

What is the relationship between different wave properties?

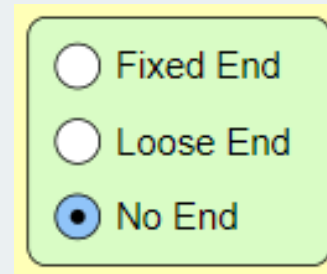
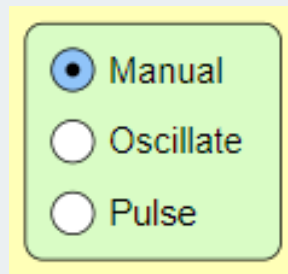
Amplitude  
Frequency  
Damping  
Tension

[Wave on a String - Waves | Frequency | Amplitude - PhET Interactive Simulations](#)

# Explore the Simulation



- Open the simulation and set it to “**Manual**” and “**No End**”:



PhET Interactive Simulations

- Drag the wrench up and down.

How does the behavior of this simulated system compare to the slinkies we just used?

# Explore the Simulation



We want to use this simulation to investigate what affects the amount of energy transferred by a wave.

- Launch the simulation. Set the mode on “**Oscillate**” and “**No End**”.
- Explore the rest of the controls and see how they change what is happening.
- Record your observations about what you can control and observe/measure in this simulation.

☐ Manual

☒ Oscillate

☐ Pulse

☐ Fixed End

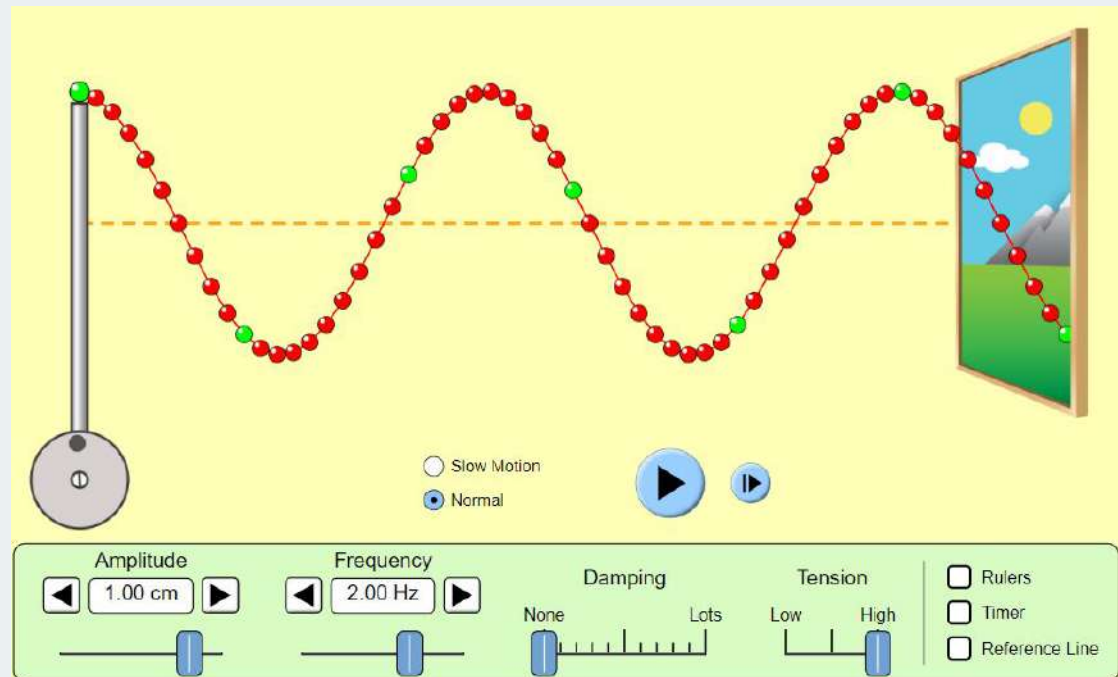
☐ Loose End

☒ No End

# Identify Variables



- List all the variables we can control
- List all the variables we can measure



# Carry Out Investigation of Amplitude



**With a partner**

Open the simulation:

<https://www.openscienced.org/general/waveonastring/>

Use these settings for each investigation you carry out (damping should be zero)

|                                            |                                         |
|--------------------------------------------|-----------------------------------------|
| <input type="radio"/> Manual               | <input type="radio"/> Fixed End         |
| <input checked="" type="radio"/> Oscillate | <input type="radio"/> Loose End         |
| <input type="radio"/> Pulse                | <input checked="" type="radio"/> No End |

PhET Interactive Simulations

Carry out your investigation for **amplitude** and record your results for what changes and what does not change.

# Construct an Explanation for Amplitude



## With a partner

Write a conclusion statement for **amplitude** that describes how changes in it affected the other variables.

*E.g., “When \_\_\_\_\_ (decreases/increases),  
then \_\_\_\_\_.”*

Also determine how **amplitude** affects or does not affect the amount of energy transferred by the wave.

# Compare Explanations for Amplitude



## With your class

- How does changing **amplitude** affect the other variables?
- How can we visually represent this?
- Does changing **amplitude** affect how much energy is transferred by the wave?
  - If so, does increasing amplitude increase or decrease the energy transferred?

# Carry Out Investigation of Frequency

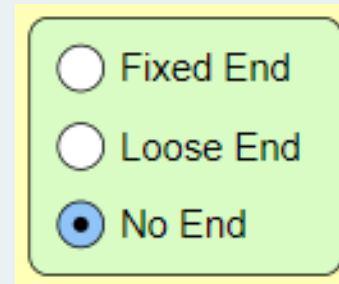
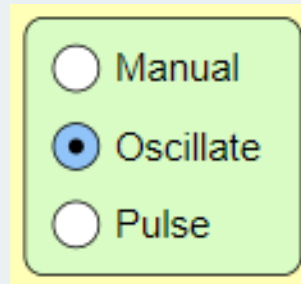


**With a partner**

Open the simulation:

<https://www.openscienced.org/general/waveonastring/>

Use these settings for each investigation you carry out (damping should be zero)



PhET Interactive Simulations

Carry out your investigation for **frequency** and record your results for what changes and what does not change.

# Construct an Explanation for Frequency



## On your own

Write a conclusion statement for **frequency** that describes how changes in it affected the other variables.

*E.g., “When \_\_\_\_\_ (decreases/increases),  
then \_\_\_\_\_.”*

Also note how **frequency** affects or does not affect the amount of energy transferred by the wave.

# Compare Explanations for Frequency



## With your class

- How does changing **frequency** affect the other variables?
- How can we visually represent this?
- Does changing **frequency** affect how much energy is transferred by the wave?
  - If so, does increasing frequency increase or decrease the energy transferred?

# Carry Out Damping & Tension Investigations



**With a partner**

Open the simulation:

<https://www.openscienced.org/general/waveonastring/>

Use these settings for each investigation you carry out:

|                                            |                                         |
|--------------------------------------------|-----------------------------------------|
| <input type="radio"/> Manual               | <input type="radio"/> Fixed End         |
| <input checked="" type="radio"/> Oscillate | <input type="radio"/> Loose End         |
| <input type="radio"/> Pulse                | <input checked="" type="radio"/> No End |

PhET Interactive Simulations

Carry out your investigations for both **damping** and **tension** and record your results for what changes and what does not change.

## Construct an Explanation: Damping & Tension



### On your own

Write conclusion statements for both **damping** and **tension**. Each should describe how changes affected the other variables.

*E.g., “When \_\_\_\_\_ (decreases/increases),  
then \_\_\_\_\_.”*

Also note how **damping** and **tension** affect or do not affect the amount of energy transferred by the wave.

# Compare Explanations for Damping & Tension



## With your class

- How does changing **damping** or **tension** affect the other variables?
- How can we visually represent this?
- Does changing **damping** or **tension** affect how much energy is transferred by the wave? If so, how?
  - If so, does increasing damping and/or tension increase or decrease the energy transferred?