



# ORC CURRICULUM MAP

## Grade 8 Science

*Topic Included:*

*Unit C: Light and Optical Systems*

*Resources Included:*

*Science in Context, Britannica School, ScienceFLIX, TrueFLIX*

*PowerKnowledge Suite, Crash Course, Crash Course Kids*

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## Crash Course Disclaimer

These Curriculum Maps have been updated to include the YouTube educational web series *Crash Course*. This web series is geared towards science. It includes topics related to Earth Science, Physical Science, Biology, Astronomy, and more. These videos can sometimes contain irreverent humour. We encourage educators to preview the videos for appropriateness before showing them in a classroom or library setting.

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## Background and Access Information

Learn Alberta's Online Reference Centre is a \$1.7 million collection of authoritative curricular aligned resources that are licensed on behalf of all students, staff, parents and public librarians learning/teaching/supporting the Alberta curriculum.

To Access the Online Reference Centre:

1. Go to [LearnAlberta.ca](http://LearnAlberta.ca)
2. Select English or French
3. Click on "Online Reference Centre" in the tab along the top of the screen
4. In school while on a school device, users do not need to enter a username or password. Users are able to enter any database or website instantly.
5. Access from a person device in school or remotely from outside of the school will require the user to enter a username/password once to unlock all of the resources.
6. Please share your district's ORC username/password with your students, parents of your students, student teachers and fellow staff members. Please do not share the username and password information on an open website (a website that does not require the user to login).

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## How to Use This Guide

Attached please find a listing of databases found on Learn Alberta's Online Reference Centre (ORC) that directly support specific learner outcomes in the grade two science and social studies curricula.

Formatting Overview for PowerKnowledge Databases:

### **Curricular Topic**

*Specific Learner Outcome (SLO)*

Name of the Database

- Topic
  - Subtopic
    - Article Title with Hyperlink
      - Article Sections

Formatting Overview for TrueFLIX:

### **Curricular Topic**

- Topic
  - eBook Title (alphabetized listing found in the Resources & Tools link in the top right hand corner of the screen)
    - Chapters in eBook if applicable

\*Please Note:

- TrueFLIX eBook links will be in the 'Resources Below Grade Level' sections.
- Links from the "Explore More" section of TrueFLIX are at a higher reading level and appear in the "Resources At or Above Grade Level" sections.

## Formatting Overview for ScienceFLIX:

### **Curricular Topic**

#### *Specific Learner Outcome (SLO)*

- Topic Area or Search Term
  - Article/Resource Title

\*Special Note: ScienceFLIX articles are presented in three (3) Lexile levels.

## Formatting Overview for Science In Context:

### **Curricular Topic**

#### *Specific Learner Outcome (SLO)*

#### Science In Context

- Browse Topics (link found in the top grey bar next to Home)
  - Topic
    - Introductory Article/Featured Content/Reference
      - Article Name with hyperlink

### A note about Science In Context:

*Science In Context* is a database that is designed for students in grades six to twelve. As such, some of the content of this database may be challenging for students who may struggle with reading.

However, this database does have several features to make it more user friendly for students with varied skill levels. First, each article indicates the reading level using a symbol just below the title of the article beside the name of the source. A green circle indicates a basic reading level, yellow square an intermediate reading level, and red triangle an advanced reading level. In addition, the "Advanced Search" feature allows users to limit the content search to a basic, intermediate or advanced reading level. This guide will include basic articles in the "At or Above Grade Level" sections and

intermediate articles in the "Above Grade Level" sections. Each title includes a hyperlink that takes you directly to the article in the database.

Last, this database does include a customizable listen feature, as well as a text translation and the ability to download a computer generated reading of the article to an MP3 format.

If you have any questions regarding this guide or if you would like a guide for additional grades please contact Bethany Arsenault, ORC Coordinator at [barsenault@thealbertalibrary.ab.ca](mailto:barsenault@thealbertalibrary.ab.ca)

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# Science 8 Unit C – Light & Optical Systems

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## Unit C: Light and Optical Systems

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SLO 1: *Investigate the nature of light and vision; and describe the role of invention, explanation and inquiry in developing our current knowledge*

- *Identify challenges in explaining the nature of light and vision (e.g., recognize that past explanations for vision involved conflicting ideas about the interaction of eyes and objects viewed; identify challenges in explaining upside-down images, rainbows and mirages)*
- *Investigate the development of microscopes, telescopes and other optical devices; and describe how these developments contributed to the study of light and other areas of science*
- *Investigate light beams and optical devices, and identify phenomena that provide evidence of the nature of light (e.g., evidence provided by viewing the passage of light through dusty air or cloudy water)*

### **Resources for Students Reading Below Grade Level**

Britannica School: Elementary

- Keyword Search: Light
  - Article Title: Light
  - Article Title: Prism
  - Article Title: Optics
  - Article Title: Lens
  - Article Title: Color
    - Color and Light
  - Article Title: Telescope
  - Article Title: Microscope
  - Article Title: Binoculars
  - Article Title: Mirage
  - Article Title: Hologram
  - Article Title: Rainbow
- Keyword Search: Optics

- Article Title: Sir Isaac Newton
- Article Title: Gyroscopes
  - Optical Gyroscope
- Keyword Search: Telescope
  - Article Title: Galileo

#### PowerKnowledge Physical Science

- Topic: Energy and Matter
  - Light and Sound
    - [All About Light](#)
  - Forms of Energy
    - [Light](#)
- Topic: Atoms and Molecules
  - Looking at Atoms and Molecules
    - [Using Scientific Instruments](#)
    - [The Electron Microscope](#)
    - [The Scanning Electron Microscope](#)
    - [The Scanning Tunneling Microscope](#)
    - [The Atomic Force Microscope](#)
    - [The Confocal Microscope](#)
    - [Scientific Instruments of Tomorrow](#)
- Topic: Force and Motion
  - Gravity
    - Isaac Newton and Gravity
      - [Light and Colors](#)
  - Isaac Newton and Laws of Motion
    - [Light and Color](#)

#### PowerKnowledge Life Science

- Topic: Human Body
  - Your Body Parts
    - [Eyes](#)

#### PowerKnowledge Earth Space Science

- Topic: Space
  - Space Exploration



- People and Space
  - [Galileo and the Telescope](#)

## **Resources for Students Reading At or Above Grade Level**

Britannica School: Middle

- Keyword Search: Light
  - Article Title: Light (physics)
  - Article Title: Radiation (physics)
    - Visible Light
  - Article Title: Isaac Newton
  - Article Title: Prism
  - Article Title: Optics
  - Article Title: Lens
  - Article Title: Color (optics)
    - Abnormal Color Vision
    - Color Vision in Animals
    - Color Perception
  - Article Title: Physics
    - The Problem of Explaining Light
  - Article Title: Microscope
  - Article Title: Field Glasses and Binoculars
  - Article Title: Mirage (optical illusion)
  - Article Title: Hologram
  - Article Title: Rainbow
- Keyword Search: Eye
  - Article Title: Eye (anatomy)
- Keyword Search: Microscope
  - Article Title: Microscope
  - Article Title: Biology
    - Development of the Microscope
- Keyword Search: Telescope
  - Article Title: Telescope
- Keyword Search: Fiber Optics
- Keyword Search: Illusion
  - Article Title: Illusion

- Visual Illusions
- Keyword Search: Optical Device
  - Article Title: Periscope
  - Article Title: Animation
    - History
  - Article Title: Typesetting
    - History
  - Article Title: Stereoscope

#### ScienceFLIX

- Topic: Light
  - Watch It
  - Read It
  - Dive Deeper
    - The Eye and Vision
    - Optics
  - Explore More
    - Applications of Light
      - Optical Instruments
    - Light Perception
      - Ophthalmology
      - Mirage
      - Rainbow
- Search Term: Microscope
  - Article Title: Seeing the Very Small
- Search Term: Telescope
  - Article Title: The Big Scopes
  - Article Title: Telescopes

#### Science In Context

- Advanced Search: "Nature of Light" (Basic & Intermediate Content selected)
  - Reference
    - [Light](#) (World of Mathematics, 2007)
    - [Color Spectrum](#) (World of Scientific Discovery, 2007)
    - [Interferometry](#) (World of Scientific Discovery, 2007)

- [Light, theories of](#) (World of Scientific Discovery, 2007)
- [Optics and Light](#) (History of Modern Science and Mathematics, updated 2012)
- [Seventeenth-century Experimental and Theoretical Advances Regarding the Nature of Light Lay the Foundations of Modern Optics](#) (Science and its Times, 2005)
- [Light](#) (World of Physics, updated 2014)
- [Optics](#) (World of Physics, updated Dec 2014)
- Advanced Search: Light
  - Topic
    - [Light](#) (Gale Encyclopedia of Science, 2014)
  - Featured Content
    - [Color](#) (UXL Encyclopedia of Science, 2015)
  - Reference
    - [Double-slit Interference Experiment](#) (World of Physics, updated 2014)
    - [Sight](#) (UXL Complete Life Science Resource, 2009)
  - Experiments
    - [Light Properties](#) (Experiment Central: Understanding Scientific Principles Through Projects, 2010)
    - [Optics and Optical Illusions](#) (Experiment Central: Understanding Scientific Principles Through Projects, 2010)
- Advanced Search: Vision
  - Reference
    - [Eye and Ocular Fluids](#) (World of Anatomy and Physiology, 2007)
    - [Eye](#) (UXL Encyclopedia of Science, 2015)
    - [Vision, Chemistry of](#) (World of Chemistry, updated 2013)
- Advanced Search: "microscopes" OR "telescopes" OR "optics"
  - Reference
    - [The Development of Key Instruments for Science](#) (Science and its times, 2001)
    - [Optical Instruments](#) (World of Physics, updated 2014)
    - [Telescope](#) (World of Physics, updated 2014)
    - [Telescope](#) (World of Earth Science, 2007)

- [Optical Telescope](#) (Astronomy & Space: From the Big Bang to the Big Crunch, August 30, 2007)
- [Microscope](#) (UXL Complete Life Science Resource, July 2009)
- [Compound Microscope](#) (World of Physics, updated 2014)
- Advanced Search: Optics
  - Reference
    - [Mirage](#) (UXL Encyclopedia of Weather and Natural Disasters, 2016)
    - [Rainbow](#) (UXL Encyclopedia of Weather and Natural Disasters, 2016)
    - [Atmospheric Optical Effects](#) (UXL Encyclopedia of Science, 2015)
    - [Lens](#) (UXL Encyclopedia of Science, 2015)

#### Crash Course Videos

- [Light: Crash Course Astronomy #24](#)
- [Telescopes: Crash Course Astronomy #6](#)

SLO 2: *Investigate the transmission of light, and describe its behaviour using a geometric ray model*

- *Investigate how light is reflected, transmitted and absorbed by different materials; and describe differences in the optical properties of various materials (e.g., compare light absorption of different materials; identify materials that transmit light; distinguish between clear and translucent materials; identify materials that will reflect a beam of light as a coherent beam)*
- *Measure and predict angles of reflection*
- *Investigate, measure and describe the refraction of light through different materials (e.g., measure differences in light refraction through pure water, salt water and different oils)*
- *Investigate materials used in optical technologies; and predict the effects of changes in their design, alignment or composition*

## **Resources for Students Reading Below Grade Level**

Britannica School: Elementary

- Keyword Search: Light
  - Article Title: Light
  - Article Title: Color
  - Article Title: Optics
  - Article Title: Mirror
  - Article Title: Lens
  - Article Title: Fiber Optics
- Keyword Search: Refraction
  - Article Title: Illusion
    - Types of Illusion
  - Article Title: Telescope

PowerKnowledge Physical Science

- Topic: Energy and Matter
  - Light and Sound
    - [All About Light](#)
  - Forms of Energy
    - [Light](#)
- Topic: Elements and Periodic Table
  - [Metals](#)
    - [Metals Have Luster](#)

PowerKnowledge Earth Space Science

- Topic: Space
  - Space Exploration
    - People and Space
      - [Galileo and the Telescope](#)

PowerKnowledge Life Science

- Topic: Plants
  - Photosynthesis
    - [Chlorophyll and Sunlight](#)
    - [What Makes Leaf Colors](#)

Crash Course Kids

- [Glow On: Crash Course Kids #20.2](#)

### **Resources for Students Reading At or Above Grade Level**

Britannica School: Middle

- Keyword Search: Light (physics)
  - Article Title: Light
  - Article Title: Lens
  - Article Title: Rainbow
  - Article Title: Spectrum and Spectroscope
  - Article Title: Mirror (optics)
  - Article Title: Microscope
  - Article Title: Telescope
- Keyword Search: Fiber Optics
  - Article Title: Fiber Optics
- Keyword Search: Laser
  - Article Title: Laser and Maser
- Keyword Search: Geometric Ray
  - Article Title: Optics
    - Geometrical Optics
- Keyword Search: Light Reflection
  - Article Title: Prism
  - Article Title: Glass
    - Optical Glass
- Keyword Search: Refract
  - Article Title: Diamond (gemstone)
    - Qualities of a Gem Diamond
  - Article Title: Mirage

ScienceFLIX

- Topic: Light
  - Watch It
  - Read It
  - Dive Deeper

- Light Perception
  - Optics
- Explore More
  - The Nature of Light
    - Reflection
  - Applications of Light
    - Optical Instruments
    - Etc...

### Science In Context

- Advanced Search: Light (Basic & Intermediate Content selected)
  - Featured Content
    - [Color](#) (UXL Encyclopedia of Science, 2015)
  - Reference
    - [Light, Polarization of](#) (UXL Science, 2008)
    - [Light, Polarization of](#) (World of Scientific Discovery, 2007)
    - [Polarization of Light](#) (World of Physics, updated 2014)
    - [Light, Reflection and Refraction of](#) (World of Scientific Discovery, 2007)
    - [Reflection, Refraction and Dispersion](#) (World of Physics, updated 2014)
- Advanced Search: "Optical Technology" OR "Optics"
  - Featured Content
    - [Optical Technology](#) (Computer Science, 2013)
    - [Reflection](#) (UXL Encyclopedia of Weather and Natural Disasters, 2016)
    - [Refraction](#) (UXL Encyclopedia of Weather and Natural Disasters, 2016)
- Advanced Search: "angle of reflection"
  - Reference
    - [Geometric Optics](#) (World of Physics, 2011)
- Advanced Search: "light transmission"
  - Reference
    - [Micro-spectrophotometry](#) (World of Forensic Science, 2016)
  - Experiments

- [Fiber Optics](#) (Experiment Central: Understanding Scientific Principles Through Projects, updated 2014)

SLO 3: *Investigate and explain the science of image formation and vision, and interpret related technologies*

- *Demonstrate the formation of real images, using a double convex lens, and predict the effects of changes in the lens position on the size and location of images (e.g., demonstrate a method to produce a magnified or reduced image by altering the placement of one or more lenses)*
- *Demonstrate and explain the use of microscopes; and describe, in general terms, the function of eyeglasses, binoculars and telescopes*
- *Explain how objects are seen by the eye, and compare eyes with cameras (e.g., compare focusing mechanisms; compare the automatic functions of the eye with functions in an automatic camera)*
- *Compare the function and design of the mammalian eye with that of other vertebrates and invertebrates (e.g., amphibians; fish; squid; shellfish; insects, such as the housefly)*
- *Investigate and describe the development of new technologies to enhance human vision (e.g., laser surgery on eyes, development of technologies to extend night vision)*
- *Investigate and interpret emerging technologies for storing and transmitting images in digital form (e.g., digital cameras, infrared imaging, remote imaging technologies)*

### **Resources for Students Reading Below Grade Level**

Britannica School: Elementary

- Keyword Search: Light
  - Article Title: Camera
  - Article Title: Microscope
  - Article Title: Telescope
  - Article Title: Binoculars
  - Article Title: Mirror



- Keyword Search: Eye
  - Article Title: Eye
    - Introduction
    - Human Eye
    - Problems with the Eye
    - Eyes of Other Animals
  - Article Title: Lens (optical Device)
    - Lens of the Eye
  - Article Title: Photography
- Keyword Search: Eyeglasses
  - Article Title: Optics (science)

#### PowerKnowledge Life Science

- Topic: Human Body
  - Your Body Parts
    - [Eyes](#)
- Topic: Animals
  - Reptiles and Amphibians
    - Lizards
      - Chameleons
        - [What Makes Chameleons Special?](#)
  - Bugs and Insects
    - Grasshoppers
      - [A Grasshopper's Body](#)

#### PowerKnowledge Physical Science

- Topic: Atoms and Molecules
  - Looking at Atoms and Molecules
    - [Using Scientific Instruments](#)
    - [The Electron Microscope](#)
    - [The Scanning Electron Microscope](#)
    - [The Scanning Tunneling Microscope](#)
    - [The Atomic Force Microscope](#)
    - [The Confocal Microscope](#)
    - [Scientific Instruments of Tomorrow](#)

## **Resources for Students Reading At or Above Grade Level**

Britannica School: Middle

- Keyword Search: Light
  - Article Title: Camera
  - Article Title: Microscope
  - Article Title: Telescope
  - Article Title: Binoculars
  - Article Title: Mirror
  - Article Title: Optics
- Keyword Search: Eye
  - Article Title: Eye
  - Article Title: Eyeglasses
  - Article Title: Insect (arthropod)
    - Sense Organs
  - Article Title: Fly
    - The Physical Characteristics of Flies
- Keyword Search: Light Beam
  - Article Title: Holography (optics)
- Keyword Search: Camera
  - Article Title: Photography
  - Article Title: Camera
- Keyword Search: Laser Surgery
  - Article Title: Radial Keratotomy
  - Article Title: Laser and Maser

ScienceFLIX

- Topic: Light
  - Read It
    - See Also (at bottom of article)
      - Color
  - Dive Deeper
    - Light Perception
      - The Eye and Vision
      - Optics
    - Application of Light

- Lasers
  - Explore More
    - Applications of Light
      - Photography
      - Optical Instruments
- Topic: Senses
  - Dive Deeper
    - Head Senses
      - Vision and Hearing
- Search Term: Camera
  - Article Title: Photography
  - Article Title: Communication Tech
    - Photography
- Search Term: Lens
  - Article Title: Lenses

#### TrueFLIX

- Topic: Human Body
  - eBook: The Nervous System
    - Explore More
      - Vision and Hearing

#### Science In Context

- Advanced Search: Eyes (Basic & Intermediate Content selected)
  - Reference
    - [Eyes and Eyesight](#) (World of Physics, updated 2014)
    - [Sight](#) (UXL Complete Life Science Resource, 2009)
    - [Eye and Ocular Fluids](#) (World of Anatomy and Physiology, 2007)
    - [Eye](#) (UXL Encyclopedia of Science, 2015)
    - [Eye](#) (World of Health, 2007)
    - [Eyes and Eyesight](#) (World of Physics, updated 2014)
    - [Vision](#) (Biology, 2016)
  - News
    - [It's Plain To See Why Some Animals Have Better Eyesight than Others](#) (Washington Post, March 19, 2013)

- Magazines
  - [Seeing eye to eye: whether they use two eyes or dozens, people and animals turn light into sight](#) (National Geographic Explorer Jan-Feb 2016)
  - [Don't Believe Your Eyes: the science of sight](#) (Odyssey, Mar 2014)
  - [Extraordinary Eyes: take a look at how other animals see the world](#) (SuperScience, Nov-Dec 2012)
  - [Animal vision revealed: many animals can see things that are undetectable to the human eye](#) (Science World, Sept 27, 2010)
- Advanced Search: Optics
  - Reference
    - [Optics and Light](#) (History of Modern Science and Mathematics, updated 2012)
- Advanced Search: Laser
  - Reference
    - [Laser Surgery](#) (Gale Encyclopedia of Medicine, 2015)
    - [Laser](#) (World of Invention, 2006)
- Advanced Search: Lenses OR "Optical Images"
  - Reference
    - [Lens](#) (UXL Encyclopedia of Science, 2015)
    - [Lenses](#) (World of Physics, updated 2014)
    - [Optical Instruments](#) (World of Physics, updated 2014)
- Advanced Search: Eyeglasses OR Binoculars
  - Reference
    - [Eyeglasses](#) (UXL Science, 2008)
    - [Eyeglasses and Contact Lenses](#) (Gale Encyclopedia of Medicine, 2015)
    - [Eyeglasses](#) (World of Invention, 2006)
    - [Binocular](#) (World of Invention, 2006)
    - [Binoculars](#) (World of Physics, updated 2014)
    - [The Development of Key Instruments for Science](#) (Science and its times, 2001)
- Advanced Search: Camera
  - Reference

- [Digital Camera](#) (World of Invention, 2006)
  - [Camera Obscura: Ancestor of Modern Photography](#) (Science and its times, 2001)
  - Advanced Search: "Night Vision" OR Infrared
    - Reference
      - [Night Vision Devices](#) (World of Invention, 2006)
      - [Infrared Detection Devices](#) (World of Forensic Science, 2016)
      - [Digital Imaging](#) (World of Forensic Science, 2016)
- \*\*\*For microscope or telescope, please see links in SLO #1 above

#### Crash Course Videos

- [Telescopes: Crash Course Astronomy #6](#)