



STEM SPORTS: PARACHUTING

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STEM SPORTS INFORMATION

STEM SPORTS SAMPLER

This unit is designed to be used over a period of 2 to 3 weeks. This sampler includes 1 out of the 5 activities (parachuting).

This is a really fun way to wrap up the year while still incorporating engineering, science, and math. There are 3-4 different recording sheet choices for each activity so you can find the level that works best for your students.

If you are interested in the full unit, you can find it in The Science Penguin shop on TpT. Your students will explore diving, sailing, basketball, and archery in the complete unit.

CLICK TO SEE STEM SPORTS ON TPT! >> >>



EACH ACTIVITY INCLUDES

Teacher Directions
Page and Materials List

DIVING
Design a "diver" that will create the biggest splash.

...you want to limit
...ays.
...e Page,
...ve the design.
...dents set up
...d cylinder to



MATERIALS
Per Team (3-5 students):
...p. water, 200ml + graduated
...ay to catch spilled water

...d Building Materials: aluminum foil,
...per marbles, craft sticks, wax paper,
...beads, other small random materials

...ent: recording page (3 choices
...e)

Scientific Explanations

DIVING
SCIENCE TIME

- A good diver will deliver a large splash in this activity.
- An object with a large surface area at the point of impact with the water will help increase the splash from its impact.
- Students should also look to design a diver with most of its mass located in the section that will strike the water. This will help to ensure that the diver hits the water with the most energy at the point of impact.

...imize large splashes by making
...ideos to demonstrate this. They
...es, then larger points of impact

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Sample Data Sheets

DIVING

Students Challenge
Directions

DIVING
Design a "diver" that will create the biggest splash.

1. Use the available materials to make a "diver". Your goal is for the "diver" to splash as much water out of the cup as possible. Your diver may not be greater than 5 cm by 5 cm by 5 cm.
2. Test your design and improve it until time is up.
3. Teams will measure how much water splashed out of the cup.

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3-4 Differentiated
Recording Sheet
Options

Name _____

DIVING DATA Bar Graph

Team	Starting Volume of Water (ml)	Volume of Water after Drop (ml)	Volume of Water Splashed Out (ml)

Describe your diver.

Name _____

DIVING DATA Bar Graph

Team	Starting Volume of Water (ml)	Volume of Water after Drop (ml)	Volume of Water Splashed Out (ml)	Volume of Water Splashed Out (L)

Name _____

DIVING DATA Stem-and-Leaf Plot

Team	Starting Volume of Water (ml)	Volume of Water after Drop (ml)	Volume of Water Splashed Out (ml)	Volume of Water Splashed Out (L)

How could your diver be improved?

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S A F E T Y

SAFETY FIRST

1. Many of these activities require that the teacher set expectations for safety before starting the activity.
2. Any time projectiles are used, students must be aware of where to stand.
3. I also recommend that students wear goggles when working with projectiles.
4. The teacher must carefully supervise students.
5. If possible, go into a hallway or outside for some competitions.

PARACHUTING

Design a parachute that will take the longest amount of time to hit the ground.

DIRECTIONS

1. Decide what materials you want to offer students, if you want to limit the materials, and which recording page you want to use. I recommend completing this activity on two separate days.

2. Introduce the challenge requirements using the Challenge Page. Give students about 30 minutes to build, test, and improve the design.

3. Gather students together and hold your contest. Students set up data tables to record the class's data. Teams take turns timing how long it takes to drop the parachute from the same height. (It might help to go out on a playground to use a taller height. You also might borrow a stepladder and stand on it as the teacher.)

4. Students complete the rest of the student page. The data pages vary so you can choose what is most appropriate for your students. You may ask students to draw a diagram of their parachutes on the back.

Recording Pages

A- seconds to land, bar graph of the number of seconds to land, describing the parachute

B- seconds to land, bar graph of the number of seconds to land, how the parachute could be improved

C- seconds to land, mass of each parachute and ball, scatterplot for mass and seconds, trends noticed from the scatterplot (I recommend working in pairs so you have more data points to notice trends)



MATERIALS

Per Class: timer, place to drop parachutes

Per Team (3-5 students):
ping pong ball or another light object, scissors,
tape (for recording sheet C- triple beam
balance)

Suggested Building Materials:
wax paper, tissue paper, plastic bags, fabric,
yarn, foam sheets, straws, clothespins, pipe
cleaners

Per student: recording page (3 choices available)

PARACHUTING

Name _____

PARACHUTING DATA

Scatterplot

Team	Mass of Parachute (grams)	Time to Land (seconds)
1	17.4	1.44
2	7.5	2.36
3	4.9	1.50
4	2.1	1.96
5	6.3	1.25
6	9.5	1.70
7	14.5	0.66
8	10.5	2.00
9	10.5	2.31
10	7.9	1.10

Flight Time vs Mass

Did you notice any trends from the scatterplot?
 There is a negative correlation between mass and the amount of time elapsed.

Generally, the greater the mass, the shorter the time. The differences are a result of varying designs.

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PARACHUTING DATA

Bar Graph

Team	Time to Land (seconds)
1	1.44
2	2.36
3	1.50
4	1.96
5	1.25

Length of Flight

How could you improve your parachute?
 could adjust the area or shape of the parachute.
 non-rectangular parachutes took longer to

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PARACHUTING

SCIENCE TIME

- The two forces at work here are gravity and air resistance, also known as drag.
- Students should know that the acceleration of an object towards the ground caused by the force of gravity (at or near Earth's surface) is always constant for any object at any time.
- The reason an object might sometimes fall more slowly is air resistance. The earth is not a vacuum because it has air made up of gas molecules. These molecules create drag.
- Air resistance is the force on an object that acts in the direction opposite of its motion. Gravity causes an object to fall while drag forces push the object upwards. The object falls because the force of gravity is stronger.
- Additionally, the greater the velocity of an object in motion, the greater the force of the resistance of the air pushing back against its motion.
- Drag is most present on lighter objects with larger surface areas that face the direction of its motion.
- Students should be advised to think how parachute designs look and how they behave when falling through the air. They should think of other examples of drag slowing an object's descent.
- Some students may struggle with their designs if they try to make them too light. The parachute should have an element of design that will make sure it falls downward in a stable manner. This will allow the direction of the force due to drag to remain opposite of the direction of gravity.

PARACHUTING

Design a parachute that will take the longest amount of time to hit the ground.

1. Use the available materials to make a parachute for your ping pong ball. You want it to have the greatest amount of time in the air when dropped.
2. Test your design and improve it until time is up.
3. Teams time how long it takes for each parachute to reach the ground when dropped from the same height.

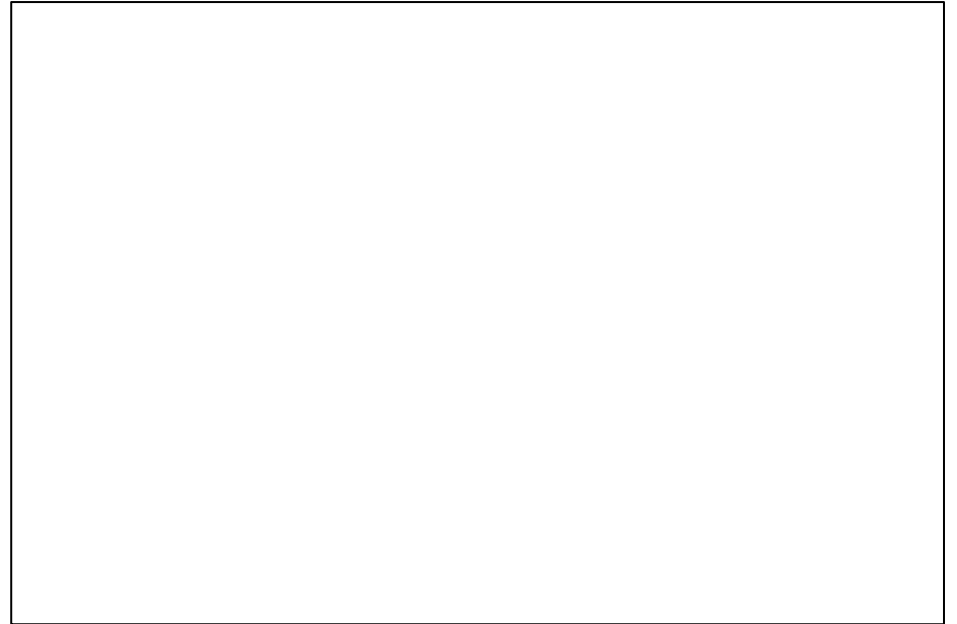


Name _____

PARACHUTING DATA

Team	Time to Land (seconds)

Bar Graph



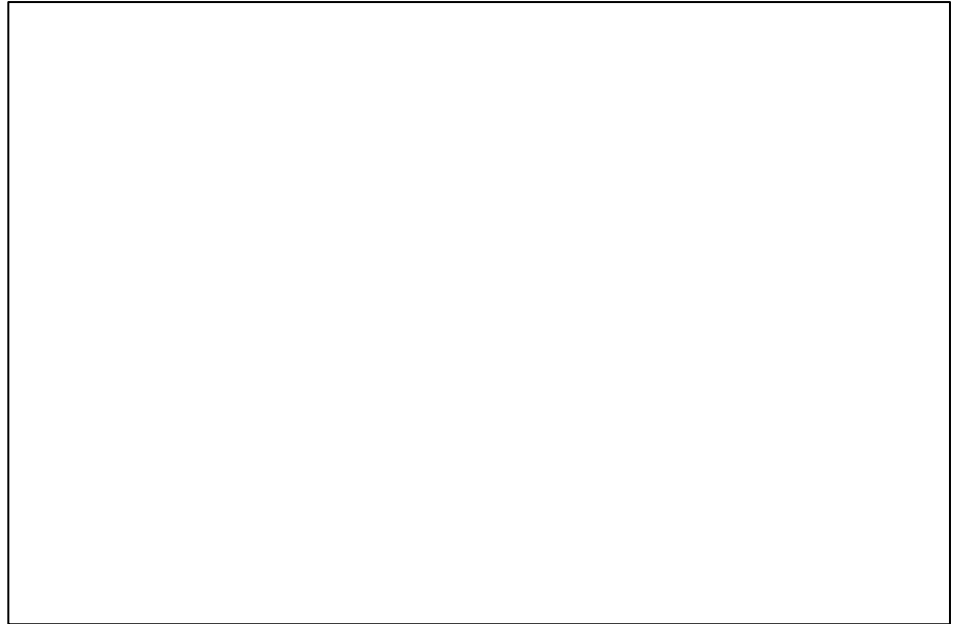
Describe your parachute.

Name _____

PARACHUTING DATA

Team	Time to Land (seconds)

Bar Graph



How could you improve your parachute?

Name _____

PARACHUTING DATA

Scatterplot

Team	Mass of Parachute (grams)	Time to Land (seconds)

Did you notice any trends from the scatterplot?

WANT MORE FUN?

Day	Activity
1	Introduce STEM Sports and assign teams. Pass out Events recording sheet on page 12. Show a video of archery and introduce the challenge using the Challenge Sheet and Archery Science Notes. Teams spend the rest of the class period designing their bows.
2	Pass out Archery recording sheets. Hold your competition and record data. Help students complete the remainder of their recording sheets.
3	Show a video of basketball and introduce the challenge using the Challenge Sheet and Basketball Science Notes. Teams spend the rest of the class period designing their coats.
4	Pass out Basketball recording sheets. Hold your competition and record data. Set expectations for completing the rest of the recording sheet.
5	Show a video of sailing and introduce the challenge using the Challenge Sheet and Sailing Science Notes. Teams spend the rest of the class period designing their boats.
6	Pass out Sailing recording sheets. Hold your competition and record data. Set expectations for completing the rest of the recording sheet.
7	Show a video of diving and introduce the challenge using the Challenge Sheet and Diving Science Notes. Teams spend the rest of the class period designing their divers.
8	Pass out Diving recording sheets. Hold your competition and record data. Set expectations for completing the rest of the recording sheet.
9	Show a video of parachutes and introduce the challenge using the Challenge Sheet and Parachuting Science Notes. Teams spend the rest of the class period designing their parachutes.
10	Pass out Parachuting recording sheets. Hold your competition and record data. Set expectations for completing the rest of the recording sheet.
11	Review how the competitions went. Have individuals select one of the sports and create a poster explaining the science, engineering, and math involved.

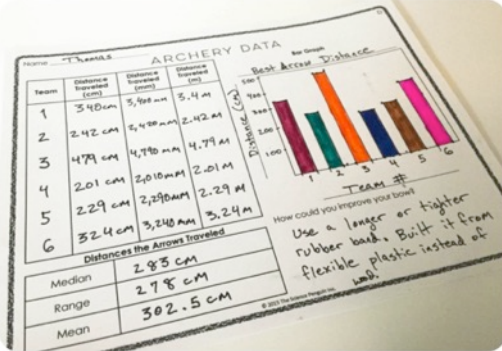
CONSUMABLES SHOPPING LIST

- tape
- foam sheets (see page 20)
- cookie sticks or hot glue sticks (see page 20)

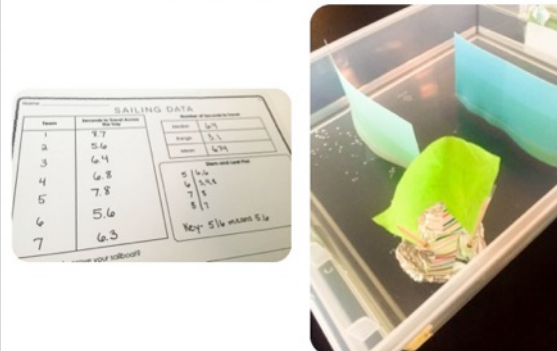
Suggested Schedule,
Shopping List, & Event
Score Sheet

EVENT SCORE SHEET		
Event	My Team's Performance	Reflection
Archery		
Basketball		
Sailing		
Diving		
Parachuting		

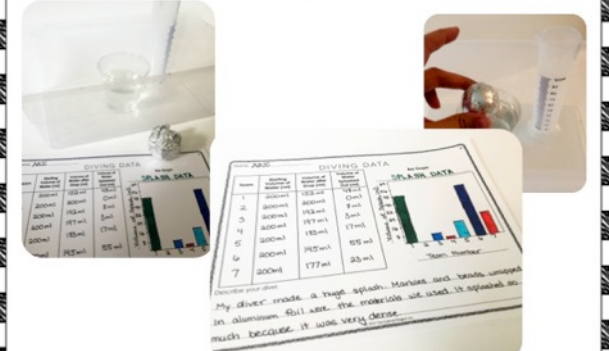
ARCHERY



SAILING



DIVING



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THANK YOU!



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