Engineer Projects Session

Webelos Elective Adventure

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|  | **completed** | **finish in den or at home** |
| **Tiger** |  |  |
| **Wolf** |  |  |
| **Bear** |  |  |
| **Webelos** | Engineer 4 |  |

**Webelos/Arrow of Light Engineer Elective Adventure**

1. Pick and do two projects using the engineering skills you have learned. Share your projects with your den, and also exhibit them at a pack meeting.

**Meeting 2**

**Time** 1 period, 45 minutes

**Location** classroom

**Equipment** Project 1: Star Wars targets

Project 2: 20 alligator clip leads per team (5 per team X 4 teams), voltage meter, poster explaining electricity

**Supplies**

Project 1:

9 wide craft sticks per boy

4-6 rubber bands per boy

1 plastic spoon per boy

Pompoms

Project 2:

80 Lemons - Lemons will be used twice.

16 Pennies – Make sure they were minted prior to 1982 (4 per team X 4 teams per half session)

16 galvanized nails or zinc-plated screws (4 per team. 4 teams per half session)

20 alligator clip leads per team (5 per team X 4 teams. Will reuse these.)

Freezer paper or waxed paper as a work surface for each team

4 Kitchen knives

**Scouts** 20 Webelos Is and IIs

**Staff**  Instructors for each project if possible. If not, one adult instructor for lemon battery project and one Boy Scout instructor for catapult project. Two Boy Scout helpers for each project. To summarize, two adult instructors or one adult and one Boy Scout instructors and four Boy Scout helpers.

Divide the group in half. One half will start with project 1, and the other half will go to another classroom to do project 2. After 15 minutes, the groups will swap rooms and work on the other project.

**Project 1: Defense Engineering Project - Catapult**

Prior to the session starting, mark a starting point and distances on the floor.

Explain to the boys that they will be doing a defense engineering project. Tell them that defense engineers develop items that assist in protecting our country. Around 400 BC, defense engineers in Greece developed catapults to shoot projectiles long distances.

Using large craft sticks, rubber bands and plastic spoons, construct catapults.

1. Stack 7 of the craft sticks, and wrap a rubber band tightly around one end.

2. Wrap another rubber band tightly around the opposite end so all 7 sticks are bound together.

3. Stack the remaining 2 sticks and wrap a rubber band on one of the ends. Put the rubber band as close to the end of the sticks as possible.

4. Insert the 7 stick bundle between the two sticks and push it as close to the rubber band securing the 2 sticks as possible. This will give the catapult more leverage.

5. Wrap a heavy rubber band in a cross fashion to secure the two stacks of craft sticks.

6. Use a few rubber bands and attach the plastic spoon to the top stick.

After the boys construct their catapults, give them pompoms to launch from their catapults. Divide the boys into groups, and have them take turns shooting their pompoms to determine whose catapult goes the farthest.

**Project 2: Electrical Engineering Project - Lemon Batteries**

Explain to the boys that they will be doing an electrical engineering project. Electrical engineers deal with power and power systems. Some of them work to bring electricity to your house while others design electronic equipment that we use.

We will use lemons to help conduct electricity in order to light up a light bulb. Here are a few things you’ll need to know.

The electricity is not in the lemon. It is a result of the chemical reaction resulting from the differences in negativity between the zinc and the copper. The electrons would rather be in the copper.

1. Use a kitchen knife to cut a penny-sized slit in all four lemons.

2. Insert a penny halfway into each of the four slits that you cut.

3. Push a zinc-galvanized nail or screw into each of the lemons, opposite the penny. Be sure you don’t let the nail and penny touch each other.

4. Place the lemons parallel to each other. Attach one alligator clip to a nail on one of the lemons. Leave the other end unattached.

5. Attach the next alligator clip to the penny in the first lemon, and attach the other end to the nail on the second lemon. Continue until all of the nails and pennies are attached. There will be another unattached alligator clip on the opposite end.

6. Separate the wires on the LED bulb. One will be shorter than the other. The short one is the negative.

7. Attach the alligator clip that is coming from a nail to the negative wire on the bulb. Attach the other alligator clip to the positive wire on the bulb.

8. Watch your bulb light up!