Camera, lenses & the eye

This activity's **Learning Goal** is to:
1) Evaluate the effectiveness of technological devices designed to make use of light, and assess their social benefits.
2) Demonstrate an understanding of various characteristics and properties of light, with respect to refraction in lenses.


Minds On

"...the Black community in America is hit with not one pandemic but two pandemics, COVID-19 and the chronic problems of racism and police violence."

- Dr Seema Yasmin, Stanford University June 2020

It is a myth that racist policing is something that happens only "over there", in the United States.

Some statistics:
- 36% of people shot to death over a decade by RCMP were Indigenous, though Indigenous people make up 4.9% of Canada's population.
- Black Torontonians are 20 times more likely to be shot by police than the city's white residents according to the Ontario Human Rights Commission,

BLACK LIVES MATTER
INDIGENOUS LIVES MATTER
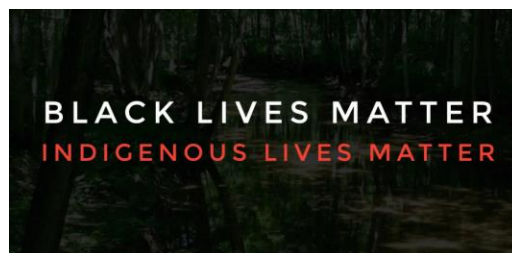
There is renewed interest and pressure across Canada right now to adopt the use of body cameras to monitor interactions between police and community in order to reduce use of excessive force. In addition, some people have raised the question: "Is investing in policing worthwhile at all?"

❏ Before moving on, visit this Jamboard to share your thinking and reactions to the ideas shared.

Do you think body cameras (or increasing police budgets) would reduce excessive force and racism in policing?

Action

In this lesson, you will learn about how cameras and the eye works. You will compare how each functions, and then learn how corrective lenses (glasses and contact lenses) work to improve our vision.

Learning Activity 1: Eye vs Camera

1) Make a copy of this anticipation guide by going to File > Make a Copy. In the Before column, mark each statement as True (T) or False (F).

2) Read through this resource: Eye vs. Camera. Then, explore this page of optical illusions. 😲

3) Open the anticipation guide from step 1.

   In the After column mark each statement as True or False based on reading the article. Write evidence that supports the answer to the statement.

   ❏ Hand the anticipation guide into the dropbox for this week.

Learning Activity 2: Lenses and the eye
1) Watch this video.

2) Explore the simulation.
   a) Select **Normal Vision**. Adjust the **Focus** and **Object Position** sliders to identify the positions when that light rays focus on the retina.
   b) Select **Near Sighted** and repeat the instructions in a). Under what conditions will Near Sighted people have difficulty seeing? What is happening in the eye? What do corrective lenses do to help?
   c) Repeat for **Far Sighted**.

3) Watch this quick video that shows both corrective lenses with "real" light and an eye model.

4) Finally, wrap up this lesson by completing this quick write reflection.

- ❏ Hand in the exit slip into the dropbox for this week.

Consolidation
This lesson had two assignments to complete: a comparison of eye vs camera and a quick write about lenses and the eye. Make sure you completed and submitted both!

Article: The Future of Sight

Understanding lenses and how the human eye works has led to research on developments such as the bionic eye and facial recognition software.

Facial recognition software is used on social media platforms such as Instagram and Facebook to help tag people in photos. It is also used by police. Click the video link below to hear an explanation of facial recognition, how it's used and its limitations. It features Joy Buolamwini, a Canadian born American-Ghanian computer scientist and digital activist based at MIT.

Fighting Algorithmic Bias

The (re-)awakening around racial inequity has recently led big tech companies such as Amazon, IBM and now Microsoft to halt conducting face scans for police in the US as of June 2020.

After watching the video:

- ❏ Complete this exit ticket. Don't forget to hit submit.

Rubric
This task will be marked out of 10 marks in the COM category.

Knowledge/ Understanding
- ❏ I understand how cameras and the eye uses lenses to capture light to form images.
- ❏ I can explain characteristics of images formed by a convex lens in the eye or camera

Exemplary	Proficient	Growing	Beginning
Demonstrates thorough knowledge and understanding of content. 5 Marks	Demonstrates considerable knowledge and understanding of content. 4 Marks	Demonstrates some knowledge and understanding of content. 3 Marks	Demonstrates limited knowledge and understanding of content. 1 or 2 Marks

Communication
- ❏ I can use science specific vocabulary terms correctly to effectively explain how lenses capture light to form images including: lens, ray, focus, converging or convex lens, diverging or concave lens

Exemplary	Proficient	Growing	Beginning
Expresses and organizes ideas and information with a high degree of effectiveness. Uses vocabulary, and terminology with a high degree of effectiveness. 5 Marks	Expresses and organizes ideas and information with considerable effectiveness. Uses vocabulary, and terminology with considerable effectiveness. 4 Marks	Expresses and organizes ideas and information with some effectiveness. Uses vocabulary, and terminology with some effectiveness. 3 Marks	Expresses and organizes ideas and information with limited effectiveness. Uses vocabulary, and terminology with limited effectiveness. 1 or 2 Marks