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Review of Previous Lesson

- State as many Vocabulary words and Learning Objectives that you remember from the last lesson as you can.
- Remember to grade yourself from 0 - 3.

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Diffraction, Refraction, Interference (Standing Waves) & Resonance (Natural/Resonant Frequency)

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Vocabulary

Content:	Start	End
interference pattern		
constructive interference		
destructive interference		
standing wave		
nodes		
antinodes		
natural frequency		
resonance		

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Learning Objectives

Content:	Start	End
Identify and explain diffraction and refraction causes, examples and applications.		
Recognise and construct interference patterns produced given two basic initial waves.		
Explain production and applications of standing waves and resonance.		
Identify nodes and antinodes on a given wave with explanation of significance.		
Demonstrate knowledge of relationship between standing waves, natural frequency and resonance.		

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Boundary Behaviour

- As a wave travels through a medium, it will often reach the end of the medium and encounter an obstacle or perhaps another medium through which it could travel.
- The behaviour of a wave (or pulse) upon reaching the end of a medium is referred to as **boundary behaviour**.

http://www.physicsclassroom.com/class/waves/Lesson-3/Boundary-Behavior

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What is a Ripple Tank?

Properties of Waves - Exploring Wave Motion

https://www.youtube.com/watch?v=y53z2zVipAs

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Refraction of Waves

- Deep water = High Speed.
- Shallow water = Low Speed.
  - What do you think will happen to the waves?

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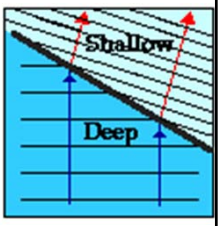
Refraction of Waves

- Waves change speed and wavelength as they pass from one medium to another so will change direction/bend.
- If the medium **OR** its properties are changed, the speed of the waves is changed.
- Deep water = High Speed.
- Shallow water = Low Speed.
  - So, if water waves are passing from deep water into shallow water, they will slow down.



http://www.physicsclassroom.com/class/waves/Lesson-3/Reflection,-Refraction,-and-Diffraction

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Refraction Example

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Why does a change in wave speed make the waves change direction?

https://www.youtube.com/watch?v=fn3VERs6oVQ

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Diffraction of Waves

- What do you think would happen if waves meet an opening or barrier in their path?

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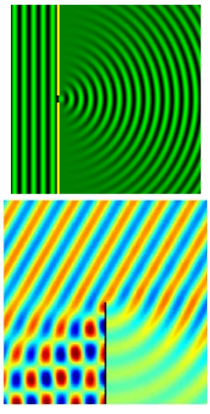
Diffraction of Waves

- Waves change direction as they pass through an opening or around a barrier in their path.
- When the wavelength of waves is larger than:
  - A gap in a barrier they can travel through the gap/around a corner.
  - An obstacle they can travel around the obstacle.



http://www.physicsclassroom.com/class/waves/Lesson-3/Reflection,-Refraction,-and-Diffraction

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Reflection, Refraction and Diffraction - Ripple Tank Demo - GCSE and A Level Physics Revision

GorillaPhysics - GCSE and A Level Physics Revision
https://www.youtube.com/watch?v=oyRNy9901zo

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What is Interference?

http://www.physicsclassroom.com/class/waves/Lesson-3/Interference-of-Waves

- What happens when two waves meet while they travel through the same medium?
- What effect will the meeting of the waves have upon the appearance of the medium?
- Will the two waves bounce off each other upon meeting *(much like two billiard balls would)* or will the two waves pass through each other?

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Constructive Interference

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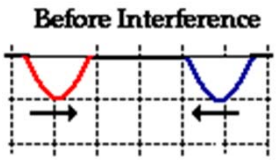
http://www.physicsclassroom.com/class/waves/Lesson-3/Interference-of-Waves



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What do you think will happen?

http://www.physicsclassroom.com/class/waves/Lesson-3/Reflection,-Refraction,-and-Diffraction 15

Constructive Interference

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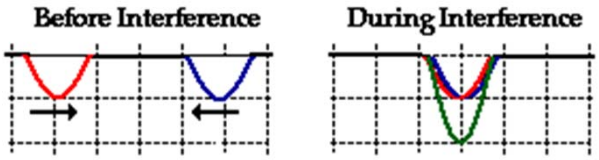
http://www.physicsclassroom.com/class/waves/Lesson-3/Interference-of-Waves



http://www.physicsclassroom.com/class/waves/Lesson-3/Reflection,-Refraction,-and-Diffraction 16

Destructive Interference

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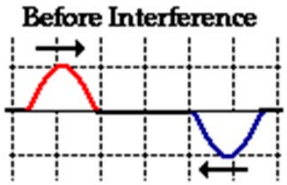
http://www.physicsclassroom.com/class/waves/Lesson-3/Interference-of-Waves



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What do you think will happen?

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Destructive Interference

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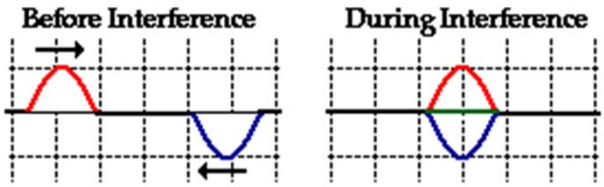

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After Interference

What do you think will happen?

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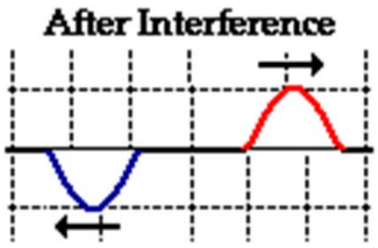
After Interference



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Travelling Waves (Standing Waves & Interference)

Bozeman Science

https://www.youtube.com/watch?v=eu1PC4botbM

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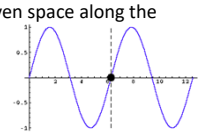
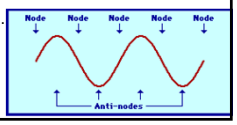
Traveling Waves vs. Standing Waves

http://www.physicsclassroom.com/class/waves/Lesson-4/Traveling-Waves-vs-Standing-Waves

- Travelling Wave:
  - When a wave is not confined to a given space along the medium (carries on 'forever').
  - e.g. an ocean wave.



- Standing Wave:
  - When a wave is confined to a given space and is made up of the inference between the wave travelling forward and the wave reflected from the fixed end.
  - Node = point of no displacement.
  - Antinode = point of maximum displacement.



https://phet.colorado.edu/sims/html/wave-on-a-string/latest/wave-on-a-string_en.html

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Resonance

https://www.youtube.com/watch?v=dihQuwrf9yQ

https://www.youtube.com/watch?v=4aenWDMPZT8

https://www.youtube.com/watch?v=X-hjeVc127I

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Resonance

http://www.physicsclassroom.com/class/sound/Lesson-5/Resonance

- Resonance only occurs when the first object is vibrating at the natural frequency of the second object.

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Problems & Solutions:

- Diffraction & Refraction:
  - http://glencoe.mheducation.com/sites/0078617766/student_view0/chapter1/section3/self-check_quiz-eng_.html
  - https://quizizz.com/admin/quiz/58fdea1a56e1e91100ce769c
  - https://flipquiz.me/u/christiantorrez1/reflection-refraction-and-diffraction
  - http://www.ducksters.com/science/quiz/wave_behavior_questions.php
- Interference:
  - http://www.physicsclassroom.com/class/waves/Lesson-3/Interference-of-Waves
  - https://quizizz.com/admin/quiz/57225c42e0ca35065e6b8c90
  - https://www.proprofs.com/quiz-school/quizshow.php?title=interference-wave&q=1

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Problems & Solutions:

- Travelling & Standing Waves:
  - http://www.physicsclassroom.com/class/waves/Lesson-4/Nodes-and-Anti-nodes
- Resonance:
  - http://www.physicsclassroom.com/class/waves/Lesson-4/Nodes-and-Anti-nodes

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Grade yourself.

- Grade yourself on the vocabulary and learning objectives of the presentation.

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