Acoustical Society of America

Anatomy of a Wave

Adams, W.K.
modified from Jackie Esler, Boulder Valley Schools

Edited by: Kelseigh Schneider
Reviewed by:
American Association of Physics Teachers Physics Teacher Resource Agents
ASA Activity Kit Committee

Students take on the roles of reporters and artists to draw and describe the nature of transverse waves. Following the activity an interactive presentation is given on properties of both transverse and longitudinal waves. I use the Wave Basics homework as preparation.

Science Topics	Process Skills	Grade Level
Parts of a wave Periodic motion of waves Wave properties	Observing Scientific Inquiry Comparing Communicating	3-12

Time Required

Advanced Preparation	Set-Up	Activity	Clean-Up
Gather materials	5 minutes	45 minutes	5 minutes

Learning Goals

Students will be able to

- draw and label a basic transverse wave.
- identify a wavelength on a transverse wave.
- describe the difference between a transverse and a longitudinal wave.
- identify the source, receiver and medium for any type of wave.

Materials

- Laminated copies of a simple transverse wave picture – 1 per pair (see page 4)*
- Lab notebooks (or regular paper)
- Pencils
- Computer with projector and PhET Interactive Simulations Wave on a String Simulation.
- Power point presentation (pdf)

*Laminated copies will be reusable and last longer

Advanced Preparations

Please forward any questions or comments to:
Wendy Adams
Education Coordinator
Acoustical Society of America
Wendy.Adams@colorado.edu

- Gather materials
- Set up computer

Set Up

- none.

Introducing the Activity

Explain that we will start by having students work in pairs and take on the roles of artists and reporters. If you have an odd number it's possible to have a group with three and two students are reporters but this is not ideal.

Doing the Activity

Note: The activity does not work if students do not follow the directions. Once they "cheat" the activity is spoiled. It may be useful to do a practice activity with a simple picture like a smiley face. Once the rules are understood, then use the wave picture.

Part 1

The reporters are given a copy of the laminated sheet face down and told not to look at it or show the sheet to anyone until told to by the teacher.

- One student is the "reporter" and will get the laminated sheet (does not look at until told to by teacher and doesn't at anytime show others)
- Partners are the "artists" – they will try to draw what the reporter describes

Tell students that the sheets the "reporter" will get are top secret – no peeking!

- Rules while describing the picture to artists:
    - Reporters cannot comment on artists work! They can answer questions, but cannot look at a picture or clarify by "showing" them.

Allow reporters to look at their sheet – tell other students to close their eyes because they will look at other students' pictures. Remind students this is FUN!!! NO CHEATING!!!

- Give a quick instruction about how the "reporter" will be telling them about the picture they will draw.
- Walk around listening as the students instruct the "artists" on how to draw the picture of the wave.

We give them 5 minutes.

Part 2

Collect the laminated copies and ask the artists to turn their picture over. The reporters find a fresh page of paper as well.

Go through the activity again, giving instructions for all students to draw this time.

After everyone is finished the class looks at both drawings and the teacher displays the original picture for the class.

- Have the class make any touch ups necessary and talk about difficulties with listening and creating images.

Introduce the terminology to the students using the image.

- Crest
- Trough
- Wavelength

Have them add the terms to their drawing. (Showing wavelength from crest to crest gives students the easiest view.)

After the partner activity begin the power point presentation. This presentation should include whole class discussion.

Interactive class presentation of the properties of waves (pdf).
Notes are included on each slide describing how I used this in class.

Explanation

In-depth background information for teachers and interested students

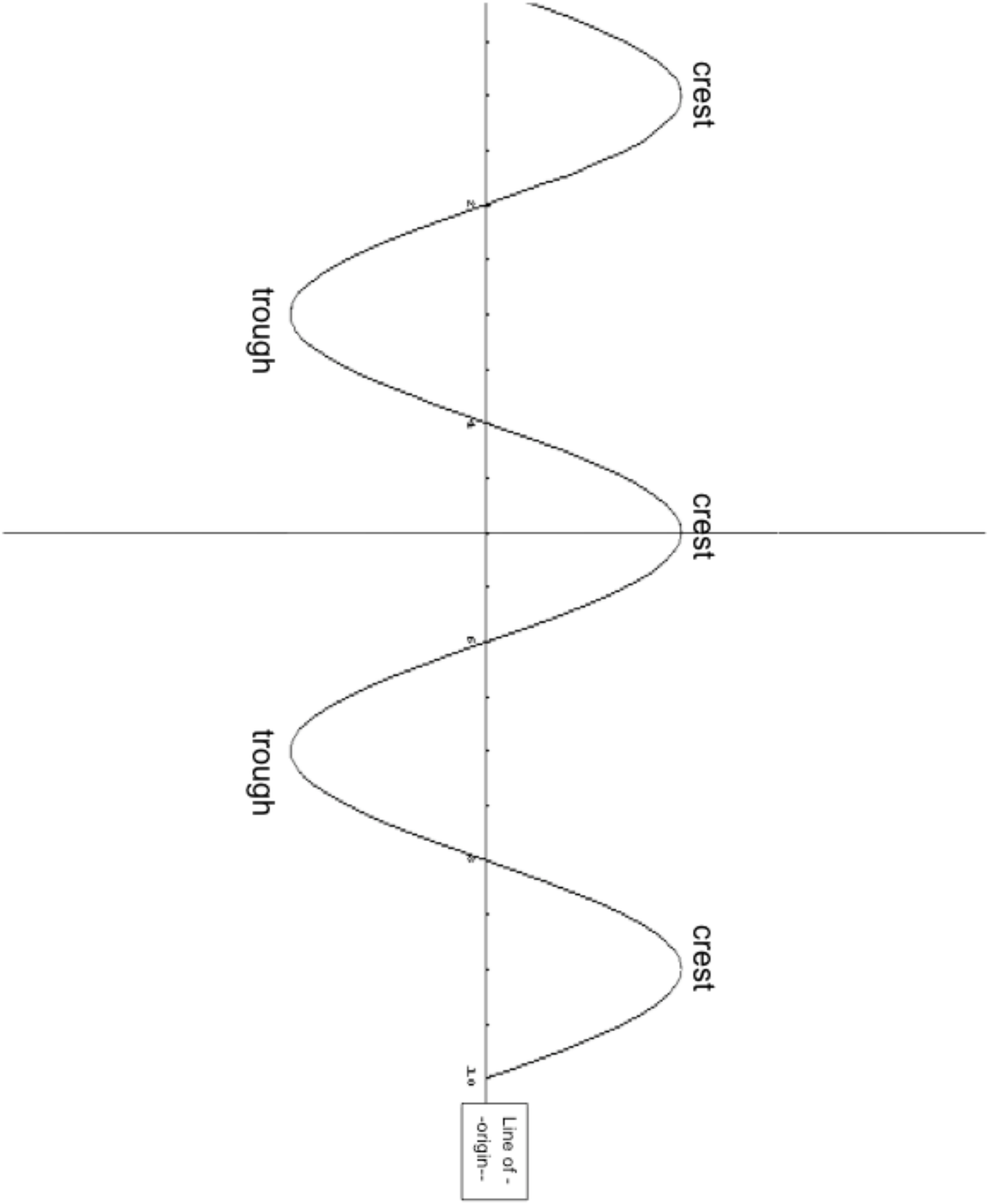
Key Terms:

- Crest – the top of the wave
- Trough – the bottom of the wave
- Wavelength – the distance between two successive, identical parts of the wave. Ex. Crest to crest or trough to trough.

Optional Extensions /Modifications

Modifications:

- Hard of hearing students can be the reporter through the interpreter
- Visually impaired students (depending on the extent of their impairment) can be the artist. A three dimensional model could be created to show how a wave feels.
- PhET Interactive Simulations are available in 65 languages so can be shown in a student's native language.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