

CANADA
4-H PEI

Introduction to STEM At Home Guide

The Introduction to STEM Project is to get members doing different STEM Activities at home. STEM stands for Science, Technology, Engineering and Mathematics! The activities in this project will introduce members to many different scientific concepts in a fun and safe way! Members should always have parental supervision while doing activities!

Project Completion Requirements

Project Items & Record Pages

- Complete at least five (5) project topics or activities
- Create at least two tangible items that will be on display at Achievement Day
- All activities/project meeting topics must be documented on the record page provided.
- Member Booklet (*with completed member reflection pages*)
- NOTE:** Although the group may do activities together, project members are expected to document & display their own project/activity items at Achievement Day.

Exhibition Requirements

Members are strongly encouraged to participate in the 4-H Classes at PEI Fairs & Exhibitions

- Members may choose **ONE** tangible project item to send on the Exhibition Circuit.
- Group members **do not** have to send the same items.
- Chosen item must be approved by the 4-H Specialist at the Club Achievement Day

4-H Year Completion

In order to complete the 4-H year members are required to:

- Complete the **PCR's (Project Completion Requirements)** as outlined above
- Complete a **Communication Project**
- Complete a **Community Service Activity**
- Complete an **Agriculture Awareness Activity**

The Project Leader's Job

To begin, thank you for volunteering your time to be a 4-H project leader! We appreciate your time and willingness to teach today's youth a new skill and share your knowledge.

Becoming a project leader can feel overwhelming at first, but we hope that this page will make your "job" clear and offer some tips to help you be successful.

Responsibilities

1. Become a screened leader

You may have already completed this step, but it is a very important one. The best place to go is to the 4-H PEI website and visit this page: <https://www.pei4h.ca/4-h-leaders>, to see if you have completed all the necessary requirements. Project meetings cannot begin until you have received a "conditional letter" from the Provincial 4-H Office.

NOTE: As of July 2019 a new policy has been implemented by 4-H Canada that each project group be accompanied by two screened leaders. *Insert more information about what National has to say about this policy and why they think it is important for this policy to be in place.*

2. Set Project Meeting Dates

The amount and length of project meetings is determined by you, the project leader. That being said, you are responsible for covering **five** activities or topics (see project activity ideas pages) with the group. You may decide that you'd like to have five meetings - covering one topic per meeting, or you may decide to spend two 5 hour sessions with your group and cover multiple topics or activities in one meeting. This will also depend on the project you are leading. For instance, if you are leading a quilting project, then the member will be focused on one large item with multiple steps and skills involved. However, a rabbit project may require multiple meetings (and even locations) to cover different activities and topics. Meetings can begin anytime after November 15th.

Whatever the case, we highly recommend that Project Leaders **set dates in advance of members signing up for the project**. This method will ensure the members know what they are signing up for, or enable them to make a decision to not sign up if they cannot commit to the dates listed. We also hope that this will avoid a lot frustration for you, because working around multiple schedules is almost impossible!

3. Choose Topics and Activities

You may choose to work on this step before setting dates for project meetings. Some topics and activities may be able to be covered in one project meeting, while others may need their own meeting. Regardless, we ask that you document your project meetings and topics covered on the next page so that the 4-H Specialist can refer to this information at Achievement Day if necessary.

4. Materials & Supplies

While you are responsible for determining what materials and supplies are needed, you **are not** responsible for covering these costs. Options to consider:

A. 4-H Canada has a FCC 4-H Club Fund that all leaders are welcome to apply to. These grants are valued at \$500 each. Applications are accepted August through to the end of October.

B. Asking for supplies. Depending on what project you are leading, just putting a call out for the supplies you need to friends, family, etc. may be successful

C. Determine an estimate total for the materials and supplies needed and set a "project fee" that all members will pay to help cover the additional costs

5. 4-H Year Completion and Project Completion Requirements

The project leader **is not** responsible for 4-H Year Completion (these components will be completed at the Club level) though each member **must** complete these components. Project leaders should focus on the Project Completion Requirements, found on the front cover of this guide. These are the items that the 4-H Specialist will expect to see on display at the Club's Achievement Day (typically scheduled for June-July).

6. Club Meetings & Events

Project leaders are not expected to attend monthly club meetings, but are more than welcome to attend if they'd like to know what is going on at the Club, Provincial or National level of 4-H. Similarly, Club events and activities are open to project leaders, but it is not necessary to attend. Project leaders are encouraged to attend Achievement Day. This is an event that wraps up the Club's 4-H year and a celebration of member success.

The Project Leader's Plan

After reviewing the Project Completion Requirements list on the front of this guide, review the Project Activity Ideas page/s. You can also pull ideas from past experiences, books, social media, online or you can plan to join a tool, attend an event or book a guest speaker. The sky is the limit! Regardless of what activities or topics you decide upon, you should choose five in total. It might be a good idea to ask the 4-H members in your project group what they envision before making a concrete plan. In some cases, the project group members may depict what activities or topics based on what project item they have in mind.

Topics and Activities

1. _____

Supplies needed:

_____	_____
_____	_____
_____	_____

2. _____

Supplies needed:

_____	_____
_____	_____
_____	_____

3. _____

Supplies needed:

_____	_____
_____	_____
_____	_____

4. _____

Supplies needed:

_____	_____
_____	_____
_____	_____

5. _____

Supplies needed:

_____	_____
_____	_____
_____	_____

Sustainable Living

Planning Your Project

- **Review & Select** the activities which you want to learn more about based on your division level - *possible topic choices are included on the next page!* Leaders and/or members are also invited to research and create their own project activity.
- **Discuss** with your project leader the project activity outlines as explained in the guide. The Leader Resource (*available at the 4-H PEI Office*) does include more detailed instructions for some project activities.
- **Identify** your goals & time-line for completing chosen project activities

Sources used for this project:

- <https://www.teacherspayteachers.com/>

Retrieved From, and for Leader Reference:

https://www.4-h-learns.org/sites/default/files/media/documents/mfound/2017-06/Lets%20Go%20Green_Activity%20Guide_2012_CAN_SK.pdf

If you are looking for help with one of your project activities, let your 4-H Specialist know,

Supplies & Materials

Supplies and materials will be needed for this project. Project leaders are not expected to cover the cost of these items. The leader can decide if they would like to set a fee for the project or if they would like to divide up the total cost of materials and divide amongst the project members. 4-H Canada also offers annual FCC Club Grants. Applications typically go live in August and are due at the end of October. These grants are an excellent way for project leaders to get some extra funding for materials.

Remember...

The multiple intelligence theory teaches us that people learn in at least 8 different ways. All individuals will be stronger in some ways of “intelligence” and weaker in others. It follows that the more ways we teach, the more members we will reach. Teaching projects using a broad blend of writing, reading, hands on work, artwork, self evaluation, discussion, and so on, will help increase the learning potential of all members.

Projects are designed to teach many skills. However, the 4-H member is always more important than the subject matter. Stress cooperation in the activities where possible to develop teamwork and cooperation skills. These are valuable skills that will assist them in a number of settings. Ensure the work is completed in a manner that members feel good about themselves and their efforts. This can be done by assigning appropriate tasks or roles based on member’s individual abilities. Modeling and expecting supportive behaviour (i.e. no “put-downs”) amongst members, or by other adults, also contributes to a positive

Project Activity Ideas

Activity #1 - Aluminum Foil Boat

- This activity will challenge you to create the strongest Aluminum Foil Boat you can. Test it out in a tub of water!

Activity #7 - Cargo Plane

- Much like the Aluminum Foil Boat, this activity will require you to try different techniques of how to create the best Paper Cargo Plane

Activity #2 - Paper Tube Toy

- This activity is designed to let you be as creative as you want! With scrap materials around your house create a toy that moves, works or changes in some way!

Activity #8 - Parachute Toy

- There are a lot of different ways you could take this experiment! Makes sure to keep a record of what works and what does not!

Activity #3 - Rain Stick

- When you're done of this craft you will be able to hear a rain storm in your tube!

Activity #9 - Penny Drop Challenge

- Start with a penny if you have one and then move onto other types of change—make sure to keep a record how many droplets fit on each type of coin

Activity #4 - Water Drop Racer

- This is a fun challenge to do with others! See if you can make a track so that the water droplet moves the fastest.

Activity #10 - Tin Foil Tower

- What is the tallest free standing tower your group could make with one box of tin foil?

Activity #5 - Rubber Band Rocket

- Get creative with what materials you have around your house and try to follow along to create a rubber band rocket and launcher

Activity #11 - Tooth Pick Pyramid

- With toothpicks try to make a different kind of tower—see how big you can get your pyramid to be!

Activity #6 - Egg Geodes

- With a few household items you can create some fantastic looking egg geodes the mimic the look of Geode rocks found naturally in different parts of the world!

Activity #12 - Homemade Spectroscope

- This activity will show how light can be split into different wavelengths—this is what creates rainbows!

New Format. New activities. New ideas.

- In its first year of the new project format, the 4-H staff welcome any feedback, questions or concerns about the Blacksmith Project. Please do not hesitate to get in touch. Further instructions are provided in the Leader Guide.
- If you have an idea or topic in mind for a project activity that relates to blacksmithing, be sure to talk to your project leader! The new project format allows you to review, discuss and select activities that interest you and your fellow 4-H project members. If you don't see something that you are interested in, suggest a new idea! Have fun with it!

Activity #1 - Aluminum Foil Boat

This activity will introduce members to gravity and buoyancy. These two forces will be at work while the boat tries to float (buoyancy) and the items in the boat create more weight and push it down into the water (gravity)! You can see these in action during this activity—and while you are participating make sure to write down what action causes what reaction! This is the basic necessity of scientific experiments!

What you Need:

- Aluminum Foil
- Varying small items (coins, buttons, pins, beads ect...)
- A tub or sink full of water.

Instruction:

- Use the Aluminum foil to create a boat shape—get creative!
- Place it in the water with nothing inside the “hull” to make sure it floats
- Once you are sure your boat will float in the water, start your experiment by placing one item in to the boat at a time. See how long it takes, and how many items it takes, until your boat starts to sink.
- Try different shapes of boats to see if there is a difference! Make sure to write down your results!



Activity #2 - Paper Tube Toy

Using all the scrap materials you have around your house , and any paper towel rolls you can collect - make a toy that is somehow working. You could use button wheels, paper clip slingshots, or anything else you can think of! Make sure you explain to others in your household how the machine works, try to make as many different configurations as you can!

Things You Need & Instructions

- Paper tubers (from toilet paper rolls or paper towel tubes cut into 3)
- Any scrap materials you have around the house
- The toy must be designed to work in some function — be creative!
- You should be able to play with it!
- Make sure you record what you created and try to take picture if you can



Activity #3 - Rain Stick

Using some of the same materials as the activity previous—you can create your own Rain Stick. A Rain Stick is a long tube that has rice or dried beans on the inside, that when tipped one direction or the other creates the sound similar to rain fall. This experiment introduces the ideas of gravity as the rice/beans go from one side to the other.

What You Need:

- Long Tube—toilet paper rolls or paper towel rolls or something similar
- Elastics / tape
- Plastic wrap
- Rice/beans/beads (some small objects that will move on the inside of your tube)
- Scissors & markers

Instructions:

- Decorate your tube—be as creative as you would like
- Take your plastic wrap and cut out two circles that are bigger than the ends of your cylindrical tube.
- Place one of the plastic circles on the end of one side of your tube—secure it over the open end of the tube with elastics or tape.
- Add your rice/beans etc.... into the tube
- Secure the other end in the same way with plastic wrap, tape or elastics
- Move your tube gently from side to side and listen to the inside material move—it sounds like rain!

Activity #4 - Water Drop Challenge

The goal of this activity is to create the fastest wax paper track for the water droplets to run on. This will introduce the concepts of velocity and friction. How fast the water droplet will move is considered the velocity of the object, and how the water droplet reacts to the material it is on, how fast or slow it moves, will depend on the friction between the material and the water droplet.



What You Will Need:

- For how many people will be taking part in this experiment—have that many different containers of water. If available, use food colouring to differentiate between the different participants.
- Wax paper—3 ft and 4 inch strips
- Eye dropper or a straw to correctly administer one droplet at the time
- Chairs, tables, books... anything that could be used as a ramp for the wax paper strip
- A stopwatch or a way to keep time
- Tape

Instructions:

- Use the wax paper and strips to create your water droplet track
- Create different ramps of different sizes to test your droplet on
- Drop one droplet of water onto the track and time it! See how you could get the fastest time
- Make sure to record your discoveries

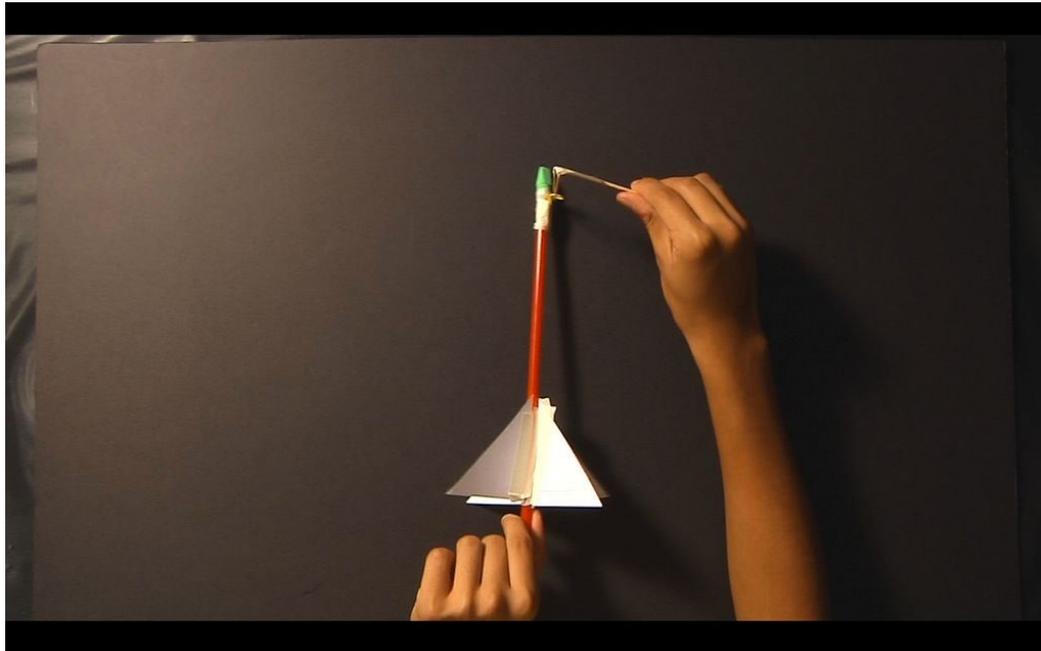


Activity #5 - Rubber Band Rocket

Your goal for this activity is to launch your rocket to the greatest height you can—the materials listed below can be substituted with other more accessible materials if needed! Get creative to make this project. The scientific concepts in this activity we have already seen—velocity and gravity. But, we are also introducing the concepts of aero-dynamics—or how the velocity of the object pushes against gravity so that it can fly!

Things You Will Need:

- 1 – Cap eraser (you could also create the nose of the rocket out of tape)
- 1 – Standard paperclip
- 1 – 3” x 5” Index card or another piece of paper cut to this size
- 1 – Rubber band
- 1 – Any craft stick
- 1 – Drinking straw, or lightweight tube
- Masking Tape
- Ruler
- Pencil



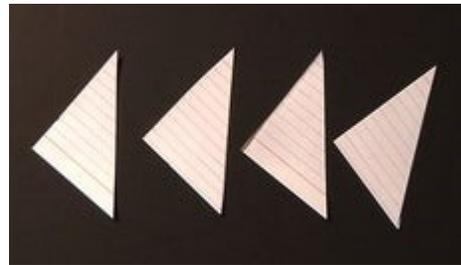
Activity #5 - Rubber Band Rocket

Instructions:

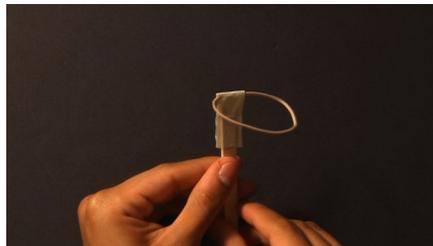
- Insert one end of the straw or lightweight tube into the cap eraser to make the nose of the rocket - or create it out of the masking tape, making a point on the end of the tube
- Bend down the larger end of the paper clip so that you make one part of the launcher— tape the paper clip with the bent end sticking away from the straw/ tube just behind the nose of the rocket.



- Fold the index card in half to make a crease and cut along the line. Draw a diagonal line across the pieces of the index card—from the top left corner to the bottom right. Cut along those lines. Place a piece of tape on either side of the longer, straight edge of one of the triangles. Stick it to the opposite end of the straw from the cap eraser or nose of the rocket. Repeat steps for the other triangles so they are evenly spaced around the rocket body and you have four fins.



- Tape the rubber band to one end of the craft stick or solid stick you are using. Use two pieces of tape to do this - double up one on top of the other to ensure the rubber band will not move



- To launch, hold the rocket by the straw below the fins. Put the rubber band around the paper clip and pull back—let the rocket go and it should launch!

Activity #6 - Egg Geodes

What are Geodes? Well in the natural world geodes are rocks that have spaces inside that allow crystals to form. This is due to a process called sedimentation that happens over many years. Over that time small particles that are in the fluid, inside of the space of the rock, slowly come together to form crystals. This experiment will mimic this process with Epsom Salt as the particles, Water as the fluid and an Egg Shell as the rock! It takes a few days to see the full effects of this experiment so be sure you have parental supervision while going through these steps!

What You Need:

- 3-4 Raw Eggs
- Craft Glue
- Epsom Salt
- Food Coloring
- Small Containers
- Small Paint Brush
- Toothpick
- Water
- Small Pot and Stove
- Small Screw Driver (optional)



Instructions:

- Crack your egg at the narrow end (use the small screw driver if you have one) and slowly largen the hole. It needs to be the size of a quarter. Empty out the contents of the egg.
- Rinse the shell out and the gently rub the inside of the egg to remove the membrane—the filmy layer inside the egg.
- Let your egg shell dry— you can gently paint your egg shell at this point as well if you would like too!
- Once dry, put a thin layer of craft glue on the inside of the shell using the small paint-brush
- Sprinkle Epsom Salts onto the glue, shaking out any extra and let dry
- For this step you will need an adult to help— boil 1 cup of water. Once boiled remove the water from the heat source and stir in 1/2 cup of Epsom salt. Do this 1-2 table-spoons at a time until the liquid is quite thick (thicker than water or until the salt will no longer dissolve in the mixture).
- Place each egg in a small container so it is sitting with the hole facing upwards and spoon the mixture into the hole. Add a drop or two of food colouring and stir in with a toothpick
- Place your shells somewhere the won't get knocked. Check them daily and break apart and thin layers that may form over the top—you need to let the liquid inside evaporate. In 2-3 days you will have a shining geode!

Source: https://theresjustonemommy.com/crystal-egg-geode/?fbclid=IwAR2rbQII3VPM7keqZLr8QzUnQFdrHgv39OjOJm_E8HpXh75CDbKctsWpi9Y

Activity #7 - Cargo Plane

This challenge is to create a paper plane that can carry the most cargo—by using various materials like coins and buttons as “cargo” you can test how much weight the paper plane can carry and still fly at least 6 feet! Try different types of paper airplane folds to see which gets the best results!

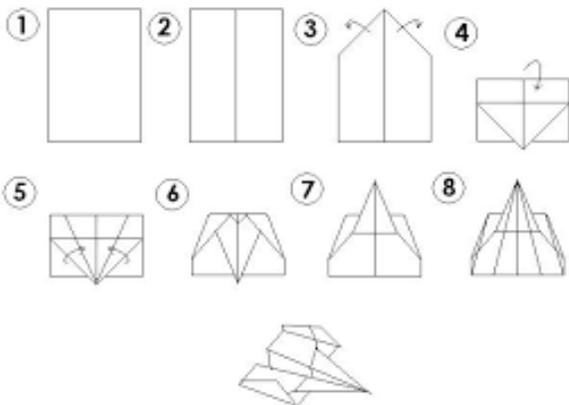
What You Will Need:

- Paper
- Lots of Tape
- Variety of coins or different small materials
- A measurement of six feet (by ruler or measuring tape)

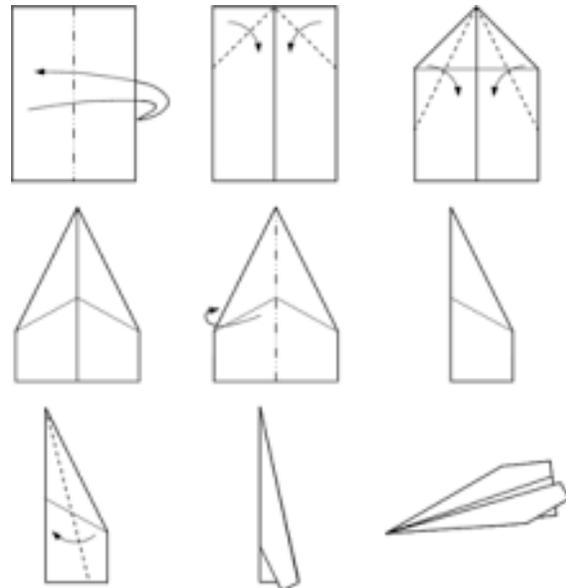
Instructions:

- Fold a paper airplane
- Add the coins or small materials one by one to see how much weight the airplane could hold while still flying six feet
- Here are some different types of paper airplane folds—

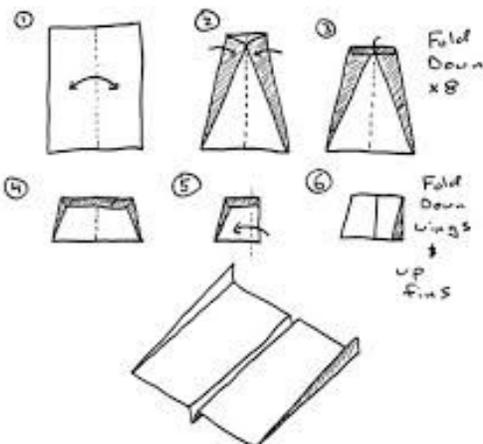
Paper Airplane #1



Paper Airplane #2



Paper Airplane #3



Activity #8 - Parachute Toy

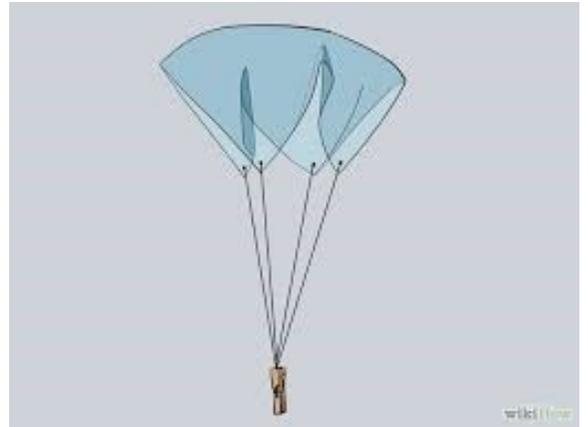
A different type of aerodynamics are needed for this flight activity—now we are using parachutes to combat against the weight of a toy being pulled down by gravity! Choose any toy that is not too heavy and small enough that you could tie it to a plastic bag— a Barbie or Action Figure would work best but use what you have got!

What You Need:

- Plastic Grocery Store Bags or small Plastic garbage bags
- Ribbon or yarn
- Scissors and tape

Instructions:

- To create a parachute lay the garbage or grocery bag flat. Cut a small hole in the two bottom corners of the garbage bag—through both sides. Tie a string of yarn or ribbon through the holes, and through the two handles of the grocery bag. If you are using the garbage bag you may need to cut holes in all four corners of the bag—through both sides.
- Attach the string to the toy
- Get to a safe height and drop! Make sure you won't hit any one!



- See how your parachute works! If it is dropping too fast—that means the gravity is more powerful than the “drag” caused by the parachute, so you should try a lighter toy. The opposite would be if your parachute was moving very slowly and fell to one side of the other, and the air doesn't stay underneath the parachute—this means the toy is too light and the pull of gravity is not enough to create the energy needed and you should try a heavier toy.
- Make sure to record your observations and try different toys to see what happens!

Activity #9 - Coin Drop Challenge

This activity is short but very interesting! Based on the characteristics of water, the molecules will stay together and yet they will expand to fill the space they are placed in. This is why you could have the same amount of water in two different sized glasses and they would still fill the same way—from the bottom up, filling all the space that it can. You will see this in action when you drop, one by one, water droplets onto coins... watch how the water acts!

What You Will Need:

- A paper towel or dish cloth in case of spills
- Different sized coins
- A water dropper or straw
- A small dish of water



Instructions:

- Place all your materials out on a flat and stable surface like a table or the floor
- Put your coins on the towel or dish cloth
- Use the water dropper or straw to put one drop at a time onto the first coin in your line up—make sure to count how many drops it takes to cause the water to spill over the coin's edge.
- Record your observations! Ask yourself—how does the water behave and what does that mean about the substance of liquids?
- You might find that due to the characteristics of a liquid, the water droplets will hold together as much as they can. Liquids are more solid than gas and so they will not totally spread to take up the space of an entire room (like air or perfume), liquids are reacting to gravity enough that the molecules will only fill up the area from the bottom up as long as they can. That is why the water creates a little mound on top of the coin until the mass of the water is more than the mass of the coin and it spills over!



Activity #10 - Tin Foil Tower

What is the tallest free standing structure you can make out of tinfoil? This is an engineering challenge where you will learn about the concepts of gravity, balance, support and some basic physics! The key to this activity is to understand that the bottom of your structure is more important than the height—your creation will not get very high unless you create a good support on the bottom! Good Luck!

What You Need:

- A solid and flat space to work on—like a table or the floor
- Lots of tin foil!

Instructions:

- Try to create a tin foil tower!
- Make sure your structure has a lot of support on the bottom so that it can hold the height without tipping over! Think of the Eiffel Tower or a Sky Scrapper! They always have a solid base so that the tower doesn't tip!



Activity #11 - Toothpick Pyramid

This activity is similar to the one above but you are using different materials! This time you will see what the tallest free standing structure you can make out of toothpicks! The same concepts apply—so try both and see which one is easier and which one is harder! What does that tell you about the material you are using?

What You Need:

- A solid and flat space to work on—like a table or the floor
- Toothpicks
- Tape

Instructions:

- Attempt to make a free standing structure out of toothpicks any way you can think of!
- Use the tape to hold together the edges of your toothpicks
- Make sure your structure has a lot of support on the bottom so that it can hold the height without tipping over! Think of the Pyramids in Egypt—they are larger at the bottom and get smaller at the top so that the structure can hold its own weight and not tip over!



Activity #12 - Homemade Spectroscope

Did you know that the light we see contains all the colours of the rainbow? However, these colours are only visible when they are split into different wave lengths - this happens in various ways! You always see a rainbow after it rains because the moisture in the air splits the light particles making the colours visible! What this experiment will do is create a tool you can use to view a rainbow anytime! This tool is called a Spectroscope!

What You Will Need:

- Empty paper towel roll
- Craft knife and/or scissors
- Blank or old CD
- Pencil
- Small piece of cardboard or cardstock
- Tape
- Paint / markers/ crayons etc.



Instructions:

- First - decorate the empty paper towel roll! Colour it in any way you would like so that you can tell yours' apart from others!
- Get an adult to help you with this next part - use a craft knife to cut a thin slit at a 45 degree angle, cut it so that slit is angled toward the bottom of the tube.
- Then directly across from the slit—cut a square hole which will be your viewing hole!
- Trace out one end your cylindrical paper towel roll onto a piece of paper or cardstock. Cut a rectangle hole in this circle which will be the hole light will come through, and tape it to the top of the roll or the other end away from the peephole and CD slit.
- Insert your CD into the 45 degree angle slit with the shiny side facing up!
- Go outside with your Spectroscope and angle towards (BUT NOT DIRECTLY AT) the sun! Look through the peephole to the fractured light particles create a rainbow. Try it with different types of light (florescent , lightbulbs, candle) and see the difference!

Member Reflection

As a 4-H member, you are encouraged to “Learn to Do by Doing” through hands-on activities. Keeping a record of your 4-H activities with this **Member Reflection** will provide helpful insight for you, your leader and the 4-H Specialist as to skills you have learned and projects you have completed throughout the 4-H year!



Skill Based Project: You are encouraged to work on skill development and completion of project requirements (with guidance from the project leader) throughout the 4-H year. Not every activity will have a tangible item (for display), but you are asked to share the activities and learnings in which you participate below...

Project Activity: _____

What I did: _____

What I learned: _____

What I liked: _____

Project Activity: _____

What I did: _____

What I learned: _____

What I liked: _____

Project Activity: _____

What I did: _____

What I learned: _____

What I liked: _____

Project Activity: _____

What I did: _____

What I learned: _____

What I liked: _____

Project Activity: _____

What I did: _____

What I learned: _____

What I liked: _____

(feel free to use more space if necessary!)

LEADER COMMENTS (optional): Leader observations can be helpful to you in future years with this and other 4-H projects. Be sure to ask your project leader if they would like to reflect on your 4-H year.

I am most impressed by... _____

I believe that you have learned... _____

In the future I encourage you to... _____

4-H Year Completion Checklist

In addition to completing a Skill Based 4-H project, members are also required to participate in Communications, at least **ONE** Ag. Awareness Activity and **ONE** Community Service Activity in order to complete the 4-H year.

Use the space provided to reflect on what you have learned through participation in these activities.

If this information has already been completed in another booklet, please indicate where it can be found:

My Communications Activity

- Speech
 Demonstration (Single)
 Demonstration (Team)
 Alternate Communications: _____

What I learned: _____

What I can work on: _____

Agriculture Awareness Activity

What did you do to complete this activity this year? (Either on your own or with your 4-H Club)

What area of Agriculture would you like to explore in the future?

Community Service Activity

What did you do to complete this activity this year? (Either on your own or with your 4-H Club)

What will you do in the future to give back to your community?

4-H PEI - Staff Comments (Optional)

Completion Requirements		<u>Completion Notes</u>
Skill Based Project		
Communications		
Ag. Awareness Activity		
Community Service Activity		