

## Physics 11

### Assignment #6 - Waves

Due Thursday, December 19<sup>th</sup>, 2019

#### Problems (Show your work)

1. You are sitting on a dock watching some waves as they roll in. You do a rough estimate and say that the waves are about 5m apart and they hit the dock every 20 seconds. a) What is the frequency? b) What is the velocity of the wave? c) If the waves kept coming at the same rate how many would hit the dock in an hour – show your work (Use a formula)?
2. Robert is driving his mom's green 2002 Buick at a velocity of 36km/h when he passes Julio who is standing on the side of the road. Shortly after Robert passes Julio he blows a tire. a) If he is 0.36km away from Julio when he blows the tire calculate the total time it takes for Robert to pass Julio and for the sound of the blowing tire to come back. b) Is this an echo? (Temp is 10°C)
3. A train with a 150Hz horn is moving at 36km/h on a day when the speed of sound is 340m/s. What frequencies are observed by a stationary person standing at the side of the tracks as the train approaches and after it passes?
4. A standing wave is set up like we did in class. The standing wave is such that it has 4 nodes (including the ends). The distance between the two support rods is 3m and the frequency is 15hz. What is the velocity of the wave?

#### \*\*\*Practice Problems\*\*\*

5. What is the main difference between a transverse wave and a longitudinal wave? Give an example of each type.
6. What is the difference between mechanical waves and electromagnetic waves? (**medium**)
7. A 5m tall Ferris wheel has a period of 4minutes. What does this mean?
8. You set off a firecracker exactly 75.0 m from the side of a building, and hear the echo of the firecracker 0.46 s later. What is the air temperature? (**-8.18°C**)
9. The ordinary human ear hears two sounds as being distinct if they occur at least 0.10 s apart. How far away must a reflecting surface be from your ear in order to hear an echo, if the air temperature is 25 ° C (**17.3m**)
10. Determine the wavelength of a wave that travels at 150 m/s and has a frequency of 35 Hz. How far does the wave travel in 1 hour? (**4.29m, 540km**)
11. A pendulum on a grandfather completes 60 cycles in 2 minutes. a) What is the period? b) What is the frequency? (**1 sec, 1/60<sup>th</sup> Hz**)
12. A man is standing in a valley, with parallel walls, when he fires a rifle, the echo from one wall is heard after 4.2 s and the echo from the other wall is heard after 6.0 s, if the air temperature is 25.0 ° C, what is the width of the valley? (**1.76km**)
13. How long will it take sound to travel 10.0 km, when the air temperature is 20° C? (**29.15s**)

14. A tuning fork has produces a sound with a wavelength of 2.05 m and a frequency of 170 Hz, what is the air temperature? **(29.17°C)**

15. A lightning flash is seen and 5 s later the thunder is heard. Find the distance to the lightning if the air temperature is 15 ° C. **(1.7km)**

16. At an air show a jet flies directly toward the stands at a speed of 1200km/h, emitting a frequency of 3500Hz, on a day when the speed of sound is 342m/s. What frequency is received by the observers? What frequency do they receive as the plane flies directly away from them? **(138kHz, 1.77x10<sup>3</sup>Hz)**