How do we know what we know about the universe?

Some of the things we know about:

- Space travel
- The sun and solar system – tides, seasons, gravity, motion of different bodies
- The life cycle of a star
- Different types of stars
- The Milky Way
- The formation of the solar system
- The formation of the universe
- The Sun – features, life cycle etc...
- Aboriginal knowledge about the night sky
- Calendars (Aztec, Mayan, Egyptian,)
- Black holes
- The size and distance of various parts of the universe
- Gravitational waves

Some things we don’t know – how could we find out?

- The ethics of space travel
- Life in other parts of the universe
- Human survival in space
- Living on Mars
- Manned missions to explore the outer reaches of the solar system – how can spaceships go faster?

Your Task

1. Decide on a problem or issue that you are curious about and create an intriguing research question (one class period)
2. Which of these factors is most significant in considering your problem or issue: moral, ethical, social, economic, political, cultural, environmental?
3. Research this problem or issue – (one class period)
5. Create a mini pecha-cucha – (one class period)
   - 8 slides – mostly images (perhaps a heading, caption or quote)
   - Create a script: you will narrate 15 seconds per slide – 2 minutes total.
   - You will need to think very carefully about how to present information (and analysis) in such a brief format!
   - You can record your script, or read live
   - The final slide (add a 9th slide) will have a list of your references
   - Be prepared to take some questions from the audience
6. Sign up for a presentation date!
### B: Inquiring and Designing

<table>
<thead>
<tr>
<th>Achievement level</th>
<th>Level descriptor</th>
<th>Level descriptor</th>
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</table>
| 1-2               | The student is able to:  
• **state** a problem or question to be tested by a scientific investigation, with **limited success** | Clearly states a research question. Limited attempt to explain the significance and context of the topic. |
| 3-4               | The student is able to:  
• **state** a problem or question to be tested by a scientific investigation | Clearly states a question. Good attempt to explain the significance and context of the topic. |
| 5-6               | The student is able to:  
• **outline** a problem or question to be tested by a scientific investigation | Clearly states a question and outlines its significance to our understanding of the universe and why it is worthy of investigation |
| 7-8               | The student is able to:  
• **describe** a problem or question to be tested by a scientific investigation | Clearly states a question and explains why it is essential to furthering our understanding of the universe, and why it is worthy of your personal investigation. |

### D - Reflecting on the impacts of science

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<tr>
<th>Achievement level</th>
<th>Level descriptor</th>
<th>Level descriptor</th>
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| 1-2               | The student is able to:  
• **state** the ways in which science is used to address a specific problem or issue  
• **state** the implications of the use of science to solve a specific problem or issue, interacting with a factor  
• **apply** scientific language to communicate understanding but does so with **limited success**  
• document sources, with **limited success** | The student:  
Makes little attempt to connect with the audience.  
States how scientists have researched and explored the problem or issue, and how the factor is relevant.  
The language and images used communicates clearly some of the time. Use of scientific language or equations is limited or only partly accurate. |
| 3-4               | The student is able to:  
• **outline** the ways in which science is used to address a specific problem or issue  
• **outline** the implications of using science to solve a specific problem or issue, interacting with a factor | Uses images and writing to attempt to connect with the audience to outline how scientists have researched and explored the topic.  
Outlines how scientists have researched and explored the problem or issue, and how the factor is related.  
The language and images used communicates clearly some of the time. Some use of scientific language or equations that is generally accurate. |
### Science 9 Astronomy Inquiry

#### 5-6

The student is able to:
- **sometimes apply** scientific language to communicate understanding
- **sometimes document sources correctly**

Uses images and writing to attempt to connect with the audience to summarize how scientists have researched and explored the topic.

Describes how scientists have researched and explored the problem or issue, and describes how the factor is related.

The language and images used communicates clearly and precisely, most of the time. Scientific language or equations are generally accurate.

#### 7-8

The student is able to:
- **describe** the ways in which science is applied and used to address a specific problem or issue
- **discuss and analyse** the implications of using science and its application to solve a specific problem or issue, interacting with a factor
- **consistently apply** scientific language to communicate understanding clearly and precisely
- **document sources completely**

Uses images and writing to effectively connect with the audience to describe and explain how scientists have researched and explored the topic.

Discusses and analyses how scientists have researched and explored the problem or issue, and how the factor is relevant.

Analysis answers questions such as – what are the limitations of the science; what are some of the setbacks scientists have faced; what are some implications for future research; what factors make this research challenging, exciting or not yet possible? What are the costs or benefits to society as reflected in the chosen factor – reach a conclusion!

The language and images used communicates clearly and precisely. Scientific language or equations are used accurately, with skill and understanding.

### Analysis – What are the essential elements? Identify parts and relationships. Interpret and reach conclusions.

**Good Inquiry Questions:**

[https://cll.mcmaster.ca/resources/misc/good_inquiry_question.html](https://cll.mcmaster.ca/resources/misc/good_inquiry_question.html)

**Sample (full size) Pecha-kucha:** [http://www.pechakucha.org/presentations/how-to-launch-a-rocket-from-your-smart-phone](http://www.pechakucha.org/presentations/how-to-launch-a-rocket-from-your-smart-phone)

**Factors:** moral, ethical, social, economic, political, cultural, environmental