

Sledding Ramp

STEM



**LOW PREP
WINTER STEM
CHALLENGE**

K-5TH GRADE

CREATED BY BROOKE BROWN

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

Sledding Ramp

Your friends are having a sledding contest!

Construct a ramp that will make your sled travel the farthest distance.



MATERIALS:

- Construction paper or cardstock
- Linking cubes (30 per group)
- Masking tape (1 ft. per group)
- Plastic bottle caps/lids for "sleds"
- Yardstick

Sledding Ramp

REAL WORLD EXAMPLES



What is similar? What is different?
How Inclined Planes are Useful

Examples of Inclined Planes

How Sleds Work



WORDS TO KNOW



inclined plane

a simple machine that slopes at an upward angle, also called a ramp



friction

surface resistance to motion



speed

how fast an object travels



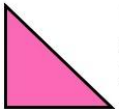
distance

the amount of space between two things



EXPLORE RAMPS

INCLINED PLANES



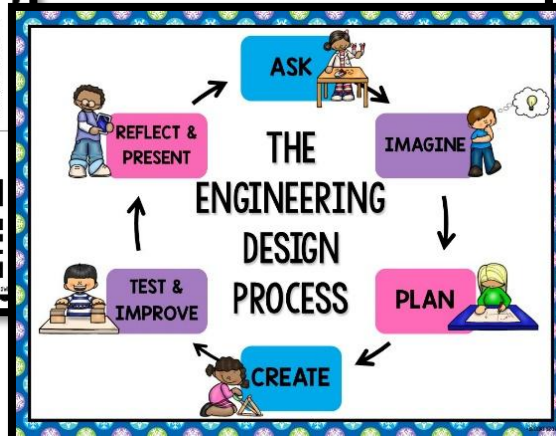
SLEDDING



FRICTION



SLED FACTS




LET'S REFLECT!



- What was most difficult about this challenge?
- How are ramps and inclined planes useful in real life?
- How did raising the height of your ramp affect the speed and distance of your sled?
- How did friction affect the speed and distance of your sled?
- How do you think extending or shortening the length of the ramp might affect the speed and distance of your sled?
- If we completed this challenge again, what would you do differently next time?

DIFFERENTIATED RECORDING SHEETS FOR K-5TH GRADE


LOWER GRADES



Sledding Ramp

Name: _____

MY BLUEPRINT



Draw a picture of your ramp.

SLEDDING TESTS

TEST 1

How high is your ramp? _____

How far did your sled go? _____

TEST 2

How high is your ramp? _____


How far did your sled go? _____

TEST 3

How high is your ramp? _____

How far did your sled go? _____

UPPER GRADES



Sledding Ramp

Name: _____

BLUEPRINT

TEST 1

How high is your ramp? _____

How far did your sled go? _____

TEST 2

How high is your ramp? _____

How far did your sled go? _____

TEST 3

How high is your ramp? _____

How far did your sled go? _____

How did friction affect your sled?


What improvements did you make to your ramp?

DIGITAL GOOGLE SLIDES NOTEBOOK

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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,

 I am able to donate: _____

Parent Name(s): _____
 Child's Name: _____

SAY Hello TO STRESS-FREE STEM!

SUPPLIES CHECKLIST			
STEM CHALLENGE	ITEM	NUMBER PER GROUP	I HAVE IT
Sledding Ramp	construction paper or cardstock	3-4 sheets	
	linking cubes	30	
	masking tape	1 ft.	
	plastic bottle cap/lid	1	
	yardstick	1	
STANDARDS ALIGNMENT			
CHALLENGE	ENGINEERING	SCIENCE	MATH
Sledding Ramp	K-2-ETS1 Engineering Design: K-2-ETS1-1 , 3-5-ETS1-2 , 3-5-ETS1-3 3-5-ETS1 Engineering Design: 3-5-ETS1-1 , 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	MP1: Make sense of problems and persevere in solving them. MP2: Reason abstractly and quantitatively. MP4: Model with mathematics. MP5: Use appropriate tools strategically. MP6: Attend to precision.

SUPPLIES CHECKLIST & STANDARDS ALIGNMENT

CHALLENGE OVERVIEW

STEM CHALLENGE: Sledding Ramp



OVERVIEW: This challenge is designed for students to experiment with ramps/inclined planes and how the height of a ramp affects the speed and distance of an object that slides down it. Students will also experiment with how friction affects the motion of an object. Cardstock or construction paper can be folded into a sloping shape similar to a slide, and can be folded upward on each side to keep the bottle caps from falling off. Linking cube towers taped to the top of the ramp make it easy and quick for students to raise and lower the height and test/measure each sled distance.

KEY SKILLS: Simple machines (inclined planes), Speed and Distance, Friction, Measurement

SUGGESTED READ ALOUDS: [Red Sled by Lita Judge](#), [Max and Marla by Alexandra Boiger](#), [Roll, Slope, and Slide by Michael Dahl](#)

MATERIALS PER GROUP: 2-3 sheets of construction paper or cardstock, 30 linking cubes, 1 ft. of masking tape, plastic bottle cap or lid, yardstick

KEY SKILLS

MATERIALS

SUGGESTED READ ALOUDS

LESSON PLAN

1. Activate students' prior knowledge by asking them to share what they already know about ramps/inclined planes and how they work. Discuss the different ways ramps are used and how they make work easier.
2. Share and discuss the videos on "Explore Ramps."
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 ramps and test them, adjusting the height of the ramp to measure the distances their "sled" travels.
8. Hold a whole class closing discussion and reflection, allowing students to share their ramp designs. Use the "Let's Reflect" poster to guide the discussion.

STEP BY STEP INSTRUCTIONS