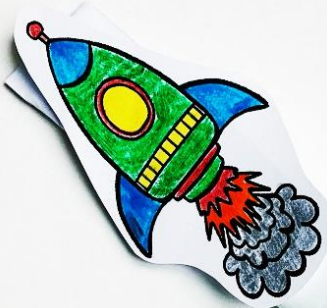


straw Rocket

STEM



**STRAW
ROCKET**

LOW PREP
END OF THE YEAR
STEM CHALLENGE

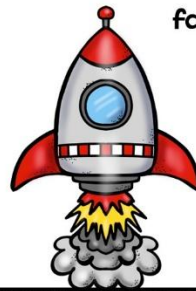
K-5TH GRADE

CREATED BY BROOKE BROWN

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

straw Rocket

Your friends have challenged you to a contest!
Construct a straw rocket that will travel the farthest distance.



MATERIALS:

- Straws (One per student)
- Paper strips (One per student)
- Paper rockets (One per student)
- Scotch tape
- Yardsticks

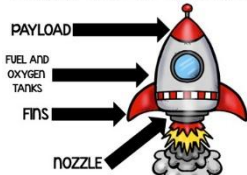
Straw Rocket

REAL WORLD EXAMPLES



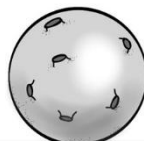
What is similar? What is different?
How Rockets Work

Basic Parts of a Rocket



EXPLORE ROCKETS

ESCAPE TO THE MOON



HOW ROCKETS WORK



WORDS TO KNOW

thrust



the force of flight that pushes an object forward or upward

drag



force on an object in the air that reduces forward motion

propel



to drive or push forward

gravity



force of attraction of objects to the center of the Earth

ROCKETS



FORCES OF FLIGHT



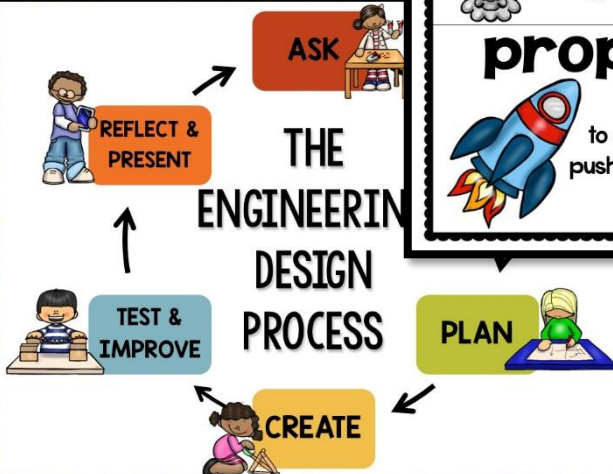
REFLECT!



What was the most difficult about this challenge?
What pushes and pulls were used in this challenge?
What forces of flight were at work when you built your straw rocket?

- How did you improve the distance of each test? How is wind power involved with the same principles you used today?
- How is your rocket design similar to and different from a real rocket?
- If we completed this challenge again, what would you do differently next time?

THE ENGINEERING DESIGN PROCESS



DIFFERENTIATED RECORDING SHEETS FOR K-5TH GRADE

LOWER GRADES

Straw Rocket

Name: _____

MY BLUEPRINT

Draw a picture of your straw rocket.

Label the PAYLOAD, FINS, and NOZZLE.

→

→

↘

How far did your rocket travel?

TEST 1	
TEST 2	
TEST 3	

UPPER GRADES

Straw Rocket

Name: _____

BLUEPRINT

How far did your rocket travel?

TEST 1	
TEST 2	
TEST 3	

Label the PAYLOAD, FUEL AND OXYGEN TANKS, FINS, and NOZZLE.

Which forces of flight were at work when you launched your rocket?

What improvements did you make to your rocket design or launch strategy?

DIGITAL GOOGLE SLIDES NOTEBOOK

Straw Rocket

Your friends have challenged you to a contest!

Construct a straw rocket that will travel the farthest distance.

MATERIALS:

- Straws (One per student)
- Paper strips (One per student)
- Paper rockets (One per student)
- Scotch tape
- Yardsticks

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: _____

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, _____

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!

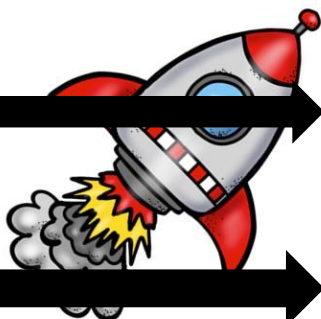
SUPPLIES CHECKLIST			
STEM CHALLENGE	ITEM	NUMBER PER GROUP	I HAVE IT
Straw Rocket	straws	1 per student	
	blank paper rectangle	1 per student	
	paper rocket	1 per student	
	scissors and tape	1 per pair of students	
	yardstick	1	

STANDARDS ALIGNMENT			
CHALLENGE	ENGINEERING	SCIENCE	MATH
Straw Rocket	K-2-ETS1 Engineering Design K-2-ETS1, 3-5 ETS1-2, 3-5 ETS1-3 3-5-ETS1 Engineering Design 3-5-ETS1, 3-5 ETS1-2, 3-5 ETS1-3	K-PS2 Motion and Stability: Forces and Interactions 3-PS2 Motion and Stability: Forces and Interactions 4-PS3 Energy 5-PS2 Motion and Stability: Forces and Interactions	1-MS Make sense of problems and persevere in solving them 2-MS Measure, draw, and estimate quantities 3-MS Model with mathematics 4-MS Attend to precision 5-MS Use appropriate tools strategically

SUPPLIES CHECKLIST & STANDARDS ALIGNMENT

CHALLENGE OVERVIEW

STEM CHALLENGE: Straw Rocket



OVERVIEW: This quick and simple challenge allows students to experiment with basic forces of flight. Students wrap paper strips around the end of a straw and seal it shut with tape. They may color and tape a paper rocket on top, if they choose. Students will blow on the end of the straw to launch the rocket and measure how far it travels. For best results, make sure the end and sides of the pocket are completely sealed. Have them pull the straw a little bit out, and leave an air pocket at the end before blowing.

KEY SKILLS: Forces of Flight (gravity, thrust, drag), Measurement

SUGGESTED READ ALOUDS: [Mae Among the Stars by Roda Ahmed](#), [Your Place in the Universe by Jason Chin](#), [Counting on Katherine by Helaine Becker](#)

MATERIALS PER GROUP: 1 straw per student, 1 paper strip and paper rocket per student, tape, yardstick

KEY SKILLS

MATERIALS

STEP BY STEP INSTRUCTIONS

LESSON PLAN

1. Activate students' prior knowledge by asking them to share what they already know about the forces of flight and how rockets work.
2. Share and discuss the videos on "Explore Rockets."
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 to construct and test their straw rockets, measuring the distances they travel.
8. Hold a whole class closing discussion and reflection, allowing students to share their straw rocket designs. Use the Let's Reflect" poster to guide the discussion.

SUGGESTED READ ALOUDS