

Ontario Grade 11 PHYSICS

SOUND WAVES Unit

- ✓ Complete Grade 11 Ontario SOUND WAVES Unit
- ✓ Daily Teaching Schedule with Homework Included
- ✓ 6 Lessons, 4 Activities, 2 Projects, 1 Quiz, 1 Test
- ✓ Fully Editable Resources
- ✓ Save you over 75%

SPH3U

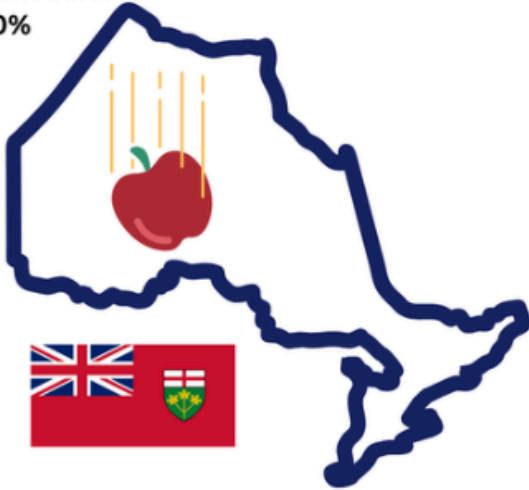


UPGRADE to the Bundle

Ontario Grade 11 PHYSICS Teaching Curriculum Bundle

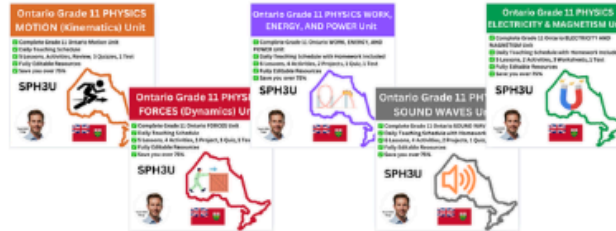
- ✓ Complete Grade 11 Ontario Year-Long Curriculum
- ✓ 5 Complete Units - Lessons, Activities, Worksheets, Homework, Quizzes, and Tests
- ✓ Daily Teaching Schedules
- ✓ Save you over 90%

SPH3U



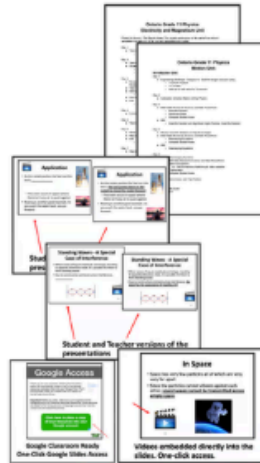
Included Units

- Unit 1 - Motion
- Unit 2 - Forces
- Unit 3 - Work, Energy, and Power
- Unit 4 - Sound Waves
- Unit 5 - Electricity and Magnetism



Everything You Need to Teach 11th Grade PHYSICS in Ontario

- Daily teaching schedule which breaks down what to teach each day
- Lessons in PowerPoint and Google form
- HW Provided
- Teacher and student versions of each lesson
- Projects and Unit Test
- All activities and review activities mentioned in the teaching schedule



CLICK HERE



**Save 90% and get the FULL ONTARIO
Grade 11 Physics Curriculum**

Lessons Included

Lesson 1 - Waves - an Introduction

Lesson 2 - Reflection, Interference, and Transmission

Lesson 3 - Standing Waves

Lesson 4 - Sound, Sound Energy, and Speed

Lesson 5 - Hearing and the Human Ear

Lesson 6 - Supersonic Travel and the Doppler Effect

The collage features six lesson preview cards, each with a title, a list of topics, and illustrative diagrams or images. The cards are arranged in a staggered, overlapping fashion. The lessons are: 1. Waves Introduction (purple header), 2. Transmission, Reflection, and Interference (blue header), 3. Standing Waves (green header), 4. Sound, Sound Energy and Speed (dark blue header), 5. Hearing and the Human Ear (grey header), and 6. Supersonic Travel and the Doppler Effect (blue header). The cards include various diagrams such as wave pulses, standing wave patterns, sound wave graphs, and supersonic aircraft. The TWF logo is visible on several cards. At the bottom, a text box states: 'This digital presentation includes both Google and Office resources and is Google Classroom Ready'.

Waves Introduction

- What Waves Are
- Types of Waves
- Transverse vs. Longitudinal Waves
- Frequency, Hertz
- Amplitude
- Crests, Troughs, Wavelength

Transmission, Reflection, and Interference

- Wave Behavior

Standing Waves

- Wave Reflection
- Interference
- Standing Waves
- Nodes and Antinodes
- Scientific and Musical Names

Sound, Sound Energy and Speed

- Hearing Sound
- Creating Sound

Hearing and the Human Ear

- Hearing Frequency
- Hearing Loss and Hearing Aids
- What Causes Hearing Loss
- Hearing Stats
- Hearing Loss Prevention
- Sound Intensity
- Anatomy of the Human Ear
- Vertigo
- Hearing Aids

Supersonic Travel and the Doppler Effect

- The Doppler Effect and Shift
- Calculating Observed Frequency
- Applications
- Supersonic Travel
- Mach Speed
- Supersonic Flight
- Sound Barrier
- Supersonic Travel and Sonic Booms
- Vapor Cone

$f_o = f_s \left(\frac{v}{v \pm v_o} \right)$

This digital presentation includes both Google and Office resources and is Google Classroom Ready

Daily Teaching Schedule

Ontario Grade 11 Physics Waves Unit

Day 1:

- Minds-On - The Coolest Things Sound Waves can Do - <https://www.youtube.com/watch?v=Ude8pPjawKl>
- Teach - Lesson 1 - Introduction to Waves

Day 2:

- Minds-On - What Does Sound Look Like? <https://www.youtube.com/watch?v=px3oVGXr4mo>
- Experimenting with Waves (50 minutes)
- The Silencer Project - Introduction and group formation (all done in class)
- Research sound transfer
 - Superb description of sound transfer
 - Includes all details, formulas, examples, picture(s) showing sound transfer
- Research sound canceling materials
 - Superb description of materials used
 - Explanation of why each material was used

Day 3:

- Minds-On - How Sound Works in Rooms - <https://www.youtube.com/watch?v=JPYt10zrcIQ>
- Teach - Lesson 2 - Reflection, Interference, and Transmission
 - Complete Student Notes
- The Silencer Project
 - Sketching
 - Research sound transfer
 - Superb description of sound transfer
 - Includes all details, formulas, examples, picture(s) showing sound transfer
 - Research sound canceling materials
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Day 4:

- Minds-On - How to Soundproof a Room - <https://www.youtube.com/watch?v=pXcmn5rOxx8>
- Teach - Lesson 3 - Standing Waves
 - Complete Student Notes
- Standing Waves Activity

Day 5:

- Minds-On - Watch How This Blind Man Uses Echo Location To Ride a Bike - <https://www.youtube.com/watch?v=iAtVOK04XvA>
- Quiz - Lesson 1-4 NEXT DAY
- Teach - Lesson 4 – Sound, Sound Energy and Speed
 - Complete Student Notes
- The Silencer Project
 - Sketching
 - Research sound transfer and sound cancelling materials

Day 6:

- Minds-On - Can Loud Music Damage Your Hearing? <https://www.youtube.com/watch?v=-R307w05iJc>
- Quiz - Lesson 1-4 TODAY
- Lab Station Activity on Sound, Sound Energy and Speed

Day 7:

- Minds-On - Can You Trust Your Ears? <https://www.youtube.com/watch?v=kzo45hWXRWU>
- Teach - Lesson 5 - Hearing and the Human Ear - Part 1
- The Silencer Project
- Tinnitus – Ringing in the Ears reading
- HW:
 - Tinnitus – Ringing in the Ears reading

Day 8:

- Minds-On - What's the Ringing in your Ear? <https://www.youtube.com/watch?v=TnsCsR2wDdk>
- Teach - Lesson 5 - Hearing and the Human Ear - Part 2
 - Complete student Notes
- The Silencer Project
- HW:
 - The Silencer Project

Day 9:

- Minds-On - The Sonic Boom Problem - https://www.youtube.com/watch?v=JO4_VHM69oI
- Teach Lesson 6 - The Doppler Effect and Supersonic Travel
- The Silencer

Day 10:

- Unit Test - Unit 4

Day 11:

- The Silencer Project Due

Additional Project: Sound Intensity and Society

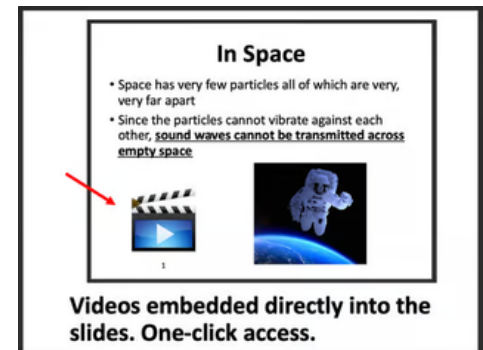
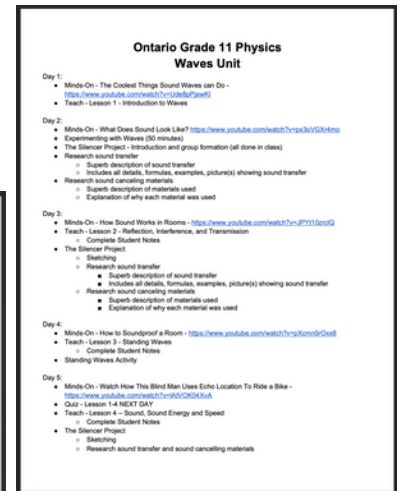
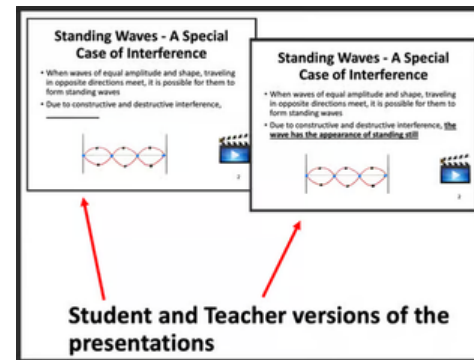
Additional Minds-On Videos

Ecolocation - <https://www.youtube.com/watch?v=i6IF7a24AFk>

Scientist Explains How to Levitate Objects With Sound - <https://www.youtube.com/watch?v=3MXVSdXZzpc>

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Complete Lessons

In Space

- Space has very few particles all of which are very, very far apart
- Since the particles cannot vibrate against each other, **sound waves cannot be transmitted across empty space**



Videos embedded directly into the slides. One-click access.

Google Access

Thank you for your purchase. Clicking the link button below will automatically create a copy of the Google resources and place them into your Google Drive. You'll find the link inside the "Shared with me" section on the left side of your Drive.

Important: Before you click, make sure you're signed in to the Google account you'd like the resources placed into. If the resources are added to the wrong account, simply sign out and then into the correct one and repeat the process.

[Click here to place a copy of your resources into your Google account](#)

Google Classroom Ready
One-Click Google Slides Access

Experimenting with Waves

You will be submitting this package so make sure you are being neat.

Purpose: You will be using springs to conduct 2 different experiments. Follow the procedures provided, making sure to record all collected data.

Materials:
- spring - stopwatch - meter stick

Part A - Relationship Between Speed and Amplitude

Procedures:

- Stretch the spring out on the floor so that it is straight, with one person holding on to each end. It is important that each person stay in the same position throughout the experiment to keep the length of the spring constant.
- Give the spring one pulse along the floor, the size of one tile (move spring continuously from one end of a tile to the other and back). Record a) the amplitude of the pulse, b) the time it takes the pulse to reach the other end of the spring, and c) the length that the pulse traveled
- Repeat step 2 again, first using a pulse that is 2 tiles, and then using a pulse that is 3 tiles.

Observations:

Pulse	Amplitude (m)	Time (s)	Distance Pulse traveled (m)
1 tile			
2 tiles			
3 tiles			

Analyze: Calculate the speed for each pulse, and compare your three values.
1 Tile: 2 Tiles: 3 Tiles:

Comparison:

Ontario Grade 11 Physics Waves Unit

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- Quiz - Lesson 1-4 NEXT DAY
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 - Complete Student Notes
- The Silence Project
 - Sketching
 - Research sound transfer and sound canceling materials

Waves

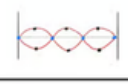
- Waves pass their energy from one particle to another until it runs out of energy**
- Example: Water waves created from tectonic activity, volcanic eruptions, winds, impacts, etc. carry a lot of energy which can be used to inflict serious damage



Videos embedded directly into the slides. One-click access.

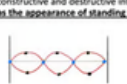
Standing Waves - A Special Case of Interference

- When waves of equal amplitude and shape, traveling in opposite directions meet, it is possible for them to form standing waves
- Due to constructive and destructive interference,



Standing Waves - A Special Case of Interference

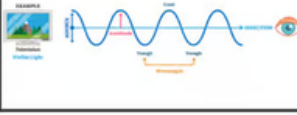
- When waves of equal amplitude and shape, traveling in opposite directions meet, it is possible for them to form standing waves
- Due to constructive and destructive interference, **the wave has the appearance of standing still**



Student and Teacher versions of the presentations

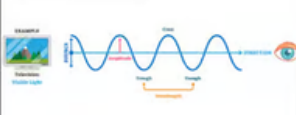
Worksheets and Activities Daily Teaching Schedule

Transverse Waves



Transverse Waves

The particles vibrate perpendicular to the direction of motion



Student and Teacher versions of the presentations

Teen Hearing Stats

- 9/10 engage in activities which put them at risk of hearing loss. These activities include listening to music above 85 decibel (db)



Teen Hearing Stats

- 1/5 teenagers suffer from at least a slight hearing loss according to a recent study in the AMA Journal**
- 9/10 engage in activities which put them at risk of hearing loss. These activities include listening to music above 85 decibel (db)



Student and Teacher versions of the presentations

Sound, Sound Energy and Speed

Lab Station Activity



7 Lab Station Activities to get your kids out of their seats and engaged in their learning

Tinnitus Ringin' in the Ears

Scientific Reading Comprehension Article and Extension Activity

Tinnitus - Ringin' in the Ears

Introduction

Tinnitus is a condition in which a person hears a ringing or buzzing sound in one or both ears. This sound is not caused by an external source, but rather by a problem with the ear itself. Tinnitus can be a temporary or permanent condition, and it can be a symptom of a more serious underlying condition. The most common cause of tinnitus is age-related hearing loss, but it can also be caused by noise exposure, ear infections, and certain medications. Tinnitus can be a frustrating and disruptive condition, but there are many ways to manage it. In this article, we will explore the causes, symptoms, and treatments of tinnitus.

Causes of Tinnitus

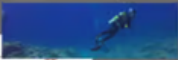
The most common cause of tinnitus is age-related hearing loss. As we age, the hair cells in our ears become damaged, which can lead to a loss of hearing. This damage can also cause tinnitus. Other causes of tinnitus include noise exposure, ear infections, and certain medications. Tinnitus can also be a symptom of a more serious underlying condition, such as a tumor or a blood vessel problem.

Symptoms of Tinnitus

The most common symptom of tinnitus is a ringing or buzzing sound in one or both ears. This sound can be constant or intermittent, and it can be loud or soft. Tinnitus can also be accompanied by other symptoms, such as dizziness, vertigo, and a feeling of fullness in the ear.

Treatments for Tinnitus

There are many ways to manage tinnitus, but there is no cure. The most common treatment is to use hearing aids, which can help to improve hearing and reduce the volume of the tinnitus sound. Other treatments include sound therapy, which involves using external sounds to mask the tinnitus sound, and cognitive behavioral therapy, which helps to change the way a person thinks about and reacts to the tinnitus sound.




Sound Waves

Sound waves are vibrations that travel through a medium, such as air or water. They are created by a vibrating object, and they travel in all directions. Sound waves are measured by their frequency, which is the number of vibrations per second, and their amplitude, which is the height of the wave. Sound waves with a frequency between 20 and 20,000 vibrations per second are audible to the human ear.



Sound and Hearing

Sound waves enter the ear through the ear canal, where they hit the eardrum. The eardrum vibrates in response to the sound waves, and these vibrations are passed on to the ossicles, which are three small bones in the middle ear. The ossicles amplify the vibrations and pass them on to the cochlea, which is a fluid-filled structure in the inner ear. The cochlea contains hair cells that convert the vibrations into electrical signals, which are then sent to the brain.



Tinnitus and the Brain

Tinnitus is a complex condition that involves the brain. It is thought that tinnitus is caused by a problem with the way the brain processes sound. In some cases, the brain may be overactive, and it may be sending out signals that are interpreted as sound. In other cases, the brain may be underactive, and it may not be processing sound correctly.

Managing Tinnitus

There are many ways to manage tinnitus, but there is no cure. The most common treatment is to use hearing aids, which can help to improve hearing and reduce the volume of the tinnitus sound. Other treatments include sound therapy, which involves using external sounds to mask the tinnitus sound, and cognitive behavioral therapy, which helps to change the way a person thinks about and reacts to the tinnitus sound.



Improve your students' Literacy and Analysis Skills, use as an Emergency Substitute Plan, or create Applicability in your classroom

[illegible]

The Silencer – Adios Amigo

Your attention, should you please be attracted to it and should otherwise not get a prize, requires you to design and build a sound insulating container that will reduce noise as much as possible.

Rules:

- Groups of 2 or 3
- Everything you use must be from recycled materials around your house
 - o Recycled doesn't mean just clean, "branded" your mother's old jar
 - o It can be anything you can find
 - o It cannot be purchased either at its entirety or largely
 - o The CANOPY must last 487 hours and must be made from materials that are not completely recycled from scratch
- Your container cannot contain any heat or electrical or chemical components
- You must be able to use every component wanted. This means you can't just use your container
- It must have dimensions that are larger than 15 cm (6") x 15 cm (6") x 15 cm (6") but smaller than 25 cm (10") x 25 cm (10") x 25 cm (10")
- The lid cannot be thicker than 2.5 cm (1") and must not stay for longer than 10 cm (4")
- You must be able to disassemble the phone from both the box and if cannot be turned while inside
- You must be able to physically touch the entire phone while it is in the box and the lid is off
- The lid can be secured with anything you wish but you only make materials attached to the box or lid is off
- A 10-15 dB difference will be applied to a group who breaks any rules

Mark:

- Written: 40% (admission to 100% pass)
- Written content: 10% (filling pages of sound traces (200-500 words)
- Written content: 10% (filling pages of sound traces (200-500 words)
- Acoustically: 30% (filling pages of sound traces (200-500 words)
- The lid needs to keep a hole in a certain defined design

Effectiveness Testing:

- To test the dB reading, we will use the same boxes with the sides here:
Side: 100cm x 100cm x 100cm
- The initial sound meter will be taken by a phone sitting on a desk, 10 cm from the box in a second phone
- The second phone will be placed 10 cm away from the dB meter on my phone 10 cm away above the lid

Waves and Sound Unit Test

Name: _____

/30

PART A: TRUE/FALSE SECTION: circle either true or false to indicate your answer for each statement

1. A transverse wave has an amplitude of 3.2 m. The vertical distance, in meters, between the top of a crest and the bottom of a trough is 2.4 m.	True	False
2. Sound waves are caused by compressions and rarefactions.	True	False
3. A string is vibrating at a frequency of 380 Hz. It makes approximately 625 vibrations as the sound travels 66 m through air at temperature 50°C	True	False
4. Noise cancelling headphones reduce outside noise by creating destructive interference.	True	False
5. If a crest of +1 amplitude meets a trough with -1 amplitude, you will see complete constructive interference.	True	False
6. Frequencies above 20 kHz are called infrasound.	True	False
7. The Doppler Effect is the change in frequency of a wave as it approaches an observer.	True	False
8. As an object moves towards you, the object will appear slightly red due to the Doppler Shift.	True	False

PART B: MULTIPLE CHOICE (3 marks): Place your answers in the table below.

	1	2	3	4	5	6	7	8

Questions 1 and 2 relate to the picture on the right.

1. If the string is 12 m long, how long is a wavelength?

- a) 2 m
- b) 3 m
- c) 4 m
- d) 5 m
- e) 6 m

2. This wave could be called the:

- a) 4th overtone
- b) 5th overtone
- c) 6th overtone
- d) 7th overtone
- e) 8th overtone

3. The distance between 4 nodes is 15.0 cm. The frequency of the source is 30.0 Hz. What is the speed of the waves in cm/s?

- a) 75.0 cm/s
- b) 1.50 x 10² cm/s
- c) 2.00 x 10² cm/s
- d) 9.00 x 10² cm/s
- e) 1.00 x 10³ cm/s

4. Which harmonic is shown on the right?

- a) First
- b) Second
- c) Third
- d) Fourth
- e) Fundamental

5. The speed of a wave can be measured in

- a) centimeters.
- b) meters.
- c) milliseconds per second.
- d) cycles per second.

Waves and Sound Quiz

Name: _____

Place your answers in the table below.

	1	2	3	4	5

1. Why doesn't sound travel through a vacuum?

- a) Vacuums are too cold to allow sound waves to travel through
- b) Sound waves are too big to travel through a vacuum
- c) Vacuums absorb the sound.
- d) Endoscopes in space are too hard therefore sound does travel through.
- e) Sound waves lengths are too long to travel the distance.

2. How is frequency related to period?

- a) They are the same thing.
- b) Period = 1 / frequency
- c) Frequency = amplitude x period.
- d) Speed = period / frequency

Waves and Sound Quiz - L1 4 V1

Name: _____

Place your answers in the box below

1	2	3	4	5	6	7	8	9	10

1. Why doesn't sound travel through a vacuum?
 - a) Vacuums are too cold to allow sound waves to travel through them.
 - b) Sound waves require a medium to travel through.
 - c) Vacuums absorb the sound.
 - d) Sound waves can't be heard therefore sound can't travel in space.
2. How is frequency related to period?
 - a) Frequency is the inverse of period.
 - b) Period is $\frac{1}{\text{frequency}}$.
 - c) Frequency = amplitude $\times$ period.
 - d) Period = speed $\times$ frequency.
3. A radio station vibrates back and forth in an electric wire with a frequency of 60.0 Hz, how many cycles will it make in 1.5 s?
 - a) 3.0 $\times 10^2$
 - b) 3.0 $\times 10^3$
 - c) 6.0 $\times 10^2$
 - d) 6.0 $\times 10^3$
4. A longitudinal wave with a frequency of 2000 Hz has a wavelength of 3.00 m traveling along a steel rail. How long will it take to travel 1000 m?
 - a) 1.5 s
 - b) 1.67 s
 - c) 0.667 s
 - d) 1.47 $\times 10^3$ s
5. A longitudinal wave of 11 m travels a trough with an amplitude of 0.8 m. The result will be a...
 - a) trough with 0.8 m amplitude
 - b) trough with 2.2 m amplitude
 - c) trough with 1.6 m amplitude
 - d) trough with 2.2 m amplitude
6. What is the period of a wave having a frequency of 40 Hz?
 - a) 0.025 s to 0.40 s
 - b) 0.025 s to 40.0 s
 - c) 40 s to 0.025 s
 - d) 40 s to 4.0 s
7. A 300 m/s sound wave travels through air at 15 $^{\circ}$ C to a tone located at the beach house who asked the fish to bring the nearest parent to start the music. If the temperature was 25.0 $^{\circ}$ C, how would the time have been if the nearest parent started the music upon bringing the fish to the house?
 - a) 1.87 s
 - b) 1.93 s
 - c) 1.94 s
 - d) 1.91 s

Sound Intensity and Society & Soundproofing Project

Quiz and Test with Answer Key

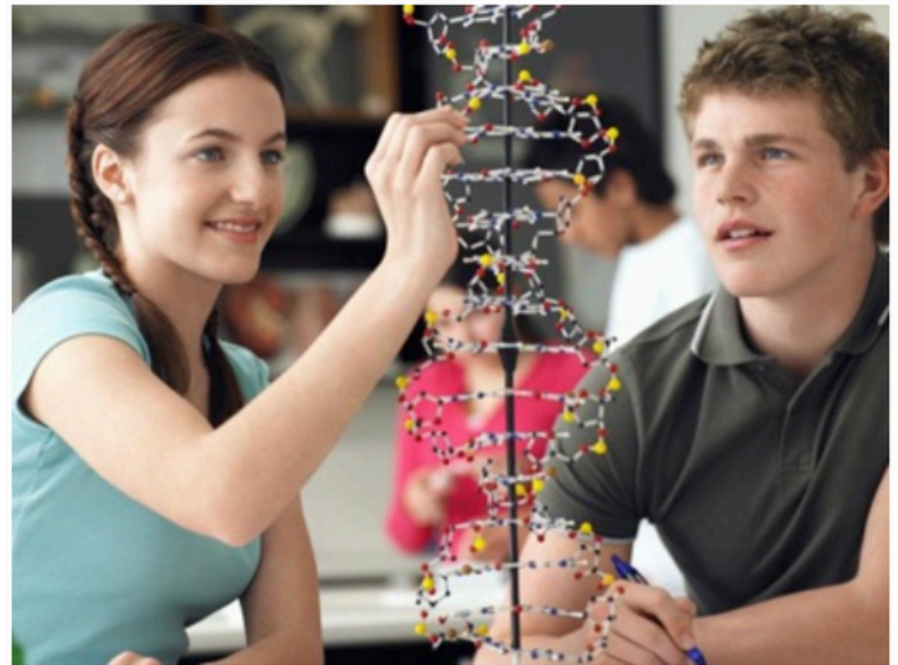
Who is this Unit for?

- **Teachers who teach grade 11 physics in Ontario**
- **Teachers who want a no-prep, ready to go out of the box unit**
- **Teachers who don't have time to plan out their Unit**

Get away from tired practices and unengaged students



Provide a Scientifically-Proven means of instruction



Incorporate Technology and Increase Collaboration



click here
to START