

Physical Science

Final Exam Review

This is by no means an all inclusive review of the semester. This is a *brief* review of the semester hitting on the major concepts of each unit. You should answer the questions on this review sheet and also go over all your old tests, quizzes, labs, and work sheets. Think about the concepts you may have had trouble on during the semester and work on those.

Remember you want to get as many points as possible on the exam so don't linger too long on one problem. Answer all those you *do* know and then go back to the others.

Don't wait the night before the exam to study!! Start now and do a little bit each night.

Tools and measurement
Matter & the Atom
Structure of Matter
Chemical Reactions
Nuclear Chemistry/Space
Using Natural Resources

Force and Motion
Work, Energy, & Machines
Waves
Sound & Light
Electricity & Magnetism

Practice - Tools and measurement (Chapter 1)

- 1.) What are the rules for significant figures for adding and subtracting?
- 2.) Which gives a more accurate measurement of volume, a graduated cylinder or a beaker? Explain your answer.
- 3.) How many liters is there in 5.0 gallons of water?
- 4.) How many pounds are there in a bag of potatoes that has a mass of 20.0 kg?
- 5.) How many centimeters are there in 35 inches.
- 6.) How many quarts are there is 2.00 liters?
- 7.) Convert 120 mi./h to m/s.
- 8.) The NBA lane is 12 feet wide. What is this in meters?
- 9.) The basketball rim is 10.0 feet from the floor. How many centimeters is this?
- 10.) What are the rules for significant figures for multiplication and division?

Matter & The Atom (Chapters 2 & 3)

- 1.) Describe the difference between a physical and chemical change. List two examples of each.
- 2.) Diagram and label the particles that make up the atom. How can you find the number of each of the particles using the periodic table?
- 3.) What is the difference between a metal, non-metal and metalloid (list two properties of each)
- 4.) Where do you find metals, metalloids and non-metals on the periodic table?
- 5.) How do Group A elements differ from Group B elements?
- 6.) What is a period? List the first three elements in period 3. What does the period number tell you about the electron configuration of the atom?
- 7.) What is a family or group? List the first three elements in family II. What does the family number tell you about the electron configuration of the atom?
- 8.) What is the atomic number tell you? Where do you find it on the periodic table?
- 9.) What is the mass number tell you? Where do you find it on the periodic table?
- 10.) What are the trends in **atomic size** as you go across a period or down a group?
- 11.) What is a valence electron? How many valence electrons does sodium have?
- 12.) What is the electron configuration of the following elements: **S, Ca, and N**?

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Structure of Matter (Chapter 4)

- 1.) What is the difference between a cation and an anion? Give an example of each.
- 2.) Write the chemical names for the compounds below.
a. Na_2SO_4 b. NO_2 c. $\text{Mg}(\text{NO}_3)_2$ d. PCl_4
- 3.) Write the chemical formulas for the compounds below.
a. lithium nitrite b. dinitrogen trioxide c. carbon monoxide d. iron (II) phosphate
- 4.) Use the equation below to answer the questions.
$$4 \text{NH}_3 + 7 \text{O}_2 \longrightarrow 4 \text{NO}_2 + 6 \text{H}_2\text{O}$$
 - a. How many moles of ammonia (NH_3) represented in the equation?
 - b. What is the mole ratio of ammonia to nitrogen dioxide?
 - c. How many moles of water are produced if 8 moles of ammonia is used up with excess oxygen?
 - d. How many grams of water will be produced in question c above?
- 5.) Describe the differences between ionic and covalent bonding.

Chemical Reactions (Chapter 5)

- 1.) What is the Law of conservation of Matter
- 2.) Balance the following equation:
$$\text{AgNO}_3 + \text{CuCl}_2 \longrightarrow \text{AgCl} + \text{Cu}(\text{NO}_3)_2$$
- 3.) Interpret the following equation in words:
$$\text{Ca} + 2\text{H}_2\text{O} \longrightarrow \text{Ca}(\text{OH})_2 + \text{H}_2$$
- 4.) Calculate the molar mass of $\text{Ca}(\text{OH})_2$.
- 5.) If you have 6.02×10^{-2} moles of H_2O , how many grams of H_2O do you have?
- 6.) Convert 18.0 g of Al to moles.
- 7.) Convert 2.5 moles of Cu to grams.
- 8.) What is the difference between an exothermic and endothermic reaction?
- 9.) Name the 5 general reaction types and write an example of each
- 10.) What is a catalyst?

Nuclear & Space Science (Chapter 7 & 16)

- 1.) What is the electromagnetic spectrum? What are three types of radioactive particles and list their properties.
- 2.) What is radioactive decay?
- 3.) Describe the differences between alpha and beta decay?
- 4.) What is half-life? Radium - 226 has a half-life of 2160 years and you have a 100 gram sample of this in your possession today, what will the year be when you only have 6.25 g of Ra-226 left?
- 5.) Use the shorthand notation to write the following (ex: ${}^2_1\text{H}$)
a. Carbon - 14 b. Uranium - 235 c. Radium - 226
- 6.) What is fission? What is it used for on this planet?
- 7.) What is fusion? Where is it seen in our universe?
- 8.) What occurs in the core of a nuclear reactor?

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- 9.) What is the difference between ionizing and non-ionizing radiation?
- 10.) What do the control rods do in a nuclear power plant?
- 11.) What is a light year and what is it a measurement of?
- 12.) What is a galaxy and to which galaxy does Earth belong?
- 13.) What is the red shift theory and why is it important?
- 14.) What does wavelength of light emitted from the surface of a star tell you?
- 15.) What is fusion and what does it have to do with space science anyway?
- 16.) The phases of the moon are a result of what?
- 17.) What is summer solstice?
- 18.) During what season is the northern hemisphere farthest from the sun? What season is this in the southern hemisphere?

Using Natural Resources (chapter 19)***

- 1.) Differentiate between renewable and nonrenewable resources. Give examples of each.
- 2.) Define the terms Ecosystem, Community, and Population.
- 3.) Define primary and secondary succession.
- 4.) What is a fossil fuel? Write the formulas for methane, propane, and butane)
- 5.) What is a greenhouse gas? Be sure to give examples of greenhouse gases.
- 6.) How is acid rain produced and why is it a problem?
- 7.) How do pesticides and fertilizers cause environmental problems?

***Did NOT cover in class...Students need to be familiar with main concepts.

Force & Motion (Chapter 8)

- 1.) What are Newton's first three laws?
- 2.) In your own word define acceleration. What units is acceleration given in?
- 3.) In your own words define the terms force, speed, friction, gravity, and position.
- 4.) What is the difference between mass and weight. What are the units for mass and weight.
- 5.) Define in your own words the terms friction and terminal velocity and explain how they relate to each other.
- 6.) A student (class of 2089) is riding on a hover board moving at 15m/s. The student starts to accelerate at a rate of 3m/s^2 . Find the students velocity 5 seconds later.
- 7.) A bus is traveling at a speed of 25km/h. A person on the bus walks toward the front of the bus at a speed of 7km/h. What would the speed of the person walking to the front of the bus as perceived by someone on the ground outside the bus?

Work, Energy & Machines (Chapter 9)

- 1.) Define the term energy. What are the differences between kinetic, potential, and mechanical energy?
- 2.) State the law of conservation of energy.
- 3.) What is work and what are the units for work?
- 4.) Find the work done by gravity on a 1kg ball that is falling from a height 30 meters.
- 5.) A baseball thrown 15m high has a mass of 0.145kg. Find the work done on it as it rises.
- 6.) If a 10kg box is lifted to a height of 50m, what is its potential energy?

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Heat and Temperature (Chapter 10)

- 7.) Define in your own words the term temperature and heat.
- 1.) Explain specific heat and give the correct units for specific heat.
- 2.) A block of mercury with a mass of 50g is heated from 20°C to 50°C. How much energy is gained by the block? Specific heat of mercury is 140J/kg•C°.
- 3.) Convert 23° C to degrees Kelvin.
- 4.) What is absolute zero?
- 5.) What is 175°F on the Celsius scale?
- 6.) What is -175°C on the Kelvin scale?
- 7.) Define and give examples of conduction, convection, and radiation.

Waves, Sound, & Light (Chapter 11 & 12)

- 1.) Draw and label the parts of a transverse wave. (amplitude, crest, trough, wavelength)
- 2.) What are the differences between a transverse and a longitudinal wave.
- 3.) What is the normal hearing range for humans.
- 4.) What is the Doppler effect? Explain thoroughly.
- 5.) A tuning fork has a frequency of 440 hertz. The wavelength of the sound produced by the fork is 0.77 m. Calculate the velocity of the wave.
- 6.) Suppose your friend is 500m away along a railroad track (made of iron) while you have your ear to the tracks (do not try this at home). He drops a stone on the tracks. How long will it take the sound to reach your ear?
- 7.) Define the following terms: Concave, convex, divergent lens, convergent lens, divergent mirror, convergent mirror, focal point, focal length, real image, and virtual image.
- 8.) A plane mirror produces what kind of image?

Electricity & Magnetism (Chapter 13 & 14)

- 1.) What is Ohm's Law?
- 2.) Explain the differences between static and current electricity?
- 3.) What is a series circuit? What is a parallel circuit? How would you place a fuse to protect an appliance in series or parallel? Explain your answer.
- 4.) What is potential difference? Current? Resistance?
- 5.) What do the following instruments measure: electroscopes, ammeter, and voltmeter.
- 6.) Define the terms insulator and conductor and give examples of each.
- 7.) A light bulb with a resistance of 400 ohms is connected to a 120 volt service. How much current flows through the bulb?
- 8.) What do AC and DC stand for? Explain the difference between the two.
- 9.) Smaller appliances in a house use 120-volt circuits. If the cost of electricity is \$0.060 per kWh, what is the current used to operate a 850-watt hair dryer?
- 10.) How much would it cost to operate a 60 Watt television for four hours a day for 20 days if the cost of electricity is \$0.040 per kWh?
- 11.) What is an electromagnet?