

Northern Lights

Topic	Northern Lights
Subject	Science & Art
Grade Level	1-3 (also available for Kindergarten)
Time	40 minutes to 1 hour
Curriculum Alignment	<p>Science 1-5: Identify and evaluate methods for creating colour and for applying colour to different material.</p> <p>Art 1-5/2-5: Students will create an original composition, object, or space based on a supplied motivation.</p> <p>Science 3-4: Demonstrate positive attitudes for the study of science and for the application of science in responsible ways.</p>

Hook:	Notes:
Show Ex-Alta 1 3D Model Video	https://m.youtube.com/watch?v=Ew2N9OqL-F4

Introduction:	Notes:
<p><u>What is AlbertaSat?</u></p> <ul style="list-style-type: none"> • AlbertaSat is a student group at the University of Alberta that builds CubeSats • CubeSats are small (like a loaf of bread) satellites made up of standardized cubes. These cubes (known as units) are 10cm x 10cm x 10cm • Ex-Alta 1 (Experimental Albertan 1) is a 3U (3 unit/3 cube) CubeSat. It was the first satellite built by AlbertaSat. • Ex-Alta 1 was built as part of an international project, QB50. This project was lead by the European Space Agency (ESA) to study space weather. 	<ul style="list-style-type: none"> • Ex-Alta 1 has 3 scientific payloads: Multi-Needle Langmuir Probe, dosimeter, and a magnetometer. These allow us to study charged particles, what happens during reentry radiation, magnetic waves, the northern lights, and space weather. We're doing this because space agencies around the world are interested in re-entry, we want to make reusable reentry vehicles, and we want to be able to predict solar storms and know more about the northern lights. Space Weather - esp. solar storms can be really devastating. If one happened today, it could destroy power grids and cause trillions of dollars in damage. • Our fourth payload, Athena, is an open source onboard computer. This will be

<ul style="list-style-type: none"> • Ex-Alta 1 was launched to the International Space Station (ISS) in April of 2017 and into orbit in May of 2017. • Show Map of QB50 Satellites • Ex-Alta 1 includes the following payloads: MNLP (Langmuir Probes), Dosimeter (studies radiation), Athena On-board Computer, Magnetometer 	<p>its test flight and if it is successful we will use it on our next CubeSat as the only onboard computer. We want to make a CubeSat as open source as possible to reduce costs and make space more accessible to groups like us.</p>
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Background Information:	Notes:
<p>Where do the Northern Lights occur?</p> <ul style="list-style-type: none"> • The Northern Lights specifically occur in the Northern Hemisphere, however the Aurora occurs at both pole, but in the south the northern lights are called the Southern Lights or Aurora Australis. They are essentially the same, they just occur in different area. <p>What causes the Aurora?</p> <ul style="list-style-type: none"> • There's a couple reasons, and studies are nowhere near complete, but basically the Aurora occurs when solar wind in the earth's magnetosphere is shifted or distorted. The magnetosphere is a region around the earth made up of solar wind and the earth's magnetic field (its big shield). <ul style="list-style-type: none"> ○ For example: if you're watching by a river and you put a big log in the river, the flow of the river will change. Magnetosphere also changes when something is added to it and the Aurora is the ripple effect. 	

Explanation of Activity:	Notes:
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<ol style="list-style-type: none"> 1. Students should be arranged so there are 4 at a table (push desks together if need be) 2. Handout materials they will need - at least 2 brushes per table, at least 8 watercolour pencils 3. Put some pictures of the northern lights on the projector for students to look at. <ul style="list-style-type: none"> ○ Students may fold the cardstock in half to make cards 4. Optional: Show students video (Northern Lights from Space) 5. Tell students to be sure to fill the page 6. Show examples - leave within view throughout session. 7. Allow time for questions and then tell students to start. 	<p>Some students may feel confused about what to paint/draw</p> <ul style="list-style-type: none"> ● Offer suggestions - suggest they draw different colours at different levels ● Show them a few pictures or videos of the northern lights <ul style="list-style-type: none"> ○ http://www.cnn.com/2016/04/19/world/nasa-northern-lights/ ● Tell them to start with a sketch and not lift their pencil for the next 5 minutes <p>Extension/Potential Assessment:</p> <ul style="list-style-type: none"> ● Have students colour the northern lights in order (from lowest to highest: blue, green, yellow, red) <ul style="list-style-type: none"> ○ https://www.theaurorazone.com/about-the-aurora/the-science-of-the-northern-lights/the-northern-lights-colours ● This relates to Specific Outcome 1-5 (1) Order a group of coloured objects, based on a given colour criterion.
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Question Period:	Notes:
<p>What are some tips for viewing the Northern Lights?</p> <ul style="list-style-type: none"> ● Look north on a clear dark night, around midnight is a good time ● Might be able to see them more outside of the city - but can still see them within (seen them lots around Allendale/Strathcona area and there's lots of lights there) ● Dress warm and talk to your parents before you go outside, arrange a family viewing night or watch from a north facing window <p>Can the Northern Lights only be seen in the north?</p>	<p>http://www.aurorawatch.ca</p>

- Technically, however the Aurora can be seen in the south (these are often called the Southern Light or Aurora Australis). The Aurora is a Polar light, so it can be seen best near the north (arctic) pole and the south (antarctic) pole.

How will we know when we can see the Aurora?

- A clear cold night is your best bet, but you can also check aurorawatch.ca (write this on the board). They put alerts on their website when it's a good time to see the lights and they also send out email alerts.

Materials Required:

- Cardstock, 1 per student
- Paintbrushes, 1 per two students
- Paint sets or watercolour pencils, 1 per four students
- Other: pencils, pencil crayons, markers, etc.