A Note on This Presentation

- This PDF document is a static archive of a live presentation originally delivered via **Lumio**, an interactive learning platform.

- Some pages represent interactive activities (like group brainstorms, collaborative workspaces, or games) that cannot be completed within the PDF.

Science Quest
— North —

MEMORIAL
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Bringing Physics To Life-
Free Interactive Resources for Educators and Students.

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CANADIAN PHYSICS COUNTS

We Need Your Input!

Help us design the next national survey of Equity, Diversity, and Inclusion in Canadian physics.

Take our Short Engagement Survey

Scan the QR code and tell us what you want to know about the Canadian physics community.

Investigators: Dr. Adrianna Tassone Dr. Eden Hennessey, Skye Hennessey, Dr. Shohini Ghose, Anastasia Smolina
Laurier Centre for Women in Science (WinS), Wilfrid Laurier University
University of Toronto
Dalhousie University

This study has been reviewed and approved by the Laurier Ethics Board (REB # 9615).

DALHOUSIE UNIVERSITY

LAURIER WILFRID LAURIER UNIVERSITY

WOMEN IN SCIENCE

RAPPORT SUR LA PHYSICS CANADIENNE

Votre avis nous intéresse!

Aidez-nous à concevoir la prochaine enquête nationale sur l'équité, la diversité et l'inclusion en physique canadienne.

Participez à notre court sondage de consultation

Scannez le code QR et dites-nous ce que vous souhaitez savoir sur la communauté Canadienne de la physique.

Enquêteurs: Dr. Adrianna Tassone, Dr. Eden Hennessey, Skye Hennessey, Dr. Shohini Ghose, Anastasia Smolina
Laurier Pour les Femmes en Science (WinS), Université Wilfrid Laurier
Université de Toronto
Université Dalhousie
Cette étude a été examinée et approuvée par le conseil d'éthique de Laurier (#9615).

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WOMEN IN SCIENCE

Our Partners...

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NSERC
CRSNG

Natural Sciences and Engineering Research Council of Canada- federal funding agency for university-based research and student training

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School of Science and the Environment(Grenfell Campus) and Physics Department (St. John's Campus)

TRIUMF

National particle accelerator centre located at the University of British Columbia housing the world's largest cyclotron.

cenovus ENERGY

The second-largest Canadian-based refiner and a top-three producer of crude oil and natural gas in the country.

Our Team...

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Dr. Svetlana Barkanova-Project Lead
John Way-Project Coordinator
Samantha Ryan-Student Research Assistant
Larry Eddy-Curriculum Developer

Our Mission...

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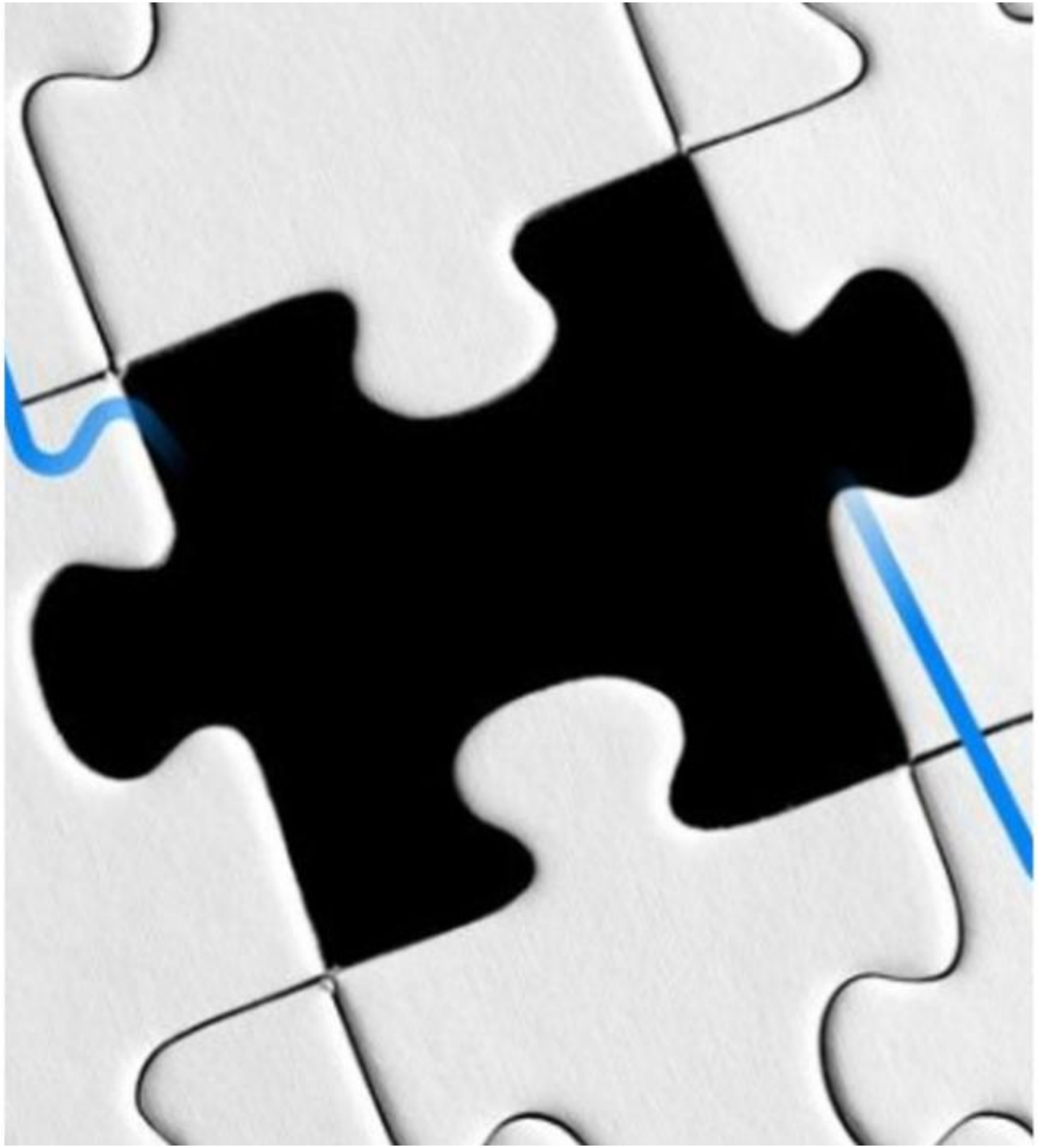


- Address the gaps for students learning Physics in rural and remote areas.

- Enhance Physics education across Atlantic Canada for intermediate and high school students.

Our Aim

1. Encourage students in rural and remote areas to consider natural Sciences and Engineering careers by connecting them with role models with a Physics background.

2. Enrich the Physics curriculum with <u>FREE</u> easily accessible, interactive hands on lesson resources that mirror curriculum objectives.

The Challenge!

Develop interactive, engaging Physics lessons designed for remote Natural Sciences and Engineering role models to inspire Physics-based careers that simultaneously meets core curriculum objectives, serving as an effective, ready-to-use tool for teachers who may not have a specialist Physics degree.

What are the Rural Physics gaps?

Teacher Isolation

Lack of Extracurricular/Mentorship Opportunities

Limited Course Offerings

Lack of Laboratory Equipment and Facilities

Limited Technology and Connectivity

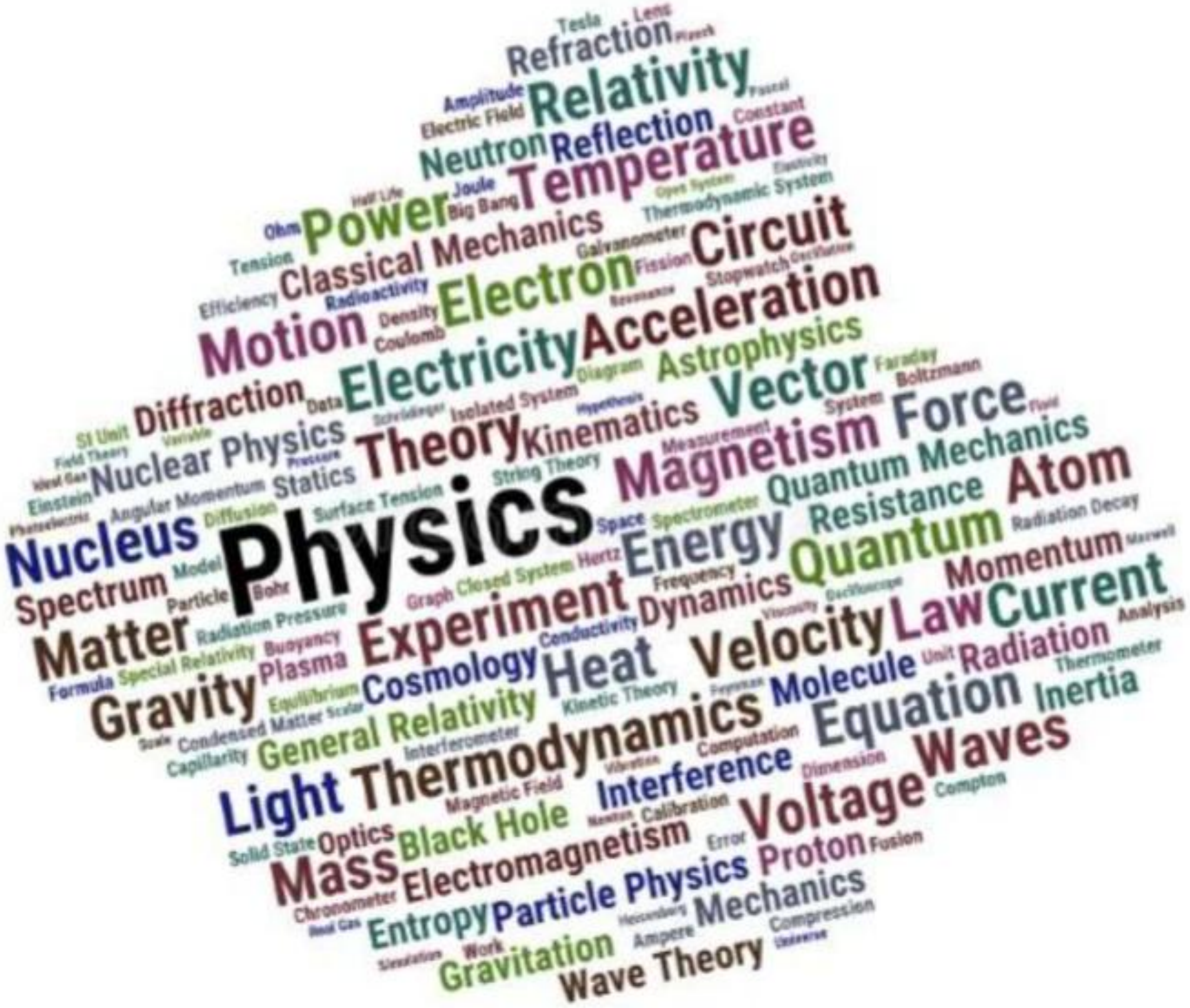
Lack of Role Models

Shortage of Qualified Physics Teachers

Lack of Professional Development

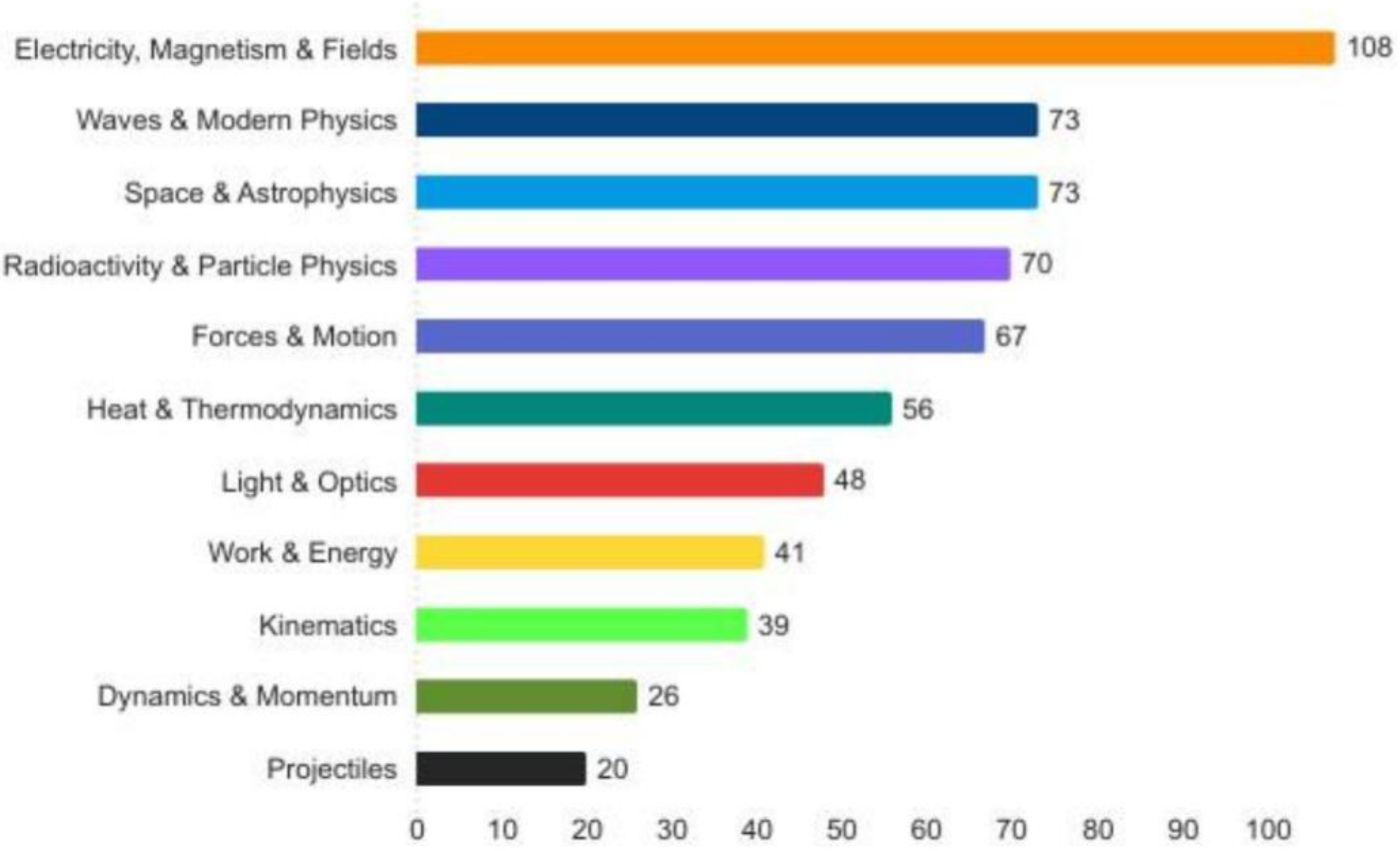
Socioeconomic Barriers

What does the data say about the concepts Atlantic Physics teachers need support with?

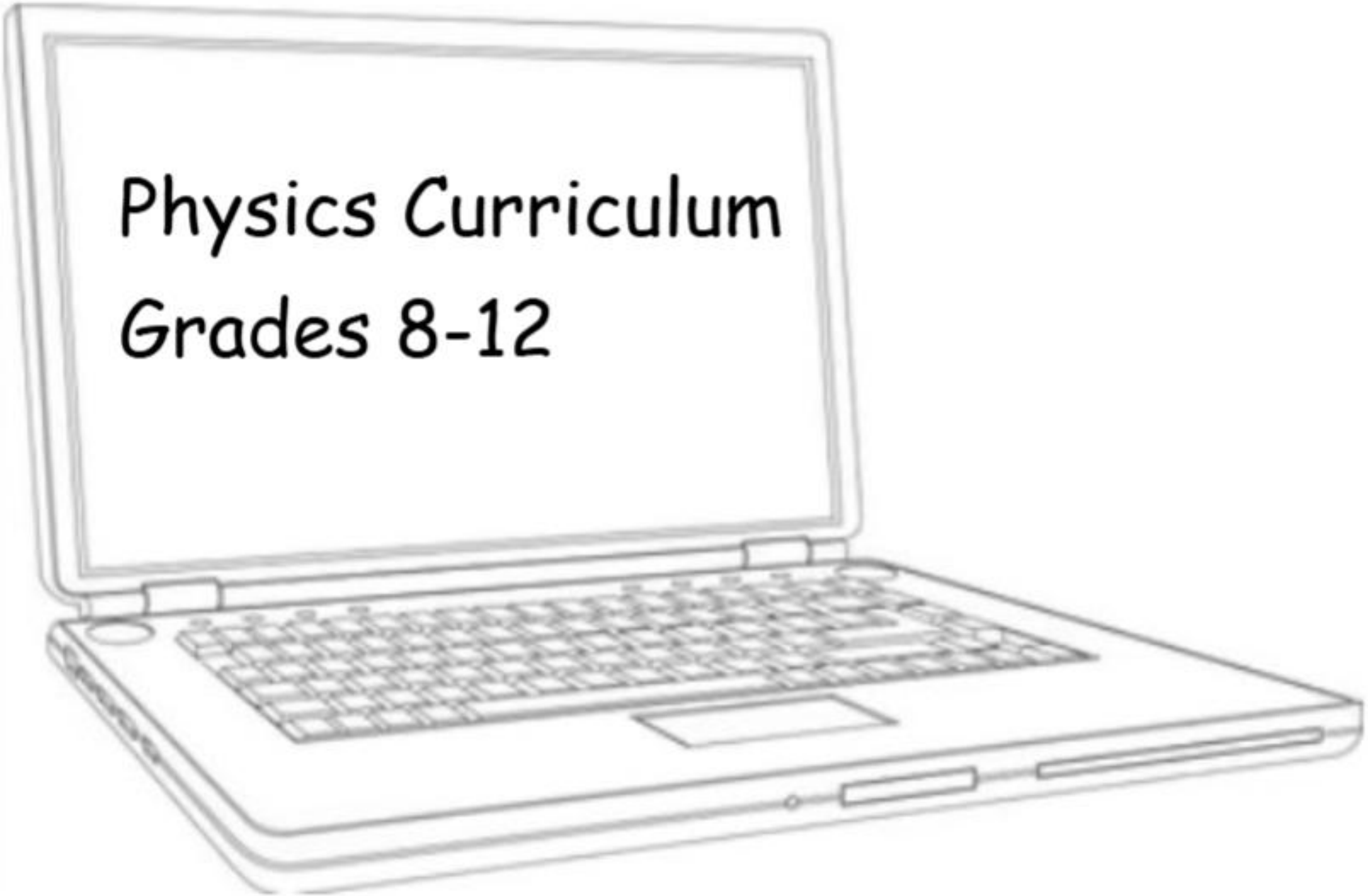


Atlantic Science & Physics Teachers Survey

Physics in the Rural Classroom(CISE Atlantic-272 Participants polled)

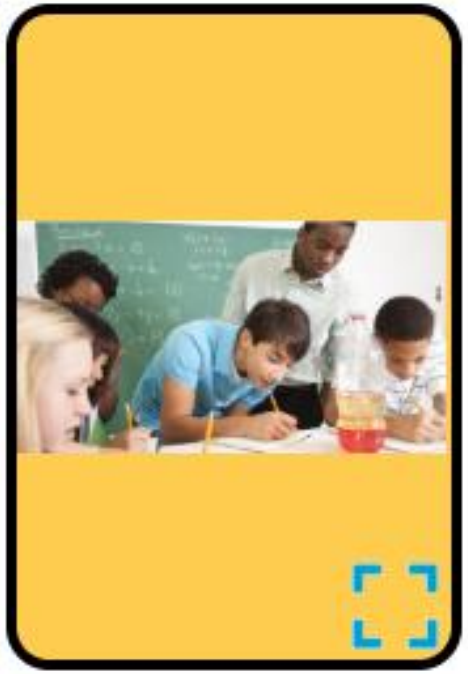


What was important when developing the educational resources?



Curriculum course objectives and learning outcomes be covered.

The main digital learning tool is interactive and collaborative for students.



Overall lesson and associated activities be fun and interactive- goal is to get them “hooked”.

Materials and resources are easily accessible and affordable.

Why Lumio?...

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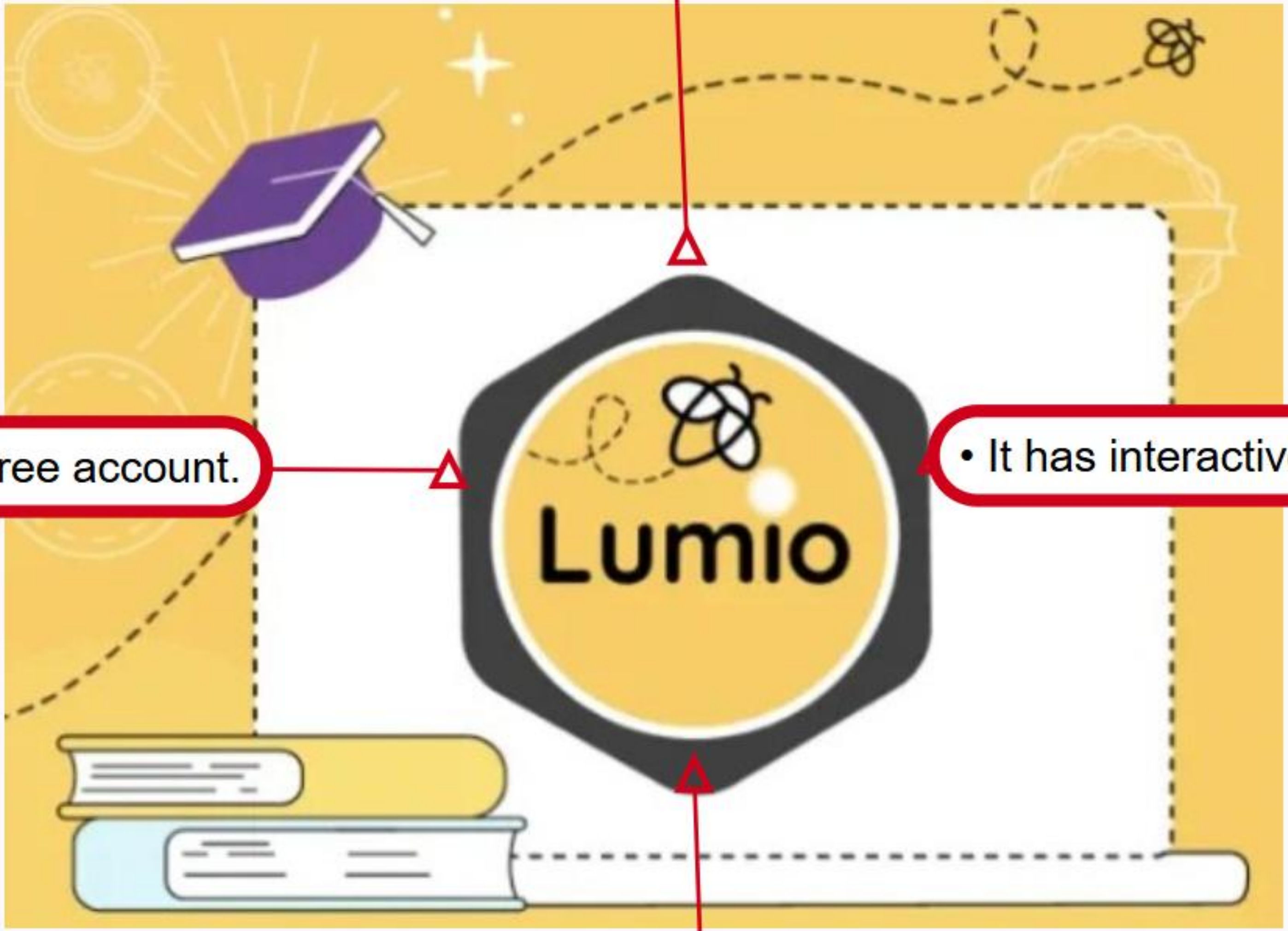
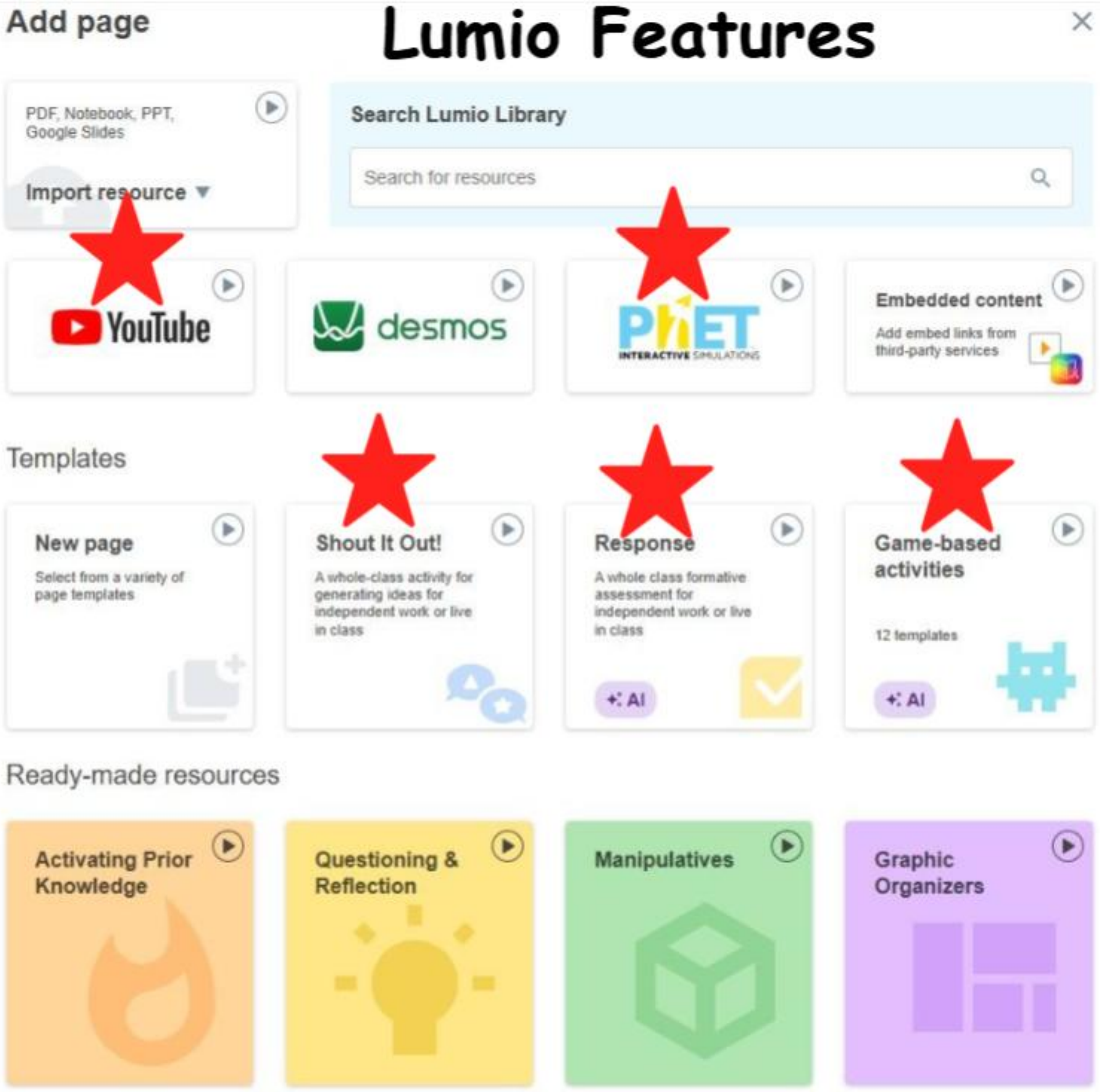
- A digital learning tool that transforms lessons



- N.L teachers have a free account.
- It has interactive activities and games.
- It engages students in-class and remotely.

Lumio Features



Game

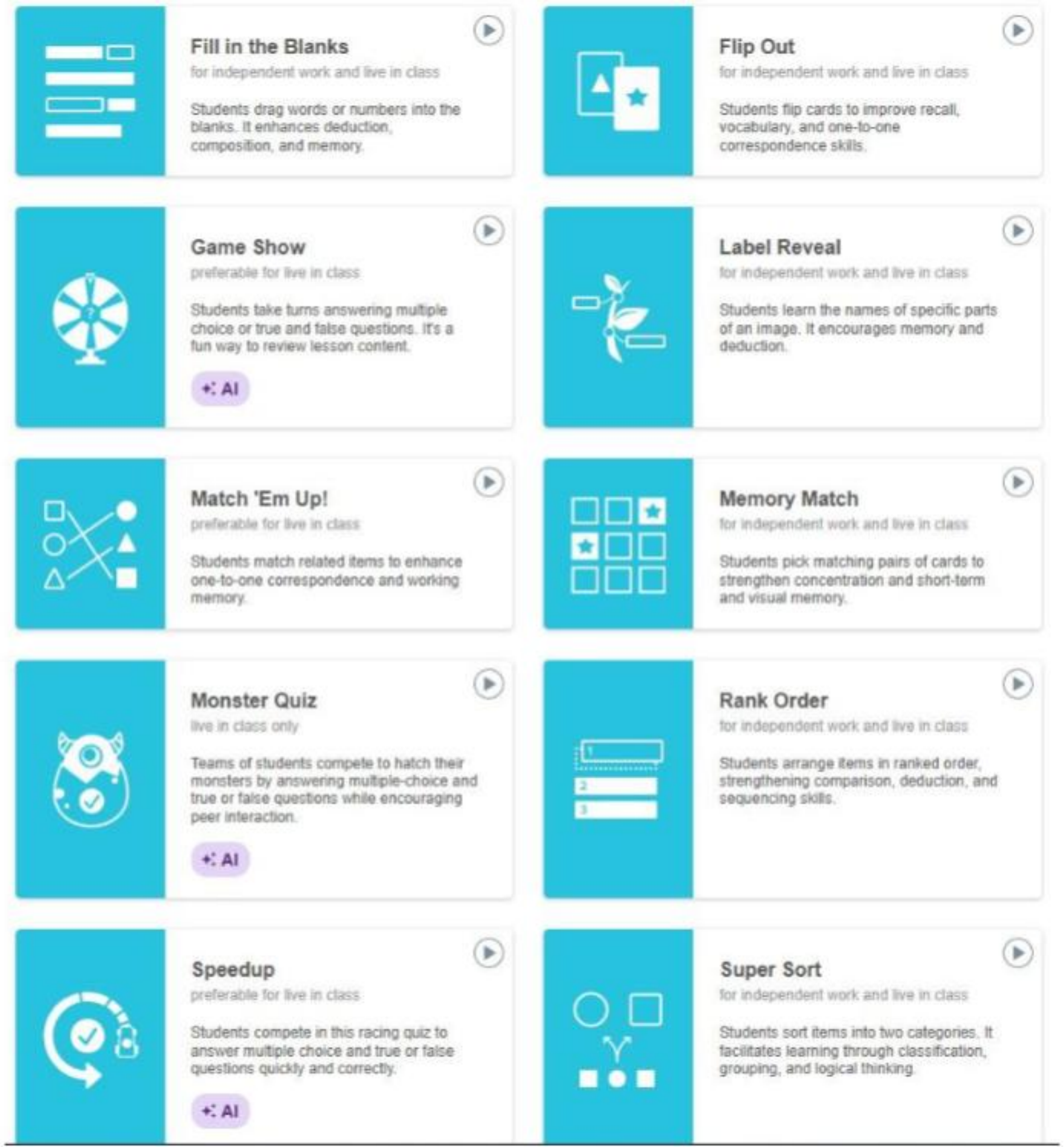
Based

Activities=

Making

Curriculum

Interactive



Interactivity!

Used with PHeT Activities → Convert page to activity **Individual Handout**

Used with Lab Work Activities → Convert page to activity **Group Workspace**

Used(sometimes) with Hook Questions(similar to Shout it Out feature) → Convert page to activity **Whole-class Whiteboard**

Lumio Lesson Components...

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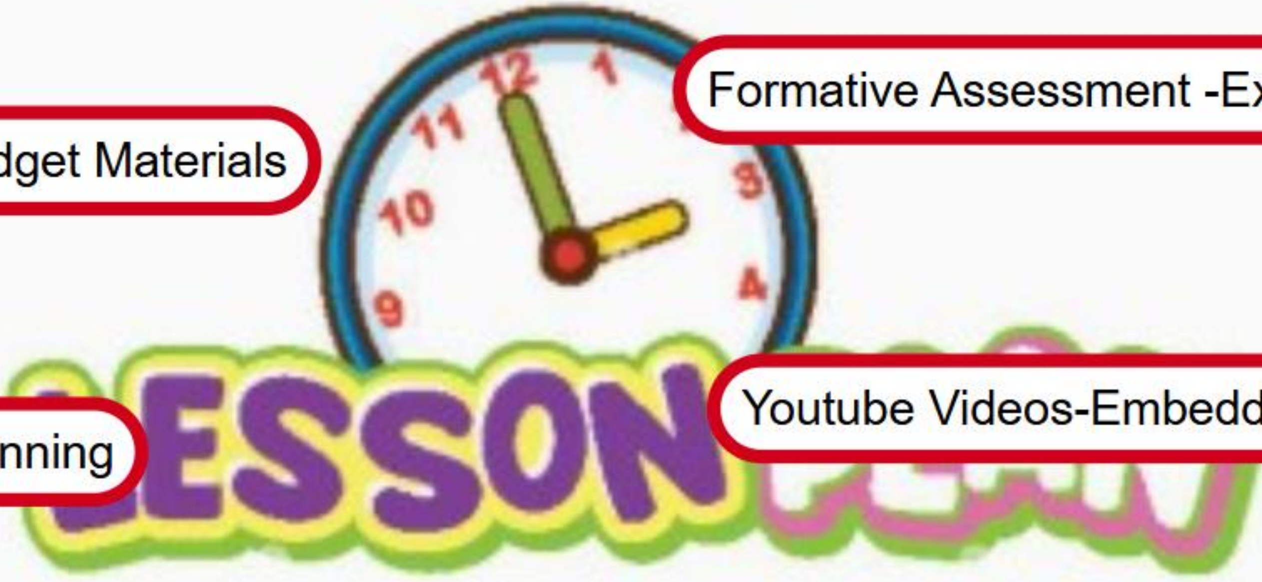
Limited Teacher Chalk and Talk

PhET Applications-Embedded Feature

Formative Assessment -Excel Spread sheet Export

Hands On Activity-Low Budget Materials



Youtube Videos-Embedded Feature and Ad Free!

Hook Question at the beginning

Interactive Learning and Engagement

Lessons designed for teacher and outside presenter

Real World Applications Provided

Lesson Ingredients

- Hook Question
- Hands on Activity
- Lecture Notes
- Youtube Video
- PhET Application
- Real World Applications
- Formative Assessment

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Part of a Sample Lesson

Electrical Circuits!

Lesson Plan: Introduction to Electrical Circuits

Grade Level: Grade 9

Learning Objectives: By the end of this lesson. students be able to:

- Define basic components of an electrical circuit.
- Build a simple circuit using the basic components.
- Differentiate between open and closed circuits.
- Construct simple circuits using an online PhET simulation.
- Identify everyday examples of electrical circuits.

Materials:

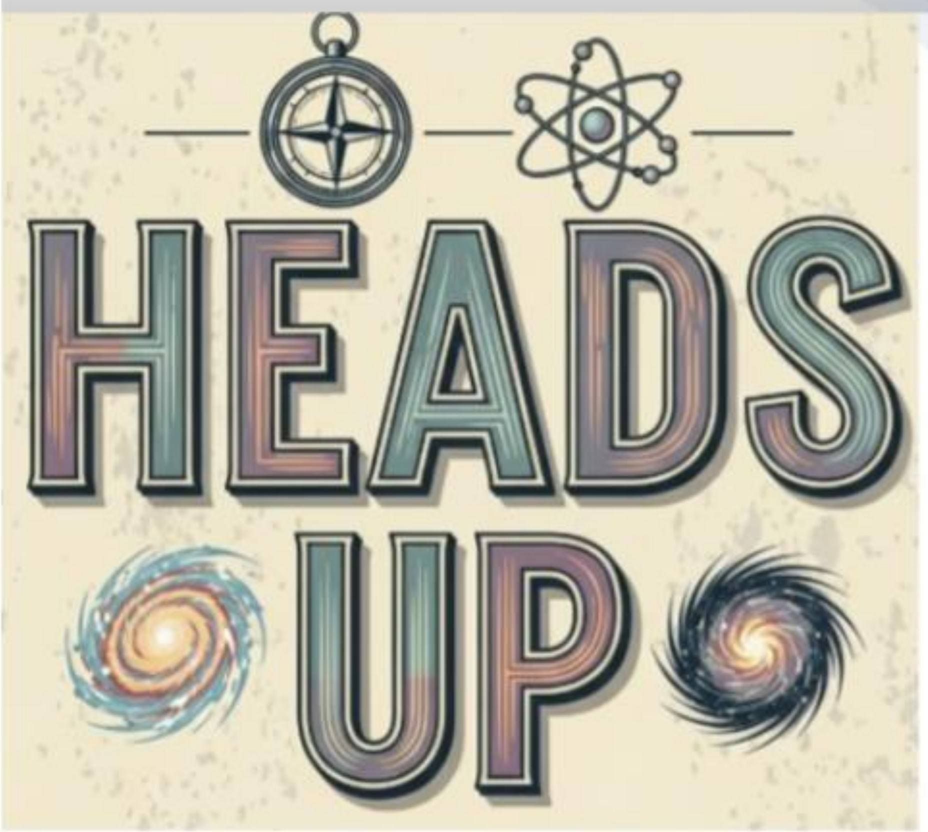
For each student group:

- 1 D-cell battery(1.5 v)
- 1 miniature flashlight bulb(E10 screw base)
- 2 strips of aluminum foil(15 cm long x 3 cm wide)
- Clear tape

For the teacher:

- Computer/Projector
- Internet Access
- Access to Lumio Project

Oncoming Short Activity!



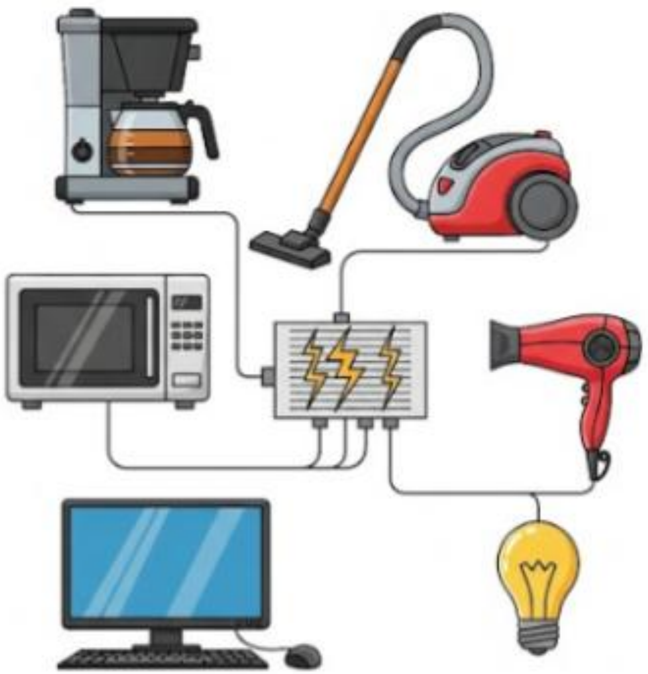
Hook Question

What do these devices have in common?

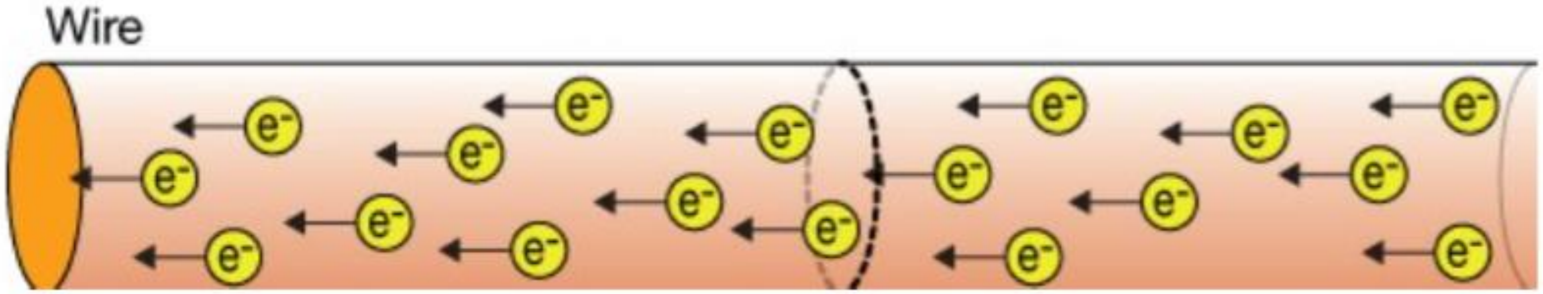
Shout It Out!

Student devices required

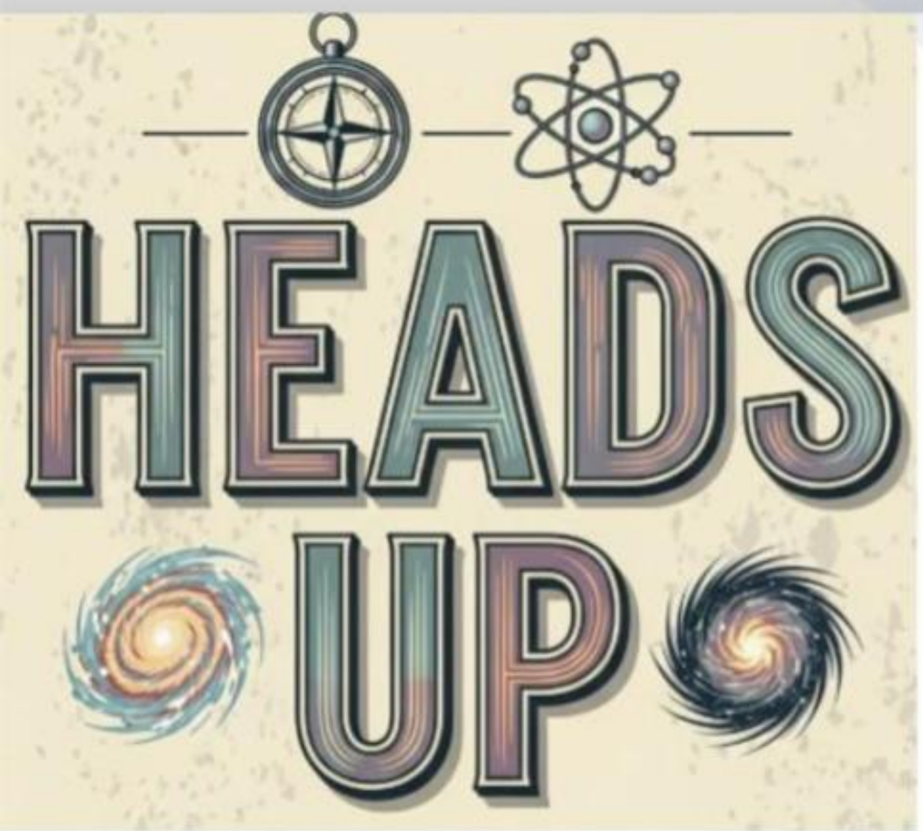
Answer: They are all powered by...



Current electricity= Electrons moving along a well-defined path.



Oncoming Short Activity!



Hands On Activity

Simple Circuit Challenge:
Lighting the Bulb!

Objective: To light a bulb using basic components of an electrical circuit.

Materials:


Procedure:

1. Students are to form a group of two.
2. Make 2 strips of aluminum foil approximately 15 cm long by 3 cm wide, folded lengthwise to make a thin, strong strip.
3. Your challenge is to make the light bulb turn on by connecting the three materials listed above.(Note: Tape is optional to help secure connections).
4. Once finished answer the question on the next slide.

Observations:

1. Briefly describe how you connected the materials to get the light bulb to turn on.

Group Workspace

PREVIEW

Student devices required

Answer: A successful circuit requires contact with all four main contact points:

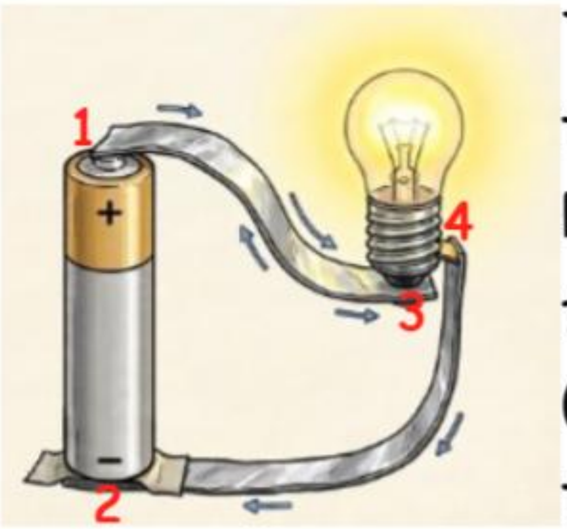
1 Battery Positive Terminal (The raised bump)

2 Battery Negative Terminal (The flat bottom)

4 Bulb Side (The threaded metal casing around the base)

3 Bulb Tip (The metal piece on the very bottom of the base)

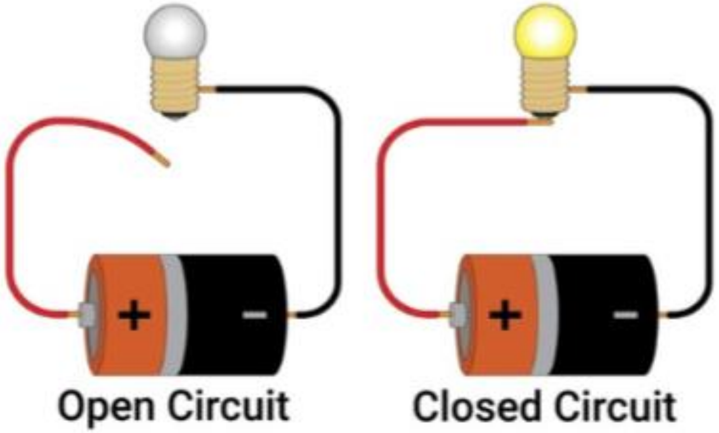
For the bulb to light, create a **closed loop** by making electrical contact at 4 contact points



The circuit configuration must allow the current to leave one end of the battery, travel through the aluminum foil, pass through the bulb's filament (the thin wire inside), and return to the other end of the battery.

The connections had to form a complete loop.

An **<u>electric circuit</u>** is a continuous, closed path for electric charge to flow. The electrons must be able to leave the source and return to it.



Lecture Notes....

There are 4 main components of an electric circuit...

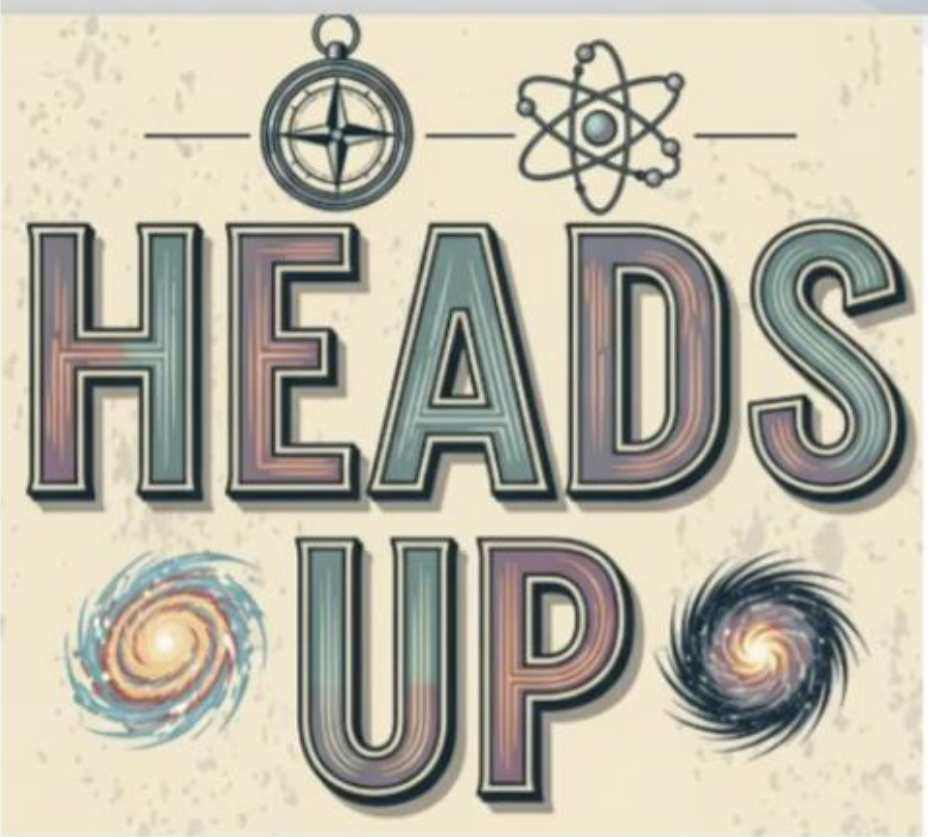
1. Power source(Battery)

- Where the electricity comes from.
- Like a heart pumping blood.

2. Conductor(Wire)

- Pathway for electricity.
- Like roads for electrons.

Oncoming Short Activity!



Circuit Symbols!

- You will eventually create circuit diagrams using appropriate circuit symbols.
- But first you must familiarize yourself with the symbols by clicking on the audio icon.

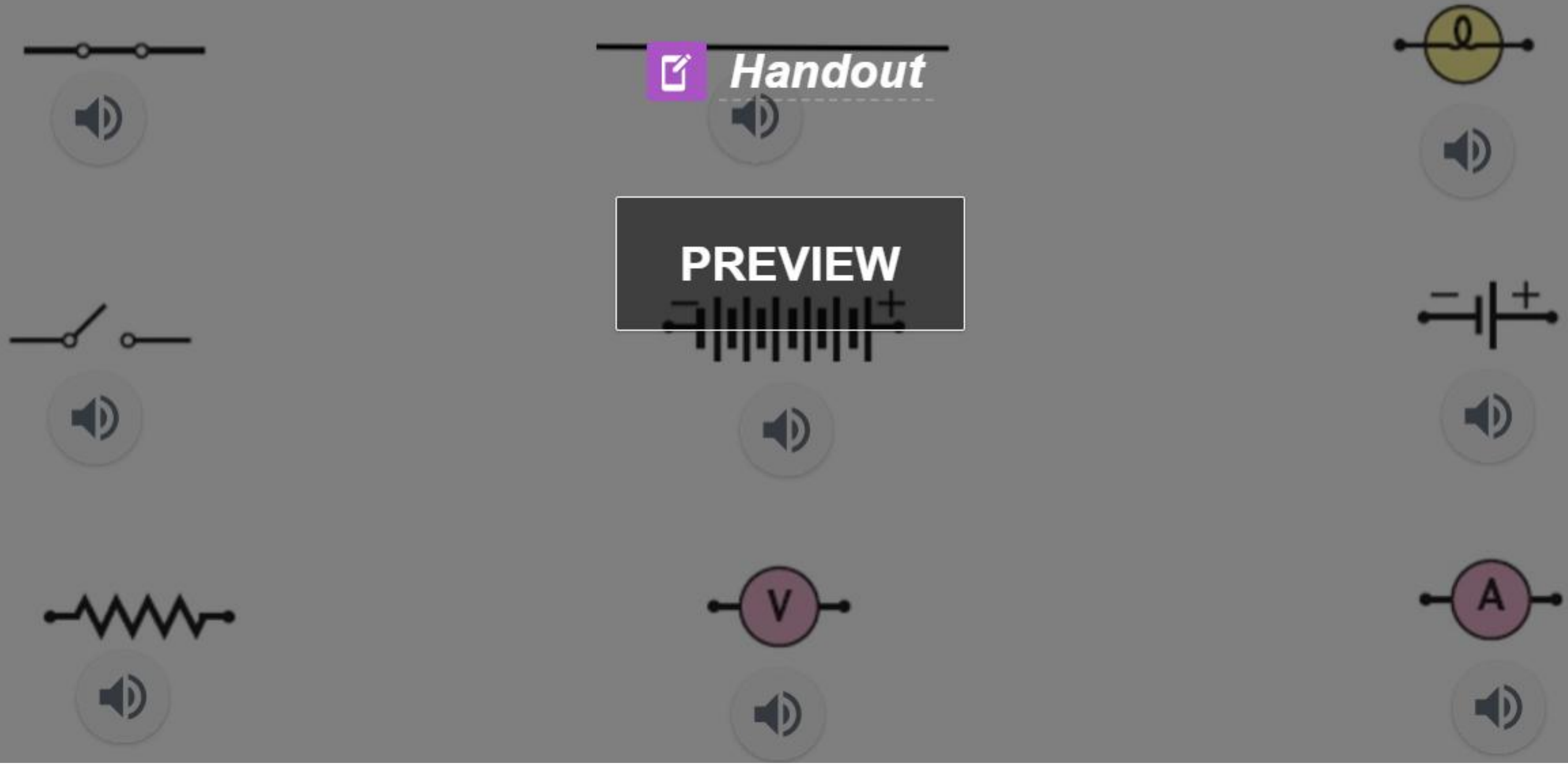
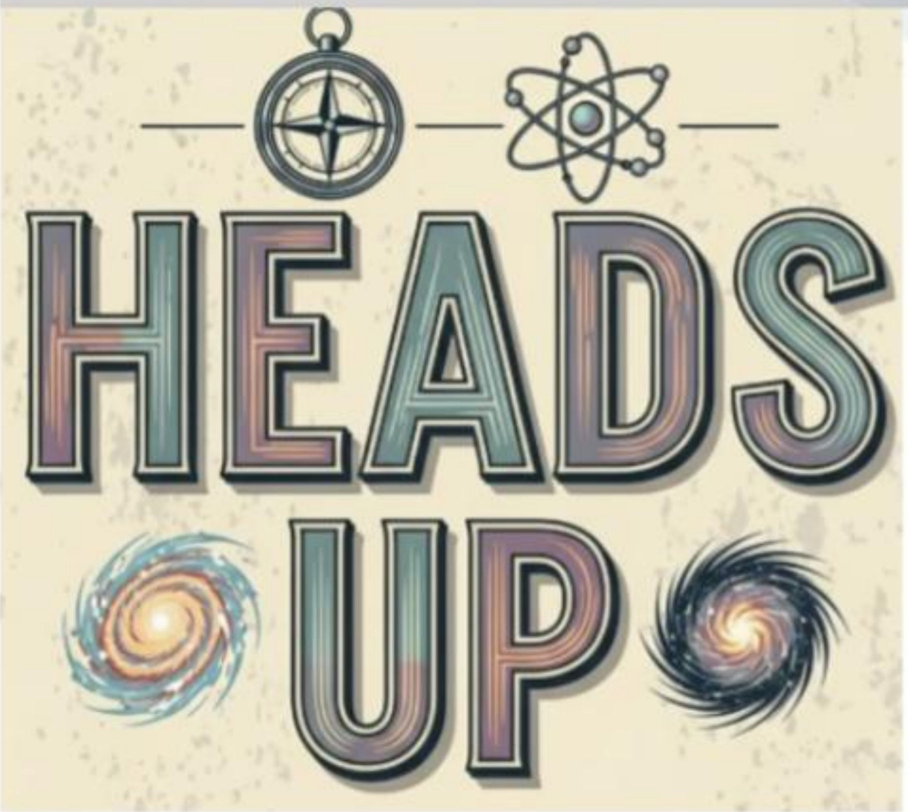


Image
Name
Battery
Closed Switch
Light
Open Switch
Ammeter
Wire
Resistor
Voltmeter
Cell

Oncoming Short Activity!



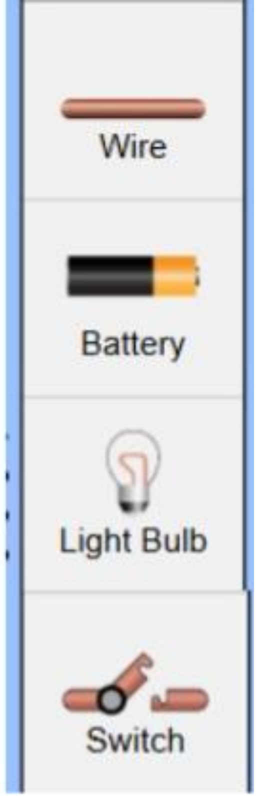
Constructing A Circuit!

PhET™ INTERACTIVE SIMULATIONS

Procedure:

Teacher/Presenter Actions

- Demonstrate how to drag, drop and connect a *battery, wires, light bulb* and *switch* to form simple circuits.
- Demonstrate pictorial vs schematic diagrams.
- Demonstrate a short circuit situation.(Importance of connecting components correctly).

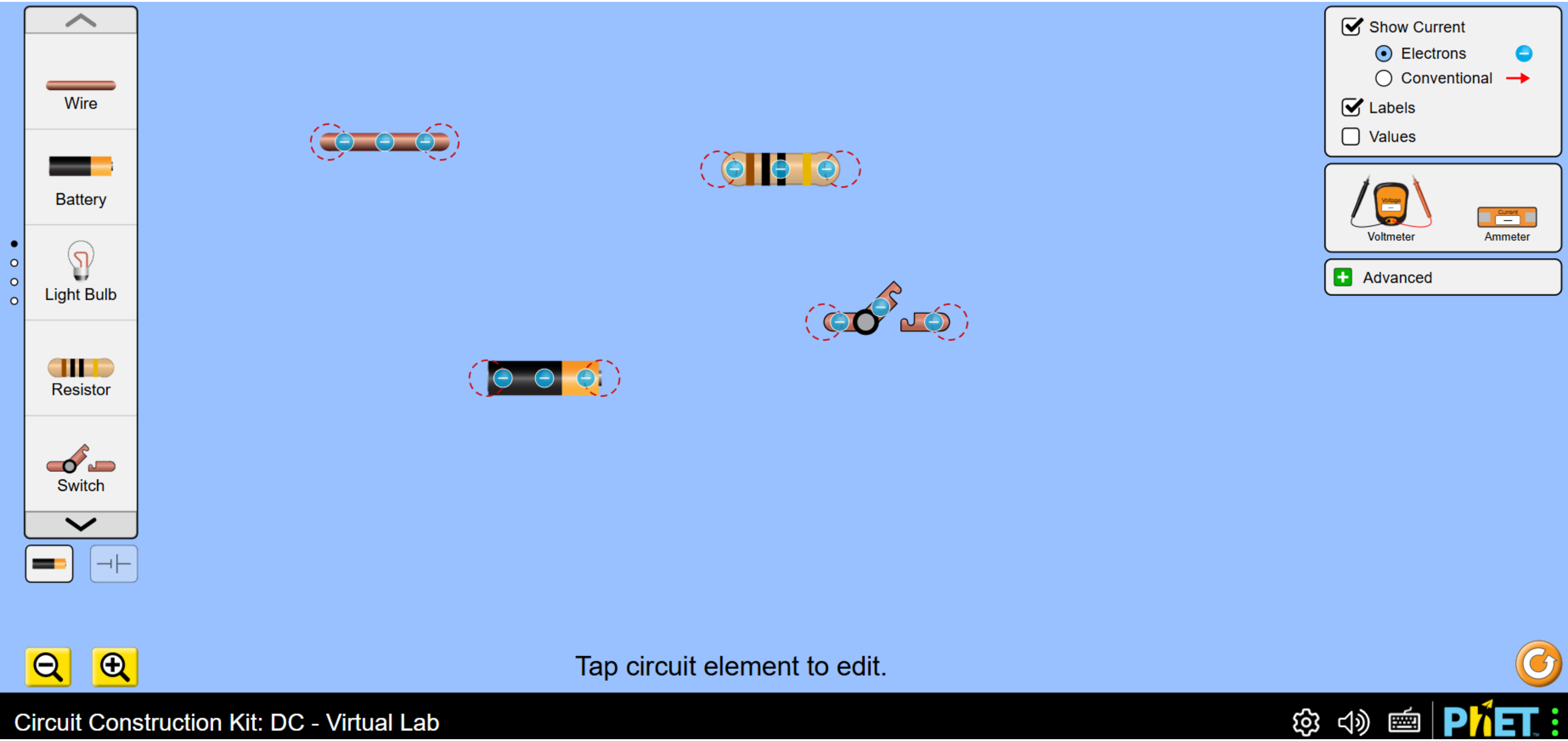


Student Actions

Task 1:Build a closed circuit with *wires*, a *battery*, a *light and* a *switch.*

Task 2:Take a screenshot of your circuit within PhET and retrieve from download folder.

Copy and paste into a Microsoft Word or Google Doc file.


Wire
Battery
Light Bulb
Resistor
Switch
Show Current
Electrons
Conventional
Labels
Values
Voltmeter
Ammeter
Advanced
Tap circuit element to edit.
Circuit Construction Kit: DC - Virtual Lab
PhET

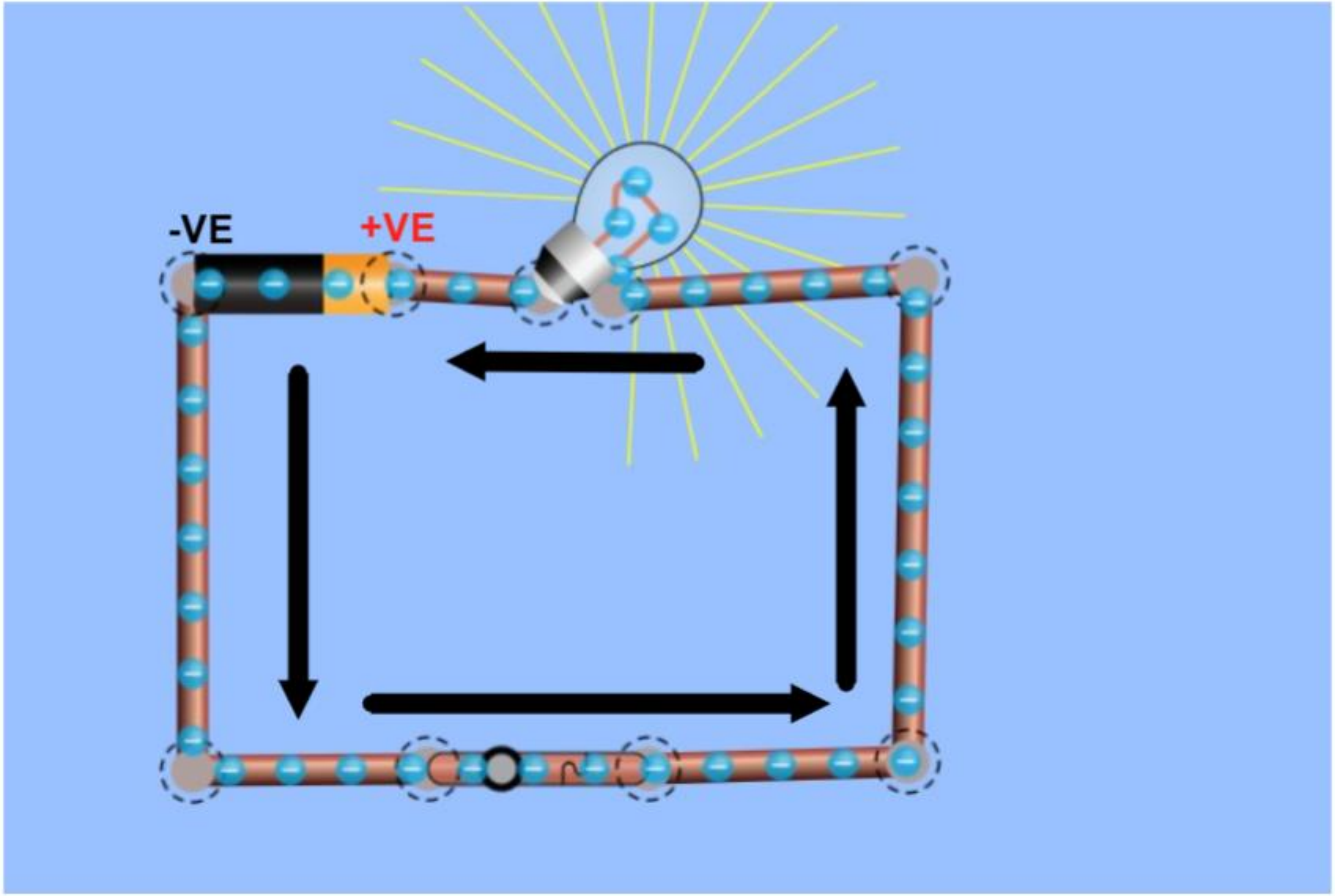
1.What did you notice about the direction of the current flow?

Handout

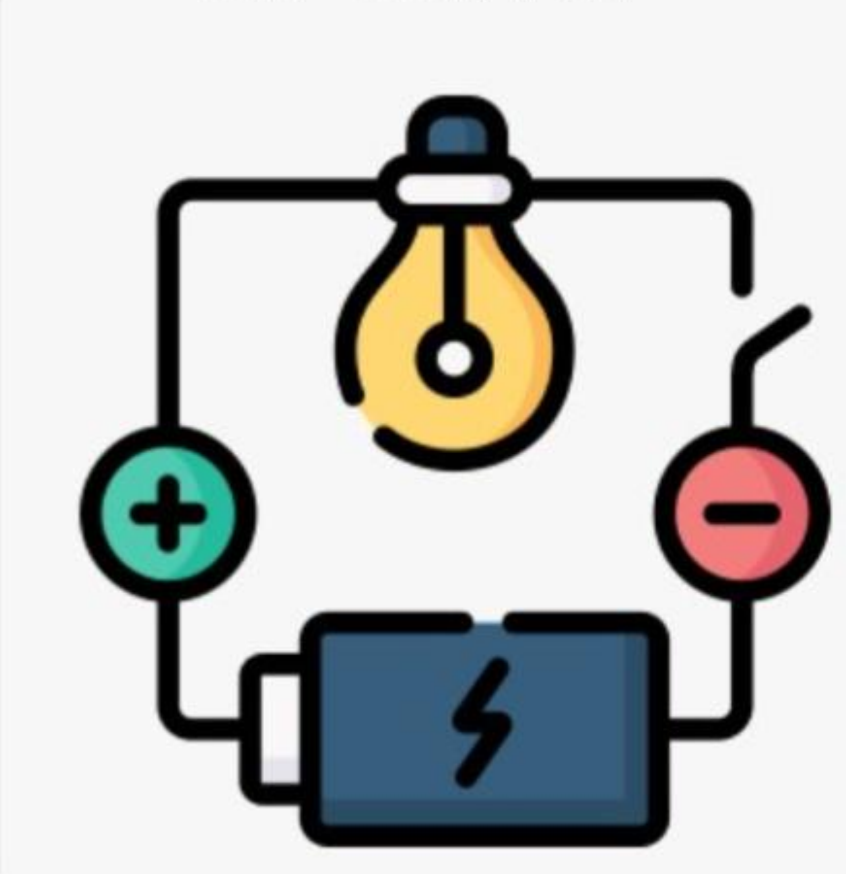
PREVIEW

1. What did you notice about the direction of the current flow?

Answer: Current flows from **negative terminal** of the power source to the **positive terminal**.

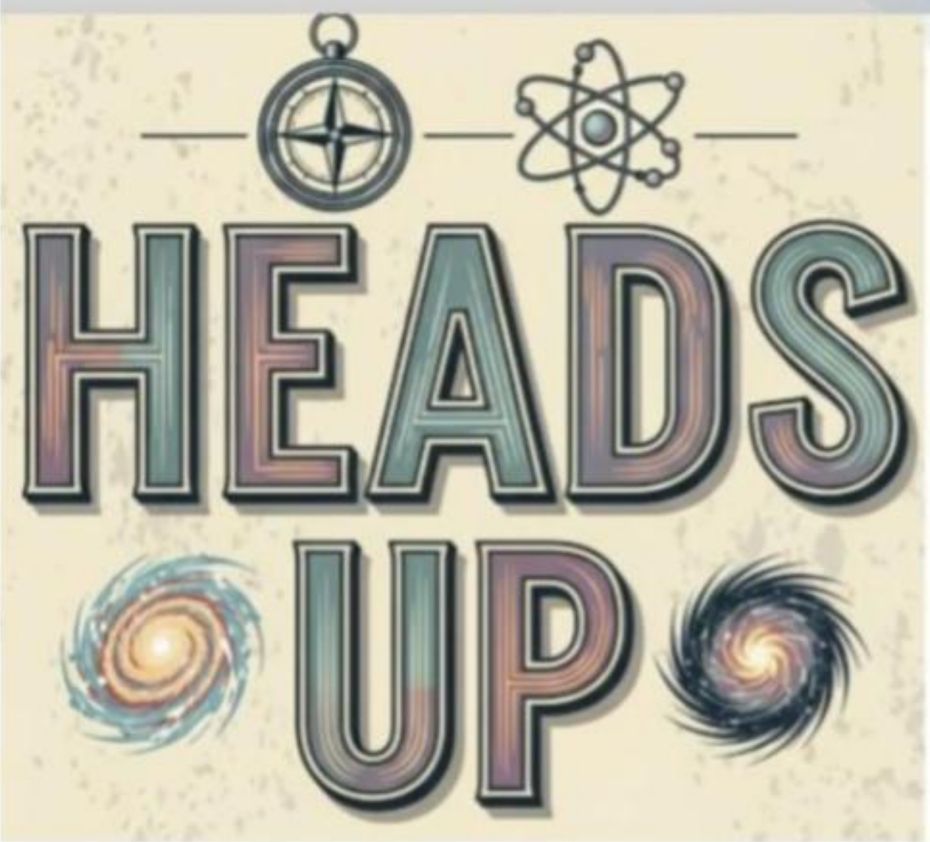


Electric circuits!



For best audio quality, **STUDENTS** press the play button.

Oncoming Short Activity!



Real World

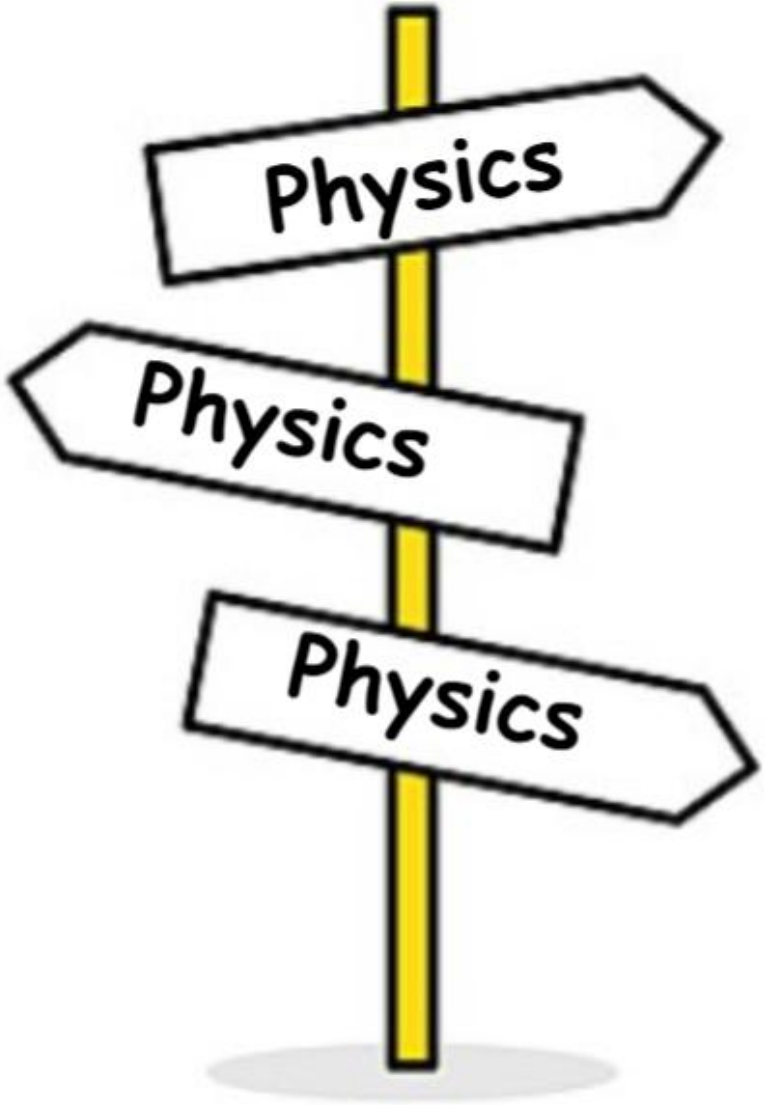
Applications!

- Medical Life-Support Imaging
- Residential Lighting and Power
- Automotive Systems
- Electronics


LET'S TEST
YOUR KNOWLEDGE
OF THIS
SCIENCE LESSON

Response

Student devices required



Career Paths

Name: Heidi Thomas

Hometown: Dunville,N.L

Profession: Captain: M.V Highlanders Passenger Ferry-Marine Atlantic

Post Secondary Institution: Marine Institute, St. John's N.L

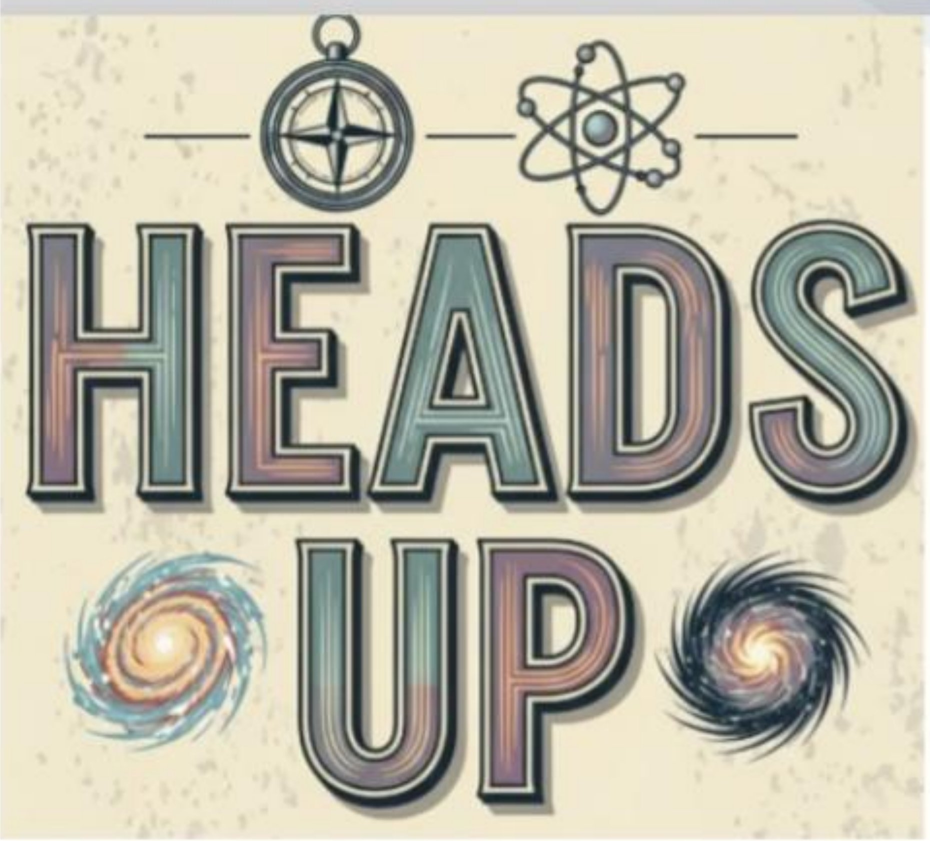
Program: Degree/Diploma: Nautical Science-Merchant Marine Diploma-Watchkeeping Mate ticket from Transport Canada.

Number of Physics Courses Completed:
High School: Physics 2204 and Physics 3204
Post Secondary: First year Physics courses-Nautical Science Program

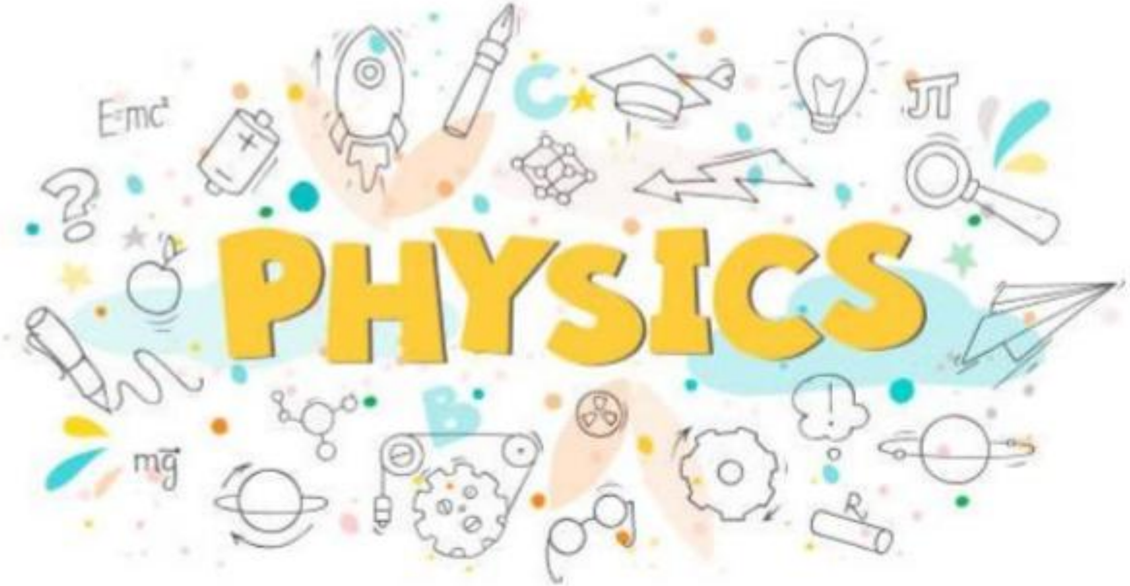
How is Physics used in your every day job?

"Physics plays a very important role in my day-to-day job as a Captain onboard a passenger ferry. It's in almost every aspect of a working ship and can be applied to many areas. From the way the ship floats, how it protects the passengers and crew, and how the ship handles in all weather conditions, physics can be apparent."

Oncoming Short Activity!



What do you think of when you hear the word...



Shout It Out!

Student devices required

Possible Responses: What do you think of when you hear the word Physics?

The Universe

Hard but Important

Electricity and Circuits

Boring Formulas

Einstein

Technology and Innovation

Astronomy

Rockets

Sci-Fi Technology

Equations and Math

Geeks

Nuclear bomb

Geniuses Only

Some of these people may even come to mind!

Oncoming Short Activity!

Let's Check Out Careers That Require Physics.

Electrician

Forensic Science

Profes sor/Te acher

Medicine

Nautical Science

Robotics

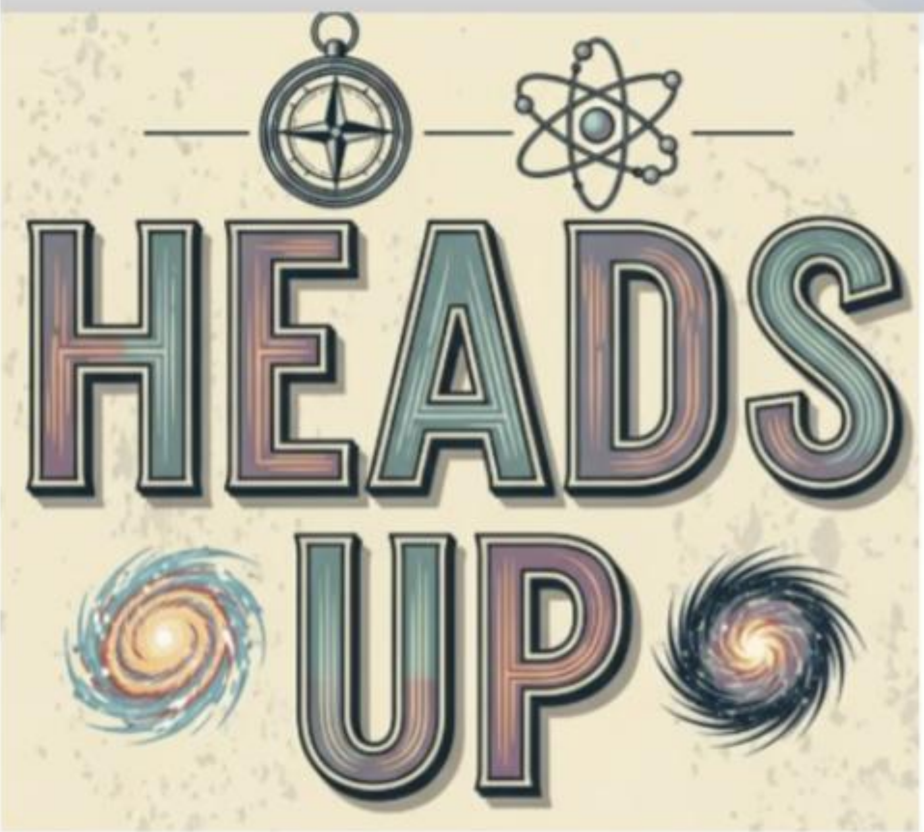
Information Technology

Air Traffic Control

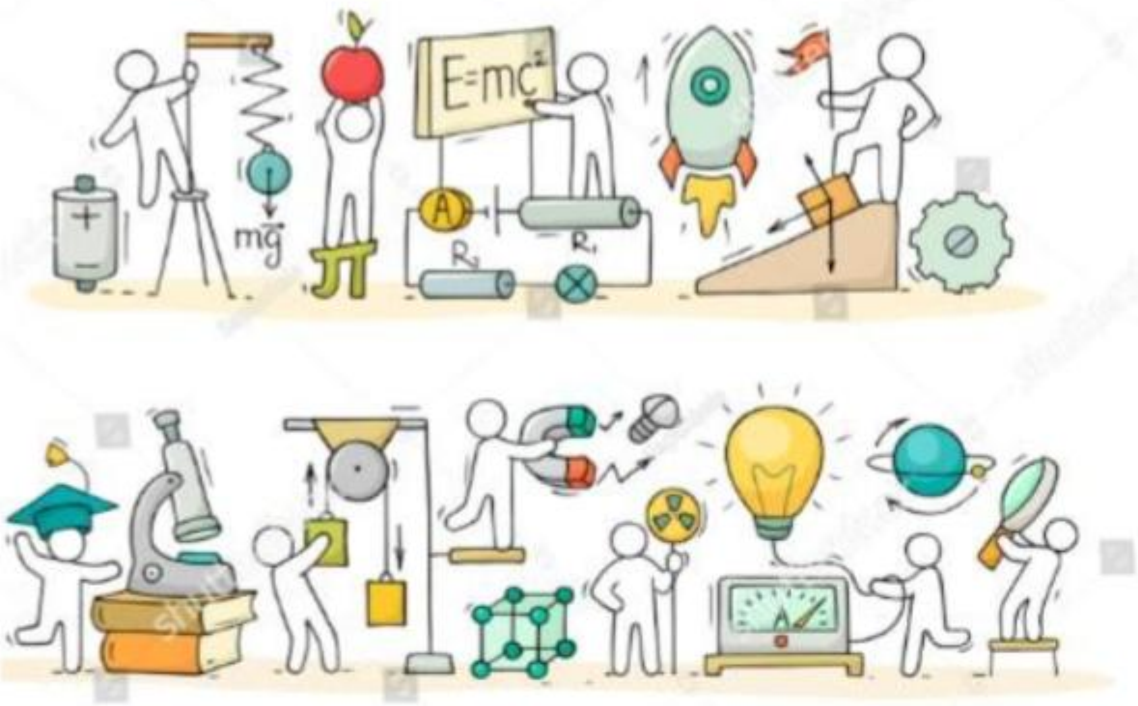
Engineering

Meteorology

Oncoming Short Activity!



Which Physics Career Path May Interest You?



Type your name near a career that may interest you.

Meteorologist

Medicine

Nautical Science

Robotics

Whole-class Whiteboard

Scientist

Engineering

Pharmacy

PREVIEW

Electrician

Information Technology

Radiation Technology

Student devices required

Teaching

Air Traffic Controller

Architecture

Surveying

Physiotherapy

Measuring Impact...

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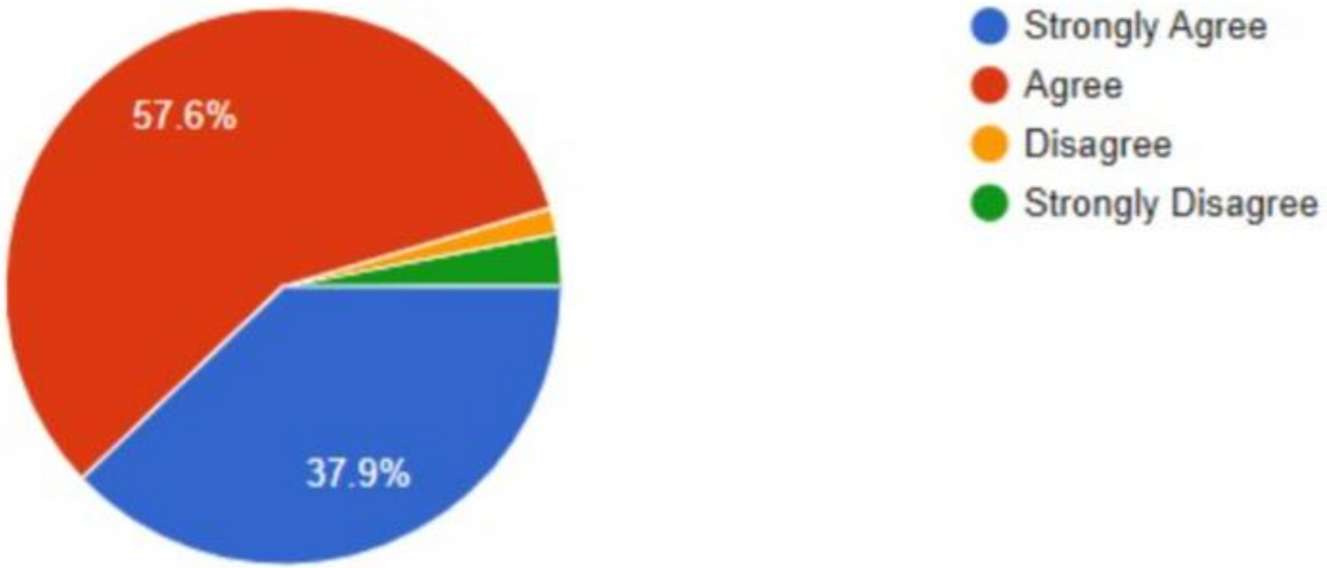
The "Test Run"

The lessons were presented in the following schools in Newfoundland and Labrador:

- Ascension Collegiate, Bay Roberts
- Holy Cross School, Eastport
- Heritage Collegiate, Lethbridge
- Se't A'newey Kina'matino'kuom - Saint Anne's School, Conne River
- Valmont Academy, King's Point
- Northern Lights Academy, Rigolet
- Fogo Island Central Academy, Fogo Island
- Crescent Collegiate, Blaketown
- J.C. Erhardt Memorial School, Makkovik
- Jens Haven Memorial School, Nain

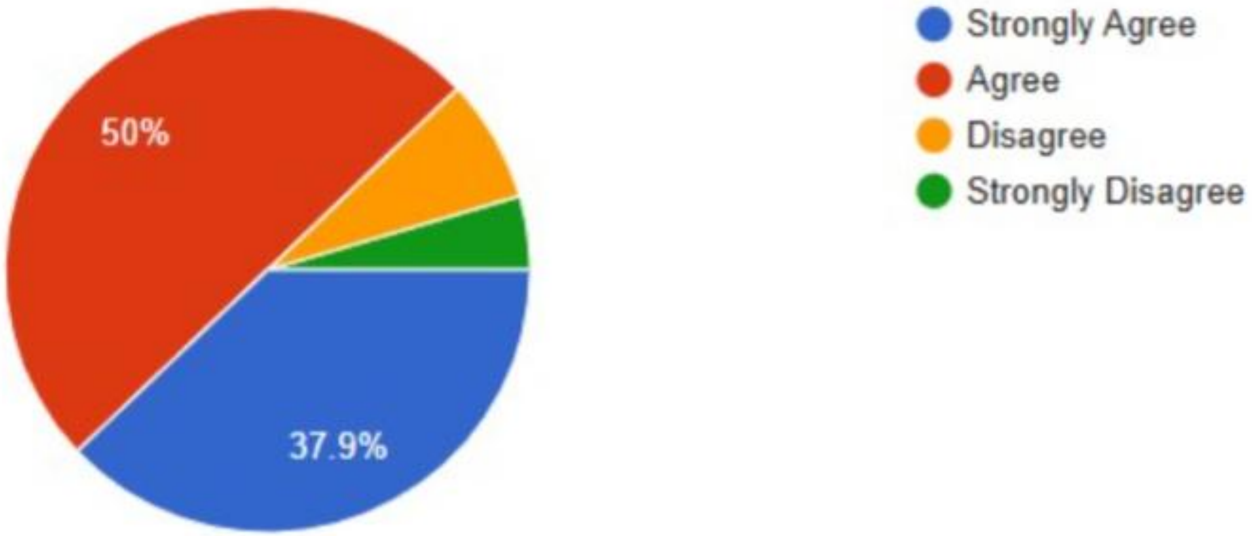
Student Impressions

- I enjoyed today's science class as it was interesting and engaging. (Science Engagement Impact)



Student Impressions

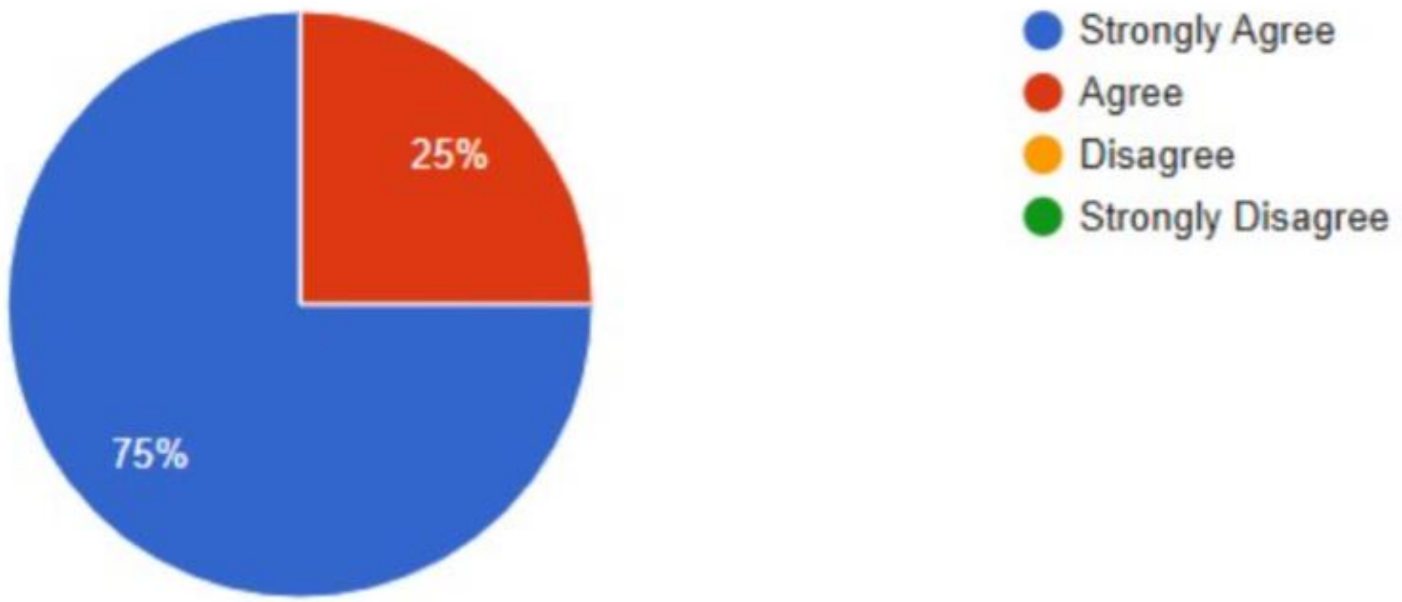
- Today's class made me realize that a career in science, technology or engineering is possible.
  (Career Aspiration Impact)



https://docs.google.com/form

Teacher Impressions

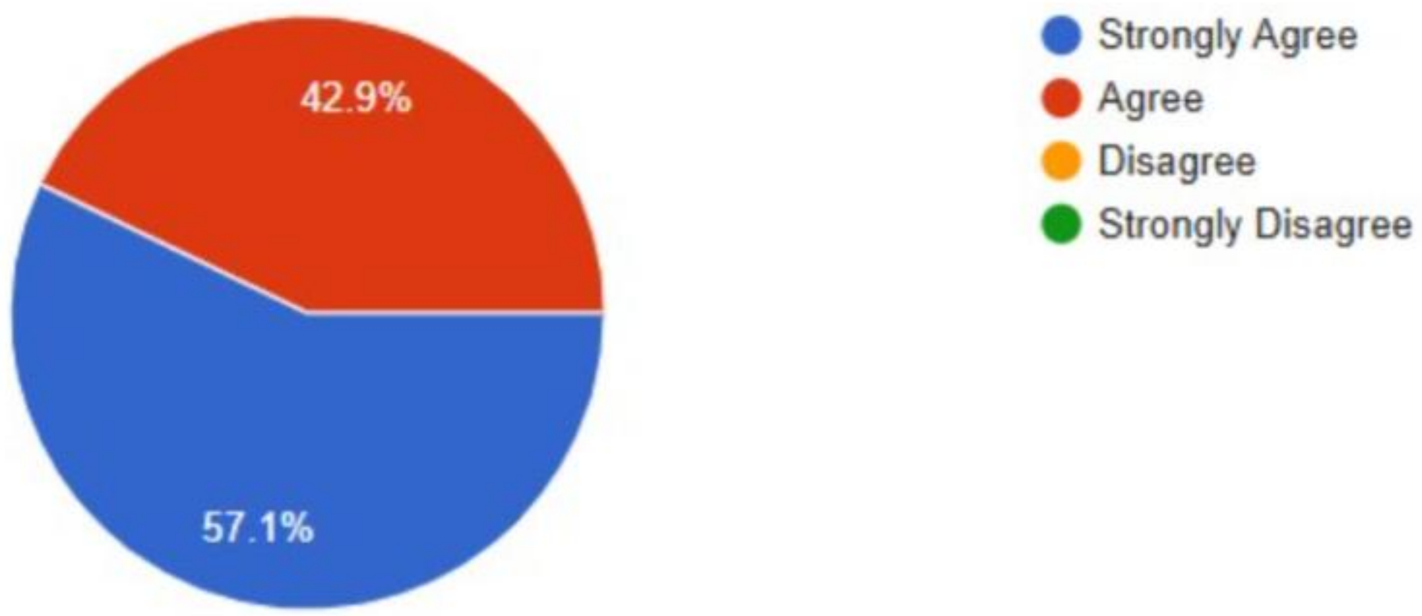
The students were very engaged in the Science lesson.



https://docs.google.com/form

Teacher Impressions

The presentation increased student's awareness of STEM careers.



https://docs.google.com/form

Testimonial

Thank you so much for hosting this session with the students! It was really cool to see how technology can be such a helpful tool. I will definitely be incorporating lessons like this one into my future classes. I really like the use of Phet for optics!I would appreciate any lessons, I teach grade 7-10 science and this is only my second year out of school so I am still getting my footing!The students seemed really engaged today. We don't use chromebooks a whole lot so they are not super quick with them but that "hands on" learning is great!I just completed the Google Form!

Zoe McDonald
ScienceTeacher 7-10
Se't A'newey Kina'matino'kuom

Lessons Developed so far...

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Grade 8 Science:	Water Systems on Earth's Surface	Fluids	Optics ✓	Cells, Tissues, Organs, and Systems
Grade 9 Science:	Space ✓	Atoms, Elements, and Compounds	Electricity ✓	Reproduction
Grade 10 Science:	Weather Dynamics	Chemical Reactions	Motion ✓	Sustainability of Ecosystems
Grade 11 Physics:	Kinematics ✓	Dynamics ✓	Work and Energy ✓	Waves
Grade 12 Physics:	Motion	Forces	Fields	Introduction to Quantum Physics

Website
Pending ...

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Narrowing Gaps and Making Connections

Connecting students, educators and role models to make science learning inclusive, engaging, and accessible in rural, remote, and northern communities.

Science Quest North

Programs and Initiatives

- STEM Outreach for Youth – Free interactive lessons and workshops.
- Research & Collaboration – University partnerships advancing inclusive science.
- Events & Webinars – Online and in-person learning experiences.

NSERC Cenovus Memorial University TRIUMF

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THE END