

Hosted by Troops 56 & 65, Delta/Greely, Midnight Sun Council

We are excited to welcome you to a BSA weekend Camporee focused on engineering and rocketry.
Fort Greely's Missile Defense Agency will give us a special presentation, and engineers & staff will help scouts complete the requirements for their Engineering Merit Badge through various STEM activities.
A 2-liter bottle rocket competition will close out Saturday's events, with the award going to the troop with the best rocket. See you soon!

Dates: Friday – Sunday, August 25-27, 2023

Location: Delta Junction Buffalo Fields Mile 1405.5 Alaska Highway (16 miles east of Delta Junction)





For information: Scoutmaster Steve Meurer 907-388-6551 stvmer1@gmail.com Scoutmaster Andrea McCarrick: 907-616-0625 andrea.mccarrick@hotmail.com Join our Facebook group "Delta Greely BSA Camporee" (scan QR code)

Registration & Costs:

All participants must be registered to attend the camporee. This includes scouts, BSA adult leaders, and other adults attending with them. Unit leaders are responsible for ensuring that everyone in their group has completed BSA Health Forms, part A & B <u>Annual Health and</u> <u>Medical Record | Boy Scouts of America (scouting.org)</u> Part C of the Health Form is not required for this camporee.

Early Bird rate (through August 11, 2023): \$15/person Regular rate (August 12-25, 2023): \$20/person

Troops will register as a group with Midnight Sun Council (see registration form at the end of this guide). Fees are payable to Midnight Sun Council at 1400 Gillam Way, Fairbanks AK. (907) 452-1976

Arrivals & Directions:

A map with directions to the site is provided below. After turning off of the Alaska Highway at Mile 1405.5, watch for Scout Oath/Scout Law signs to direct you to the Registration Table.

All attendees must check in with Registrations upon arriving before participating in any events, and will be directed to their campsite from there.



General Information:

This camporee will be a great fun and memorable adventure for all who attend. Your camporee staff wants this to be a SAFE activity without injury or mishap. To plan for that goal, we have established a few common sense rules that will make the camporee more enjoyable for all.

- 1. Leadership: at least two registered adults must accompany and remain with each unit at the camporee. The camporee committee wants to remind all adults that this camporee is for the scouts to enjoy. Please use the patrol method at all times. We are planning to have enough volunteers to staff each station, but we always welcome more volunteers to pitch in and make this a great event for the kids.
- 2. Campsites: We will be camping in the jamboree style; there are no existing campsites. Be prepared with tents and rain shelters.
- 3. Fires: Fire rings will be provided at campsites and can be used as long as there is not a burn ban on at that time. Please bring your own firewood, and alternate means of cooking meals if necessary. Be aware that burn bans may be in effect at the time, though this is unlikely in the Fall. We will do our best to communicate any applicable restrictions, but troops should plan to check for fire restrictions as well.
- 4. Meals: Units will prepare their own meals, with the exception of a hot lunch on Saturday provided by Troops 56 and 65.
- 5. Water: Potable water is not available onsite. Plan on bringing your own supply for drinking and sanitation. (We will have a supply of water for bottle rockets.)
- 6. Restroom facilities: There will be an ample number of Sani-Cans located throughout the campsite.
- 7. Parking: There will be a designated parking area for vehicles separate from the camping area. Troops will be able to drive in to their campsite to unload and pack up their gear before and after the camporee.
- 8. Cleanup: Each unit's adult leaders will be responsible for ensuring that their campsite is clean prior to leaving. All trash must leave with your unit. (Leave No Trace.) Camporee staff must inspect the campsite before departure.
- 9. Awards: The main engineering challenge for the weekend is the 2 -liter bottle rocket competition, and an award will be given to the troop performing the best in this challenge. The Golden Skillet and Spirit Award will also be presented at Saturday night's closing ceremony.

Schedule of Events:

(Subject to change if necessary)

Friday, August 25:

- 5:00 pm Units begin arriving, check in, set up camps, make dinner
- 8:00 pm Games & campfires
- 9:00 pm Cracker Barrel/Senior Patrol & Scoutmaster meeting
- 10:30 pm Scouts to be at their campsites & settled down for the night

Saturday, August 26:

- 7:00 am Rise and shine! Breakfast and cleanup at campsites
- 9:00 am Opening Ceremony with Flags
- 9:30 am Morning stations begin
- 12:30 pm Hot lunch (provided)
- 1:30 pm Afternoon stations begin.
- 3:30 pm Games, optional extra time for rocket testing/adjustment if desired
- 4:30 pm Dinner at campsite & Mystery Box Golden Skillet prep and clean-up.
 - (Turn in your golden skillet entry at 5:45pm for judging.)
- 6:00 pm Pop Bottle Rocket Competition, followed by Awards Ceremony and Flags
- 8:00 pm Optional campfires, hike, Paper Airplane Frisbee Golf (details included at end)
- 10:30 pm Scouts to be at their campsite & settled down for the night

Sunday, August 27:

Breakfast at campsite Check out by 10:30 am

The Stations:

The stations at this camporee are carefully designed to address each requirement of the Engineering Merit Badge in an interesting, interactive manner. Several local engineers and missile defense soldiers and professionals are donating their time to help make this a meaningful and exciting time. We estimate that each station will take about 45 minutes, with a 15 minute break in between. If scouts complete each station, they will earn their Engineering merit badge (and hopefully have a great time doing it!)

Some examples of stations include:

Missile Defense presentation & chats with engineers Design, build & test pop bottle rockets Deconstruct appliances to look inside Other STEM activities

There will be a First Aid station as well, where scouts can work on requirements for rank or the merit badge, if needed.

Detailed information will be provided at the Friday night Cracker Barrel.

Pop Bottle Rocket Design & Competition:

Two of the merit badge requirements include building a piece of patrol equipment and entering a local competition, so we have chosen to host a 2-liter Pop Bottle Rocket competition on Saturday evening.

One of Saturday's stations gives scouts time to design, build and test their bottle rocket. Troops or patrols are encouraged to be creative with their designs, and to lean into thinking like an engineer in terms of designing, testing, learning from "mistakes" and refining their rocket based on its performance to build an even better product. (Remember, engineering is a continuous improvement program!)

The challenge is to build a two-liter pop bottle rocket that can out-fly the competition. The contest winner will have the highest average of three launches. Not only must your design fly far, it must survive multiple launches. The fuel for the pop bottle rockets is water and compressed air. The rocket launcher, air compressor/hand pump, and water will be available so scouts can test and re-engineer their design.

Before the competition, each rocket will be inspected by our expert panel of Rocket Engineers. The panel will consider: creativeness, functionality, and the design process. Bonus points will be awarded for rockets that are also decorated to demonstrate unit and patrol pride.

Individuals are welcome to build their own rockets (as supplies allow), but the official award will go to the best troop/patrol submission.

Basic supplies for building the rocket will be provided at the camp such as:

2-liter pop bottles Glue & tape Rulers & scissors Cardboard Paint & markers Launch pad and pump/air compressor, water for launching rockets

We should have enough empty 2-liter pop bottles, but feel free to bring extra also.

*****Troops are welcome to bring other supplies and encouraged to begin researching, designing, and testing their rocket beforehand. *******

One great website for ideas is <u>www.aircommandrockets.com</u>. Some information on bottle rockets is also included at the end of this leader guide.

What to Bring:

- Camping supplies (tents, rain shelter, sleeping bags & pads, etc)
- Firewood & drinking/wash water
- Meals (except for Saturday lunch)
- Personal gear (uniform, hygiene, Scout book, first aid kit, mess kit, warm gear/rain gear depending on the weather, insect spray, etc.)
- Patrol flag
- Golden Skillet and Spirit awards if your troop has them currently
- Additional supplies for pop bottle rockets (if desired), and any bottle rockets you have started to build or research so far
- Paper airplane designs for Frisbee Golf game (if desired)
- BSA Health forms, part A & B, for each participant

Questions?

For more information, please feel free to contact our Scoutmasters:

Troop 56: Steve Meurer: 907-388-6551 stvmer1@gmail.com

Troop 65: Andrea McCarrick: 07-616-0625 andrea.mccarrick@hotmail.com



To join the Facebook group for this event, search for "Delta Greely BSA Camporee" or scan this QR code with your phone's camera and follow the link.

See you soon!

Saturday night game:

Paper Airplane Frisbee Golf with an Engineering Twist

Golfers will sign in and show the officials the planes they plan to use. Standard 8.5x11 paper (no card stock) will be provided and all planes must be made onsite. Scouts may bring printed templates for their planes as long as they show the officials before folding them into a plane. Each player may have up to three planes to use for the game.

The course will have twelve hula hoop "holes," corresponding to the attributes in the Scout Law. Scores will be kept by each group of three or four players so the honor system will apply. (If possible, groups will be made of mixed troops or patrols.)

The first throw will be made by all in the group with the next throw being made by the farthest from the hole as in the real game of golf. The lowest number of total throws

through the course, just like golf. More rules will be available at the event and officials will be available to answer questions.

The following resources may be helpful: http://www.funpaperairplanes.com/ http://www.paperaeroplanes.com/

http://www.paperairplaneshq.com/ http://www.amazingpaperairplanes.com/

Sample Water Bottle Rocket Info:

What is a Water Bottle Rocket? A water bottle rocket is a 2-liter (soda) bottle with compressed air (for safety reasons we keep the air pressure at 80 psi) and water released in a downward direction.

Construction

Almost any 2 liter bottle will work. The tube should slide snugly into the nozzle of the bottle forming a nearly air tight seal.

#1 Main Body/Pressure Chamber

The main part of your rocket is the body or PRESSURE CHAMBER. Peel the label off your bottle and try to clean the glue residue the best that you can. Do NOT use a knife or other object to scrape the label off. Scrape marks can weaken the plastic. Also, do not use hot water the plastic may shrink and weaken the bottle. Some people have tried to use chemical solvents to remove the glue residue on the bottle. This might alter the walls of the bottle and make them too brittle or soft. Therefore we don't recommend it.

#2 After Cleaning

When launching, the pressure inside the bottle will cause the walls to expand. This expansion leads to a loss of energy and will make the rocket fly to a lower altitude. To solve this problem take some or duct tape, strapping tape, or packing tape and pre-wrap three bands around the pressure chamber. You don't want the tape to be too bulky and watch for wrinkles. This will strengthen the walls of the bottle without adding too much mass and launch altitude will increase overall.

#3 Nose Cones

Nose cones are not only for performance but add character and style to your rocket. Be sure to take some time thinking out the design of your rocket before committing to a plan of action. Shown here are only two examples; so don't be afraid to be creative. The "Bertha Series" nose cones are easy to make. The "Bertha" nose cones are made by cutting the bottom off a **spare bottle** with a pair of scissors and attaching the top portion onto the pressure chamber. (Note: Never cut the pressure chamber) To mark a straight line around the bottle for cutting, place the bottle on a bottle stand and hold a marker at the desired height as you rotate the bottle.

Before attaching the nose cone, add a small lump of modeling clay in the bottle's neck to increase the mass (see section on Rocket Concept).

After the modeling clay is pushed in place, tape over it with some duct tape and replace the cap. Once you launch the rocket and see how it hits the ground you will understand the reason for the tape. Make sure you have a cap on the nose cone. Before you tape the cone on, roll the rocket over a flat surface to make sure the cone and pressure chamber align. A curvy rocket will not be safe coming off the launcher.

This rocket is called "The Bullet". It is the easiest to make but lacks flight stability, this can be fixed to a degree by pressing a small lump (a few ounces) of clay to the inside of the nose cone. This will add mass to the cone and keep your rocket from flipping end over end while in flight. The cone is made from the middle section of an extra two liter bottle. Secure the cone with tape and attach to the bottle with tape. **(Note: do not puncture or cut the pressure chamber).** For more detailed instructions, see the section on Center of Mass and Center of Area.

#4 Fins

Fins are the guidance system for your rocket. Without them a rocket would tumble end over end. Fins can give your rocket life and beauty. However, fins tend to be the single greatest downfall of many young rocket builders. With the incredible speeds and acceleration generated at launch, many fins get ripped off the rocket body within a fraction of a second. Fins should be firm; if they flop around they are useless.

Materials: (remember lightweight but sturdy) Duct Tape, Corrugated Cardboard. How many fins do I need? To ensure stability and safety, the minimum number of fins on a rocket is three (3). Many people choose a 3 or 4 fin design. There is no maximum number of fins you may have but keep in mind that the more fins you have the more drag you will create and drag slows a rocket down.

Constructing fins:

Be creative and cut out 3 or 4 identical fins. You can use any shape except "forward swept" fins. The size of the fin does matter! The best rockets fly well with long and narrow fins. After cutting the fins out of corrugated cardboard, lay the fin on a flat surface and laminate the entire fin surface with tape to reduce the amount of water damage to the fins.

Fin placement:

The fins of your rocket can't be placed above the halfway point of your pressure cylinder. You want to place your fins at the base of the rocket to lower or maintain the center of gravity. If you were to place the fins above the center of gravity, the rocket would tumble and spin out of control once it left the launch pad. Fins cannot be placed lower than the curved section near the neck of the bottle. If they are lower than this, the rocket will not fit on the launch pad.

Attaching the fins:

Fins should be adequately secured; duct tape works well. Do not use glue because it does not expand with the pressure chamber and may cause them to pop off. Glue may be used to temporarily hold the fins in place, but they should be reinforced with duct tape. To find the location of the fins on the bottle, take a piece of string and wrap it around the outside of

the bottle and mark the length using an ink pen. Remove the string from the bottle and lay it out in a straight line and mark the string in 3 or 4 equal lengths depending on the number of fins you are going to use. Wrap the string around the bottle again and transfer the marks to the bottle. If you are using 4 fins this will create 90-degree angles, 3 fins will be at 120-degree angles. To mark a straight line on the bottle, lay it in a door jam and use the straight edge to draw a line the length of your fin. You now have the locations of where to attach your fins. Apply a piece of tape to the paper clip or index card tabs and carefully tape them to your rocket. Look at your fin. Make sure it doesn't curve or it isn't crooked. It should be in a direct line with the body of your rocket. If it isn't perfect, take it off and try again. Attach the other fins. Test the wiggle of the fins. Your fins shouldn't wiggle more than a few centimeters from side to side. Adding more tape to the top and bottom areas of the fin might fix this problem.

#5 Center of Mass and Center of Area

By placing a clay ball or weight in the nose cone the Center of Mass is moved high enough on the rocket so that it won't tumble on lift off. If the center of mass of your rocket is too close to the center of area, your rocket will cartwheel out of control. It will NOT fly straight! Moving the center of mass up away from the midpoint of the rocket will help to ensure that the rocket flies straight. Here is a way to tell if your rocket will tumble. Measure the Center of Mass and mark this spot on your rocket. The best way to determine Center of Mass is to balance your rocket on a yardstick. To measure the center of area, cut out a silhouette of the finished rocket in corrugated cardboard. Next use a screwdriver to poke three widely spaced holes in the silhouette. Ream the holes out so the silhouette rotates

freely on the screwdriver. Hang a weighted string on the screwdriver. Trace the line created by the string on the silhouette. Do this for all three holes. Where the three lines intersect is the center of area. Measure and transfer this point to your rocket. The center of mass should be at least the width of your rocket body in front of the center of area. If necessary, add additional modeling clay inside the nose cone near the tip until you achieve the appropriate separation.



Troop Registration Form

2023 Fall Engineering Camporee

Delta Junction Buffalo Fields, August 25-27, 2023

Troop#	Council:
Troop#	Council:

Scoutmaster: Phone:

Youth or Adult	Name of Attendees	Youth or Adult	Name of Attendees

attendees ______ x \$_____ registration fee = \$_____ Total Paid

Early Bird rate (through August 11, 2023): \$15/person Regular rate (August 12-25, 2023): \$20/person

> Please return registration form and fees to Midnight Sun Council 1400 Gillam Way, Fairbanks AK. (907) 452-1976