Name _____ Hour _____

1. 10 waves pass every second. The frequency of this wave is _____ unit = _____

2. 10 waves pass every second. The period of this wave is _____ unit = _____

3. If the speed of sound is 345 m/s, what is the wavelength of the wave above?

4. **DOPPLER EFFECT**:
   a. As a sound moves toward you, the apparent frequency of it _____.
   b. As a sound moves away from you, the apparent frequency of it _____.

5. a. At car honking its horn is **moving away** from a stationary observer at 14 m/s. If the frequency of the horn is 250 Hz, what frequency would the observer hear if it is 12° C outside? *(240 Hz)*

   b. What frequency would the observer hear if the car was **moving towards** her? *(261 Hz)*

6. If the temperature of the air decreases by 15 ˚C, how much does the speed of sound decrease by?

7. A sound wave of frequency 420 Hz is heard 1 **mile** away 4.2 seconds after the sound is made. What is the wavelength of the sound wave? *(0.91 m)*

8. Convert 346 Hz into kHz. _____   45.9 MHz = _____ Hz

9. Radio waves travel at what speed? _____

10. Calculate the wavelength of 105.1 FM in meters. **(2.85 m)**

11. Calculate the wavelength of AM 1130 in meters. **(265.5 m)**

12. If the speed of sound outside this morning was 313 m/s, what is the temperature in °**F**? **(-19 F)**

13. A child drops a rock off a cliff that is 45 m high. If the temperature is 25 °C, how soon after dropping the rock will she hear the sound of the rock hitting the ground? **Be careful…think this one through**! The **rock has to fall** (1-D motion) and the **sound has to travel back up. (3.16 sec**)

14. If you hear a firecracker 0.25 sec after seeing it and it is 85 °F outside, how far away from the fireworks are you? (**86.9 m**)

15. How are frequency and wavelength related? _____

16. A longer BW has a   longer / shorter   wavelength, which leads to a   higher / lower   frequency causing the pitch to be higher / lower.

17. What are the first 2 harmonics of an organ pipe that is 40 **cm** long and is **closed at one end** if the speed of sound is 350 m/s? *(ans. 219 Hz, 657 Hz)*

18. If a pipe has a fundamental frequency of 250 Hz, find the next two harmonics if the pipe is
    OPEN: **CLOSED:**

19. You spin a flexible plastic pipe that is **open at both ends** around your head that has a length of 0.9 meters. If it is 70 ˚F in the room, find the first three harmonics. *(ans. 190 Hz, 380 Hz. 570 Hz)*

20. Why does sound travel faster in solids than gases? _____

21. Why does sound travel faster in warmer weather? _____

22. Describe an example of resonance. _____

23. Label where the nodes and antinodes are on the standing wave off to the side.

24. A string instrument (guitar) uses   all harmonics / only ODD harmonics.

25. A string instrument (guitar) needs to end in a(n)   node / antinode

26. A Boomwhacker that is **capped on 1 end** uses   all harmonics / only ODD harmonics.

27. A Boomwhacker that is **capped on 1 end** needs to end in a(n)   node / antinode

28. Which travels faster, light or sound? _____

29. The average speed of sound in MN would be the largest during what season? _____

30. How are FM and AM radio waves different?

31. **WHY** do you hear a higher pitch when an object moving toward you is honking its horn? (what is happening to the frequency of the sound waves?)