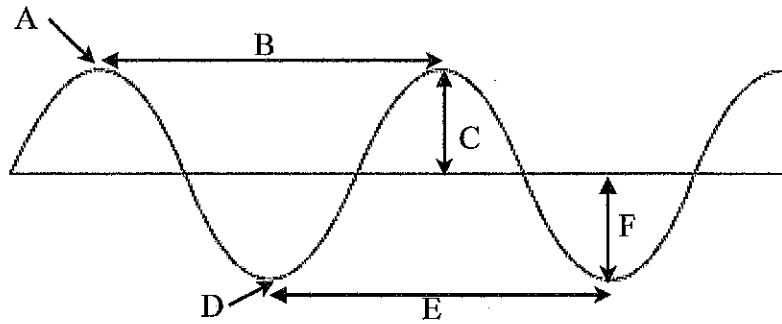


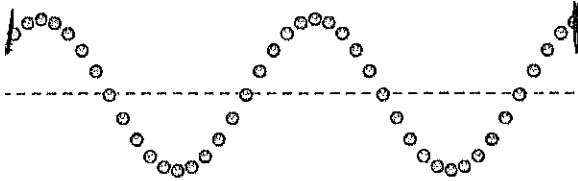
Waves Worksheet #2

- A: Crest
- B: Wavelength
- C: Amplitude
- D: Trough
- E: Wavelength
- F: Amplitude



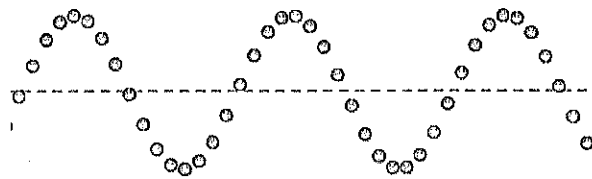
Frequency

Wave 1:



1. How many wavelengths long is Wave 1?
2 wavelengths

Wave 2:



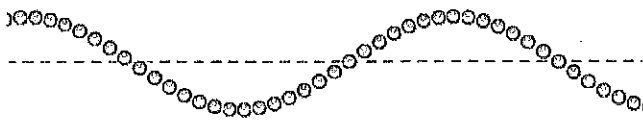
2. How many wavelengths long is Wave 2?
2.5 wavelengths

3. How many wavelengths long is Wave 3?
1.5 wavelengths

4. Which wave has the highest frequency?
Wave 2

5. Which wave has the lowest frequency?
Wave 3

Wave 3:



6. What is the definition of frequency?

The number of waves in a given time.

7. How can you tell by looking at it if a wave has high or low frequency?

How close or spread out the waves are

Frequency Connection

There are three members of a family. The dad has a deep, low voice. The mom has a medium-high voice, and the baby has the highest voice.

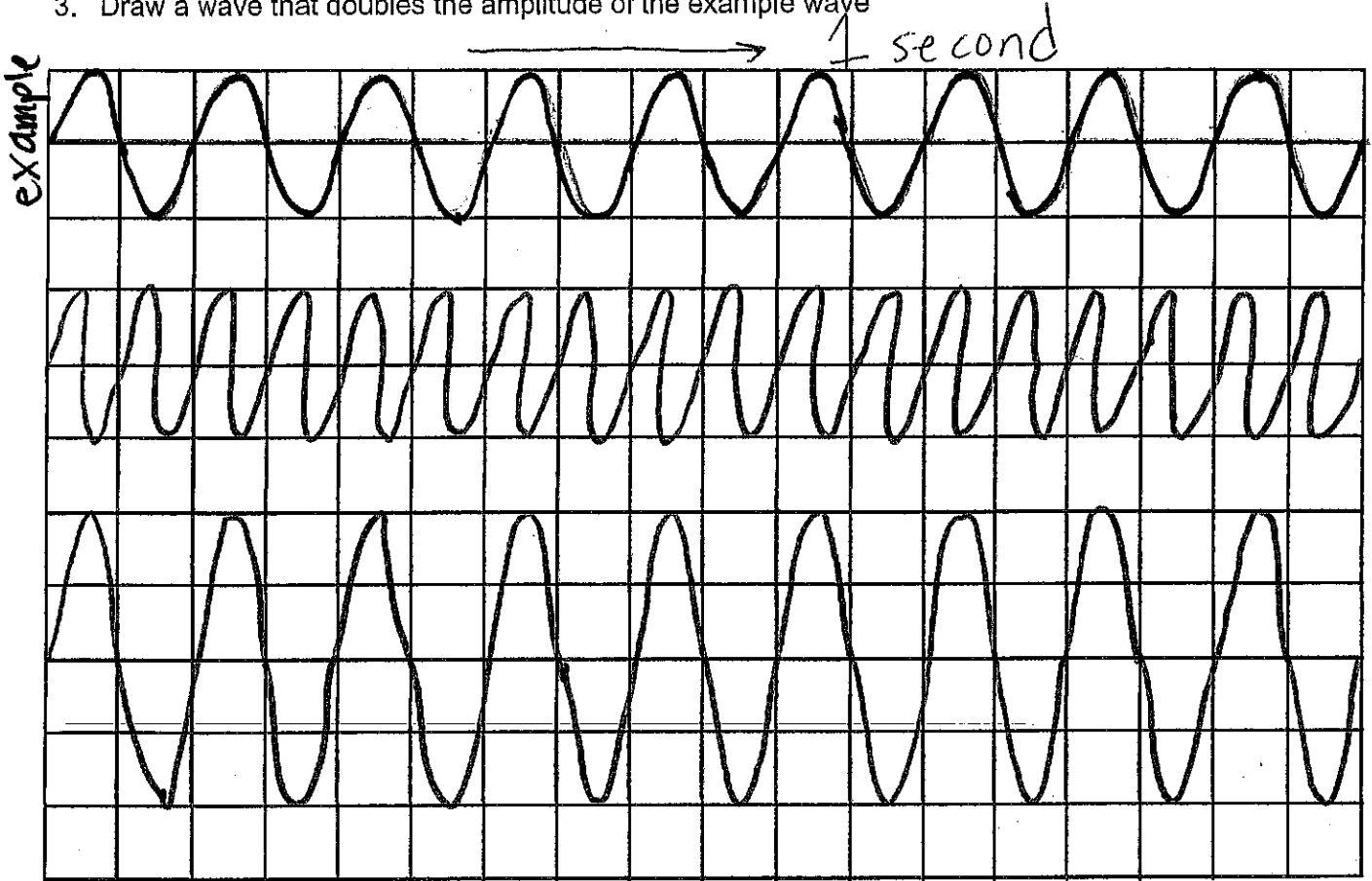
8. Which wave belongs to the dad's voice? Wave 3

9. Which wave belongs to the mom's voice? Wave 1

10. Which wave belongs to the baby's voice? Wave 2

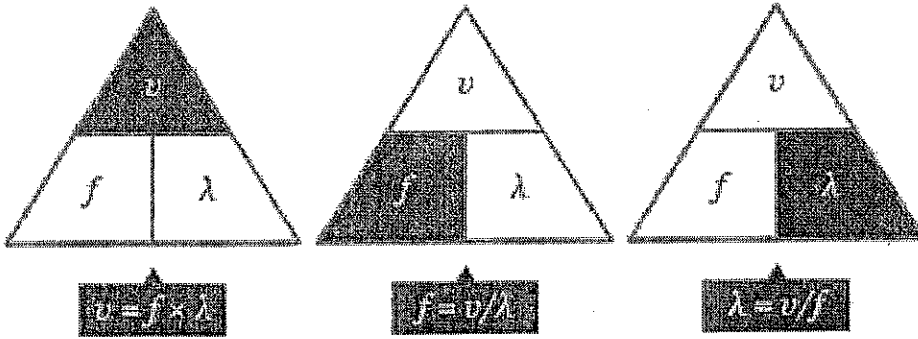
Wave Properties

1. Figure out the amplitude and wavelength of the example wave.
2. Draw a wave that doubles the frequency of the example wave.
3. Draw a wave that doubles the amplitude of the example wave.



Figuring out wave speed

Cut out and glue/tape the diagram and table below into your notebook. (Once completing the back)



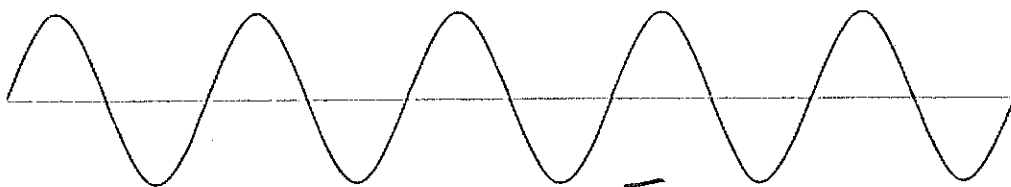
distance

Velocity = $\frac{\text{distance}}{\text{time}}$

| Property of Wave | symbol | unit |
|------------------|-----------|-------------------------------|
| Velocity / Speed | v | (m/s) - meters/second |
| Frequency | f | (Hz) Hertz - waves per second |
| wavelength | λ | (m) - meters |

The time from the beginning to the end of the wave train in each situation is 1 second.

Wave 1



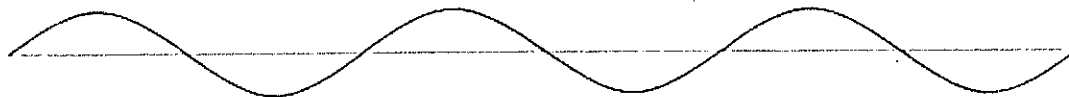
$$v = f \times \lambda$$

$$v = 5.0 \times 2.5 \text{ cm}$$

- a) How many waves are there in this wave train? 5
- b) Wavelength 2.5 cm c) Amplitude 1 cm d) frequency 5.0 Hz e) speed 12.5 cm/s

$$.125 \text{ m/s}$$

Wave 2



- a) How many waves are there in this wave train? 3
- b) Wavelength 4.5 cm c) Amplitude .5 cm d) frequency 3.0 Hz e.) speed 13.5 cm/s

$$.135 \text{ m/s}$$

Problems:

1. What is the wavelength of a sound wave with a frequency of 50 Hz? The speed of sound is 342 m/s.

$$\lambda = \frac{v}{f} \quad \lambda = \frac{342 \text{ m/s}}{50 \text{ Hz}} = 6.84 \text{ m}$$

2. A sound wave in a steel rail has a frequency of 620 Hz and a wavelength of 10.5 m. What is the speed of sound in steel?

$$v = f \times \lambda = 620 \text{ Hz} \times 10.5 \text{ m} = 6510 \text{ m/s}$$

Wave Speed Calculation

1. Use the formula $\text{frequency} \times \text{wavelength} = \text{wave speed}$ to complete the table.

| | Frequency (Hz or $\frac{1}{s}$) | Wavelength (m) | Wave speed (m/s) |
|---|----------------------------------|----------------|------------------|
| A | 500 | <u>3.0 m</u> | 1500 |
| B | <u>2400 Hz</u> | 0.5 | 1200 |
| C | 1,000 | 0.34 | <u>340</u> |
| D | <u>10,000,000,000</u> | 0.03 | 300,000,000 |
| E | 150,000,000 | <u>2.0 m</u> | 300,000,000 |
| F | 20,000 | 0.15 | <u>3,000 m/s</u> |

Cut out and
tape/glue into
your notebook

2. Water waves on a lake pass by a boat that is anchored.

- A wave crest passes by the boat every 4.0 seconds. Calculate the frequency of the waves in hertz. $\frac{1}{4.0} = .25 \text{ Hz}$

- The distance from one wave crest to the next wave trough is 5.0m.

- Calculate the wavelength of the waves. 10.0 m

- Calculate the wave speed. 2.5 m/s



3. What is the velocity of a wave with a frequency of 760 Hz and a wavelength of 0.45 m?

$$342 \text{ m/s}$$

4. What is the frequency of a pendulum that is moving at 30 m/s with a wavelength of 0.35 m?

$$85.71 \text{ Hz}$$

5. What is the wavelength of a sound wave moving at 340 m/s with a frequency of 256 Hz?

$$1.33 \text{ m}$$

6. A wave with a frequency of 14 Hz has a wavelength of 3 meters. At what speed will this wave travel?

$$42 \text{ m/s}$$

7. The speed of a wave is 65 m/s. If the wavelength is 0.8 meters, what is the frequency of the wave?

$$81.25 \text{ Hz}$$

8. A wave has a frequency of 46 Hz and a wavelength of 1.7 meters. What is the speed of this wave?

$$78.2 \text{ m/s}$$

9. A wave traveling at 230 m/s has a wavelength of 2.1 meters. What is the frequency of this wave?

$$109.5 \text{ Hz}$$

10. A wave with a frequency of 500 Hz is traveling at a speed of 200 m/s. What is the wavelength?

$$0.4 \text{ m}$$

11. A wave has a frequency of 540 Hz and is traveling at 340 m/s. What is its wavelength?

$$0.63 \text{ m}$$

12. A wave has a wavelength of 125 meters is moving at a speed of 20 m/s. What is its frequency?

$$0.16 \text{ Hz}$$

13. A wave has a frequency of 900 Hz and a wavelength of 200 m. At what speed is this wave traveling?

$$180,000 \text{ m/s}$$

14. A wave has a wavelength of 0.5 meters and a frequency of 120 Hz. What is the wave's speed?

$$60 \text{ m/s}$$