Waves Review

EE) What is a wave?

EE) What is required for a wave?

EE) What is the velocity of sound?

EE) What is the velocity of light in a vacuum, sometime known as nature's speed limit?

EE) What happens to the frequency of a wave if you increase the wavelength?

E) What is the relationship between frequency and period?

E) What is superposition?

E) Describe the motion of a transverse wave. Give an example of a transverse wave

E) Describe the motion of a longitudinal wave. Give an example of a longitudinal wave.

E) An incident light ray strikes a surface at 20 degrees from the normal line. What is the angle of reflection?

E) Wavelength = 5 cm Frequency = 2Hz Period=? Velocity = ?

E) Wavelength = 20 cm Frequency = Period= Velocity = 5 m/s

E) Wavelength = Frequency = 2Hz Period=? Velocity = 1 m/s

E) What is the critical angle between air and diamond (n=2.4)?

E) What is the critical angle between water (n=1.3) and plastic (n=1.5)?

E) Which additive primaries combine to give you cyan, magenta, and yellow?

E) Which subtractive primaries combine to give you Red, blue, and green? Draw a picture to explain how.

M) Briefly describe the dual nature of light.

M) Describe Resonance, include an example from class.

M) What is happening in our eyes when we see different colors?

M) What is white light?

M) Explain what you would hear as a firetruck comes towards you. Why? What is this called?

M) Explain what you would hear as a firetruck moves away from you Why? What is this called?

M) If you increase the frequency of a wave what happens to the wavelength, velocity, and amplitude

M) What is the name of an area of low pressure in a sound wave?

M) What is a sonic boom?

M) How would you align two polarizing filters in order to allow the least amount of light through? Why?

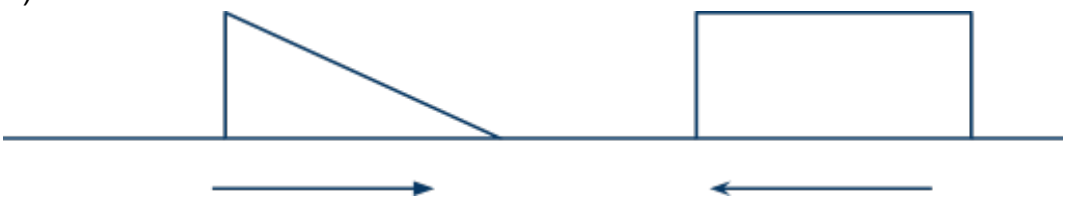
M) If you are 10 meters away from your friend and you yell louder what is changing?

M) An incident light ray strikes a surface at 30 degrees to the horizontal. What is the angle of reflection?

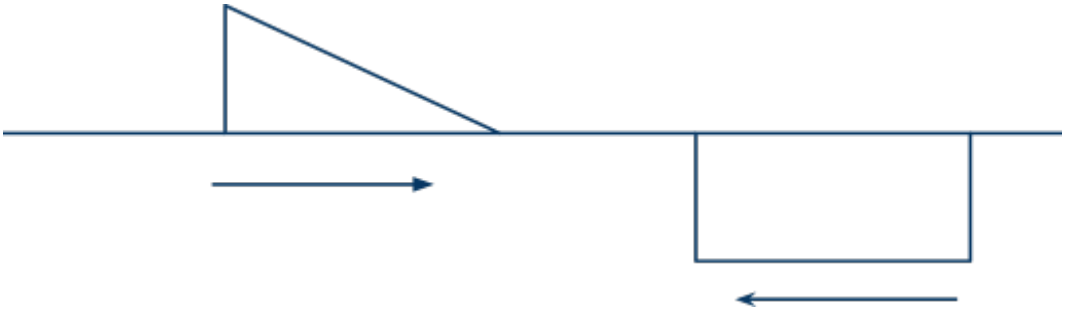
M) An incident light ray hits a glass surface at 20 degrees from the normal line. What is the angle of refraction?

M) What would happen if you send an up pulse and an equal down pulse towards one another?

M)



M)



M) You blow over the top of a water bottle such that you create resonance that you know to be the first harmonic. If the bottle is 80 cm tall, what is the frequency you are hearing?

M) You see three crests past you in a pool every 4 seconds. The pool is 50 meters long and you notice it takes 12 seconds for a wave to make it across the pool and back. Find the frequency,period, wavelength, and velocity.

M) You see two crests past you in a pool every 5 seconds. The pool is 50 meters long and you notice that 15 waves fit in the total length of the pool. Find the frequency,period, wavelength, and velocity.

H) What is an example of the Doppler effect with light? Explain in detail what we have learned from this.

H) An incident light ray is traveling at 2 x10^8 m/s in a certain medium. If the light ray enters water (n=1.3) what is the angle of refraction?

H) Draw a Transverse wave. Label the crest, trough, amplitude, and wavelength.

H) Explain what happened to the Tacoma Narrows bridge. (Use wave terms)

KEY

#1 EE) Waves are energy moving through space

#2 EE) Waves require a vibration to start, also most require a medium (light is an exception)

#3 EE) DEPENDS ON THE MEDIUM! 340 m/s IN AIR

#4 EE) 3 x10^8 m/s

#5 EE) f decreases

#6 E) Frequency and Period are inversely related to one another. As f increases wavelength (**λ)** decreases and vise versa.

#7 E) Net Displacement of medium is equal to the sum of the amplitudes of the individual waves combining

#8 E) Medium moves perpendicular to direction of the wave, examples ocean, light

#9 E) Medium moves parallel to the direction of the wave, examples sound

#10 E) 20 degrees, angle in = angle out

#11 E) T (Period) = 0.5 seconds, V= 0.1 m/s

#12 E) f (frequency) = 25 Hz T (period) = 1/25 s or 0.04s

#13 E) Period (T) = ½s, **λ (**Wavelength)= 0.5 m

#14 E) 24.6 degrees

#15 E) 60 degrees

#16 E) Cyan= Blue + Green, Magenta = Red+ Blue, Yellow= Red + Green

#17 E) Red= Yellow+ Magenta, Blue= Cyan+ Magenta, Green= Cyan+ Yellow
Yellow absorbs blue, and Magenta absorbs Green

#18 M) Light is both a wave and a particle, particle nature helps explain reflection and refraction, wave nature help explains superposition.

#19 M) Resonance is when energy is being added at the right timing to produce large amplitudes. Examples from class: large tube and flame to create large sound, big slinky moving a lot despite low energy in,

#20 M) Stimulation of red, green, and blue receptors. The combination of these three help us to see all possible colors

#21 M) "White" light is acutally the entire visible light spectrum, all three receptors are stiumlated and thus we process white.

#22 M) You would hear a high pitched noise as the frequency is increased as the object moves towards you. This is called the doppler effect.

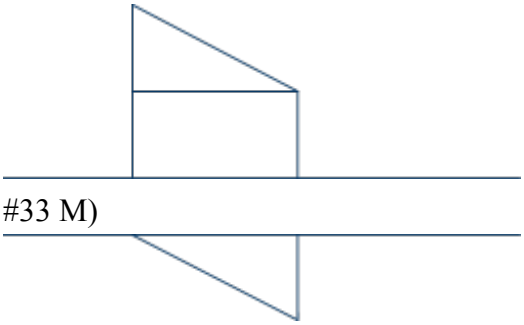
#23 M) You would hear a low pitched noise as the frequency is decreased as the object moves away from you. This is called the doppler effect.

#24 M) If you increase f, wavelength decreases, velocity is constant, amplitude is constant. Period would also decrease.

#25 M) Rarefaction

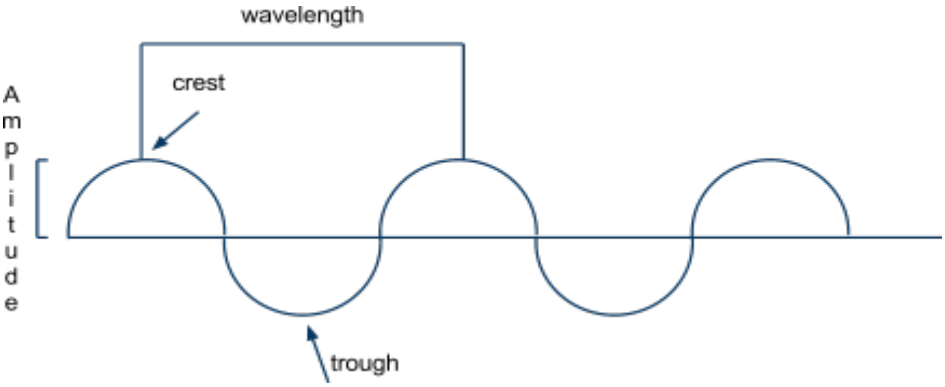
#26 M) A Sonic boom is the pressure explosion caused by an object traveling greater than or equal to the speed of sound in that medium. Ex. jet plane flying faster that 340 m/s in air creates

a sonic boom
#27 M) You would want them at 90 degrees to one another to block the most orientations of light trying to pass through the two filters.
#28 M) Amplitude is increasing
#29 M) 60 degrees
#30 M) 13.2 degrees
#31 M) Right where they overlap desctructive interference will occur and the medium will be at equilibirum. After they will pass right through one another.
#32 M)



#33 M)

#34 M) 106.25 Hz
#35 M) f= ¾ Hz, T=4/3 s, **λ=**11.11m, V= 8.33 m/s
#36 M) f= Hz, T= 5/2 s, **λ= 3.33m,** v= 1.32 m/s
#37 H) Stars look red to us, determined that universe is expanding which gives proof to the big bang theory
#38 H) *(Using 28 degrees incident angle with normal) **32.8 degrees**
#39 H)



#40 H) The Tacoma narrows bridge is a great example of resonance. The wind was blowing at a speed equal to the natural frequency of the bridge that would produce resonance. This caused the energy of the waves to increase to a very large amplitude causing the bridge to fail.