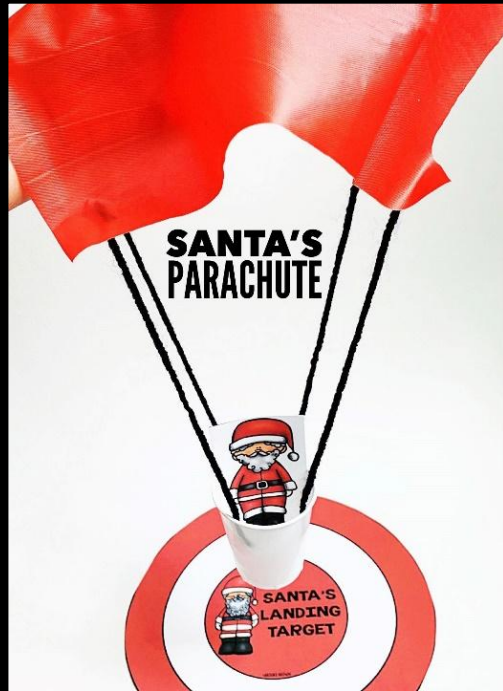


**TALLEST  
TREE**

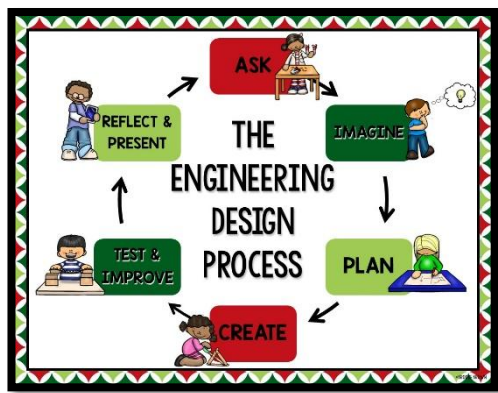


CREATED BY BROOKE BROWN

# 3 LOW PREP STEM CHALLENGES + BONUS BRAINBUILDER ACTIVITY



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



### Santa's Parachute

Santa's sleigh broke down!

Construct a parachute with basket that will help him land safely on target and upright on the ground.

**MATERIALS:**  
 CHOICES FOR PARACHUTE:  
 • Coffee Filter  
 • Plastic tablecloth (60" x 10')  
 CHOICES FOR BASKET:  
 • Tin can  
 • 4 index cards  
 • string, yarn, or fishing line  
 • Scotch tape  
 • Paper Santas  
 • pennies to adjust weight

### Tallest Tree

You have been asked to create a decorative tree for the holiday parade.

cups to construct the tallest tree possible

**MATERIALS:**  
 • Playdough (1-2 cans per group)  
 • Popsicle sticks (20 per group)  
 • Paper elves

### Shelf for the Elf

The elf needs a safe and high place to sit that cannot be reached by children.

Construct the tallest shelf possible that will hold the elf.

**MATERIALS:**  
 • Playdough  
 • Popsicle sticks  
 • Paper elves

### BRAINBUILDER

#### Gingerbread Escape

Work with your team to create a working zipline for your gingerbread man.

You will need a paper gingerbread man, paperclip,

### EXPLORE PARACHUTES

PLAYTIME WITH PARACHUTES

PARACHUTE ADVENTURE

### EXPLORE SHELVES

THE ELF ON THE SHELF

ENGINEERING

### EXPLORE TREES

THE BIGGEST CHRISTMAS TREE EVER

WORLD'S TALLEST TREE

### WORDS TO KNOW

<b>canopy</b> the main upper component of a parachute	<b>gravity</b> the force of attraction of objects to the center of the Earth
<b>drag</b> a type of force or air resistance	<b>mass</b> the amount of matter in an object

### WORDS TO KNOW

<b>horizontal</b> side to side direction, parallel to the ground	<b>vertical</b> up and down direction, perpendicular to the ground
<b>joint</b> a point at which parts of a structure meet	<b>support</b> to bear weight or hold up

### WORDS TO KNOW

<b>architect</b> a person who designs buildings	<b>structure</b> something that is built or constructed
<b>pyramid</b> a three-dimensional solid with a polygonal base and triangular faces that meet at a point	<b>cone</b> a three-dimensional solid that tapers from a circular base to a point

### Santa's Parachute

**REAL WORLD EXAMPLES**

What is similar? What is different?  
How Parachutes Work

**Main Parts of a Parachute**

How Parachutes are Useful

### Shelf for the Elf

**REAL WORLD EXAMPLES**

What is similar? What is different?  
Types of Shelves

Where Shelves Are Found

How Shelves are Useful

### Tallest Tree

**REAL WORLD EXAMPLES**

What is similar? What is different?  
Common 3D Shapes Found in Trees

**REAL WORLD EXAMPLES**

What is similar? What is different?  
Common 3D Shapes Found in Towers



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

### Santa's parachute

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

**MY BLUEPRINT**

Draw a picture of your parachute and basket.

Label the CANOPY and LOAD.

TESTS

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

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

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

What improvements did you make to your parachute design?

### Shelf for the Elf

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

**MY BLUEPRINT**

Draw a picture of your shelf.

How high is your shelf?

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

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

What improvements did you make to your shelf design?

### Tallest Tree

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

**BLUEPRINT**

HEIGHT: 1 \_\_\_\_\_

HEIGHT: 2 \_\_\_\_\_

HEIGHT: 3 \_\_\_\_\_

Which design worked best?

Color the tree.

### Gingerbread Escape

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

**BLUEPRINT**

TESTS

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

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

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

What improvements did you make to your gingerbread design?

### LET'S REFLECT!

- What was most difficult about this challenge?
- How are parachutes useful?
- Which materials were most effective for your parachute and why do you think so?
- How did drag (air resistance) affect your parachute's drop?
- How did gravity affect your parachute's drop?
- How did mass and weight affect your parachute's drop?
- What are some features of real parachutes that are important for them to function effectively?
- If we completed this challenge again, what would you do differently next time?

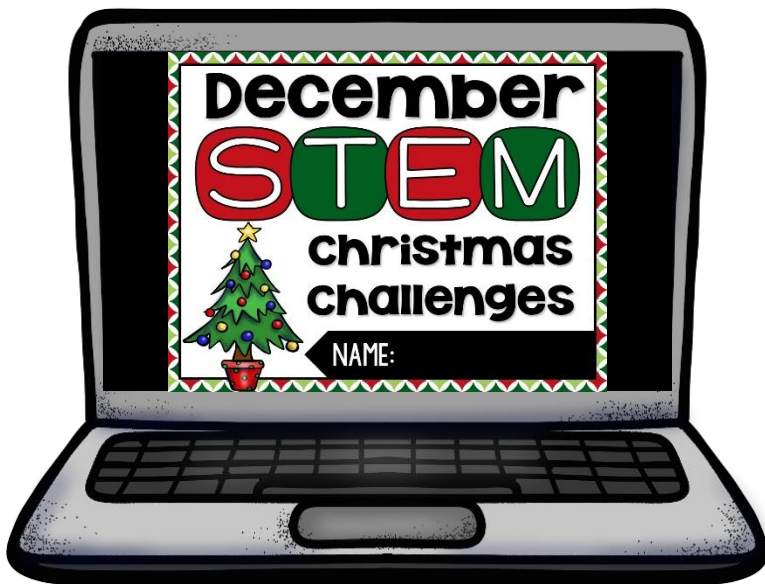
### LET'S REFLECT!

- What was most difficult about this challenge?
- How is your shelf similar to and different from the shelves in our classroom?
- How is your shelf designed to make it as sturdy and balanced as possible?
- What horizontal and vertical lines did you use in your shelf design?
- What are some different styles of shelves and how are they useful?
- What materials would you use to build real shelves?
- If we completed this challenge again, what would you do differently next time?

### LET'S REFLECT!

- What was most difficult about this challenge?
- Which tree design was the tallest and why do you think so?
- How does the design of your tree affect its balance and stability?
- How are buildings designed using these same concepts?
- Which three-dimensional shapes are represented in your tree tower?
- If we completed this challenge again, what would you do differently next time?

## 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 December STEM Journal

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

Illustration of two children in winter gear standing next to a decorated Christmas tree.

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

If 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
Santa's Parachute	coffee filters	1	
	thin plastic tablecloth cut into 10" x 10" squares	1	
	mini cup	1	
	index cards	4	
	scotch tape	1 roll	
	scissors	1	
Shelf for the Elf	string, yarn, or fishing line	2 yards	
	Santa cutouts	1	
	pennies	5	
Tallest Tree	playdough	one 1/2 oz. or two 3 oz.	
	popstick sticks	20	
	elf cutout	1	
BONUS BRAINBUILDER: Gingerbread Escape	ruler	1	
	green cups (large or mini) - found at most party supply stores	24	
	ornament cutouts with tape (optional)	1 set	
	yardstick	1	
	gingerbread cutout	1	
	fishing line	12 ft.	
	paper clip	1	

## STANDARDS ALIGNMENT

DECEMBER STANDARDS ALIGNMENT			
CHALLENGE	ENGINEERING	SCIENCE	MATH
Santa's Parachute	K-2-ETS1 Engineering Design: K-2-ETS1-4, 3-5-ETS1-2, 3-5-ETS1-3 3-5-ETS1 Engineering Design: 3-5-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	1-MS Make sense of problems, and persevere in solving them 1-MS Reason abstractly and quantitatively 1-MS Model with mathematics 1-MS Attend to precision 1-MS Look for and make use of structure
Tree Tower	K-2-ETS1 Engineering Design: K-2-ETS1-4, 3-5-ETS1-2, 3-5-ETS1-3 3-5-ETS1 Engineering Design: 3-5-ETS1-4, 3-5-ETS1-2, 3-5-ETS1-3	2-Structure and Properties of Matter Action/Reaction Forces, tension and compression forces, weight, balance, stability	1-MS Make sense of problems, and persevere in solving them 1-MS Reason abstractly and quantitatively 1-MS Model with mathematics 1-MS Attend to precision 1-MS Look for and make use of structure
Shelf for the Elf	K-2-ETS1 Engineering Design: K-2-ETS1-4, 3-5-ETS1-2, 3-5-ETS1-3 3-5-ETS1 Engineering Design: 3-5-ETS1-4, 3-5-ETS1-2, 3-5-ETS1-3	2-Structure and Properties of Matter Action/Reaction Forces, tension and compression forces, weight, balance, stability	1-MS Make sense of problems, and persevere in solving them 1-MS Reason abstractly and quantitatively 1-MS Model with mathematics 1-MS Attend to precision 1-MS Look for and make use of structure
BONUS BRAINBUILDER: Gingerbread Escape	K-2-ETS1 Engineering Design: K-2-ETS1-4, 3-5-ETS1-2, 3-5-ETS1-3 3-5-ETS1 Engineering Design: 3-5-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	1-MS Make sense of problems, and persevere in solving them 1-MS Reason abstractly and quantitatively 1-MS Model with mathematics 1-MS Attend to precision 1-MS Look for and make use of structure

## CHALLENGE OVERVIEW

## STEM CHALLENGE: Santa's parachute



**OVERVIEW:** Choosing from a variety of materials, students will construct a parachute and basket for Santa that will drop on a target and land without the basket tipping over. By designing an effective parachute, they will attempt to increase drag, reduce the strength of gravitational pull, and reduce the speed at which objects fall.

**KEY SKILLS:** Engineering Parachutes, Drag/Air Resistance, Gravity, Balance

**SUGGESTED READ ALOUDS:** [Santa's New Jet](#) by David Biedrzycki, [Parachute](#) by David Parker, [How Do Parachutes Work?](#) by Jennifer Boothroyd

**MATERIALS PER GROUP:** Parachute options: 1 coffee filter, 110" x 10" plastic tablecloth square Basket options: mini cup, 4 index cards

**Other materials:** scotch tape, 2 yards of string, yarn, or fishing line, 5 pennies, paper Santa

## KEY SKILLS

## MATERIALS

## LESSON PLAN

1. Activate students' prior knowledge by asking them to share what they already know about parachutes and how they work. Discuss the different kinds of materials that parachutes are made out of in order to increase drag/air resistance and help people and objects land safely.
2. Share and discuss the videos on "Explore Parachutes."
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 parachutes and test them to see if they land on the target with Santa's basket upright.
8. Hold a whole class closing discussion and reflection, allowing students to share their parachute designs. Use the "Let's Reflect" poster to guide the discussion.

## SUGGESTED READ ALOUDS

## STEP BY STEP INSTRUCTIONS



# ALTERNATIVE WINTER CHALLENGES

## Special Delivery

You need to delivery toys to children in need.

Construct a parachute with basket that will help the toys land safely on target and upright on the ground.



### MATERIALS:

#### CHOICES FOR PARACHUTE:

- Coffee Filter
- Plastic tablecloth (10" x 10")

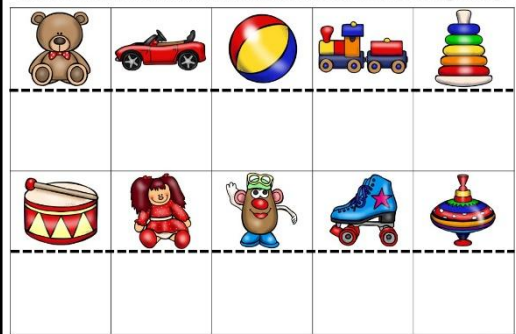
#### CHOICES FOR BASKET:

- Mini cup
- 4 index cards
- string, yarn, or fishing line
- Scotch tape
- paper toys
- pennies to adjust weight



## Toy Shelf Challenge

cut on the solid lines and fold on dotted lines so that each toy sits up.



## drag



a type of force or air resistance that reduces forward motion

## mass



the amount of matter in an object

## Toy Shelf

The toy shop owner needs to build a new shelf.

Construct the tallest shelf possible that will hold the toys.



### MATERIALS:

- Playdough (1-2 cans per group)
- Popsicle sticks (20 per group)
- Paper toys
- Rulers

## WORDS TO KNOW

### horizontal

side to side direction, parallel to the ground



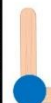
### vertical

up and down direction, perpendicular to the ground



### joint

a point at which parts of a structure are joined



### support

to bear weight or hold up



## Toy Shelf

### REAL WORLD EXAMPLES



What is similar? What is different?

Types of Shelves

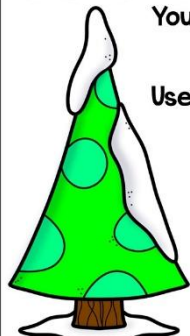
### Where Shelves Are Found

How Shelves are Useful

## Winter Tree

You would like to decorate your home for winter.

Use cups to construct the tallest tree possible.



### MATERIALS:

- Cups
- Popsicle sticks
- Paper snowflakes and tape (OPTIONAL)
- Yardstick

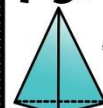
## WORDS TO KNOW

### architect



a person who designs buildings

### pyramid



a three-dimensional solid with a polygonal base and triangular faces that meet at a point (apex)

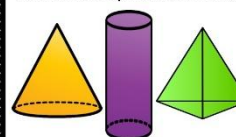
## Winter Tree

### REAL WORLD EXAMPLES



What is similar? What is different?

Common 3D Shapes found in Trees

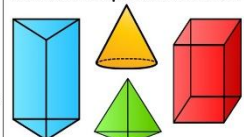


### REAL WORLD EXAMPLES



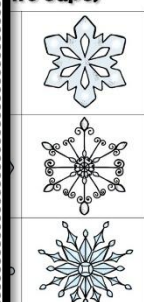
What is similar? What is different?

Common 3D Shapes found in Towers



## Challenge

(no cups)



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

OVER  
**40%  
OFF!**

