

Name: _____

Class: _____

Due Date: _____

C.2 Wave Model

Understandings

- Transverse and longitudinal traveling waves.
- Wavelength λ , frequency f , time period T , and wave speed v applied to wave motion as given by $v = f\lambda = \frac{\lambda}{T}$.
- The nature of sound waves.
- The nature of electromagnetic waves.
- The differences between mechanical waves and electromagnetic waves.

Equations

$$v = f\lambda = \frac{\lambda}{T}$$

The solutions can be found on the YouTube channel Go Physics Go:

<https://www.youtube.com/@gophysicsgo/playlists>

Use your favorite sources to answer the following questions

1. What is a *wave*? What do waves transfer? What do waves not transfer?
2. How are all waves created?
3. Define *medium*. Give three examples.
4. Define *vacuum*.
5. Define *mechanical wave*. Give an example.
6. Define *electromagnetic waves*.
7. List the seven electromagnetic waves in order of decreasing wavelength λ , increasing frequency f , and increasing energy $E = hf$.
8. State the meaning of ROY G BIV

9. Define *longitudinal wave*. Give an example.

10. Define *compression*.

11. Define *rarefaction*. Do not confuse *rarefaction* with *refraction*!

12. **Use a pencil and ruler!** Draw a *longitudinal wave*. Label the *compression* and *rarefaction*.

13. Define *transverse wave*. Give an example.

14. Define *crest*.

15. Define *trough*.

16. **Use a pencil and ruler!** Draw a *transverse wave*. Label the *crest* and *trough*.

17. Define *wavelength* λ . Units?

18. Define *period* T . Units?

19. Define *frequency* f . Units?
20. State the equation which relates the *speed*, *wavelength*, and *frequency* of a wave.
21. What information can we obtain from a *displacement vs. distance* graph?
22. What information can we obtain from a *displacement vs. time* graph?
23. Define *intensity*. Units?
24. What is the mathematical relationship between the *intensity* and *amplitude* of a wave? What about the *energy* and *amplitude* of a wave?
25. What is the mathematical relationship between the *intensity* and *distance* from a wave source?
26. Imagine a boat which is in the middle of the ocean. A water wave passes under it. What happens to the boat? Does it travel vertically (up and down)? Does it travel horizontally (left and right)? Both? Neither?
27. What is the speed of sound in a vacuum? In air? In a metal?

28. What is the speed of an electromagnetic wave in a vacuum? In air? In a metal?

29. For sound waves pitch is directly proportional to _____ and loudness is directly proportional to _____.