

# DISCUSSION

## Optional Study and Discussion *continued*

- 3 Critical Thinking:** Brainstorm and experiment. What do you think would happen if the weights were dissimilar but the strings were the same size. Make another pendulum wave with same size strings but different weights.
- 4 More Fun:** Research other pendulum waves too! Here is one that is an art display!  
<http://largependulumwave.nl/>

# T E A C H E R S G U I D E



**PENDULUM WAVE DEMO**  
ITEM # 3645-00

## ENERGY - MOTION

A captivating demonstration for all ages! The Pendulum Wave Demo simulates phases, beats, and frequencies. Features a stand with nine 7/8" (22mm) steel ball pendulums and comes with an initiator stick, which helps to simultaneously release all pendulums. When released, the pendulums will swing back and forth to quickly form a wave pattern and then cycle through different phases. Great for a classroom, as a gift, or for display. Ships flat. 3 piece construction that assembles in minutes.



# Materials

- meter length of string, two nuts or washers
- *8-10 weights (e.g. nuts, washers, identical weights that easily attach to string.)*
- Optional:*
- *2 meter sticks*
- *dissimilar weights*
- *4 meters of string (approximately)*
- *tape, scissors, books*

# Goals & Objectives

## Students will:

- review the definition of frequency. Frequency is simply how often something happens during a period of time.
- observe a pendulum wave.

# DISCUSSION

## Optional Study and Discussion

- 1 Make your Own:**  
Make your own pendulum wave with 2 meter sticks (or a meter stick and a ruler or tape measure), 4 meters of string (roughly), 8-10 weights (e.g. nuts, washers, masses that easily attach to string), tape, scissors, and a stack of books. Cut the string into 9 different lengths and attach a similar washer to each string. The first string should be 44 cm. Each subsequent string should be 3 cm less. (44 cm, 41 cm, 38 cm... 29 cm.) Set up the meter stick and support it with a desk or stack of

books. At the 10 cm mark on the meters stick, tape the first string. Each subsequent string should be 9 cm apart. You have now created your own pendulum wave!

- 2 In your Environment:**  
Discuss where in your environment you see examples of frequencies varying. (A playground with different length swings is a perfect example of this. If time and resources allow, visit a playground with different size swings.)

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# ACTIVITIES

- 1** Review that frequency is simply how often something happens during a period of time.

## Note

It is always best to DO an experiment ahead of time to be able to best present it to the class.

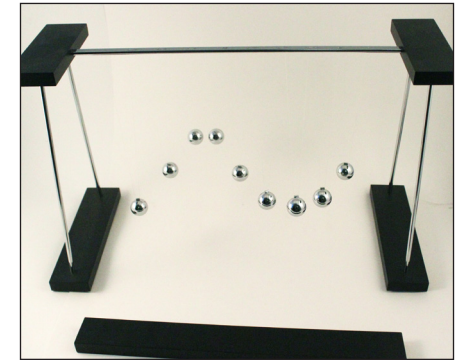


- 2** Introduce to the students one piece of string approximately 1 meter long. Cut the string unevenly to produce a short piece and a long piece (65 cm and 35 cm). Attach a washer or nut to each piece of string. Have one student hold each string at the same level in front of the class.

Ask students what will happen to the frequency of each string. How will the frequencies be similar? How will they be different? Which string will have a higher frequency than the other and why?

Allow students to brainstorm possible answers in pairs for approximately 3-5 minutes. Discuss ideas generated with the entire class.

- 3** Conduct the experiment with the small and large string starting the string parallel to the floor and releasing the washer at the same time on the count of three. Count the frequency cycle of each washer (for approximately 30 seconds).



- 4** Introduce the pendulum wave. Give students time to observe the pendulum wave. What do they observe?

Elicit whole group discussion on what they think will occur. After discussion, using the bar included, start the pendulum wave by starting all pendulums at the same time. Allow students to enjoy the show! Allow students to come up and start the pendulum wave themselves.