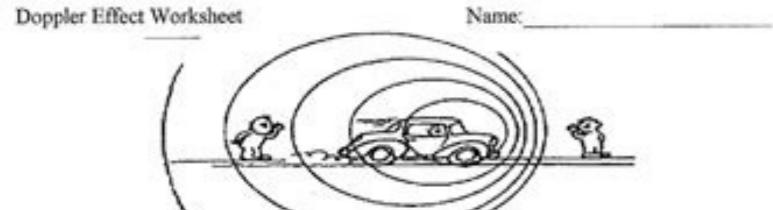


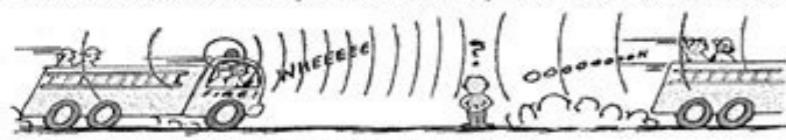
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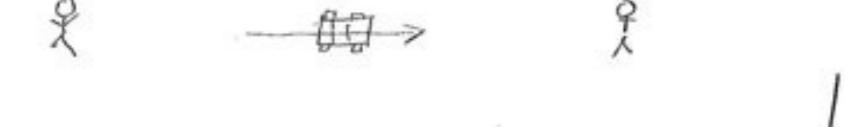
- Doppler Effect Worksheet Name: _____
- When an automobile moves towards a listener, the sound of its horn seems relatively
 - Low pitched
 - High Pitched
 - Normal
 - When the automobile moves away from the listener, its horn seems
 - Low pitched
 - High Pitched
 - Normal
 - The changed pitch of the Doppler effect is due to changes in
 - Wave speed
 - wave frequency
 - Circle the letter of each statement about the Doppler Effect that is true.
 - It occurs when a wave source moves away from an observer
 - It occurs when an observer moves towards a wave source
 - It occurs when a wave source moves away an observer
 - It occurs when an observer moves away a wave source
 - True / False: A moving wave source does not affect the frequency of the wave encountered by the observer.
 - True / False: A higher frequency results when a wave source moves towards an observer.

- Two fire trucks with sirens on speed towards and away from an observer as shown below.



- Which truck produces a higher than normal siren frequency?
- Which truck produces a lower than normal siren frequency?

- Draw the sound waves around the moving truck below similar to the simulation from the beginning of class. Describe the sound that each observer would hear in terms of its pitch.



Doppler effect

To stay on track:

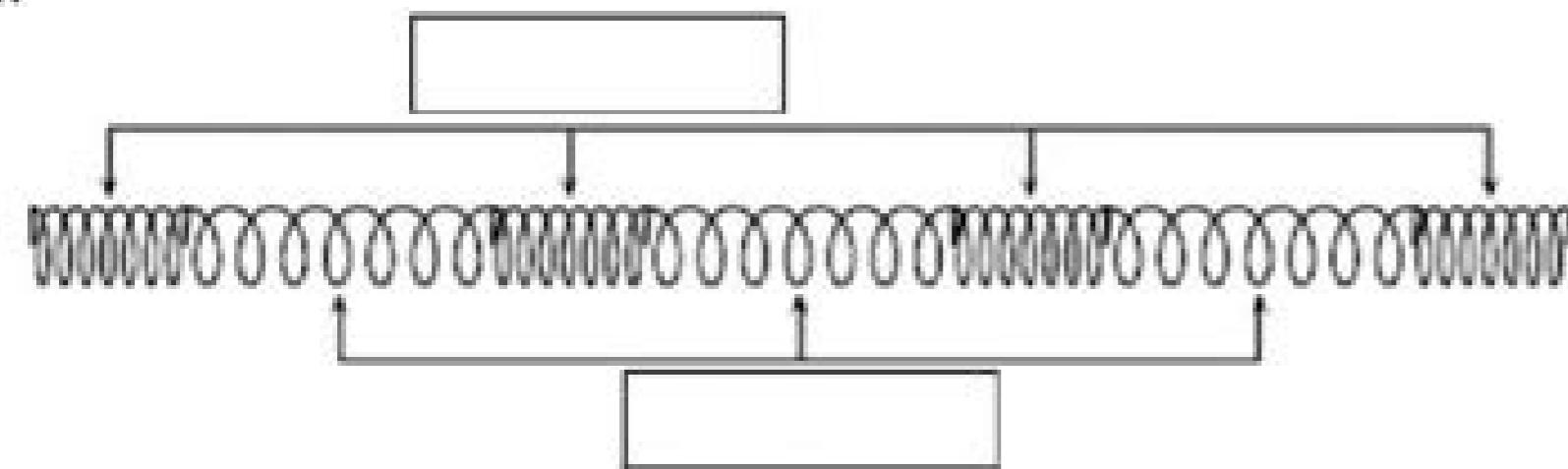
The liveworksheets on the Doppler effect and the homework given at the end of the worksheets, should take you a week to complete and mark.

The memo to the homework will be sent at the end of the week ☺

- Sound waves are examples of transverse longitudinal waves
- _____ are regions in the above mentioned wave where the particles are closest together.
- _____ are regions in the above mentioned wave where the particles are furthest apart.

Label the wave sections below:

4.



- of a wave refers to the no of compressions (or rarefactions) that pass a given point per _____.

- The time taken for two successive compressions (or rarefactions) to pass a given point is known as the _____ of the wave.

- Period of a wave is measured in _____ (only give the unit symbol)

- Frequency of a wave is measured in _____ (only give the unit symbol)

LIVEWORKSHEETS

Situation 1: Source moving towards a stationary listener

$$f_s = \frac{v + v_s}{v} f_s$$

This observed frequency is always higher than the source frequency. It makes no difference if the source is moving towards or away from the listener.

$$f_s = \frac{v - v_s}{v} f_s$$

Your answer (1) thus needs to be as big as possible and as small as possible. In order to achieve this, move the denominator to the top or the bottom in order to make the value as big as possible.

$$f_s = \frac{v + v_s}{v - v_s} f_s$$

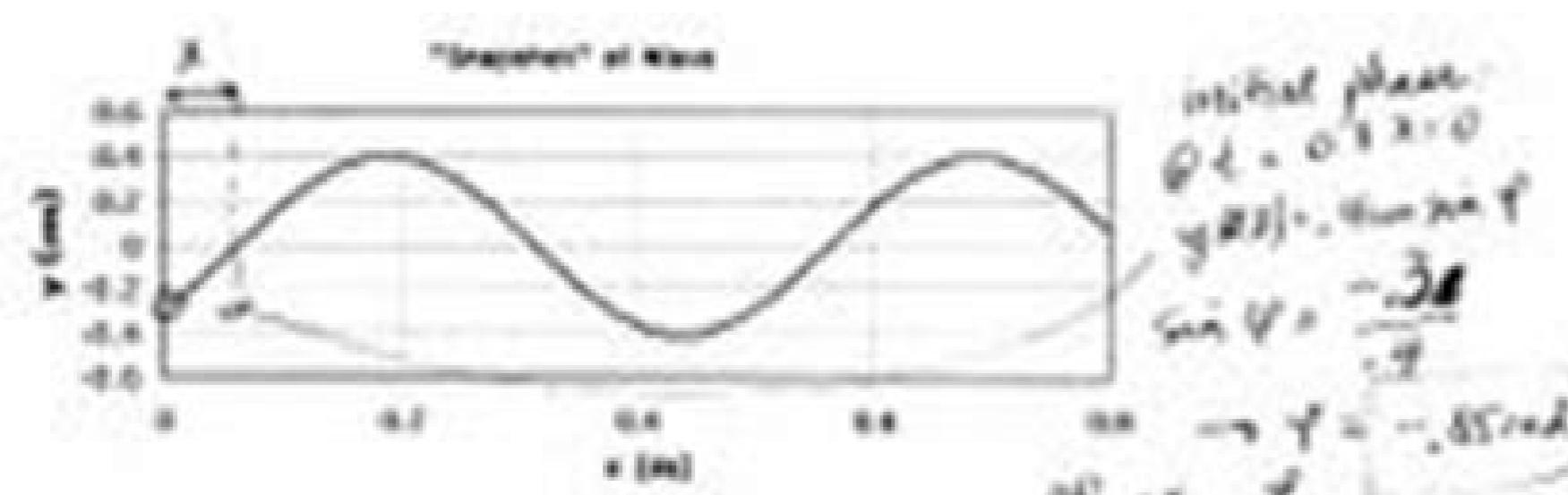
Or you can write it as:

$$f_s = \frac{v}{v - v_s} f_s$$

When a car approaches you, the sound waves that reach you have a shorter wavelength and a higher frequency. You hear a higher pitch sound.

LIVEWORKSHEETS

6. (25 points) A snapshot of a wave on a string occurs at time shown below. The waves is moving to the right with velocity v . The tension in the string is 100 N and the mass density is $\mu = 0.01 \text{ kg/m}$



Find the following values (all units)

$$\text{amplitude} = 0.4 \text{ cm} \quad \text{b) wavelength} = 0.5 \text{ m}$$

$$c) \lambda = 2\pi/\beta = 2\pi/(36.57)/0.5 = 3.87 \text{ m}$$

$$d) \text{angular frequency} = 45.8 \text{ rad/s} \quad e) \text{initial phase} = -0.13 \rightarrow -1 \text{ rad}$$

f) Determine the speed of the wave.

$$v = \sqrt{\frac{T}{\mu}} = \sqrt{\frac{98}{0.013}} = 36.5 \text{ m/s}$$

g) Write an equation for the wave, substituting all appropriate quantities from above.

$$y = 0.4 \cos \left[\frac{45.8}{0.5} x - 45.8 t + \left\{ -1 \text{ rad} \right\} \right]$$

h) Calculate the maximum velocity of the string at the point $x = 0.4 \text{ m}$ at time $t = 0 \text{ s}$.

$$\frac{dy}{dt} = 0.4 \cos \left(-45.8 \frac{x}{0.5} \right) \cos \left[12.9 \frac{x}{0.5} (4\pi) - 45.8 \frac{t}{0.5} - 1 \right] \\ = -16.2 \text{ cm/s} = -1.62 \text{ m/s}$$

The tension in the string is decreased by a factor of 4, making chain changes. What happens to

the the wave speed $v = \sqrt{\frac{T}{\mu}} = \frac{1}{2} v_0$ half

i) the wavelength $\lambda = \frac{v}{f} = \frac{1}{2} v_0 = \frac{1}{2} \lambda_0$ half

j) the angular frequency of the traveling wave (depends on source)

Same

Chapter 12: Interference

Read these resources and answer questions:

[The basic physics behind every double-slit experiment \(Physicist Effect\)](#)
[How does interference work? \(Physics Classroom\)](#)
[How does interference work? \(Wikipedia\)](#)



Answer the following questions based on the reading material.

1. Answer all of the basic questions below. You can choose to answer them in any order:
 a) Low frequency b) High Frequency c) Normal frequency

d) Low frequency e) High Frequency f) High Frequency g) Normal frequency in frequency

2. Then explain what of the following effects pass through you in your everyday life?

a) Diffraction b) Interference

3. Then explain how sound waves and light waves differ in terms of the wave interference they exhibit.

4. Then explain how frequency affects the wave interference they exhibit.

5. Then explain how waves travel away from their source in different ways.

a) Direct sound b) Reflected sound

c) Direct light d) Reflected light

e) Direct waves f) Reflected waves

6. Then explain how waves travel away from an object in different ways.

a) Direct sound b) Reflected sound

c) Direct light d) Reflected light

e) Direct waves f) Reflected waves

7. Then explain how waves travel away from a source in different ways.

a) Direct sound b) Reflected sound

c) Direct light d) Reflected light

e) Direct waves f) Reflected waves

8. Then explain how waves travel away from a source in different ways.

a) Direct sound b) Reflected sound

c) Direct light d) Reflected light

e) Direct waves f) Reflected waves

9. Then explain how waves travel away from a source in different ways.

a) Direct sound b) Reflected sound

c) Direct light d) Reflected light

e) Direct waves f) Reflected waves

10. Then explain how waves travel away from a source in different ways.

a) Direct sound b) Reflected sound

c) Direct light d) Reflected light

e) Direct waves f) Reflected waves

11. Then explain how waves travel away from a source in different ways.

a) Direct sound b) Reflected sound

c) Direct light d) Reflected light

e) Direct waves f) Reflected waves

12. Then explain how waves travel away from a source in different ways.

a) Direct sound b) Reflected sound

c) Direct light d) Reflected light

e) Direct waves f) Reflected waves

13. Then explain how waves travel away from a source in different ways.

a) Direct sound b) Reflected sound

c) Direct light d) Reflected light

e) Direct waves f) Reflected waves

14. Then explain how waves travel away from a source in different ways.

a) Direct sound b) Reflected sound

c) Direct light d) Reflected light

e) Direct waves f) Reflected waves

15. Then explain how waves travel away from a source in different ways.

a) Direct sound b) Reflected sound

c) Direct light d) Reflected light

e) Direct waves f) Reflected waves

16. Then explain how waves travel away from a source in different ways.

a) Direct sound b) Reflected sound

c) Direct light d) Reflected light

e) Direct waves f) Reflected waves

17. Then explain how waves travel away from a source in different ways.

a) Direct sound b) Reflected sound

c) Direct light d) Reflected light

e) Direct waves f) Reflected waves

18. Then explain how waves travel away from a source in different ways.

a) Direct sound b) Reflected sound

c) Direct light d) Reflected light

e) Direct waves f) Reflected waves

19. Then explain how waves travel away from a source in different ways.

a) Direct sound b) Reflected sound

c) Direct light d) Reflected light

e) Direct waves f) Reflected waves

20. Then explain how waves travel away from a source in different ways.

a) Direct sound b) Reflected sound

c) Direct light d) Reflected light

e) Direct waves f) Reflected waves

21. Then explain how waves travel away from a source in different ways.

a) Direct sound b) Reflected sound

c) Direct light d) Reflected light

e) Direct waves f) Reflected waves

22. Then explain how waves travel away from a source in different ways.

a) Direct sound b) Reflected sound

c) Direct light d) Reflected light

e) Direct waves f) Reflected waves

23. Then explain how waves travel away from a source in different ways.

a) Direct sound b) Reflected sound

c) Direct light d) Reflected light

e) Direct waves f) Reflected waves

24. Then explain how waves travel away from a source in different ways.

a) Direct sound b) Reflected sound

c) Direct light d) Reflected light

e) Direct waves f) Reflected waves

25. Then explain how waves travel away from a source in different ways.

a) Direct sound b) Reflected sound

c) Direct light d) Reflected light

e) Direct waves f) Reflected waves

26. Then explain how waves travel away from a source in different ways.

a) Direct sound b) Reflected sound

c) Direct light d) Reflected light

e) Direct waves f) Reflected waves

27. Then explain how waves travel away from a source in different ways.

a) Direct sound b) Reflected sound

c) Direct light d) Reflected light

e) Direct waves f) Reflected waves

28. Then explain how waves travel away from a source in different ways.

a) Direct sound b) Reflected sound

c) Direct light d) Reflected light

e) Direct waves f) Reflected waves

29. Then explain how waves travel away from a source in different ways.

a) Direct sound b) Reflected sound

c) Direct light d) Reflected light

e) Direct waves f) Reflected waves

30. Then explain how waves travel away from a source in different ways.

a) Direct sound b) Reflected sound

c) Direct light d) Reflected light

e) Direct waves f) Reflected waves

31. Then explain how waves travel away from a source in different ways.

a) Direct sound b) Reflected sound

c) Direct light d) Reflected light

e) Direct waves f) Reflected waves

32. Then explain how waves travel away from a source in different ways.

a) Direct sound b) Reflected sound

c) Direct light d) Reflected light

e) Direct waves f) Reflected waves

33. Then explain how waves travel away from a source in different ways.

a) Direct sound b) Reflected sound

c) Direct light d) Reflected light

e) Direct waves f) Reflected waves

34. Then explain how waves travel away from a source in different ways.

a) Direct sound b) Reflected sound

c) Direct light d) Reflected light

e) Direct waves f) Reflected waves

35. Then explain how waves travel away from a source in different ways.

a) Direct sound b) Reflected sound

c) Direct light d) Reflected light

e) Direct waves f) Reflected waves

36. Then explain how waves travel away from a source in different ways.

a) Direct sound b) Reflected sound

c) Direct light d) Reflected light

e) Direct waves f) Reflected waves

37. Then explain how waves travel away from a source in different ways.

a) Direct sound b) Reflected sound

c) Direct light d) Reflected light

e) Direct waves f) Reflected waves

38. Then explain how waves travel away from a source in different ways.

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