

Applying Universal Design for Learning to OER

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Download slides:
bit.ly/beyondaccessibility

Session Topics

- Review of first session
- Social model of disability
- Universal design for learning (UDL)
- Multimodality and multiple formats
- Accessible math
- Image descriptions

Review: Technical Accessibility

- Assistive technologies
- Web Content Accessibility Guidelines (WCAG)
- Specific accessibility guidelines for different types of content

Accessibility Checklists

Strengths

- Easy to understand and follow
- Highlight the most important technical considerations to make sure students with disabilities can access the material

Weaknesses

- Accessibility as something that we can go back and fix later
- Do not ensure good design
- Do not account for the multiple formats of OER
- Students face challenges not addressed in standard accessibility checklists
- Does not ensure equal access to learning outcomes

Medical Model vs. Social Model of Disability

Medical Model:

"Disability as an individual problem, affliction, or deficit that needs a cure or accommodation."

Social Model:

Disability as a spectrum that can affect different people in different ways depending on their context, environment, and the tools they have access to, and is a product of history and culture.



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What is an average student?

The classroom, “far from neutral, is constructed for a mythical, “able-bodied,” neurotypical norm that neither reflects nor accommodates the wide range of diverse learners within it, regardless of whether these learners have been diagnosed with a disability” (Wilson, 2017).



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What else affects accessibility?

- **Day-to-day life**
- **Digital literacy**
- **Access to technology**

Universal Design for Learning (UDL)

Provide multiple means of

- Engagement (WHY)
- Representation (WHAT)
- Action and Expression (HOW)

Multiple Means of Representation

Guidelines:

1. Perception
2. Language and symbols
3. Comprehension

Guideline 1: Perception

Interact with flexible content that doesn't depend on a single sense like sight, hearing, movement, or touch.


1. Offer ways of customizing the display of information
2. Offer alternatives for auditory information
3. Offer alternatives for visual information

CAST (2018). Universal Design for Learning Guidelines version 2.2. Retrieved from <http://udlguidelines.cast.org>

Provide Multiple Formats

Web, HTML, PDF, EPUB

Math for Trades
Volume 2



open.bccampus.ca **BCcampus** OpenEd

Download this book ▲

- EPUB3
- Digital PDF
- Print__pdf
- XHTML

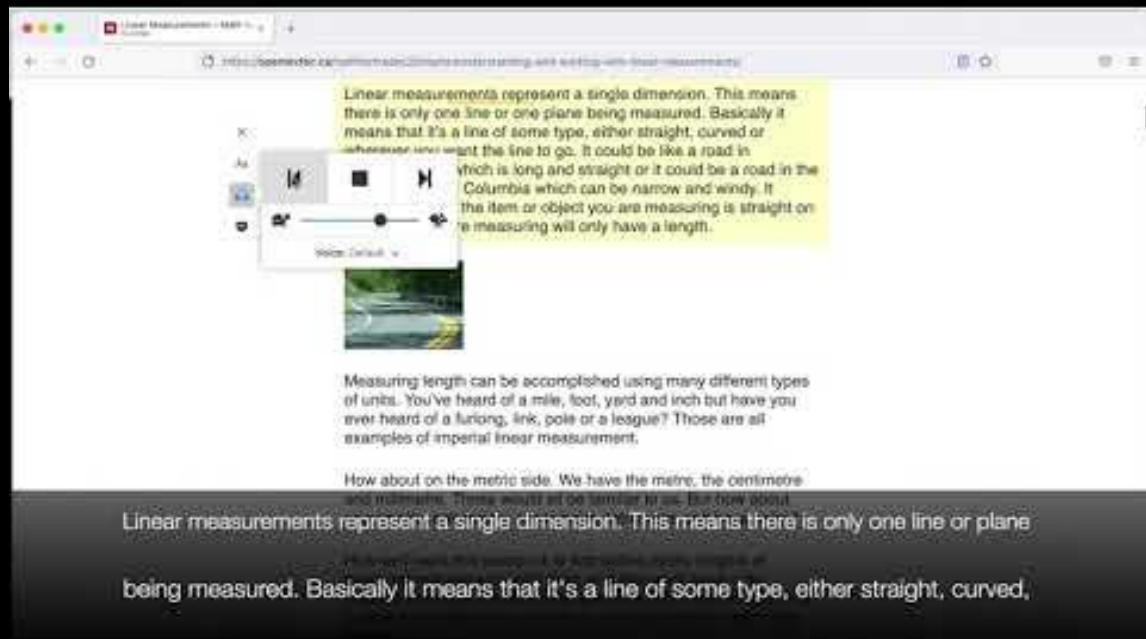
Multimodality

Combining text, images, video, audio, and interactivity to give students multiple ways to engage with content.

Examples:

- Text-to-speech
- Audiobooks
- Videos
- H5P

Text-to-speech



Linear measurements represent a single dimension. This means there is only one line or one plane being measured. Basically it means that it's a line of some type, either straight, curved or

which is long and straight or it could be a road in the Columbia which can be narrow and windy. If the item or object you are measuring is straight on, you're measuring will only have a length.

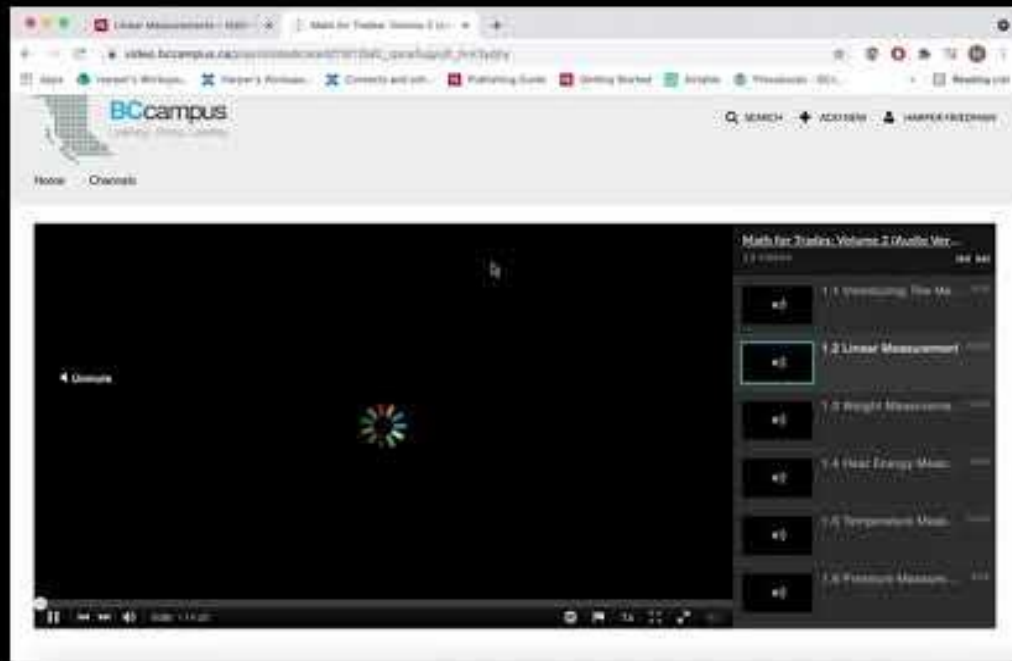
Measuring length can be accomplished using many different types of units. You've heard of a mile, foot, yard and inch but have you ever heard of a furlong, link, pole or a league? Those are all examples of imperial linear measurement.

How about on the metric side. We have the metre, the centimetre and millimetre. These would all be similar to us. But how about

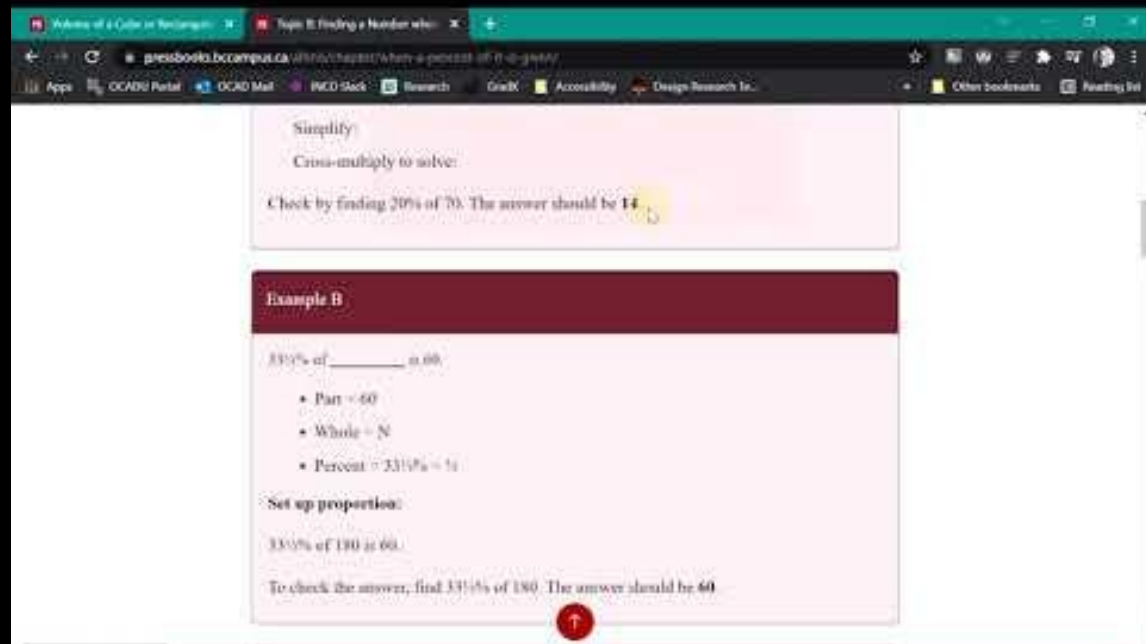
Linear measurements represent a single dimension. This means there is only one line or plane

being measured. Basically it means that it's a line of some type, either straight, curved,

Audio books



MathJax - Zoom



The screenshot shows a web browser window with two tabs. The active tab is titled "Topic B Finding a Number when..." and the address bar shows the URL "pressbooks.bccampus.ca/pressbooks-chapter/when-a-percent-of-it-is-given/". The browser's bookmark bar includes links for "Apps", "OCADU Portal", "OCAD Mail", "INCO Slack", "Research", "Globe", "Accessibility", "Design Research Inc.", "Other bookmarks", and "Reading list".

The main content area displays a pink box with the following text:

Simplify:
Cross-multiply to solve:
Check by finding 20% of 70. The answer should be 14.

Below this is a dark red header labeled "Example B". The content below the header is:

33 1/3% of _____ is 60.

- Part = 60
- Whole = N
- Percent = $33\frac{1}{3}\% = 14$

Set up proportion:
33 1/3% of 180 is 60.
To check the answer, find 33 1/3% of 180. The answer should be 60.

A red circular zoom icon with an upward-pointing arrow is located at the bottom center of the page.

Guideline 2: Language and Symbols

Communicate through languages that create a shared understanding.

1. Clarify vocabulary and symbols
2. Clarify syntax and structure
3. Support decoding of text, mathematical notation, and symbols
4. Promote understanding across languages
5. Illustrate through multiple media

CAST (2018). Universal Design for Learning Guidelines version 2.2. Retrieved from <http://udlguidelines.cast.org>

Glossary

Ohm's Law

Combining the elements of **voltage**, **current**, and **resistance**, George Ohm developed the following formula:

The difference in electric potential between two points, which is defined as the work needed per unit of charge to move a test charge between the two points. It is measured in volts (V).

- E = Voltage in volts
- I = Current in amps
- R = Resistance in ohms

"Ohm's Law" screenshot is from *Basic Motor Control* by Aaron Lee and Chad Flinn. Licensed under a [CC BY 4.0 licence](#).

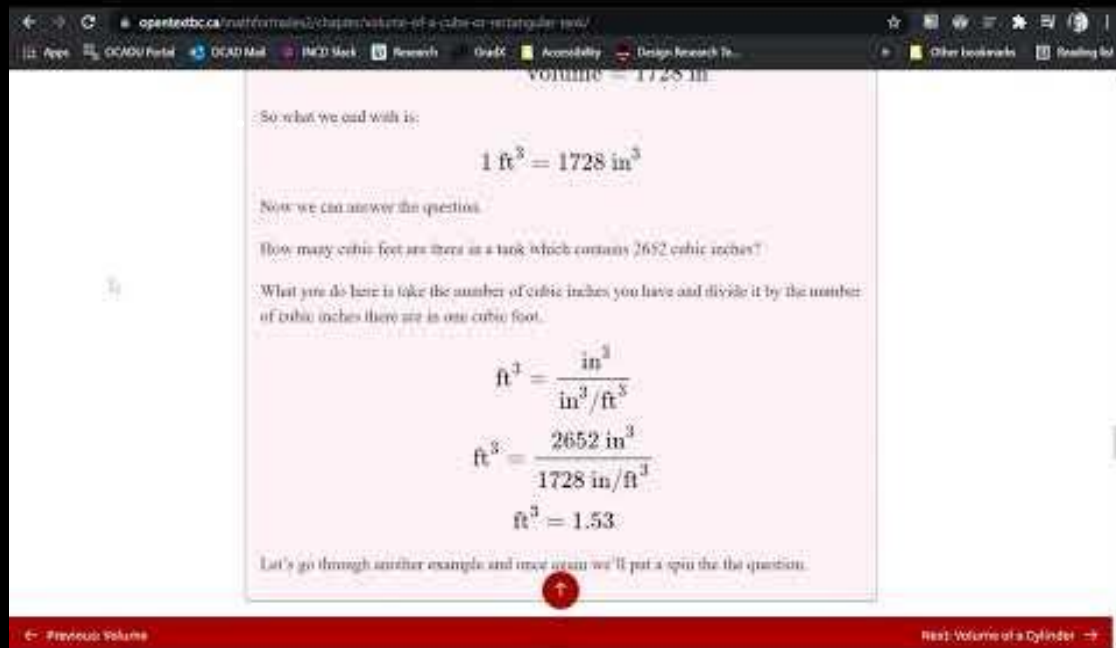
Video demonstrations

Video: Global Virgin Application – Oxidative Colour

Note: Video has no sound.



Screen reader reading math



The screenshot shows a web browser window with the address bar displaying `opentextbc.ca/math/formulas2/chapter/volume-of-a-cube-or-rectangular-box/`. The browser's bookmark bar includes links for 'Apps', 'OCADU Portal', 'OCAD Mail', 'IMC3 Slack', 'Research', 'Grade', 'Accessibility', 'Design Research Te...', 'Other bookmarks', and 'Reading list'. The main content area of the page is titled 'VOLUME = 1728 in³' and contains the following text and equations:

So what we end with is:

$$1 \text{ ft}^3 = 1728 \text{ in}^3$$

Now we can answer the question.

How many cubic feet are there in a tank which contains 2652 cubic inches?

What you do here is take the number of cubic inches you have and divide it by the number of cubic inches there are in one cubic foot.

$$\text{ft}^3 = \frac{\text{in}^3}{\text{in}^3/\text{ft}^3}$$
$$\text{ft}^3 = \frac{2652 \text{ in}^3}{1728 \text{ in}/\text{ft}^3}$$
$$\text{ft}^3 = 1.53$$

Let's go through another example and once again we'll put a spin on the question.

A red screen reader icon (a circle with an upward arrow) is positioned below the equations. At the bottom of the page, there is a red navigation bar with the text 'Previous Volume' on the left and 'Next: Volume of a Cylinder' on the right.

Guideline 3: Comprehension

Construct meaning and generate new understandings.

1. Activate or supply background knowledge
2. Highlight patterns, critical features, big ideas, and relationships
3. Guide information processing and visualization
4. Maximize transfer and generalization

CAST (2018). Universal Design for Learning Guidelines version 2.2. Retrieved from <http://udlguidelines.cast.org>

Structure of Information

- Scaffolding new knowledge
- Resource navigation options
- Chapter and heading titles
- Numbering systems (i.e., headings, figures, tables)
- Consistent chapter elements and structure

H5P

<https://h5p.org/>

and

<https://kitchen.opened.ca/>

- Interactive web-based activities and formative assessments
- Available in Pressbooks – activities can be embedded in the webbook
- Can build your own activities or reuse and remix activities created by others

H5P: Multiple Choice

Mark all of the fragments in the list of sentences below.

☒ To find the perfect apartment.

☒ Working without taking a break.

☐ I needed to bring work home.

☒ Unless the ground thaws before spring break.

☐ You'll find what you need if you look.

☐ We try to get as much work done as we can in an hour.

☐ We won't be planting any tulips this year.

☐ Deidre scoured the classifieds each day.

☒ In order to meet the deadline.

☒ On the shelf next to the potted plant.

 Check

 Reuse  Rights of use  Embed

H5P

"Fragments" activity by Brenna Clarke Gray was adapted from content from *Writing for Success - 1st Canadian Edition*, which is licensed under a CC BY-NC-SA 4.0 licence.

H5P: Interactive Video



“Hand washing interactive video” by Michelle Hughes is licensed under a CC BY-NC 4.0 licence.

H5P: Image Hotspots

+ Clear, Informative Title

Clear, informative headline +

+ Topic sentence that's related to the organizational pattern you're using. Supporting information that supports the topic sentence, provides examples, identifies causes, defines effects or otherwise supports the claim made. +

+ Transitional paragraph that summarizes the previous point, introduces the next point and shows how the two are related.

Clear, informative headline parallel to first

Another topic sentence that states the paragraph's main point. Supporting information as necessary. Transitional sentence that sets up the paragraph list:

- + Topic sentence: Supporting details.
 - Topic sentence parallel with first: supporting details.
 - Topic sentence parallel with second: supporting details.

Reuse <> Embed

H5P

"Organizing Information" activity by Arley Cruthers is licensed under a CC BY-NC 4.0 licence.

Textboxes

Can be used to:

- Highlight the most important ideas of a section.
- Walkthrough key processes or procedures.
- Provide concrete examples or case studies to support main ideas.

Example A

Express 4:5 in higher terms.

$$4:5 = \frac{4}{5} \rightarrow \frac{4}{5} \left(\frac{\times 2}{\times 2} \right) \rightarrow \frac{8}{10}$$

4:5 is equivalent to 8:10

More information on UDL

Universal Design for Learning Guidelines

- Explore all of the principles in more detail
- Read about the guidelines and checkpoints, which provide more detail about what each principle includes.
- Lots of concrete examples.

(<https://udlguidelines.cast.org/>)



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Designing for Print

ANNOTATE: Why might someone want a print copy?

Print Design Considerations

- Text size
- Links to additional resources
- Access to multimedia content

Move through the slides at your own pace. You can use the quiz questions to test your knowledge. After you're done, you'll be invited to reflect on what you learned.



An interactive H5P element has been excluded from this version of the text. You can view it online here:

<https://kpu.pressbooks.pub/businesswriting/?p=1322#h5p-38>



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Let's practice describing
images!

Tips for Writing Image Descriptions

What to describe

- Content/purpose of the image.
- Will depend on audience/context

How to describe

- Be objective
- Be concise.
- If image is complex, go from general to specific

Starry Night by Vincent van Gogh



“Starry Night” by Vincent van Gogh is in the public domain.

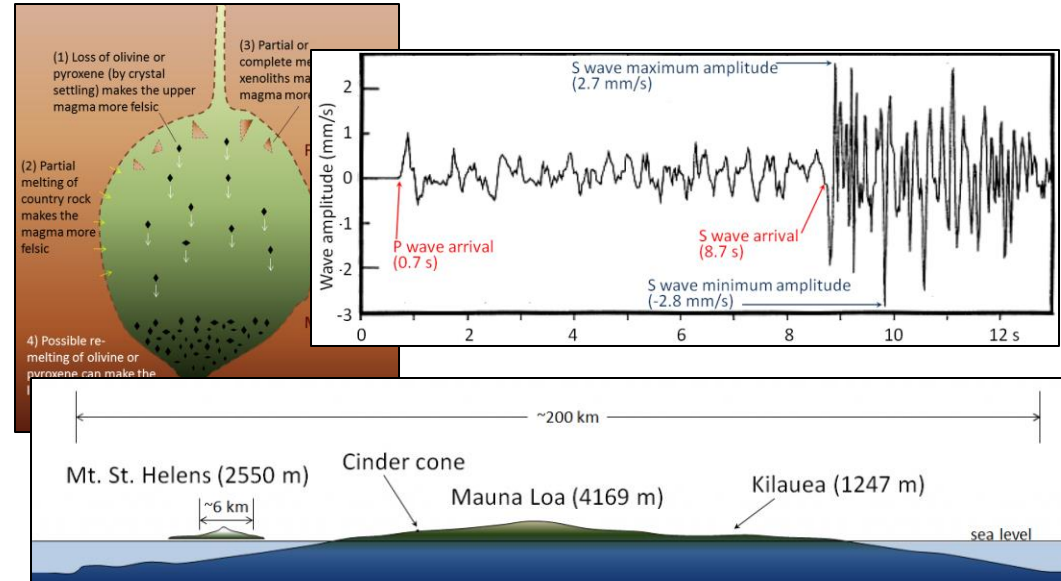
Where to describe an image

1. Alternative text field (ALT text).
2. Surrounding text or caption.
3. Long description linked somewhere else in the resource.

Long Descriptions for Complex Images

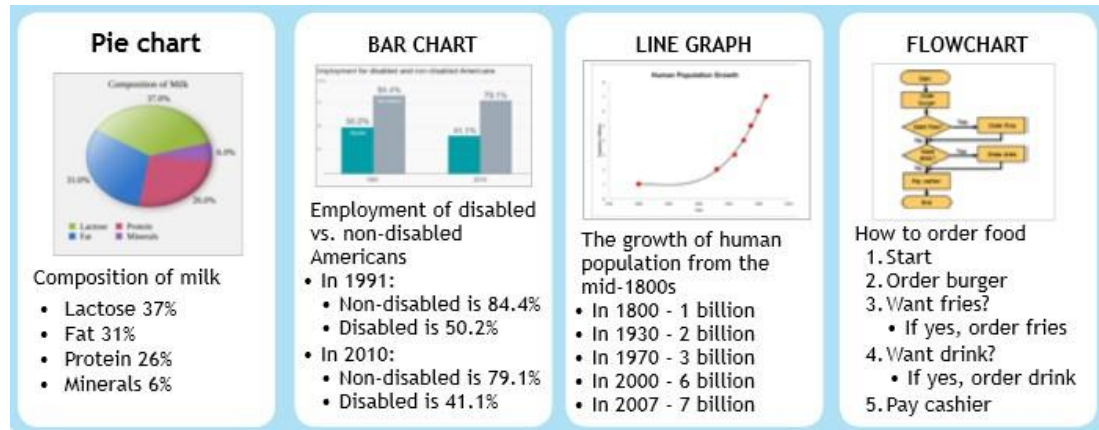
Examples

pie charts, bar charts, line graphs, flow charts, diagrams, illustrations, math graphs, and maps



Magma Chambers, P and S Waves, and Volcano Size © Steven Earle. CC BY

Lists



Bulleted and numbered lists can be used to present information found in

- Pie charts
- Bar charts
- Line graphs
- Flow charts

Adapted from © Supada Amornchat. [Complex Images for All Learners \[PDF\]](#). CC BY-NC-SA.

Data Tables

Data tables can be used to present information found in

- Complex tables
- Bar charts
- Line graphs
- Pie charts

PIE CHART

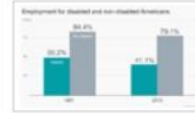
List the numbers from smallest to largest.



Composition	%
Minerals	6
Protein	26
Fat	31
Lactose	37

BAR CHART

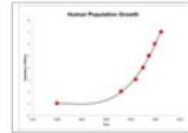
Briefly describe the chart & a summary, and provide title and axis labels.



Year	Non-disabled	Disabled
1991	84.4%	50.2%
2010	79.1%	41.1%

LINE GRAPH

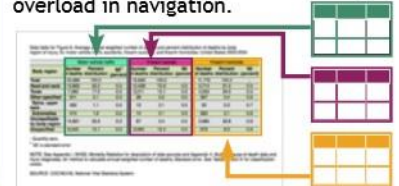
List the numbers from earliest to latest year.



Year	Population
1800	1 billion
1930	2 billion
1970	3 billion
2007	7 billion

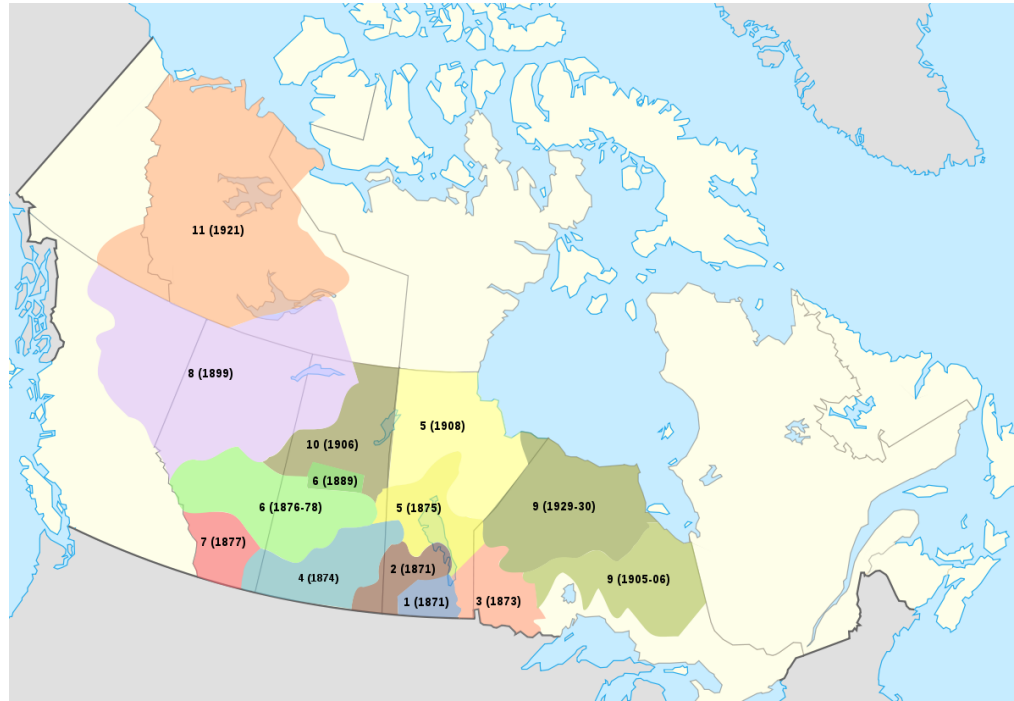
COMPLEX TABLE

Data separated into 3 tables aids cognitive overload in navigation.



Adapted from © Supada Amornchat. [Complex Images for All Learners \[PDF\]](#). CC BY-NC-SA.

How would you describe: Map of the Numbered Treaties



"[Numbered Treaties Map](#)" by [Themightyquill](#) is licensed under a [CC BY-SA 2.5](#) licence. Adapted from work by [STyx](#) and [Yug](#).

Things to consider:

- What information is already provided in the surrounding text? What information is only conveyed in the image? What do I want students to take away from this image?
- How to order the treaties
 - Based on date (i.e., old to new)
 - Based on location (i.e., south east to north west)
 - Based on size (i.e., big to small)
- How much detail to include
 - How much area is covered by each treaty
 - What borders each treaty

How would you describe this image?

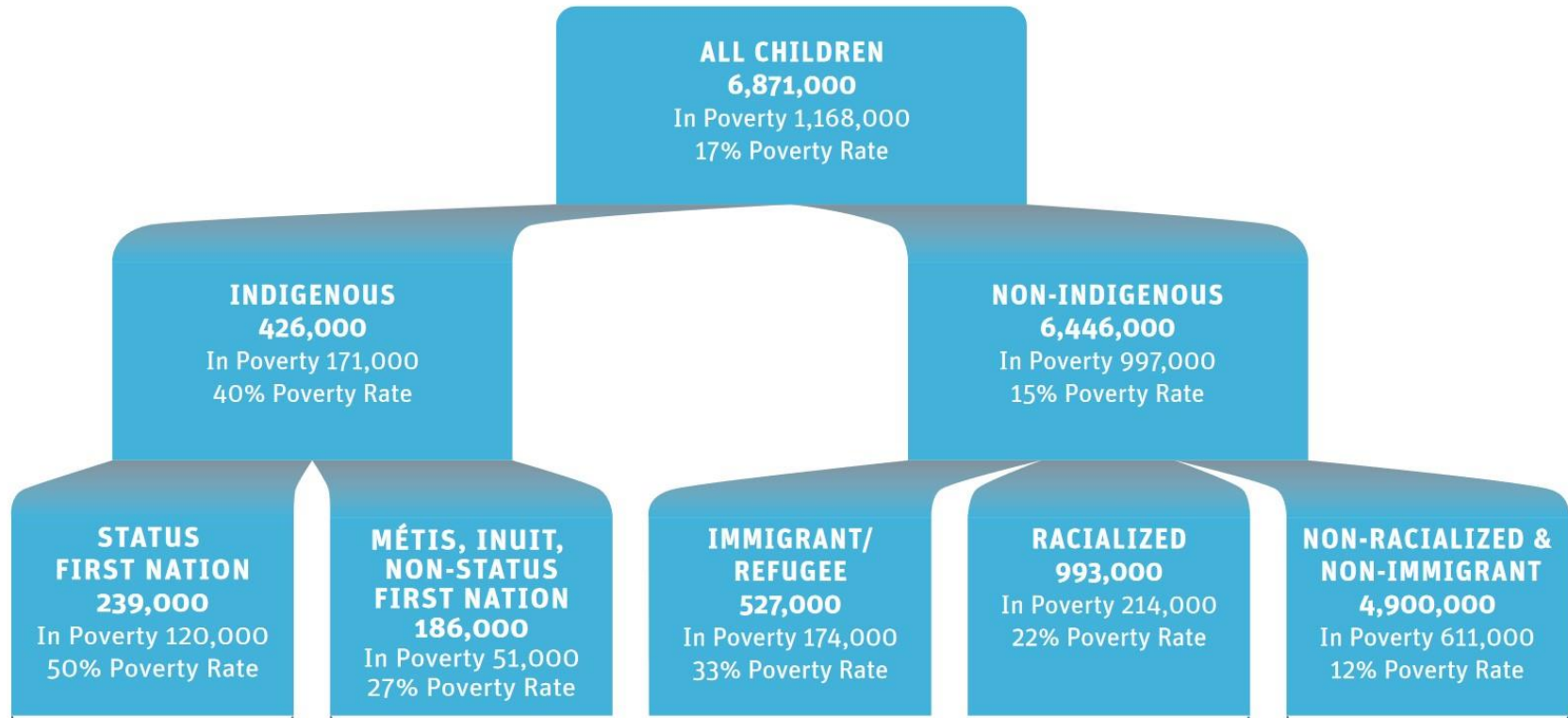


Image source: Macdonald, D., & Wilson, D. (2013). [Poverty or Prosperity: Indigenous Children in Canada \[PDF\]](#). Canadian Centre for Policy Alternatives. Not openly licensed.

Option 1: Bulleted List

A flow chart describing the poverty rates of different groups of children in Canada based on 2006 census data.

- **6,871,000 total children:** 1,168,000 in poverty, 17% poverty rate.
- **426,000 Indigenous children:** 171,000 in poverty, 40% poverty rate.
 - 239,000 Status First Nation children: 120,000 in poverty, 50% poverty rate.
 - 186,000 Métis, Inuit, Non-Status First Nation children: 51,000 in poverty, 27% poverty rate.
- **6,446,000 Non-Indigenous children:** 997,000 in poverty, 15% poverty rate.
 - 527,000 Immigrant/refugee children: 174,000 in poverty, 33% poverty rate.
 - 993,000 Racialized children: 214,000 in poverty, 22% poverty rate.
 - 4,900,000 Non-racialized and non-immigrant children: 611,000 in poverty, 12% poverty rate.

Option 2: Table

A flow chart describing the poverty rates of different groups of children in Canada based on 2006 census data. The data is provided in the below table.

Group	Total Children	Total In Poverty	Poverty Rate
All children	6,871,000	1,168,000	17%
All Indigenous children	426,000	171,000	40%
Status First Nation children	239,000	120,000	50%
Métis, Inuit, and Non-Status First Nation children	186,000	51,000	27%
All Non-Indigenous children	6,446,00	997,000	15%
Immigrant/Refugee children	527,000	174,000	33%
Racialized children	993,000	214,000	22%
Non-racialized & Non-Immigrant children	4,900,000	611,000	12%

POET Training Tool

poet.diagramcenter.org/

- When to describe images
- How to describe images
- Practice describing images

Lots of examples.

OER Production Series Webinars

- Find, Use, and Share OER – July 21
- Introduction to Pressbooks – July 28
- Technical Accessibility – August 11
- Applying UDL to OER – August 16
- Advanced Pressbooks – August 25

Register at <https://bccampus.ca/events/>



Questions?

Download slides and list of links: bit.ly/beyondaccessibility