

# TECHNO-WHIZ! BROWNIES



## **PROGRAM COMMITTEE**

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### **INTRODUCTION**

Techno-Whiz is designed to allow the girls to 'play' with engineering and science activities. The activities are meant to be fun for the girls and the Guiders!

The Association of Professional Engineers, Geologists and Geophysicists of Alberta provided much appreciated information on fun engineering activities. Thanks also to the Guiders who contributed to the development of the challenge. Have fun!

**Select at least 2 of the following areas of interest and do an applicable activity –** either the one listed here or another equivalent challenge.

**Structures:** Explore how to build a structure that is stable and will support itself.  
Materials for each team: 20-30 marshmallows (preferably the large ones), 30 drinking straws or Popsicle sticks.

Step 1) Divide the girls into teams of three.

Step 2) Each team should build a structure with the materials provided. The goal is to build a house with as many stories as possible, without it falling over.

Step 3) Then, they can dismantle the structure and eat the marshmallows!

Tips: Build a strong base before trying to build it high. Cross bracing (i.e. triangles with the straws/sticks) will provide reinforcement. There is no wrong design!

**Buoyancy:** Have fun with the buoyant effect of gas bubbles.  
Materials for each Brownie: clear glass, approximately 15 raisins, fork, soda pop (7Up™ or other clear brand).

Step 1) Provide each Brownie with a glass full of soda pop.

Step 2) Have them drop the raisins into the pop. What happens? Encourage them to try flattening some of the raisins or squishing a few into a tight ball.

Step 3) They can use the fork to remove the raisins from the glass. Enjoy the snack!

Why: The carbon dioxide in the pop (bubbles) are attaching to the raisins, and raising them to the surface. Once the bubbles release from the surface, the raisins fall again.

- Flight:** Comparison of different parachute materials.  
Materials for each girl: square of light material (20 cm X 20 cm), Lifesaver candies, 4 pieces of string or yarn 30 cm long. Provide a selection of material: facial tissue, plastic bag, cotton, and nylon. Also, bring a hole punch and/or large sewing needle.
- Step 1) Thread a piece of string through one corner of the material using the needle then tie a knot to secure it. Repeat with the other 3 strings. Alternatively, punch a hole in each corner, then thread the string through the hole and tie a knot. Adults can do this ahead of time.
- Step 2) Help the girls to thread the other end of each string through the center of the candy and tie a knot.
- Step 3) The girls can throw the parachute into the air and observe how it falls. This works best if they have the candy in their hand and bunch the parachute above it. It takes practice! If they are having trouble, they can stand on a chair and drop it.
- Step 4) Discuss what materials seem to slow the fall of the candy the most
- Why: As the candy falls, air is caught and squeezed under the parachute. This air is compressed which slows the fall of the parachute.

- Sound:** Explore how sound travels in the form of vibrations.  
Materials for pair of Brownies: 2 containers (yogurt-cups, disposable plastic glasses, tin cans), 4m long piece of string, scissors.
- Step 1) Organize the Brownies into pairs. Give each girl a container.
- Step 2) An adult should poke a small hole in the bottom of each container with the scissors.
- Step 3) Help the 1<sup>st</sup> Brownie to push one end of the string through the hole in the bottom of her container and tie a knot. Then, have the 2<sup>nd</sup> Brownie push the other end of the string through the hole in the bottom of her container and tie a knot.
- Step 4) Each girl takes a container and they step apart until the string is tight. The 1<sup>st</sup> Brownie should talk slowly and clearly into her container while the 2<sup>nd</sup> Brownie holds her container to her ear. Take turns talking and listening.
- Why: The sound of the Brownie's voice causes the container to vibrate, which causes the string to vibrate, which causes the container at the other end to vibrate, which the 2nd Brownie hears as sound. Does it work if the string isn't tight?