STEM Activities

Popsicle Bridge Competition

Rules

Patrols are invited to build a bridge using a kit supplied by the council. Bridges are to be built prior to the camporee. Scouts are encouraged to work together as a patrol project. Scouts should build a bridge that will span a distance of 15 inches and must be at least 3 inches wide. The bridge does not have to have a solid surface or road. The bridges will be placed on two supports that are 15 inches apart. Weight will be applied near the center of the structure until it fails. The goal is to build a bridge that will support the most amount of weight.

Popsicle Bridge

Patrols are challenged to build a bridge using popsicles sticks and glue. Bridges are to be built prior to the camporee. Scouts are encouraged to work together on this project. Adult leaders should share ideas IF ASKED. Scouts should use their thoughts to design and build the strongest structure they can.

Use ONLY a maximum of 100 standard popsicle sticks. Build a bridge that will span a distance of 18". The bridge will need to be at least 3" wide. The bridge does not need to have a solid surface or road. A standard Popsicle stick is 4 ½" long and 3/8" wide. DO NOT USE jumbo sticks, which are 6" long and 1 1/16" wide.

The bridge will be brought to the judging area at the camporee. The bridge will be placed onto two supports that are 18" apart. Weight will be applied in the center of the structure until it fails. The goal is to build a bridge that will support the most amount of weight.

Super Soap Bubbles

This experiment is all about physics. Participants will learn about how different surfaces cause different soap bubbles to form. Plan on seeing bubbles. Lots and LOTS of BUBBLES! Each lab will contain enough supplies for all lab members to participate. Older boys (ages 11-13) will have fun building a variety of wireframes while younger boys (ages 7-11) will enjoy seeing all the different bubbles being formed. Click here for a list of materials and instructions.

Elephant Toothpaste

In this experiment, participants will learn about the role of chemistry. By combining a few simple home ingredients, scouts will watch as a major foam reaction occurs, perhaps reminding them of a giant tube of toothpaste. The experiment is quick, easy and great for all ages. Click here for a list of materials and instructions.

Slime Time

The purpose of this experiment is to show that chemistry isn't just important, it's fun! Each lab will go through a series of measured steps in the process of creating homemade SLIME! Participants will be left with a better understanding of the role chemistry plays in their lives while also leaving them with a fun take home gift. This event is for all ages and will be fun for anyone. Click here for a list of materials and instructions.

Cobra Sticks

Demonstrating a steady hand will be key when performing this fun activity. Everyone in the lab will take turns weaving together popsicle sticks into a long chain that takes the shape of a snake. After the puzzle has been completed, it's time to watch your creation come to life! Click here for a list of materials and instructions.

Catapults

Scouts will get an opportunity for a hands-on engineering lesson with this experiment. Each participant will get their own wood kit to construct a working catapult that they will put to use. Put Newton's first law to work and watch it throw! Click here for a list of materials and instructions.

SPECIAL EVENTS

Cook-off Completions

This year's cook-off theme is based on the STEM concept and how well do you use science, technology and engineering or some scientific research to create a tasty dish. Are you an Alton Brown type of Scout when it comes to cooking? Some examples might be using a solar oven, cooking on a car dash or engine, making use of chemical reaction for cold or hot dish, dehydrated foods or ERMs that can cook or freeze your meal in front of our judges. We are looking for creative alternative ways to cooking. The more scientific, the more creative engineering and the better use of technology you can prepare your dish the better.

Scoutmaster Cook-off

Your Scoutmaster will be going head to head with other Scoutmasters in making the best main dish ever in this year's Scoutmaster Cook-off.

Patrol Cook-off

Your patrol will be going head to head with other patrols in making the best dessert ever in this year's Patrol Cook-off.

Cardboard Boat Races

Scouts will construct a boat out of duct-Tape and cardboard. The boat must hold two scouts and will be raced across the pool. There will be points for creativity, etc., and if the boat is not fully constructed out of card board and duct tape; 25 points will be deducted upon entering. Each unit will be provided with cardboard and 1 roll of duct tape at check-in. You may bring additional cardboard and duct tape if you wish. The race is scheduled for 4PM on Saturday afternoon at the pool. All boats need to be constructed on site & before races.

LifeNet Helicopter

This active duty medical helicopter will be on display at the Camporee. This crew is on active duty and if they receive a call they will need to respond.

Astronomy

This will be done after the campfire on Saturday night. Come out and learn about our heavenly night sky.

PATROL STEM Survival Kit

Each patrol will need to have a STEM survival kit. This kit is only a suggestion. Each patrol will need think about the items they will need based on the events they have selected. Listed below are suggestions. You may want to bring other items, or additional items.

- Knife – X-Acto type
- Markers -assorted colors
- Tape – duct, Scotch &/or clear
- Fast-drying glue – Glue stick
- Pliers, twisters & Scissors
- Tooth picks
- Needle, thread & spools
- Q-tips
- Eye droppers
- Wire
- Zip-ties
- Zip-lock bags – quart & gallon
- Paper – gridded & plain
- 3x5 cards
- Pencils
- Paper clips
- Small stapler & staples
- Compass &/or GPS
- Bubble wrap
- 2 Quart soda bottle
- Lighter
- Marbles
- Flashlight
- Balloons
- Drinking straws
- String
- Nails & hammer
- Straight edge or Ruler & Protractor
- Batteries – C cells & 9v
- Safety Pins
- Rubber bands
- Small paint brushes or foam brushes
- Assorted pins
- Small paper bags
- Plastic spoons
- Popsicle sticks large & small

PATROL EVENTS

Events at this camporee will be on a first come first serve basis and Scout patrols will only be able to select two of the four areas (Science, Technology, Engineering and Mathematics) during the Camporee; one area in the morning, and one area in the afternoon in each area there are many activities that they can rotate

through. Each area / event may have a limit, as to the number of scouts that can participate in each. Please note that many of the activities may meet rank and merit badge requirements. Wristbands will be handed out during check-in and must be worn be all day on Saturday. Scouts will not be allowed to participate in activities without them. In addition, patrols may complete in the Popsicle bridge, cardboard boat race, patrol cook-off, and astronomy activities.

SCIENCE

Geology – A wide range of geology projects and rock experiments from creating miniature salt flats, to comparing the hardness of minerals, to making crystals!
Wind Power – Kites have been used for years for entertainment and science – come and test your skills.
Chemistry – Make some goo and other fun chemistry projects that will make you go ahhh.
Archery – Learn the science behind the sport of archery and do some shooting.
Hot Air Balloons – Build your own hot air balloon and see how high hot air will take you.
Build a Radio – Build a radio using simple parts.
Mouse Trap Car Races – Build and race your car that is made out of a simple mouse trap.
Ice Cutting – What different materials can you use to cut ice?
Weather - Make gear and instrumentation to help predict the weather.
Plant Identification – Learn how plants affect our everyday life. This activity will meet the trail to 1st requirements.
Wildlife Identification – Learn how animals travel, their tracks and signs. This activity will meet the trail to 1st requirements.
T-shirt cannon -Use compressed air to propel a tee shirt at a target
Magnet Challenge – Build an electric motor or electro-magnate
Build an Electroscope -
Polymers –Make gummi worms by mixing various compounds
Experiment Design – use the scientific method to design a science experiment
Vandegraaff generator – see how static electricity can be developed
Cartesian Diver- See how pressure and density affect objects

TECHNOLOGY

Solar Power- Can you use the sun to cook and melt metals? What other ways can you make use of the sun?
Catapults - Make and design a catapult using simple materials and see how far you can shoot an object.
Robotics – Make a simple robot.
Airplanes – Learn what it takes to fly by building a model plane, along with flying them.
Rockets – Build your own and then launch it.
Air Power – Water Bottle Rockets – Decorate and shoot your rocket. How high can you go?
Fire Building- How many different ways can you start a fire?
Electronics – Learn about electrical components, circuits, and schematics while building a simple project.
Papermaking – Learn to make you own paper.
Water and scuba diving principles – Build a Cartesian diver and other projects that make scuba diving possible.
Hydraulic Machines- Build and learn about hydraulics.
Robotics – (SUNY) robotics demonstration
Lego Robotics - See how robots are built and run a mission
Drones –See a real drone take off and hover over the campsite sending pictures
GPS/Geocaching –Learn how GPS works and use equipment to navigate
Virtual Reality –Use virtual reality goggles to see 3D
Paper Airplanes – See how different plane designs affect flying distance
Fun with magnets - See how magnets create electrical fields as they move

ENGINEERING

Pioneering – How many different ways can you use your pioneering skill to build simple machines? This activity will meet the trail to 1st requirements

Transportation – How can you move things?

Simple Machines – Use your skills and creativity to build different types of machines.

Model Building- All engineering ideas start with models and prototypes, from napkins, computers, and 3D. Here you will be building some of your own designs.

Rube Goldberg Machine – Ever play Mousetrap? Try your hand at building a large course with everyday objects.

Metal Detecting and Mining – Learn how to use a metal detector and do some gold panning this activity will introduce you to the new Mining MB.

Sling Shots – Develop and shoot sling shots made from different materials.

Marble Rollercoaster- Try your hand at building a large course with everyday objects.

Metalworking - Learn to form, cut, and cast metals.

Rockets – Build your own bottle rocket and launch it using compressed air

Model Rockets –Bring your own model rocket and launch it

Gasoline Engines – Take apart an engine and see what makes it go.

Pulleys –See the impact of using pulleys on pulling or lifting heavy objects

Oil Spill –Use various materials to contain and clean up an oil spill

Computer –See the insides of a computer and what makes them work

Steam Engine- See how steam power is used to create electric energy

Jet engines- See the insides of a jet engine and hear one start up.

MATHMATICS

Code Breaking – Make a code and try to break one.

Map and Compass – Can you build your own compass? This activity will meet the trail to 1st requirements.

GPS – Geocaching – Can you find the cache and bring back the prize?

Knot Science – Learn the science behind ropes and knot use. This activity will meet the trail to 1st requirements.

Large 3 person Sling Shots – How far and accurate can you as a team shoots an object?

Rubber Band Guns – Build and shoot your own rubber band gun.

Chess – Chess and math is there anything else that needs to be said?

Frisbee Golf - Here you find out how to apple acceleration, height, and angle to play a game.

Pool – You will create a large pool table and play a game.

Bowling – Bowling, known as "ten pins" throughout most of the world, is a game played by rolling a heavy ball down a long narrow track and attempting to knock down ten pins arranged in the form of a triangle with its vertex oriented towards the bowler. The arrangement of the 10 bowling pins is that of a tetractys. Learn more about how mathematics is important to the game of bowling while playing a game or two.

Sierpinski Triangle – How large can you make or build yours?

Tug-A-War – A twist on the old game made be in stored.

Fishing Challenge - use various weights to determine casting distance

Crossing the Street – Use speed and distance to solve pedestrian crossing time

Mean, Median & Mode -Use statistics to solve problems using darts & marbles

Odds – Learn how the 'house' always wins using dice and roulette

Heights and distance – Use mathematical calculations to determine height and distance

Surveying – See how technology has impacted surveying from tape measure to GPS

Jeopardy - Give questions to the math answers.

Following is a list of some of the activities and programs that we plan on having at the event. As we work through the list of events, we will drop some, and add others in their place. We are constantly looking for

ideas that can improve or add to what we already have. A final list of stations and corresponding map will be published closer to the camporee date.

The stations listed may or may not be the actual stations at the camporee, as well as many additional stations being added as we move forward

Rockets – launch different items with air and with liquid
Stream Study – study stream in park and impact we have on it
Catapult – Make/design a catapult using simple materials
Rubber band guns – Shoot a rubber band with a device you make
Ice Cutting – How to cut ice with a copper wire
Papermaking – Make a piece of paper
Simple Machines – The principles behind the 6 simple machines and how to use them
Egg Smash – Timed event to make an egg smash container
Robots – An area set up to make a simple robot, or hopefully, bring your own
Spaghetti Bridge – Make a bridge out of spaghetti
Pedal Cars – Self propel yourself around the pedal car course
Rube Goldberg Machine – Ever play the game Mousetrap? Try your hand at building a large course with everyday objects.
Pinewood Derby Cars – Experiment with putting weights at different spots to increase speed
Code Breaking – Make a code, try and break one
Magnets – How do they work, what can you do with them
Astronomy – See the stars in a mobile planetarium.
Chemistry – make crystals
Sound – How is sound made and transmitted?
Penguin Dwelling – Build a dwelling for an ice cube, put it under a heat lamp, see how much melts
Hexahexaflexagon – Construct one and learn how to use it. Learn how to say the word!
Mobius Strips – How many sides does a piece of paper really have?
Skimmer – Make a skimmer and then see if it will fly, and how far
Windmill – How much electricity will a windmill generate? Build propellers and find out
Slide Rule – Do these ancient things really help you do calculations? Can you build your own?
Weather Station – Can you predict the weather?
Rope – Can you really find out if a structure is square, with a piece of knotted rope?
Sierpinski Triangle – How large can we make one?
Solar system – Walk from earth to the moon, and back again. All in a matter of minutes.
Sun dial – Learn to tell time with a sun dial. Learn how to tell time in the woods.

Other displays from local high-tech companies.
Science Fair – You can enter our Science Fair as an individual, den or patrol, pack or troop.
(See full rules, regulations and registration information on pages 23-33)
Robot Competition – Build your own robot and compete against other Scouts.

STEM CAMPOREE

Science Fair Rules, Regulations & Registration

On the next pages is all the information for the Science Fair to be conducted at the camporee. The Science Fair Committee tried to address all the possible questions that could be asked. However, if you have a question that you cannot find the answer to on these pages please contact the Science Fair Chairperson, Sue Shorter, at sbshorter@msn.com, and she will attempt to find the answer for you.

The Scientific Method

These are the basic steps that should be followed when working through an experiment. Participants are encouraged to refer back to these steps throughout the project.

1. Define the Problem

Pick a subject that you like and have interest in. Do background research to familiarize yourself with the subject. Talk with people who have knowledge of the subject. Many people will be glad to help you, they just need to be asked.

2. Formulate a hypothesis

A hypothesis is an idea of what you think might happen given the understanding you have gained from your research. The purpose of setting a hypothesis is to keep you focused on answering a specific question and keeping your experiment on track.

3. Design your experiment

Keep you project as simple as possible. It is better to test one variable thoroughly than to test many at once. All experiments need an appropriate control. You need to have a standard to test your experimental results against. Allow enough time for the experiment to be repeated. Begin early and understand the project before you begin and allow 6 – 8 weeks to complete the experiment.

4. Keep a detailed notebook

Don't cross anything out. Entries should be dated. Include all observations. They may be important in supporting your conclusions.

5. Collect data

Quantify your results by reporting numbers not just observations.

6. Formulate a conclusion

Did your data support your hypothesis? If not, that is a result too. You are not out to prove your hypothesis. This is about, here is what I thought would happen, and here is what actually happened.

7. The Final Presentation:

Tips: For the Science Fair There are several essential elements to a good presentation:

1. Present your data using averages, not individual measurements. Also, don't present the data more than once. Don't make a line graph and pie chart of the same data. Finally, don't include more than one variable on a graph or it gets confusing.
2. Report sample size (n=?). Older students should give some statistical analysis of their data, such as standard deviation, a nova or t-test.
3. Have print large enough to read from a distance.
4. Be sure that you understand all the terms and acronyms you present.

Calendar of Events

April 4, 2014 Science Fair Entry Form Due, January 1 through May 1, 2014 Conduct Experiment and Complete Board, May 3, 2014 Science Fair at PA Dutch STEM Camporee and Awards Ceremony

Basic Ingredients for a Science Fair Project

Science Fair Do's and Don'ts for Parents

DO:

1. Let your scout select a topic or question that is interesting to him or her
2. Have your scout research (read about) his or her topic so the scout will be knowledgeable about the topic
3. Show your scout how to keep things organized (use tables, graphs, etc.)
4. Help your scout setup a timetable to keep up with deadlines

5. Help your scout plan the experiment. A good experimental design includes a control and a variable. A control is part of the experiment that shows the importance of the missing variable. A variable is the factor that is tested. Compare the variable to the control. Help your scout gather his or her results and present them using numbers when appropriate.
6. Help your child see trends or patterns in the results and be sure that he or she can explain how the conclusions were reached

If your scout is working on a science fair project for school this year, it may be used for the PAD Science Fair, as long as it meets all criteria for the event.

Don't:

1. Don't do the project for your scout
2. Don't select the topic for the child; it is okay to help your child narrow down the topic.
3. Don't allow your child to do an "overnight" project. i.e. a project that takes only a day to do
4. Don't let your scout make up data; all data should be observable and measurable
5. Don't allow your child to copy a project from a book, a web site, or any other source. It is okay to get ideas from these sources but then encourage your scout to develop a question from which an experiment can be conducted. For example, "I wonder what would happen if…?" His or her question becomes the topic of the science fair project.

Ideas for Science Fair Projects

Links

http://www.ecologyproject.org/educators/?gclid=CJ67r7-muboCFUwV7Aodl3EAXA
http://www.sciencekids.co.nz/experiments.html
http://www.sciencebuddies.org/science-fair-projects/science_project_ideas.php
http://chemistry.about.com/od/chemistryactivities/tp/Easy-Science-Projects.htm

Cub Scouts

Tigers:

Requirement 5F- Weather
Elective 34- Conservation

Bear:

Requirement 6E- Energy
Elective 1- Space
Elective 2- Weather
Elective 3- Radio
Elective 4- Electricity
Elective 7 Things that Go
Elective 15- Water and Soil Conservation

Webelos:

Scientist Badge
Engineer Badge
Geologist Badge

Belt loops (All levels)

Astronomy
Geology
Science
Weather
Wildlife Conservation

Boy Scouts/Venturers

Aviation
Bird Study
Chemistry
Electronics
Environmental Science
Fish and Wildlife Management
Forestry
Geocaching
Geology
Insect Study
Mammal Study
Nature
Oceanography
Orienteering
Plant Study
Reptile and Amphibian Study

Robotics
Soil and Water Conservation
Space Exploration
Do Different Colored Roosters Lay Different Colored Eggs?
Sustainability
Weather

Risk Assessment for Science Fair Project

The following are NOT allowed as part of the project display

- ☐ Living organisms
- ☐ Preserved specimens or human/animal parts or body fluids
- ☐ Human or animal foods
- ☐ No poisonous plant materials
- ☐ Glass objects unless deemed appropriate by the PAD Science Fair Committee
- ☐ All chemicals including water, dry ice, drugs/medications, test strips/chemicals
- ☐ All hazardous devices such as weapons, ammunition, type 3&4 lasers, syringes, needles
- ☐ Flames or highly flammable materials
- ☐ Batteries with open-top cells
- ☐ Awards, medals, business cards, flags, logos, CDs, DVDs, brochures, booklets, endorsements
- ☐ Visual presentations depicting vertebrate animals in surgery, dissections, necropsies, lab procedures, etc.
- ☐ Identifications like name, postal address, e-mail address, telephone, etc.
- ☐ Active internet or email connections as part of displaying or operating the project
- ☐ Any apparatus with unshielded belts, pulleys, chains, or moving parts with tension or pinch
- ☐ Any apparatus producing temperatures that will cause physical burns if not adequately insulated Images
- ☐ Photographs/visual images must be credited (Photograph taken by… or Image taken by…)
- ☐ Photographs/visual images of other persons (not contestant) must have permission in writing from the photographed student and parent if not over 18 years old
- ☐ The PAD Science Fair Committee must view in its entirety and audio-visual or multi-media presentations

****The ***Guide to Safe Scouting*** must be followed.