Physical Science
Physics Semester 2013 - 2014
Final Exam Study Guide ~~2007-2008~~

Name: Key

Unit 1: Inquiry and Reflection
(Ch. 1: Section 1 in textbook)

1. What are the steps of the scientific method? (p. 8)
   Problem, Research, Hypothesis, Test Hypothesis with experiment, (collect data), analyze data, draw conclusions
2. What is a variable? (p. 9)
   the part of the experiment that changes from manipulating the independent variable.
3. A good experiment only has ___1___ independent variable in it. (Handout: Scientific Method Review, p. 2)
4. What is the difference between dependent and independent variables? (p. 9)
   independent: the individual scientist changes this
   dependent: you measure this at the end (the results)
5. Scientific law: (p. 12)
   a rule or principle that describes what happens in nature.
6. Theory: (p. 12)
   an explanation of an event based on many observations + experiments
7. Constants: (p. 9)
   the part that does not change in an experiment.
8. Control: (p. 9)
   the part of the experiment that the results are compared to.

Unit 2: Motion
(Ch. 2 and 3 in textbook)

1. Displacement: (p. 39) The measurement (distance ± direction) of an objects change in position from starting point.
2. If the position of an object changes, you know it was in ___motion___. (p. 38)

3. Instantaneous speed: (p. 42) the speed at a certain instant. ex. speedometer

4. Average speed: (p. 42) total distance divided by total time

5. Velocity includes speed and direction: (p. 44)
6. Formula for speed: (p. 40)

$$s = \frac{d}{t}$$ (shows the relationship between s, d, t)

7. A merry-go-round horse moves at a constant speed but a constantly changing velocity. (p. 48)
8. Acceleration: (p. 47)
the rate of change of velocity
ex. 25 m/s east

9. Positive acceleration is speeding up: (p. 47-50)

10. Negative acceleration is slowing down: (p. 47-50)
11. Acceleration formula: (p. 48)

$$a = \frac{v_f - v_i}{t}$$

12. On a graph with speed on the y-axis and time on the x-axis, a line showing positive acceleration will go up, a line showing negative acceleration will go down and a line showing zero acceleration will go horizontally. (p. 50)

13. Changing the mass or the speed of an object will cause its inertia to change. (p. 54)
14. Newton's First Law: (p. 54-56) an object moving at a constant velocity keeps moving at that velocity unless an unbalanced net force acts on it.

15. Newton's First Law is also called the law of inertia. (p. 55)

Unit 3: Force and Unit 4: Circular Motion

(Ch. 3 in textbook)

1. What forces are at work when something is in free fall? (p. 74)

   air resistance – upward force
   gravity – downward pull

2. Newton's Second Law: (p. 69) $F = m \cdot a$

   explains the relationship between force, mass + acceleration

3. Compare a falling penny and feather both in and out of a vacuum: (p. 73)

	In a vacuum	In air
penny	same	faster
feather	same	slower

4. When we are close to Earth's surface, the acceleration of a falling object due to gravity is $9.8\ m/s^2$ (include correct units): (p. 77)

5. Formula for Newton's 2nd law: (p. 69)

   $F = m \cdot a$

6. The greater the force applied, the greater the acceleration. (p. 69)

7. How large the gravitational force between two objects is depends on the distance between them and their mass. ~~(p. 77-78)~~ p. 76

8. Your weight will decrease as you get farther from the center of earth. (p. 77-78)

9. Define action-reaction forces: (p. 83)

   They are equal and opposite forces

10. "To every action there is an equal and opposite reaction" is Newton's 3rd Law. (p. 83)

11. The formula for acceleration is: (p. 69)

    $a = \frac{F_{Net}}{m}$

12. Solve this problem:
A 500-N force acts on a 25-kg object. The acceleration of the object is:
(Show your work!) $a = \frac{F}{m} = \frac{500}{25} = 20\ m/s^2$

13. When astronauts are circling the earth, gravity is still strong enough to affect them. Why do they feel weightless? (p. 78, 79)

A space shuttle is in free fall, falling around the earth instead of straight downward to its center. Since everything inside the shuttle is also falling at the same rate, everything seems to be floating, or "weightless."

14. An object is thrown. If there were no gravity, what direction would it travel in?
In the same direction it was thrown. (up, horizontally, etc.)
ex.

Unit 5: Potential and Kinetic Energy: Energy Transformations
(Ch. 4 in textbook)

1. Kinetic energy is energy of motion. As an object's velocity increases, its kinetic energy (increases/decreases). (p. 102)

2. As an object moves horizontally, will its gravitational potential energy change? (p. 104)
No, because it stays the same distance above the ground.

3. The SI unit we use to measure energy and work is the joule. (p. 102)

4. Explain how energy is transformed or changed when a car moves: (p. 108)
chemical potential energy → kinetic energy

5. Because of the Law of Conservation of Energy, we know that the total amount of energy in the universe does not change. (p. 111)

6. What are the 2 conditions that have to be satisfied for work to be done on an object? (p. 126)
1) a force must make something move
2) the movement must be in the same direction as the applied force

Unit 6: Electricity
(Ch. 7 in textbook)

1. Fill in the SI units: (p. 205)
   Current is measured in amperes. Resistance is measured in ohms.
2. Ohm's Law formula: (p. 205)

$$I = \frac{V}{R}$$ ~~Current~~

3. Ohm's Law in words: (p. 205)

   Current is equal to the voltage difference divided by the resistance.

4. Static electricity: (p. 192)

   an electric charge that has accumulated on an object.

5. How are static electricity and an electric current different? (Electricity Test)
   static electricity lasts only for a fraction of a second when it is discharged. Electric current moves as long as there is a closed circuit.
6. Insulator: (p. 195)

   a material through which electrons do NOT easily flow.

7. Lightning: (p. 196)

   a large discharge of static electricity.

8. A battery is a source of constant electric current. (p. 201)

9. What are two safety measures used in home electrical systems that prevent overheating and overloaded circuits? (Name two devices) (p. 210)

   fuse, circuit breaker

Unit 7: Waves
(Ch. 10 in textbook)

1. Compressional waves: (p. 292)

   Waves in which the particles of the medium move back and forth only in the same direction as the motion of

2. Transverse waves: (p. 292) the matter in the medium moves back + forth at right angles to the direction that the wave travels.

3. Using a slinky, how can you create a compressional wave? (demonstrations)
Squeeze together the coils, then release them.

4. Water waves are: (p. 292-294)
mostly transverse, with some compressional movement

5. Seismic waves are: (p. 295)
a combination of transverse and compressional waves.

6. Wavelength: (p. 297)
the distance from crest to crest

7. Frequency: (p. 297)
the number of waves that pass a point in one second

8. Explain the relationship between wavelength and frequency: (p. 298)

As the frequency increases, the wavelength decreases

As the frequency decreases, the wavelength increases

9. Wave energy is measured by its amplitude. (p. 300)

Unit 8/9: Sound and Light
(Ch. 11, 12, and 13 in textbook)

1. The law of reflection states that the angle of incidence is always equal to the angle of reflection. (p. 385)

2. Why do we see anything? (p. 384) because light is reflected off it to your eyes.

3. Sound waves travel in Compressional waves: (p. 322)

less space

4. Compare the speed of sound: (choose from solids, liquids, or gases) (p. 323)

   Sound travels fastest in most solids because it takes less energy to make the molecules compress together (they are close together already).

   Sound travels slowest in most gases because it the molecules are farther apart, so it takes longer for them to become compressed.

5. What does the oval window in the ear do? (p. 325, 326)
   it transfers sound vibrations to the cochlea

6. As the intensity of sound increases, what happens to the loudness? (p. 327)
   it increases.

more space

7. Hertz: (p. 330)
   the frequency of a ware is measured in Hertz

8. What causes reverberations and echoes? (p. 339)
   the reflection of sound waves

9. Bats use echolocation to find prey: (p. 339)

10. Light reflections from rough surfaces are called ~~regular~~ diffuse reflections. (p. 385)
11. Light reflections from smooth surfaces are called ~~diffuse~~ regular reflections. (p. 385)

12. A blue shirt reflects blue wavelengths and absorbs all others. (p. 389)
13. Explain why a mirage happens: (p. 388)
    light is refracted through air layers of different densities, causing one or more images of a distant object to reach our eyes.
14. When light passes from one medium to another of a different density, light will change speed and bend, or refract. (p. 386)