

# G.I.R.L.S.

## GIRLS INSPIRING RISING LADIES IN STEM

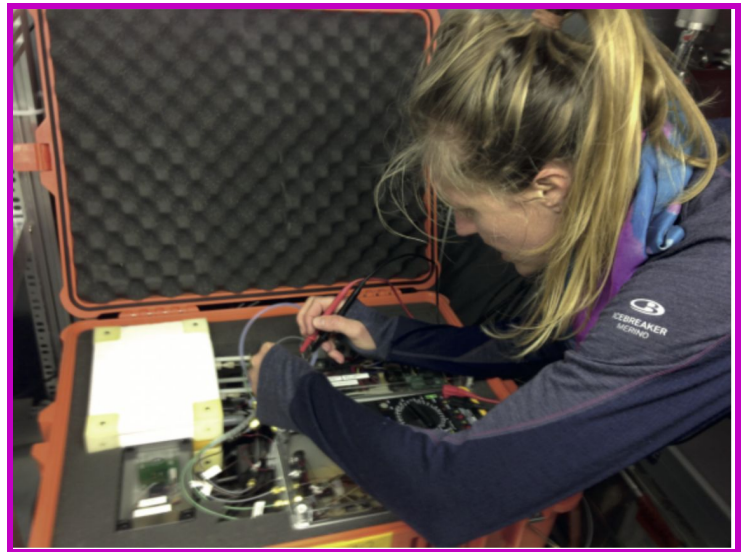
Name: \_\_\_\_\_ Date: \_\_\_\_\_

### TOPIC # 1: WEATHER AND ENERGY

#### WHAT IS LIGHTNING, TORNADO IN A BOTTLE, AND MARBLES AND ENERGY

##### SCIENTIST OF THE DAY: FIONNA TUMMON

Dr. Fionna Tummon is an atmospheric scientist who grew up in Capetown, South Africa. From a young age, she was always interested in the ocean and sky surrounding her. This interest led her to study chemistry, biology, and physics in hopes of gaining the chance to learn more about her environment. She went on to get her Masters degree in Atmospheric Science and her PhD project focused on the climatic impact of different chemicals in southern Africa. Since 2012, she has worked for an organization called Stratosphere-troposphere Processes and their Role in Climate (SPARC), and she currently serves as the Director of SPARC's International Project Office. In this role, she inspires young scientists to explore the environment and promotes coordination between atmospheric scientists around the world.



##### BACKGROUND

You rub the balloon on your hair and the balloon builds up an electrical charge (static electricity). Touching the charged balloon to the end of the fluorescent light bulb causes the electrical charge to jump from the balloon to the bulb. Lightning is an electrical discharge within a thunderstorm. As the storm develops, the clouds become charged with electricity. Scientists are still not sure exactly what causes this, but they do know that when the voltage becomes high enough for the electricity to leap across

# G.I.R.L.S.

## GIRLS INSPIRING RISING LADIES IN STEM

the air from one place to another, lightning flashes! Lightning can spark within a cloud, from one cloud to another, from a cloud to the ground, or from the ground to a cloud.

Energy is the ability to do work. Different forms of energy include kinetic energy, which is the energy of motion, and potential energy, which is stored energy that can be used later.

### NEW WORDS

#### Tornado in a Bottle

- **Weather:** \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
- **Climate:** \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
- **Tornado:** \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

#### What is Lightning?

- **Lightning:** \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
- **Atmosphere:** \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
- **Hurricane:** \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

# G.I.R.L.S.

GIRLS INSPIRING RISING LADIES IN STEM

## Marbles and Energy

- **Work:** \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
- **Energy:** \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
- **Potential Energy:** \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
- **Kinetic Energy:** \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
- **Conservation of Energy:** \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

## TODAY'S EXPERIMENT

In the lightning experiment, we will be rubbing a balloon on our hair to build a static charge and illuminate a light bulb. In the Marbles Experiment, you will explore the different forms of energy. In the Tornado in the bottle experiment we see the swirling motion you give the bottle forms a vortex and is a easy way to create your own tornado.

## SCIENCE CONCEPT: HYPOTHESES

In science, a hypothesis is an idea or explanation that can be tested through study and experimentation. A hypothesis is always an *educated* guess that is made using information we already know. After you make a hypothesis, you test it by doing an experiment to see what happens. Outside science, a theory or guess can also be called a hypothesis. Generally, hypotheses are stated as an "if... then..." statement.

# G.I.R.L.S.

GIRLS INSPIRING RISING LADIES IN STEM

# G.I.R.L.S.

## GIRLS INSPIRING RISING LADIES IN STEM

Let's create a hypothesis for our experiment:

---

---

---

---

### **TORNADO IN A BOTTLE**

#### **MATERIALS LIST**

- ☐ 2 2-liter clear plastic pop bottles (empty and clean)
- ☐ Water
- ☐ Duct tape

#### **PROCEDURE**

1. Fill one of the bottles two-thirds full of water.
2. Take the Tornado Tube and twist it on the first bottle. Then, grab the second bottle and attach it to the Tornado Tube. Or use duct tape to fasten the two containers. Make sure to tape tightly to make sure that no water will leak out when you turn the bottle over.
3. Turn the tornado maker, so that the bottle with the water is on top. Swirl the bottle in a circular motion. Most tornadoes form counter-clockwise in the Northern Hemisphere. A tornado will form in the top bottle as the water rushes into the bottom bottle.
4. If you want to get creative, you can also use food coloring to make the tornado have a color and glitter to represent debris.

### **WHAT IS LIGHTNING?**

#### **MATERIALS LIST**

- ☐ Fluorescent light bulb
- ☐ Rubber balloon

#### **PROCEDURE**

1. Turn all of the lights off in the room. (The darker the better!)
2. Rub the balloon on your hair for several seconds.

# G.I.R.L.S.

## GIRLS INSPIRING RISING LADIES IN STEM

3. Then hold the statically charged balloon near the end of the light bulb. This will illuminate the bulb.
4. Repeat the demonstration as many times as desired.

### MARBLES EXPERIMENT

#### MATERIALS LIST

- ☐ Ruler with groove in it
- ☐ Marbles

#### PROCEDURE

1. Line up two marbles in the middle and one marble at the edge
2. Flick the marble.
3. Repeat the experiment with different configurations of marbles (like shooting 2 at

#### QUESTIONS

1. What do you think will happen when we flick the marble at the end towards the other 2 marbles?

---

---

---

2. What pattern do you see? Why do we see this pattern?

---

---

---

3. What is one new thing you learned today?

---

# G.I.R.L.S.

GIRLS INSPIRING RISING LADIES IN STEM

4. What was your favorite experiment and why?

## EXIT PASS

## EXPERIMENT LINKS

U I W B J E G I W M F W U N M  
N Y C G A G L G J A C X J J M  
F E L P T N Q C I T E N I K X  
H O I P M I F N S C G J K Q A  
D X M K O N E N A C I R R U H  
L G A B S T N T C X A K R O W  
I E T X P H E I C L L H H T N  
O G E D H G S N A X E B V M N  
P P K J E I S P T S L G Y K K  
V F J L R L A X Y I Y X M D R  
X O I S E K P M I C A D M O D  
W E A T H E R D Y A S L E Q V  
I R W M V L H J W S L R I G X  
H M Z P Z T O R N A D O U B T  
H B I J N E N E R G Y Z L A S

WEATHER  
CLIMATE  
TORNADO  
LIGHTNING  
ATMOSPHERE  
HURRICANE  
WORK  
ENERGY  
POTENTIAL  
KINETIC  
GIRLS

- <http://www.weatherwizkids.com/experiments-lightning.htm>
- <http://www.weatherwizkids.com/experiments-tornado-bottle.htm>
- [https://frugalfun4boys.com/2012/11/14/transfer-of-energy-science-experiment/?utm\\_source=rss&utm\\_medium=rss&utm\\_campaign=transfer-of-energy-science-experiment](https://frugalfun4boys.com/2012/11/14/transfer-of-energy-science-experiment/?utm_source=rss&utm_medium=rss&utm_campaign=transfer-of-energy-science-experiment)

G.I.R.L.S.

GIRLS INSPIRING RISING LADIES IN STEM