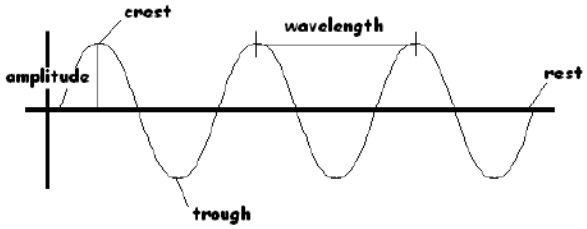
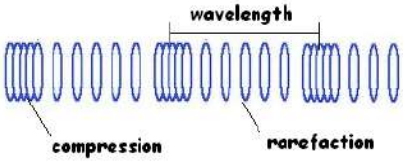
Waves, Sound, and Light Test Review

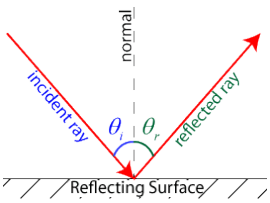
1. **Label the following items on the wave:**
   a. **amplitude**
   b. **wavelength**
   c. **crest**
   d. **rest**
   e. **trough**



2. **Label the following items on the wave:**
   a. **wavelength**
   b. **compression**
   c. **rarefaction**

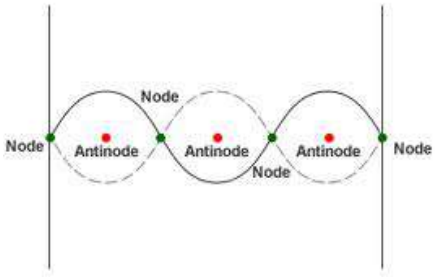


3. **What type of energy is associated with a wave?** ***kinetic energy***
4. **What two properties affect the speed of a wave?** ***density/elasticity***
5. **Of the phases of matter, which phase allows waves to travel the fastest through it? Why?** ***solid; it is the most elastic***
6. **How does temperature affect the speed of a wave?** ***higher temperatures cause faster molecular movement therefore waves will move faster***
7. **What type of wave is represented in question #1? Is sound or light representative of this type of wave?** ***transverse; light***
8. **What type of wave is represented in question #2? Is sound or light representative of this type of wave?** ***longitudinal (compressional); sound***
9. **How is the speed of sound calculated?** ***Speed of wave = frequency (Hz) X wavelength (λ) (meters)***
10. **Solve the following problems:**
    a. **What is the <u>speed</u> of a wave with a frequency of <u>10 hz</u> and a wavelength of <u>2 meters</u>?** ***10 hz X 2 meters= 20 m/sec***
    b. **What is the <u>frequency</u> of a wave with a speed of <u>60 m/sec</u> and a wavelength of <u>200 cm</u>?**
       convert 200 cm to 2 m first; 60 m/sec / 2 m= 30 hz
    c. **What is the <u>wavelength</u> of a wave with a speed of <u>15 m/sec</u> and a frequency of <u>10 hz</u>?** ***1.5 m***
11. **What will cause a wave to change speed or direction?** ***a change in medium***
12. **List and define the 4 type of wave interactions.**
    reflection- bouncing back of a wave
    refraction- bending of a wave as it enters a new medium
    diffraction- bending of a wave around a barrier
    interference- when 2 or more waves arrive at the same time and combine into a single new wave.
13. **What is the diagram below representing? Explain the concept.**



Law of reflection; the angle that light enters will reflect off at the exact same angle

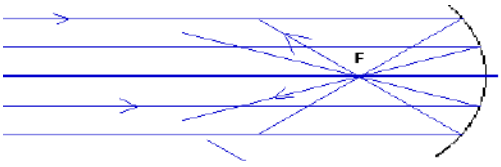
14. **What are the two types of interference? Which one will make a sound louder and which one will make a sound softer?** ***constructive and destructive; constructive gets louder and destructive gets softer***
15. **Label the node and antinodes on the standing wave below.**



16. **What is the frequency of a standing wave (natural frequency)?** ***resonant frequency***
17. **Give an example of an object that uses resonant frequency to function?** *radio stations broadcast at a specific frequency therefore the radio must match the same frequency in order to pick up the station; glass breaking when a sound frequency matches the resonant frequency of the glass causing it to vibrate*
18. **What must be present in order for a sound wave to occur?** *matter*
19. **What three factors affect the speed of a sound wave?** *temperature, elasticity, and density*
20. **What is the speed of sound in air?** *340 m/sec*
21. **What term is used to describe frequency in sound?** *pitch*
22. **What is the human range of hearing in hertz?** *20 hz to 20,000 hz*
23. **How do the words *infrasonic* and *ultrasonic* apply to human hearing?** ***below 20 hz is infrasonic; above 20,000 hz is ultrasonic***
24. **What is SONAR?** ***sound navigation and ranging; sends out sound waves and measures distance of object based on time it takes reflected sound to return***
25. **What is the Doppler Effect? How does the pitch change as the sound source moves past the observer?** *change in frequency due to a change in the motion of the object or the observer; the pitch is higher as the sound approaches and then goes lower has it passes*
26. **What other terms are used to refer to amplitude?** *intensity/loudness*
27. **What are the decibel readings of the following:**
    a. **Threshold of Human Hearing** ***0 db***
    b. **Ear Damage** ***85 db and up***
    c. **Threshold of Pain** ***120 db***
28. **What is the science of sound?** ***acoustics***
29. **What are the two types of tones? What effect is achieved as the tones are mixed constructively?** ***fundamental tone (lowest frequency); overtones (higher frequencies); harmony***
30. **What criteria must be met to classify a sound as music?** *pleasing quality; definite pitch; repeated timing (rhythm)*

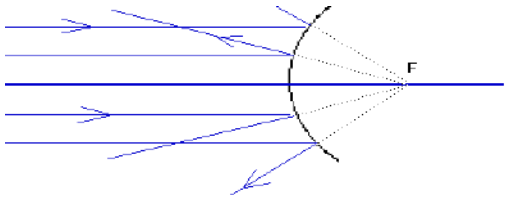
31. **The musical scale includes the following: do, re, me, fa, so, la, te, do. What term would be used to describe the interval between do and do?** ***octave***
32. **What are the three categories of musical instruments?** *wind, percussion, string*
33. **How can you make the pitch of the sound higher in a wind or string instrument?** *make the air column or string vibrating shorter*
34. **What form of energy is light characterized as?** *electromagnetic*
35. **What creates light?** *atoms produce photons when excited; light is made up of a stream of photons*
36. **What is the speed of light in a vacuum?** *300,000 km/sec*
37. **List the types of light on the electromagnetic spectrum from lowest frequency/longest wavelength to highest frequency/shortest wavelength?** ***radio waves, microwaves, RADAR, infrared, visible, ultraviolet, x-ray, gamma ray***
38. **How does visible light appear before it is separated*? white light***
39. **What happens when light enters a prism*? it separates into the visible spectrum (ROYGBIV)***
40. **Of the colors involved in ROYGBIV, which color has the lowest frequency and which color has the highest frequency*? red is lowest, violet is highest***
41. **What are the types of radio waves*? amplitude modification (AM) and frequency modification (FM)***
42. **Which type of light is invisible but can be detected as heat*? infrared***
43. **Which type of light is invisible and can cause skin cancer, but is also important for production of vitamin D?** ***ultraviolet***
44. **Of the forms of electromagnetic radiation, which is the strongest with tremendous penetrating ability?** ***gamma rays***
45. **Define transmission, absorption, and reflection in terms of light.**
    transmission- light can pass through
    absorbed- light is taken into the object
    reflected- light is bounced off of the object
46. **What are two ways to describe objects that transmit light?** ***transparent- light passes through and objects can be seen clearly through it (transparent); translucent-light passes through but objects cannot be seen clearly through it***
47. **How would light be transmitted through an opaque object?** ***it wouldn't, light would only be absorbed or reflected***
48. **Why does an object appear to have a color?** ***that color from the visible spectrum is being reflected while all other colors are being absorbed***
49. **What objects reflect light?** ***mirrors***
50. **What are three types of mirrors?** ***plane (flat), concave and convex***
51. **Which are two types of lenses?** ***concave and convex***
52. **Label the mirrors and lenses below:**

a.



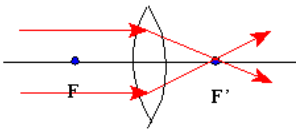
concave mirror

b.



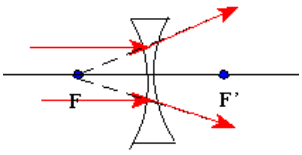
convex mirror,

c.



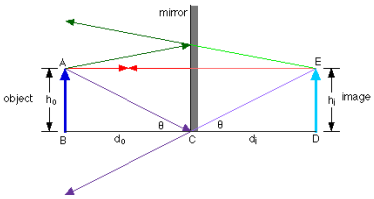
convex lens,

d.



concave lens,

e.



plane mirror,

53. **What are the two types of reflection?** *regular (smooth object that does not scatter light therefore image is seen) and diffuse (rough object that scatters light so light is reflected but image is not seen).*