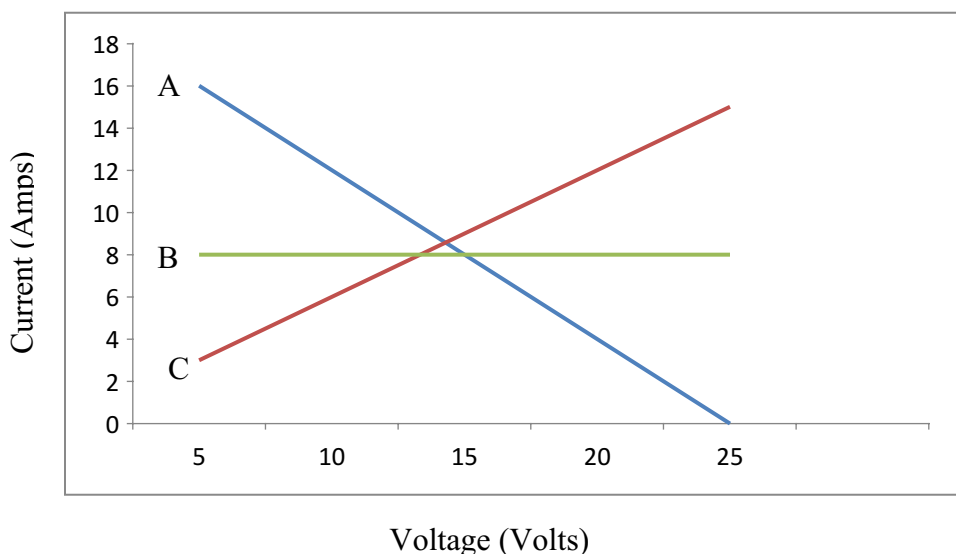


Graphing, Variables and Constants

1. Two students wanted to determine the relationship between the number of cups of coffee consumed and pulse rate. They had volunteers drink 1, 2, 3 and 4 cups of coffee and recorded their pulse rate 10 minutes after each cup of coffee.
 - a. Name the independent variable _____
 - b. Name the dependent variable _____
 - c. Which variable goes on the x-axis? _____
 - d. Which variable goes on the y-axis? _____
 - e. What type of graph, line or scatter should they make? _____

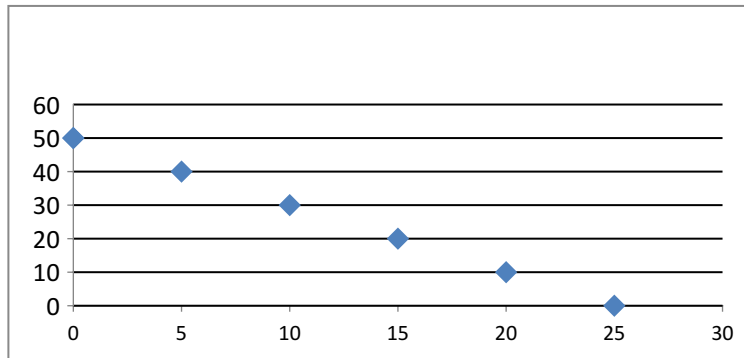
2. Joe and Bob conduct an experiment to determine the relationship between the amount of voltage in a circuit and the current. They increase the voltage used in each trial by 5V and measure the current each time. They are careful to keep the voltage source the same and all the parts that make up the circuit the same. Once they have made their graph they notice that as the voltage increases, the current in the circuit also increases.
 - a. Name the independent variable _____
 - b. Name the dependent variable _____
 - c. List all of the constants in the experiment _____
 - d. Which line on the graph below best represents their data? _____

Current vs. Voltage



3. Solve the formula $P = V^2/R$ for V and for R.

4. An incomplete graph is shown below. It is for an experiment that shows that as time increases, the temperature decreases. Time was measured in hours and temperature was measured in degrees Fahrenheit. What is missing from this graph? Add all of the missing items to the graph below.



Sound and Waves

1. Draw a diagram of 3 wavelengths of a transverse wave.

Label the following:

Trough
Crest
Wavelength
Amplitude
Equilibrium

2. How do you measure wavelength?

3. What is a longitudinal wave?

4. An example of a longitudinal wave is _____.

5. What is a transverse wave?

6. An example of a transverse wave is _____.

7. What is a compression?

8. What is a rarefaction?

9. Explain how amplitude and intensity (loudness) of a sound wave are related.

10. Explain how frequency and pitch of a sound wave are related.

11. What is The Doppler Effect?

12. When an object is forced to vibrate at its natural frequency, it causes the _____ to grow.
This phenomenon is called _____.

14. Explain why we are unable to hear sounds in space (in a vacuum).

15. What is a beat?

16. Put water, air, and steel in order, from fastest to slowest, according to the speed at which sound travels through them.

1st _____

2nd _____

3rd _____

17. When you increase the volume of your voice, you are changing the _____ of the sound wave you are making.

18. In general, sound travels faster through materials that are more _____.

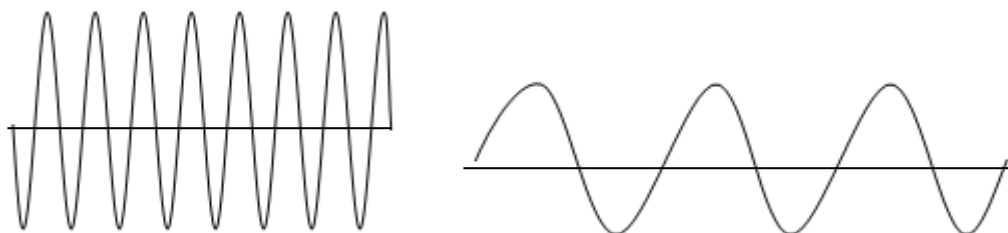
19. The superposition of two waves occurs when they:

The shape of the resulting wave is the _____ of the two waves.

20. What is constructive interference?

21. What is destructive interference?

22. Compare the second wave to the first.



23. A surfer sits by the ocean and watches 28 waves pass by in 60 seconds.

a. What is the frequency of the waves?

b. What is the period of the ocean wave?

24. If the period of a wave is 19 s what is the frequency?

25. Calculate the speed of a wave with a frequency of 150 Hz if the wavelength is 2.5 m.

26. Calculate the wavelength of a wave with a frequency of 68 Hz and a wavespeed of 170 m/s.

27. Calculate the frequency of a wave with a wavelength of 9 m and a wavespeed of 343 m/s.

Light

1. What is the speed of light? _____

2. All waves from the electromagnetic spectrum are what type of wave? _____

3. What is the difference between visible light and the rest of the electromagnetic spectrum? _____

4. Compare gamma waves and microwaves as they travel through outer space, in terms of

a) speed

b) frequency

c) energy

d) wavelength

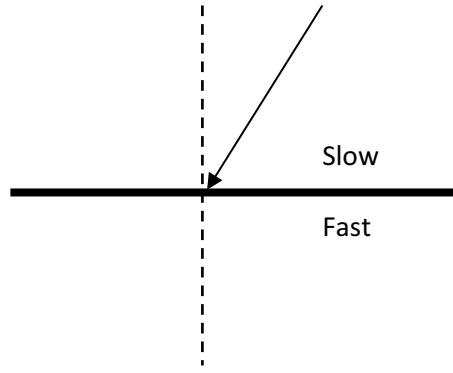
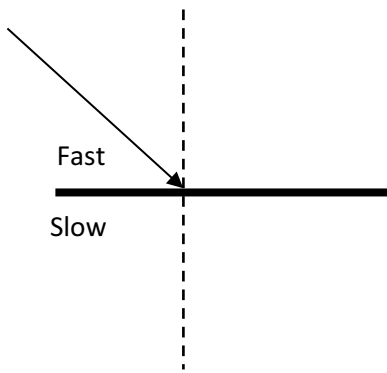
5. As the frequency of a wave increases, its wavelength _____

6. What causes electromagnetic waves to form?

7. What are the types of waves in the electromagnetic spectrum that have a frequency just higher and just lower than visible light?

8. A ray of light strikes a polished mirror at an angle of 37 degrees from the surface of the mirror. What is the angle of incidence, and what will be the angle of reflection?

9. Draw the refracted light rays below. (What does a dotted line represent?)



10. Explain why refraction occurs.

11. As light travels across a boundary from air to water, what happens to its

a) speed

b) frequency

c) wavelength

d) color

12. The three primary colors of light are _____, _____ and _____.

13. The three secondary colors of light are _____, _____ and _____.

14. Blue + Green Light = _____ light

Red + Green + Blue Light = _____ light

Blue + Red Light = _____ light

Red + Green Light = _____ light

15. A white object _____ all light to an observer's eyes.

16. A black object _____ all light that is shined upon it.

17. If a t-shirt looks red is it because it absorbs the color red and reflects all other colors or because it only reflects red and absorbs all other colors? Is it emitting red light?

18. Explain how Young's double slit experiment proved that light behaves as a wave.

19. Give an example of diffraction.

20. Joe looks at Frank's shirt in the sunlight, and sees that it is a green color. Draw and describe a diagram explaining why Frank's shirt appears green to Joe.

21. What is the difference between a luminous source and an illuminated source?

22. Give two examples of a luminous source and two examples of illuminated objects.

23. Define the following and provide one example of each:

Opaque –

Transparent –

Translucent -

24. Write whether the following descriptions apply to concave or convex mirrors:

- A. Curve Inward
- B. Curve Outward
- C. Always produce smaller images
- D. Can produce images that are upside-down
- E. Always produces images that are right side up
- F. Provides viewers with a larger field of view
- G. Can make images really big or really small

25. Draw a picture to represent a concave mirror.

26. Draw a picture to represent a convex mirror.

27. Draw parallel rays hitting a concave lens.

28. Draw a parallel rays hitting a convex lens

29. List two places where you might find a convex lens. 30. List two places where you might find a convex mirror.

Electricity

1. What is electricity?
2. What is a conductor?
3. An example of a conductor is _____.
4. What is an insulator?
5. An example of an insulator is _____.
6. What is resistance?
7. Explain how resistance would differ in a thick wire and a thin wire.
8. What are the differences between AC and DC? Batteries supply _____ and wall outlets supply _____.
9. Wall outlets are wired in parallel so that
 - a)
 - b)
10. The difference between a fuse and a circuit breaker is:
11. What causes the charge in a circuit to move?
12. Draw a circuit, using schematic symbols, which contains a battery, wires, and 3 bulbs in series.
13. Draw a circuit, using schematic symbols, which contains a battery, wires, and 3 bulbs in parallel.
14. Of the two circuits you have drawn in problems 12 and 13, which would have brighter bulbs (assuming both circuits used identical bulbs)? Why?

15. What is the mathematical relationship between resistance and current in a circuit?
16. What is the relationship between voltage and current in a circuit?
17. A certain light bulb has a resistance of $120\ \Omega$. If a current of $1.2\ \text{A}$ is going through it, calculate the voltage applied.
18. A voltage of 200 volts is applied to a $1000\ \text{k}\Omega$ resistor. Calculate the current through the resistor.
19. A voltage of 9.0 volts is applied to a resistor and the current going through it is found to be $0.040\ \text{A}$. Calculate the resistance.
20. Three light bulbs are wired in series, and plugged into a 120 V outlet. All together they use 51 Watts.
- a) Make a diagram of this circuit:
 - b) How much power does each bulb use?
 - c) How much voltage does each bulb get across it?
 - d) How much current is going through each bulb?
 - e) What is the resistance of each bulb?
21. In a small mp3 player, the current going through a $1500\ \Omega$ resistor is $0.165\ \text{A}$. Calculate the voltage across, and the power used by, the resistor.