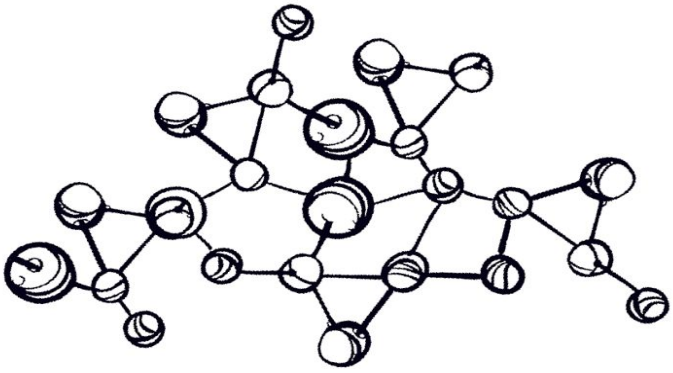


2020 SCIENCE FAIR

Oak Hills Elementary
April 23, 2020 6- 8 PM

OAK HILLS SCIENCE FAIR

It's that time of year again! Time to have fun with science! The **SCIENCE FAIR** will involve science projects, engineering challenges, coding, and student inventions. It is always so much fun to see what our Oak Hills students come up with each year. You will also be able to engage in fun family engineering activities. We can't wait!

For the **SCIENCE FAIR** you can:

Do a **SCIENCE** project: Ask a question and use the scientific method to find the answer!

Do a **CREATIVE STEM** project: Can you write a computer program? Or make a stop motion animation movie? Or make a Lego model of a machine? This is your chance to show everyone.

Do an **ENGINEERING CHALLENGE**: Create a marble run out of cardboard or a home-made rocket. See your designs tested!

Do an **ENGINEERING** project: Have you got a great idea about a new invention? Or an idea about how to improve something? Use the engineering method to develop your idea!

JUST COME: The hard work of hundreds of Oak Hills students will be on display at the **SCIENCE FAIR**, as well as **MANY OTHER ACTIVITIES**. Your whole family is welcome to explore the exhibits, participate in demonstrations, and just have fun!

Frequently Asked Questions:

Who can be a part of the SCIENCE FAIR? YOU! We invite all Oak Hills students to create an experiment or prototype they can test or determine a topic to explore. If you do not wish to do a long-term, self-directed project, please come to view other students' projects and participate in interactive exhibits. Only those who submit a project need to register.

Will I win something? The Oak Hills SCIENCE FAIR is a celebration, not a competition. A project reviewer will meet with each participant to share the things the student did well and then explore with them ways they might expand their inquiry in the future.

Will these projects be done in the classroom? No. SCIENCE FAIR projects will be completed at home, not in the classroom. This is a great opportunity for Oak Hills students to do long-term, self-directed projects.

How do I register? ONLINE. Go to http://www.oakhillspto.org/ and follow the link to register.

Can I work with a friend or sibling on my project? Sure! You and your family know how you'll learn best from this experience. If you plan to work with a partner, please fill in the partner's name on your registration form and ask your partner to do the same for you when they register. PLEASE BE SURE THAT YOUR PARTNER KNOWS THAT YOU ARE WORKING TOGETHER.

When will my project be reviewed? Review times are randomly assigned and will be provided to the participant prior to the fair. The SCIENCE FAIR Committee plans for youngest students (K-1) to be reviewed early in the night and for siblings to have reviews near the same time so that families can choose how long to enjoy the fair.

Do I have to pay? No. Every registered student will receive a project board and a participation ribbon.

Who gets a board? Every registered student will get a board UNLESS you are working with a partner (only one partner will receive the board.) Also, students doing engineering projects will not receive a board.

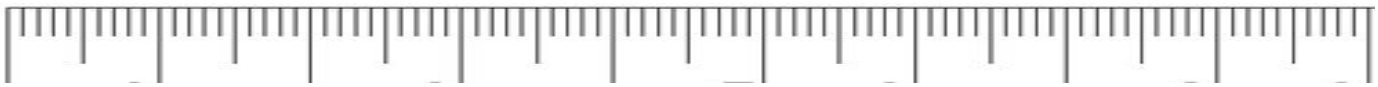
What are the project categories? Each category has a slightly different structure for the project. Please read on for details.

Can I do both an Engineering Challenge and another project? Yes. We will schedule your reviews so they will not conflict.

When do I turn my project in? Your project may be turned in Wednesday, April 22 from 5:30-7PM or Thursday, April 23 from 7:45-8:00AM. Please do not drop off expensive equipment (computers, etc.) Just bring those with you to the event.

I have a different question... Send us an email at sciencefair@oakhillspto.org. We're happy to help.

SCIENCE



Get ready to research! **Science** is a method to answer questions about our world and our universe! By carefully controlling your experiments, your ideas can be disproven or verified.

The scientific method:

1. Form a **question.**
2. Research.
3. Make a **hypothesis.** (An idea you can test)
4. Design a **procedure.**
   a. Identify **one variable** (something that can be changed.)
   b. Identify a **control** (something that remains unchanged) for that variable.
5. **Measure** the results. (Run the experiment and gather data.)
6. Form a **conclusion**. Verify or disprove the **hypothesis** with the data.

Forming a Question

A successful project begins with a good question. The question should not be answered by a simple yes or no. For example, "*how does salt affect the freezing point of water?"* is a better question than "*Does salt affect the freezing point of water?"* Good scientific inquiry questions do not include taste, smell, and opinion-based responses. Good scientific inquiry questions have one **variable** and **measurable data**. If you can repeat the experiment several times, you will have more data to work with and your conclusion will be more accurate. Please note: your experiment cannot include dangerous materials.

Making a Hypothesis

A **hypothesis** is a prediction about what you think will happen. The **hypothesis** gives you a general guide as to what to expect from the experiment and does not need to be correct.

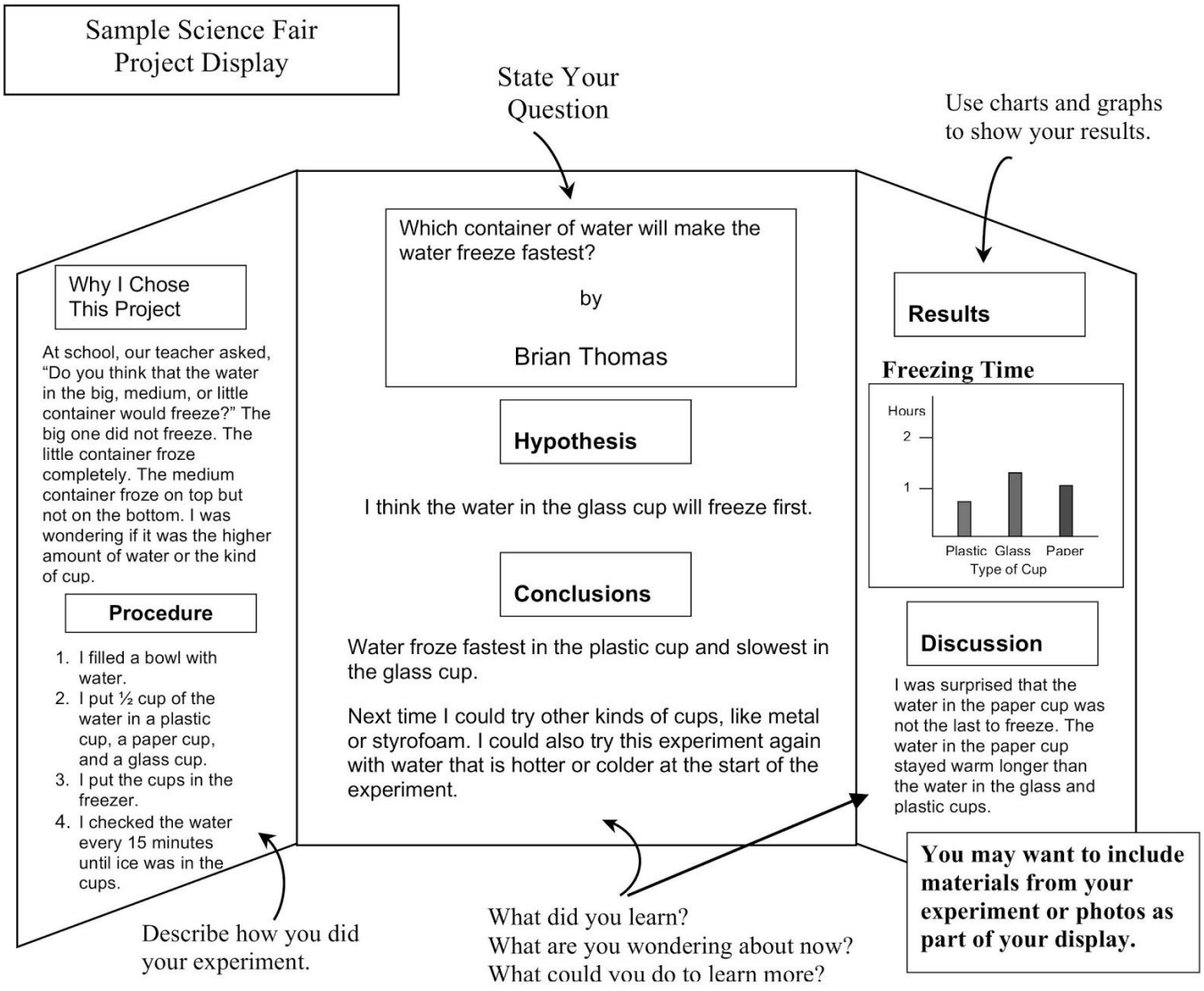
Designing the Procedure

A **procedure** is a step by step method of how you conduct your test. Your procedure needs to **measure** your **variable** (what you are changing) against your **control** (that which stays constant). It is the difference between the **variable** and the **control** that either verifies or disproves your **hypothesis**. For example, to answer "*Does salt affect the freezing point of water?"*, you would have two containers of water: a **control** and **test**. In the **control**, you would not add salt. In the **test** container, you would add salt. Then you would put both containers at the same temperature and record if each froze. A successful procedure can be described and repeated by others.

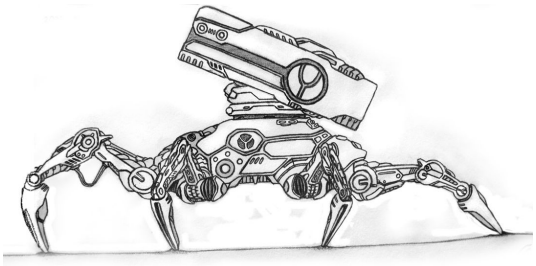
Examining the Data and forming a conclusion

Your conclusion is what you have observed about your test, and is based upon measurements, not opinions. Your data should compare your **variable** against your **control**. For example, *The salty water did not freeze in the freezer, but the control did.* Try **graphing** your results.

Example Science Project Board



If you have chosen to complete a science project, please answer the questions on the Science Project Proposal form on page 12 and turn it in to your teacher by Friday, February 28. You must also register online. Please visit http://www.oakhillspto.org/ **and follow the link to register.**

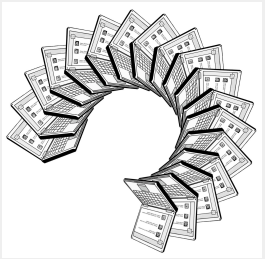


CREATIVE STEM

The **CREATIVE STEM** category is your chance to be creative with STEM. Students will be responsible for supplying all that is required to exhibit their project, such as computers or tablets. Students will discuss their project and the creation process with reviewers. If your project is something that can be projected on a large screen, please email sciencefair@oakhillspto.org.

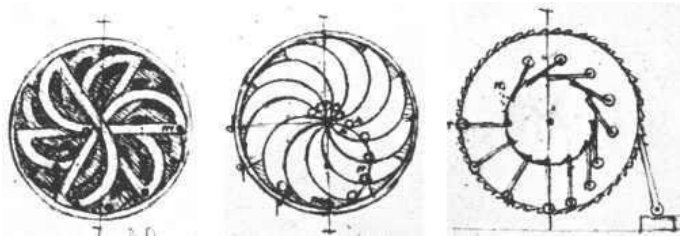
Computer Programs/Coding:

Show us a computer program that you have created and want to exhibit. This could be in any language or any platform. Try Scratch or Code.org or something with Minecraft.



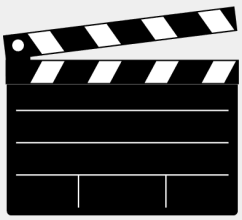
Technical illustration/CAD/Modelling:

Make a real or digital model to illustrate an idea or object. This could be a 3D model, a simulation model, a Lego model (of your own design), or anything in between. Can you model how a wing works? Or how a clock works?



Storytelling/Digital Media:

Show us a way of telling a story using STEM. The possibilities are endless to convey a story with things such as computer illustration, stop motion animation, puppet making, and video editing.



If you have chosen to complete a Creative STEM project, please answer the questions on the Creative STEM Project Proposal form on page 14 and turn it in to your teacher by Friday, February 28. You must also register online. Please go to http://www.oakhillspto.org/ **and follow the link to register.**

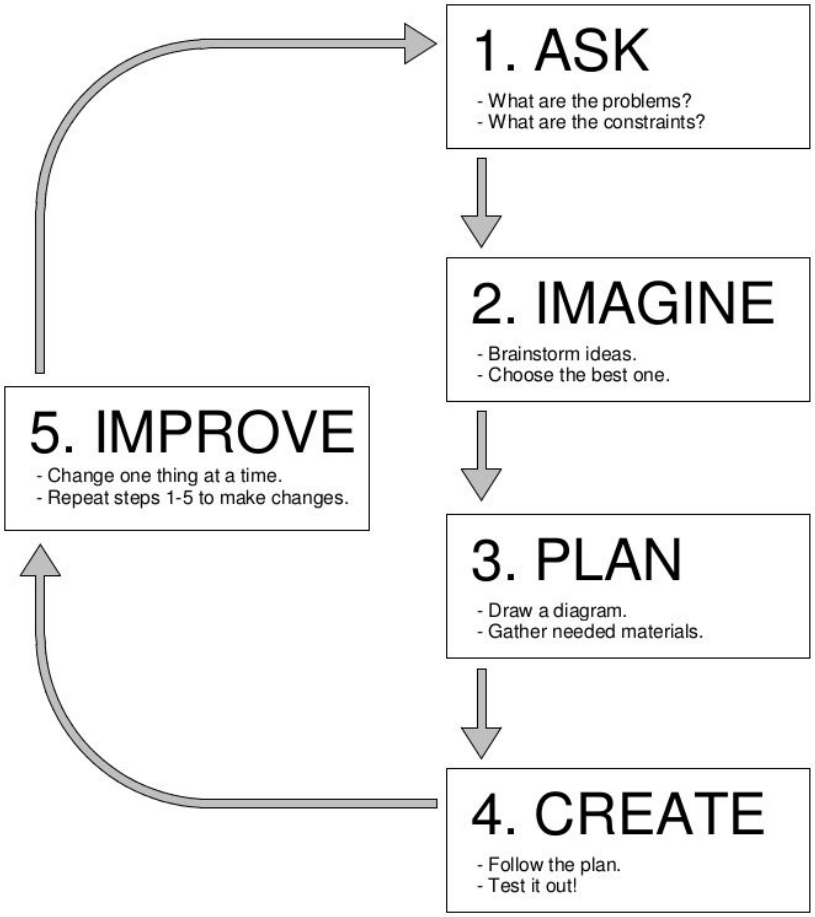
ENGINEERING

Engineers improve or create something for a particular purpose and their project needs to have a measurable result. Students can choose to do a **prototyping project,** where they invent something, or an **improvement project,** where they modify an existing product. Note: If you are inventing something, you need to be able to measure your results to show that it fits its purpose. If you are improving something, you need to be able to measure how much it has improved.

We have prepared two engineering/design projects on the following page that students can pick if they like. In this case only, the project display board is not required. The project will culminate in a final test scenario that will be facilitated and reviewed by a volunteer on the night of the event. Students are asked to keep a design journal and should be prepared to discuss their design process in a group setting. However, students can always design their own problems in which case a project display board is required. In either case, projects will follow the process below.

The Engineering Design Process

Engineers use this process to create or improve things.



If you have chosen to complete a Engineering/Technology project, please answer the questions on the Engineering/Technology Proposal form on page 13 and turn it in to your teacher by Friday, February 28. You must also register online. Please visit http://www.oakhillspto.org/ **and follow the link to register.**

ENGINEERING CONTINUED…

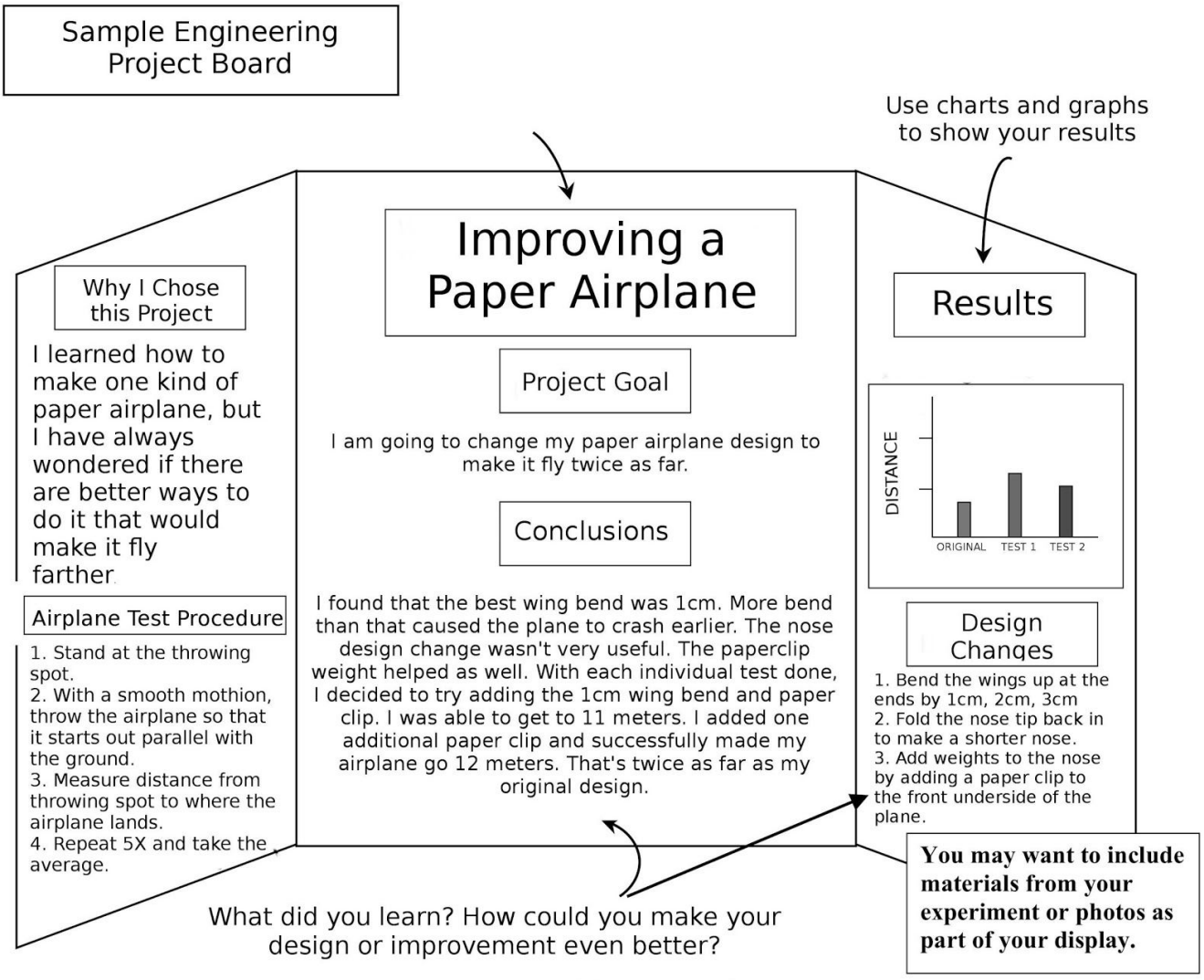
The **goal** (the thing you're making better) and the **constraints** (limits or boundaries) need to be measurable. For example, if the problem is to make a ball bouncier, we must define the constraints. These can take almost any form but need to be measurable. Let's consider two examples, one of improvement, and one of prototyping.

In our first example, we decide to improve the bounciness of a ball. That means we need to be able to measure how bouncy it is now. Then, we need to identify the constraints for our solution. We could imagine constraints such as: the ball must be the same size and a goal that the ball must bounce twice as high as it did before.

In our second example, we want to design something completely new. In this case, we want to make a toy boat. Our toy boat must float, be made out of wood, and weigh less than 1 pound.

In the design process, you will have lots of ideas to try out. As you work to improve these ideas, it is a good general idea to try one different thing at a time. In our ball example, we might have the idea to change the material and to make it hollow. While it may be tempting to try both ideas simultaneously, it's best to try one thing at a time. Perhaps first change the material and test. If that works well, then make it hollow and test again. All of these revisions have measurable outcomes.

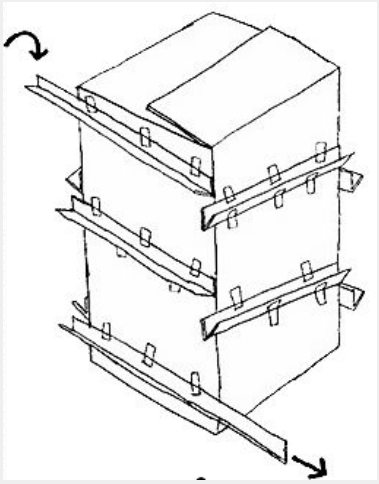
Example Engineering Prototype or Improvement Project Board



ENGINEERING / DESIGN CHALLENGE

Use the Engineering Design Process to solve a challenge! At the **SCIENCE FAIR**, we will run marbles through your marble runs and race your balloon cars! Students should have tested and improved their projects using the Engineering Design Process on the previous page before the **SCIENCE FAIR**. These are projects that are done ahead of time. It will be exciting to see how other students solved the same problems. At the **FAIR**, each student will be able to demonstrate their project. Students should be prepared to discuss their trials and iterations. We encourage them to document their process in words, pictures, or drawings.

Marble Run — Open to All Grades



Do you think you could build a marble run using only tape and cardboard? Will the marble make it from top to bottom in 15 seconds or longer? How long of a run can you build? What design modifications might increase or decrease the marble's speed?

- **Objective:** Using just cardboard and tape to create a Marble Run. One section of your marble run must run uphill!
- **Requirements**: The marble must run for 15 seconds.
- **Materials**:
  - Cardboard
  - Tape
  - Marbles
  - Scissors (with adult supervision)
- **Directions:** Use the engineering design process to help you test and modify your design. Keep track of your process by writing, drawing, or taking pictures.

Go for the record! How long can your marble run?

Soda Straw Rocket — Open to All Grades

Soda Straw Rockets is an excellent opportunity for students to practice the engineering design process. They are challenged to create and modify the design to see how the changes impact the rocket performance. Length, fin shape or angle can be changed–one variable at a time–to see how the rocket launch performs, and compares to the control design. Can you design a rocket that will travel as far as possible? Get ready to grab some simple supplies to bring your idea to life!

- **Objective:** Design and build your own soda straw rocket, using the materials listed below, that will travel as far as possible.
- **Requirements**: All entries must use a rocket made from paper and launched using a straw. The rocket MUST travel 10 feet. Kids must do all the work.

Materials:

- ❑ Pencil
- ❑ Scissors
- ❑ Tape
- ❑ Reusable Straw
- ❑ Paper

Directions:

To make the jet: Wrap the paper around the pencil to create the rocket. Remove the pencil and replace it with the straw. The rest is up to you! Use the engineering design process to help you test and modify your design.

Go for the record! How far can your rocket go?

Foam Rocket — Open to All Grades

Do you think you could build a rocket powered by a rubber band? The foam rocket flies ballistically. It receives its entire thrust from the force produced by the elastic rubber band. The rubber band is stretched. When the rocket is released, the rubber band quickly returns to its original length, launching the foam rocket in the process. Can you design a rocket that will travel as far as possible? Get ready to grab some simple supplies to bring your idea to life!

- **Objective:** Students will construct rockets made from pipe insulating foam, using the materials listed below, that will travel as far as possible.
- **Requirements**: All entries must use a rocket made from pipe insulating foam and launched using a rubber band. The rocket MUST travel 10 feet. Kids must do all the work.

Materials:

- ❑ 30 centimeter-long foam pipe insulation (½ inch size pipe)
- ❑ Rubber band - size 64
- ❑ Cardboard or stiff poster board
- ❑ Three 8-inch plastic cable wraps
- ❑ Duct tape

Directions to make the Rocket:

1. Using scissors, cut one 30-cm length of pipe foam.
2. Cut four equally spaced slits at one end of the tube. The slits should be about 12 cm long. The fins will be mounted through these slits.
3. Cut a 12 cm length of duct tape down the middle to make two pieces. Place one piece over the other, sticky to shiny side, to make the tape double-strong.
4. Slip a rubber band over the tape and press the tape around the nose end of the rocket (opposite the end with the slits). Press the tape tightly and reinforce it with another length of tape wrapped around the tube.
5. Cut fin pairs from the stiff cardboard.
6. Slide the nested fins into the slits cut in the rear end of the rocket. Close off the slits with a piece of duct tape wrapped around the foam tube. The rocket is finished.

If you have chosen to participate in one of the design challenges, please check the line item on the Registration Form.

SCIENCE PROJECT PROPOSAL

Fill out this form and return it to your teacher by February 28 if you are doing a science-based project. You must also register online at http://www.oakhillspto.org/ by Sunday, March 1.

Student Name: _____Grade: _____Teacher:_____

My Question:
What is the question you hope to answer?

My Hypothesis:
A prediction about what I think will happen. *The hypothesis gives you a general guide as to what to expect from the experiment and does not need to be correct*.

The procedure I will use:
(How I will test my Hypothesis?)

My variable:
(the one thing I will change)?

How I will measure my results:

What materials I will use:

Official use only
Notes:_____
_____
_____
_____

ENGINEERING PROJECT PROPOSAL

Fill out this form and return it to your teacher by February 28 if you are engineering a prototype or improving on an existing product. You must also register online at http://www.oakhillspto.org/ by Sunday, March 1.

Student Name: _____Grade: _____Teacher:_____

My project will be (circle one): **Prototyping** or **Improvement**

What are you improving/ prototyping?

What is the purpose or goal?

What are your boundaries or constraints?
(How will you measure this?)

What is your expected outcome?

Official use only
Notes:_____
_____
_____
_____

CREATIVE STEM PROJECT PROPOSAL

Fill out this form and return it to your teacher by February 28 if you are going to explore a Creative STEM project. You must also register online at http://www.oakhillspto.org/ by Sunday, March 1.

Student Name: _____Grade: _____Teacher:_____

What are you doing?

How are you doing it?

What do you expect to have learned when you are done?

How will you present what you did and learned?

Official use only
Notes:_____
_____
_____
_____