Icarus

Grade Level	3	**Workable grades**	3, 4, 5, 6
Recommended Time	1 hour		
Curriculum Alignment	Topic B: Building with a Variety of Materials ● Science 3-6: Use, safely, a variety of tools, techniques and materials in construction activities ● Science 3-7: Construct structures, using a variety of materials and designs, and compare the effectiveness of the various materials and designs for their intended purposes.		

Background Information (Science required for the lesson) :

<u>What are Cube Satellites?</u>
The type of satellites that we build are called Cube Satellites (also called CubeSats), which are about the size of a loaf of bread.
Picture a cube with sides that are 10 cm long. Now imagine stacking all three of them together. That is the size of our satellite, 3 cubes.
A cube satellite with "one cube" , "two cubes", and "three cubes" are called 1U, 2U, and 3U satellites respectively. Cube satellites can be as small as 1 cube, or as large as 12 cubes!

<u>What is Icarus?</u>
This is the frame of the satellite. We designed our frame in house, that means students planned, designed, and built it all themselves. We named it Icarus after the Greek hero who flew higher than ever before. It is made out of aluminum.
This frame has to be strong enough to withstand being launched from the Earth in a rocket!

The frame of the satellite is very important, it is what holds it all together. All of the pieces of the satellite, like the computer (what controls everything, like a motherboard), and the payload (the reason the satellite is in space, like our wildfire camera), and the communication systems (antennas), have to fit inside. The frame has to be very strong, very light, and be no bigger than 10cm by 10cm by 30cm!

<u>How do Satellites get launched?</u>
Satellites don't actually get launched into space from the Earth, they first get carried into outer space on a rocket before getting launched into orbit from space. Our first satellite was ejected from the International Space Station from Nanoracks. Nanoracks are a really simple device, it has cubby holes in it where the satellites are placed, and then a spring pushes the satellites out of their cubby hole and they begin their orbit! The reason the size of the cube satellite is so

important is because those cubbies are a very particular size, and the satellite has to be exactly the right size to fit inside and slide out easily. If it is too big it won't fit, and if it is too small it won't eject correctly.

Explanation of Activity:	**Notes:**
1. Using the materials provided, they will build the structure of a cubesat 2. When all the students have completed their design, the students will test their design, by tying a string to the structure 3. Once the string is secure, students will swing it around in a circle for 10 seconds to simulate G forces. 4. The goal is to have the structure intact at the end of the swings.	For safety, step 3 should be done in an open space, for example: outdoors, or in a gym. Enough room for each student to swing their cubeSat structure.

Materials Required (INCLUDE ALL MATERIALS NEEDED EVEN PEN AND PAPER)
Required: ● Tape ● Dowels ● String ● Scissors ● Tin Foil Optional: ● Fun decorative craft materials (pipe cleaners, pom-poms, stickers, etc…)

Changes to the activity for COVID-19
Send the teacher the materials and have AlbertaSat members present the slide remotely