

# Physics Final: review Chapters 7-14

Buoyancy force

Law on Conservation of Momentum

Impulse

2 types of simple machines

Law of Heat Exchange

Heat engines

Heat pumps

Specific heat

Thermal energy

Coefficient of linear expansion

Kinetic energy

Potential energy

Mechanical wave

Electromagnetic waves

Compound machine

Heat of fusion/vaporization

Pressure

Pascal's principle

Archimedes' Principle

Kepler's 3 Laws

Universal Law of Gravitation

Work-Energy Theorem

power

Mechanical Advantage

Efficiency

Conservation of Mechanical Energy

collisions

temperature

heat

temperature conversion

Bernoulli's Principle

crystal vs amorphous solids

types of waves

1. At what velocity does a satellite circle the earth at if its 225 km above its surface?
2. What is the weight of the satellite (#1) when its 225 km above the earth's surface if its mass is 1500 kg?
3. Using Newton's variations of Kepler's Third Law, find the mass of a planet if its moon has an orbital radius of  $2.7 \times 10^8$  m and a period of 35 days (24 hours each)?
4. Using Kepler's Third Law, calculate the period of a satellite that is four times closer to the earth than the moon is?
5. What force is required to stop a 36 g bullet traveling at 455 km/hr in 0.13 s?
6. A 56 g ball traveling at 12 km/hr strikes a 88 g ball that is stationary. What is the speed of the 88 g ball after the collision if the 56 g ball recoils at 2 km/hr?
7. An 87 kg sled is pulled 133 m using 7,960 J of work. What angle is the pull rope at if a 68 N force is applied along the rope?
8. How much work is required to lift a 55 kg box 4.5 m using an 87 % efficient machine?
9. What velocity will a 2.3 kW motor lift a 98 kg object at?

10. How much KE does a 33 N object have if it is traveling at 2.3 m/s?
11. How high would the object in #10 go if were launched straight up with that amount of energy?...no friction...
12. A 65 g pendulum is 0.24 m above a table. a) If it is pulled back to a new position so that it is now 0.37 m above the table, how much PE does it have?
- b) What speed will it attain as it passes the equilibrium?
- c) How much work is lost to friction if it only attains 0.56 m/s?
13. How much heat is given off if steam at 120 degrees C is condensed and cools to water at 25 degrees C?
14. How long will it take a 20.0 W electric heater to change 35.0 L of water in a 12.4 kg glass tank from 17.0 to 22.0 degrees C? (c of glass is 664 J/kg C)
15. What is the final temperature of an experiment if 78 g of copper at 100.0 degrees C is added to a 125 g aluminum calorimeter cup with 88.0 g of water in it at 22.0 degrees C? (c of aluminum is 930 J/kg C and the c of copper is 385 J/kg C)
16. A 1.3 kg steel bridge changes temperatures in an average year about 44.0

degrees. What change in length does it undergo? (coefficient of linear expansion for steel is  $12 \times 10^{-6}/C$ )

17. a) What buoyancy force is applied to a 76 kg rock that displaces 950 ml of water?  
b) What is the apparent weight of the rock in water? ( $1 \text{ ml} = 1 \text{ cm}^3$ )

18. What is the lifting force of a 5.4 cm diameter large piston if 450 N is applied to a 1.2 cm diameter smaller piston?

19. What pressure would be exerted by a water on you if you were 30.0 m below the surface?

20. What is the wavelength of a 440 Hz sound wave in air?

21. What is the speed of light if a wave has a length of  $7.01 \times 10^{-7} \text{ m}$  and a frequency of  $4.28 \times 10^{14} \text{ Hz}$ ?

22. How much would you heat up water if it fell over a falls that was 67 m high and all the PE was changes to TE?

23. What is the "c" of a 45 g lead bullet if it hits a wall at 303 m/s and all the KE is changed to TE?

24. What is the wavelength of a wave that vibrates as a whole on a 33 cm wire? The wave travels at 24.5 m/s
25. How long does it take a sound to return (go down and back) to a boat if the ocean floor is 1.2 km deep? Sound travels at 1500 m/s in water
26. A helium balloon is 22.0 m in diameter with a 205 kg basket and 125kg skin (balloon) mass. How much can the balloon lift if helium has a density of  $0.179 \text{ kg/m}^3$ ?
27. What is the apparent weight of a  $62 \text{ cm}^3$  rock that has density of  $4500 \text{ kg/m}^3$  if its put in water?
28. I am 1.76 m high and 79.0 kg. a) What is my S.G. if 1.60 m of me is under water? B) What is my volume? C) What is my apparent weight?
29. A 2.4 kg block is on a  $30.0^\circ$  frictionless ramp that is 66.0 cm long. A 1.9 kg block is at the bottom of the ramp waiting to be hit by the descending 2.4 kg block. What speed do the two travel at (on the horizontal) after the 2.4 kg strikes the 1.9 kg block and they stick together as they move off?
30. A 50.0 g bullet is shot horizontally from a 90.0 cm barrel of a gun. A) What is the acceleration of the bullet in the barrel if an average force of 250.0 N is applied to the bullet? B) If the gun is 1.40 m off the ground how far will the bullet go?... c) The bullet hits a tree and stops in 1.23 cm. d) What force did the tree apply to the bullet?
31. A soccer ball is kicked at 34.8 m/s at an angle of  $33.0^\circ$ . a) How long is it in the air? B) How high does it go? C) How far does it go?