Name _____ Hour _____

Sound Problems

due _____

1. Convert 22℃ into _____ °F

2. Calculate the speed of sound outside if it was sunny and 85 °F today. *(347.6 m/s)*

3. A baseball fan on a warm summer day (30℃) sits in the bleachers 152 m away from home plate.
   a. What is the speed of sound in air at 30℃ ? *(348 m/s)*

   b. How long does it take for the fan to hear the crack of the bat? *(0.44 s)*

4. On a day when the temperature is 15℃ a person stands some distance away from a cliff and claps his hands. The echo returns in 2.5 seconds. How far away is the cliff? *(≈ 424 m, Hint remember to cut the distance or time in half since the sound goes there and back in that time.)*

5. A clock chimes outside on a 65 °F day. If it takes 0.57 sec before you hear it, how far away are you in **MILES**? (0.12 miles)

6. Why does sound travel faster in solids than in air? _____

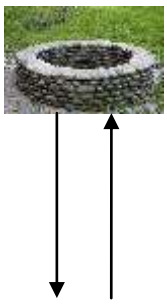
7. What type of wave is sound? What causes it? Draw an **example** of a sound wave.

8. A race car is traveling at 32 m/s. The driver sounds its horn with a frequency of 420 Hz. If the speed of sound is 345 m/s, calculate the frequency you will hear:
   a. as the race car approaches you. *(463 Hz)*

   b. as the race car moves away from you. *(384 Hz)*

Name _____ Hour _____

9. Your uncle tells you he flew at Mach 2. How many **miles per hour** was he flying if it was 8℃ out? (≈1500 mph)



10. You drop a stone into a well that is 122.5 m deep. How many sec after you let it go will it take for you to hear it hit the bottom of the well if the temp is 21.7℉? *(≈ 5.38 sec. Hint- you need to find the time it takes the stone to fall with a 1-D motion equation and then add that to the time it takes for the sound to come back up)*

time for the rock to fall + *time for the sound to travel back up*

$\Delta y = v_i \Delta t + \frac{1}{2} a \Delta t^2$ $v = \Delta x / \Delta t$

11. A Hertz is the same as what other unit? _____
12. What does supersonic mean? _____
13. List 1 item that is supersonic. _____
14. When the frequency of a force applied matches the natural frequency of the object creating maximum energy transfer, it is known as _____
15. Sounds with frequencies from 20-20,000 Hertz are known as this _____
16. Sounds with frequencies **less than** 20,000 Hertz are known as this _____
17. Sounds with frequencies **more than** 20,000 Hertz are known as this _____
18. The unit used to measure the loudness of sound is _____
19. The first American to break the sound barrier _____
20. Loud sound that occurs when an object travels faster than the speed of sound _____
21. What 2 things affect the speed of sound? _____ and _____
22. The frequency where sound waves are most efficiently turned into physical motion is _____

23. A guitar string is 65 **cm** long and is tuned to produce a fundamental frequency of 196 Hz. *(Hint-it's a string.)*
    a. What is the speed of the waves on the string? *(255 m/s)*

    b. What are the next two harmonics for the string? *(392 Hz , 588 Hz.)*

24. You swing one of the dollar store toys (open on both ends) around your head.
    a. If it is 0.85 m long and it if 25℃ in the room, what is the fundamental frequency? *(203 Hz)*

    b. If you were able to cap the toy on 1 end, what would the fundamental frequency be? What would the next 2 harmonics be? (≈101.5 Hz and next 2 are 304 Hz, 507 Hz)