Physics Second Semester Exam Review

1. A 8kg rifle is used to fire a 50g bullet. If the bullet leaves the gun at 800m/s, what was the recoil velocity of the gun?

2. Two cars are driving in the same direction. If the 2400kg car is going 15m/s and strikes the rear of the 3000kg going 9m/s, what is the resulting speed?

3. A 15,000kg railroad car travels at 18m/s. A 5000kg load is dropped straight down into the car. What is the speed of the system?

4. A gun is fired vertically into a 4.4kg block of wood. If the bullet's mass is 22g and has an initial speed of 340m/s, how high will the block/bullet rise?

6. What is the speed of a wave with a given frequency of 2.5hz and a wavelength of .6m?

7. What is the wavelength of a water wave given f=.5 hz and v=4m/s?

8. A transverse wave f=10hz travels on a string. The distance between crest and the adjacent trough is 1.5 m. Find wavelength and the speed.

9. A person sees that 2.5m separates a trough and its adjacent crest on a water wave. Also, 33 crests pass by him in 30s. Find the velocity.

10. Two fisherman 24m from shore notice that it takes 6.5 seconds for a wave crest that passes by them to reach the shore. Their boat also goes through 11 complete oscillations in 19s. Find the period of the wave and the wavelength.

11. A geologist's simple pendulum, whose length is 37.1cm, has a frequency of .819hz at a certain location. What is the acceleration due to gravity?

12. A pendulum makes 44 vibrations in 60s. What is its period and frequency?

13. How long must a simple pendulum be if it is to make exactly one complete vibration per second?

14. Assuming two cars are driving away each other on a 25C day. One driver traveling 100km/hr beeps his horn (600hz) when he sees a deer on the road. What frequency does the other driver traveling 130km/hr in the opposite direction hear?

15. A boat is drifting directly over a giant squid on a foggy 20°C day. If a boat 1.5km away backfires, how much time elapses between the instant the squid hears the sound to when the people on the boat hear it?(v water= 1500m/s)

16. A person sees a heavy stone strike the concrete pavement on a 18°C day. A moment later, two sounds are heard from the impact: one comes in the air and the other through the concrete, and they are 1.4s apart. How far away did the impact occur?(v in concrete is 3000m/s)

17. If A is 880hz, find the frequency of G in the second octave below.

b) If the air temperature is 15C, what is the wavelength of the note G in the above problem?

18. If A is 440hz and you want to play a C# in the third octave above on a 1.4cm diameter open pipe in a 25°C room, How long should the pipe be?

19. Using 348m/s as the speed of sound, find the 1st harmonic (fundamental) that can played on a closed pipe 35cm long and .41m diameter.b. What are the frequencies of the next two harmonics heard?

20. A 9cm tall object is 60cm from a convex mirror having a focal length of 13cm. Find the location of the image

\_\_\_\_\_ cm in front or behind

21. What is the size of the image? \_\_\_\_\_\_ real or virtual upright or inverted

22 A concave mirror has a focal length of 20cm. Find the location of the image if the object is at 45cm and is 8cm tall

the size is

\_\_\_\_\_ cm upright or inverted real or virtual

23. A converging lens of focal length 23cm is placed to the 70cm to the right of a 14cm tall object. Find

location of the image right left \_\_\_\_\_\_\_\_\_ size of image real virtual upright inverted

24. A diverging lens of focal length 8 cm is placed 3cm to the right of a 84cm tall object. Find

\_\_\_\_\_ location of the image right left \_\_\_\_\_\_ size of image real virtual upright inverted

25. A ray of light passes from air into water at an angle of  $50^{\circ}$  to the perpendicular. What is the angle of refraction? N water = 1.33 What is the speed of light in water?

26.A ray of light passes from air into crown glass at an angle of 35 ° to the normal of the glass surface. Find the angle of refraction n=1.52 for crown glass The speed of light in the crown glass

27. How many electrons make up a charge of 100micro-coulombs?

29. What is the magnitude of the electric force of attraction between an iron nucleus(q=+26e) and its innermost electron if the distance between them is 1.5 E –12m?

30. How far apart must two electrons be if the force between them is 2 e - 12n