

Engineer Activity Badge Outline -- Technology Group

The Engineer Activity Badge is recommended to be presented in a one month format, as outlined in the Webelos Program Helps booklet. This example outline presents the Badge in four weekly meetings. The goal of this outline is to complete as many requirements as possible in the four weeks. The latter part of this outline is pretty thin, so you may wish to supplement this badge with a little work on something else.

In order to complete the requirements, a field trip must be taken to someplace where some aspect of engineering can be observed, like a construction site. Plan this trip and alert the parents ahead of time. Make sure to telephone the parents a couple days before the field trip, which will help attendance. Deal with any transportation problems ahead of time. While this is a Den outing, it does not require one parent per Scout -- only enough to drive.

Use the Webelos book in the meeting. Have the Scouts read sections from the book. Use all the resources you have available, such as the Program Helps and the Webelos Den Activities Book. Make sure you sign off their books each meeting.

Week 1

Requirements to be fulfilled:

Do Five of These:

1. List 10 different things engineers do.
2. Visit a construction job. Look at a set of plans. Tell your Webelos Den leader about these. (Get permission before you visit.)

Discussion :

1. Read the introduction and requirements on pages 135 - 136. Discuss the requirements and how they will be worked on in and outside the Den.
2. Read pages 136-137 on what engineers do. Have the Scouts take out a piece of paper to write down a list of what engineers do. Start out with a few things to write down. Things like: Design computers, design bridges, search for oil. Ask the Scouts for their ideas also -- steer them in the right direction with the answers. If you have a parent with any engineering background at all, ask them to come in to the Den meeting and explain what they do. Do they have examples they can bring in, either photos or gizmos?
3. Read page 137 on visiting a construction site. Plan your field trip. Pick a location for your outing where a building or houses are being constructed. Go talk with the foreman about the trip. Plan it for a time when it will be safe on the site. Follow all directions the foreman gives you.

Homework:

1. Go on your field trip.

Week 2

Requirements to be fulfilled:

Do Five of These:

3. Measure the length of a property line. Explain how property lines are determined.
4. Make a drawing of how electricity gets to your home.

Discussion :

1. Read page 138 on Surveying Land. Bring as long a tape measure as you can. Find a plot of land for which you can either find the corner markers or you have a map. Find a corner marker and have the Scouts measure the length of the property line. If there is time and the property lines are accessible, have the Scouts measure all the property lines of the plot, then sketch the plot.
2. Read pages 138 - 140 on Electricity. If you have any demonstrations bring them in. Things like hand crank generators are great demonstrations. Have the Scouts take out a piece of paper and draw how electricity gets to their home. Talk about hydro-electric generation, burning fossil fuels to make electricity, nuclear power plants (and waste products), and hydro-thermal power generation (generating electricity using subterranean steam).

Emphasize the safety rules.

Homework:

1. Check out the property lines around your home. Can you find corner markers?

Week 3

Requirements to be fulfilled:

5. Make drawings of three kinds of bridges. Explain them.
6. Make and show how a block and tackle works.

Discussion :

1. Read pages 140-142 on bridges. Ahead of time gather the materials to demonstrate bridges. Bricks work well as ends. Get some stiff card stock, and craft sticks. Make the bridges as shown in the handbook. Make the square and triangle sections as shown in the handbook.
2. Read pages 143 - 144 on Block and Tackle. Ahead of time, gather together the materials to make to thread spool block and tackle. Yes it really works. You might also want to obtain a couple double or triple blocks from the hardware store, so you can clearly demonstrate the ratios, of rollers to weight that can be lifted, and weight that can be lifted a distance versus the distance the rope is pulled.

Extra Credit: Gather together the materials to make the spring scale shown in the handbook. This is a great item to test the block and tackle with. The components can be obtained from your hardware store.

Homework:

1. You cross over or under bridges every day. If you travel on the freeway you go under and over them all the time. Look for bridges during the week. How many types of bridges can you identify?

Week 4

Requirements to be fulfilled:

7. Build and show how a catapult works.
8. Draw a floor plan of your house. Include doors, windows and stairways.

Discussion :

1. Read page 145 on Catapults. This is the one activity in the Engineer Badge that the Scouts want to desperately to do. Probably so they can shoot things at each other. There are numerous plans available for simple catapults. The first one in the book works well and can be assembled from bits and pieces in a few minutes. It might work best for you to set aside a time other than the Den meeting, to work on this project. Then you are not so time constrained.

Gather the materials, set a time and go for it. You will want to allow time for some challenge after they are complete, so that the Scouts can see how well they work. Also bring them to the Pack Meeting. Ping-pong balls are harmless and work well as projectiles. Take normal safety precautions.

2. Read page 145 on Floor plans. Have the Scouts take out a piece of paper and draw the floor plan of their home. It will not come out very well, so send it home. It is a very good idea for them to finish this, so they have clearly in their mind what the floor plan is and how to draw one.

Homework:

1. Finish your floor plan at home with help from mom or dad. Save this! You will need it for your Readyman Activity Badge.

Engineer

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Strength of Hollow Tubes:

Begin the demonstration by laying a brick on a Styrofoam cup laying on its side. Place another cup on its rim and add bricks (2 to 3) until it crushes. Glue four cups together rim to rim and bottom to bottom with white glue and allow to dry. Place bricks (usually four) on top until the structure crushes. Demonstration shows the use of columns in engineering and bridges.

Pulleys:

A simple pulley is when you have a single pulley with the rope going through it. When a simple pulley is used, you are pulling downwards to lift the object up, thus using your weight to help you. Thus with a simple pulley you can only lift an object that weighs as much as you.

A common example of a pulley is a bicycle rear sprocket connected by its chain with the chain wheel.

Levers:

A lever helps you to lift things easily. A lever can be made by laying a plank over a wooden log or a can with both ends intact. Balance the plank so that there is a short end and a long end. Place the short end under the object to be raised and push down on the long end. Try raising some bricks. To experiment you can try to raise things with the short end and you will find that it is more difficult or not possible to raise the object. The longer end of the plank gives you the ability to create more force and therefore raise weights easier.

Common Levers:

- 1) Door - Easier to push by door handle than by hinges.
- 2) Wheelbarrow - Wheel is the balancing point.

Experiment: Obtain a 2 x 4 piece of wood and place a can or a wooden log of the same diameter on one chair. Try to lift a scout in a second chair by placing the plank over the log and under the second chair and lift. Don't try to lift too fast or high or the second chair will tip over with the boy in it.

Springs:

Springs store energy when compressed, which is released when the is released. Catapults are a form of springs.

Energy Racer: This toy makes use of the spring use of stored energy. The stored energy in the case is in the rubber band. Push a thumb tack part way into one end of a wooden spool. Use a rubber band just a little longer than the spool. Push it through the spool and loop it around the thumbtack. Thread a short stick through the rubber band loop, wind it up. Release the energy racer on the floor.

Le Mouse 500 Racer: Remove the bait pan and hook arm from a mousetrap. Cut a 1/2 inch V-notch at the rear; sanding and waxing it so the string will slide smoothly. Turn it over and screw in small screw eyes 1/2 inch from the edge. Axles are cut from coat hanger wire. Make the wheels by sawing 3/16 inch sections from 1 1/4 inch dowel. Drill holes in the center of the wheels. Pound flat the ends of the axles and push the axles into the holes in the wheels. Glue in place. With sandpaper, roughen the rear axle where the string will be wound. Tie the string to the snapper, but not to the axle. To run the snapper, pull snapper back and hold it with your thumb. Wind the string onto the rear axle until tight. Set the racer on a rough or rough surface and watch it go.