Texas UIL

Physical Science Concepts

Grades 5-8

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hexco

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General Information

UIL Middle School Science Tests

The UIL Middle School Science Test is divided into two divisions: Science I (Grade 7) and Science II (Grade 8). The test consists of 35 multiple choice questions which you will have 45 minutes to complete. The scoring of the test is as follows: five (5) points for each correct answer, zero (0) points for each unanswered question, and minus two (-2) points for each incorrect answer. Points and awards are given for the top six high point individuals as well as points for the first place team. Awards are given in both the Science I and Science II divisions.

Test Composition

From the UIL Academic website we read: "Emphasis for the science contest will be placed on knowledge of scientific fact, understanding of scientific principles, and the ability to think through scientific problems….Such concepts include, but are not limited to: matter and energy, equilibrium, force and motion, physical and chemical properties, the relationship between organisms and the environment, the components of our solar system, the composition of matter and genetics."

The test is composed from material in current state-adopted textbooks, *Science World*, and *National Geographic World*.

Hexco Testing Material

These review materials are not to serve as a replacement for a dedicated instructor/coach and students. They will, however, help organize, guide, and direct your study time and help you to brush up on material that you might have covered in previous years. This review material, combined with your ongoing science instruction, will not only help to improve your Science I and II test scores, but will also will improve your knowledge of general science information. It will help prepare you for material you will be tested over on our Texas state standardized tests as well.

Good luck with your endeavors in science!

General Science Information

Lab Safety

Lab safety is important and essential to a successful lab activity. The majority of lab safety items in question are typically "common sense" type of situations. On the test, if you will take the time to carefully read the question concerning lab safety and consider the options, you will find the answer is typically standing out on the page. Here are a few lab safety rules to consider.

1. Follow all directions given by instructor. Clean up when done.
2. Always properly use lab safety equipment: safety glasses, aprons, gloves, fire extinguishers, and eyewashes.
3. Never mix chemicals without being told to do so.
4. Never return unused chemicals to original bottle.
5. Dispose of all materials as directed.
6. Keep water away from electrical devices.
7. Report all accidents/spills/concerns to your instructor.
8. Always pour acid into water, not water into acid (A & W root beer; always pour **A**cid into **W**ater). This rule involves the dilution of a strong acid with distilled, deionized water. **Adding water to concentrated acid will result in the acid violently reacting and spitting back out of the container onto you**.
9. Long hair, baggy clothing, and loose jewelry should be taken care of before lab.
10. Never sniff or smell chemicals in lab unless told to do so. Then, if instructed to smell a mixture, waft the mixture towards your nose using one of your hands. Do not stick the container under your nose and take a big whiff!
11. Use lab equipment for its instructed use. Beakers for mixing and heating, test tubes for mixing and heating small quantities, etc.

Many of the lab safety questions will involve one answer that relates to you following the advice of your instructor or teacher or waiting for instructions from your teacher. These answers are typically the correct solution for the lab safety issues. Follow instructions given to you by your instructor.

Sample Questions

1. You are instructed to obtain 10.0 grams of sodium chloride in order to complete a particular lab activity. You and your partner accidentally get 15.0 grams of the sodium chloride. Which of the following would be the most correct response of what to do with the excess sodium chloride?
    a. place the excess in a plastic bag or beaker for use later
    b. pour the remainder back into the sodium chloride container
    c. go ahead and use the 15.0 grams instead of the 10.0 grams
    d. dispose of the excess as instructed by your teacher

2. Your lab instructor has given you directions to complete a lab. You decide to try the lab a different way and end up cutting your hand on a glass beaker. What should you do first?
    a. run cold water on your hand to stop the bleeding
    b. apply direct pressure to the cut to stop the bleeding
    c. inform your instructor
    d. ask to go to the bathroom and stop at the nurse's office on the way back to class

3. What should you consider when heating a test tube of a strong basic solution you have been instructed to heat up by your teacher?
    a. Is the material in a test tube that is marked as safe to heat in direct flame?
    b. How long will the material take to heat?
    c. Why are you heating this up?
    d. What is the boiling point of the strong basic solution?

Equipment Uses

In science labs, always use equipment for what it was designed for. Never try to misuse equipment or select materials that you have not been instructed to do so. Following directions will keep you safe and ensure that your lab has the best opportunity for success.

1. Beakers/test tubes: mixing and heating if so marked
2. Balances: calculating mass of solid, liquid, or gas
3. Graduated cylinders: measuring volume
4. Thermometers: measuring temperature
5. Tongs/clamps: moving/holding glassware when hot or cold
6. Test tube/glassware brushes: cleanup
7. Multimeters: measuring electrical values/unknowns
8. Microscopes: magnifying small objects; bacteria, fungi, cells
9. Bunsen Burner: heating materials in lab
10. Ruler: measure length
11. Spring scale: measure force in Newtons

Sample questions

4. Your lab asks you to measure 10.0 mL of a liquid to the nearest tenth of a millimeter. Your lab tool of choice for this task would be the _____.
    a. beaker
    b. test tube
    c. graduated cylinder
    d. spot plate

5. Select the one below that would not be essential to correctly measuring 45.0 grams of a solid for use in a lab activity.
    a. Tare the scale before use.
    b. Make sure the pan or balance tray is clean before weighing the solid.
    c. Use a weighing paper or weighing tray to keep the scale pan clean.
    d. Know the chemical formula for the material you are using.

Metric System

The metric system is a system of measurement that is used throughout the world to calculate and measure materials volume, temperature, length mass, and more. In the United States, we use the metric system of measurement as well as the standard system of measurement. In science, the majority of measures are taken using the metric system. If you wish to work in any health profession or other science field, you will have to be proficient in using the metric system.

A few basics concerning the metric system are:

1. System of measurement based on units of 10
2. There are base units for measurable quantities.
3. To delineate the size of a measurement we attach prefixes to the base units to make them larger or smaller than the base unit itself.
4. Being based on units of 10, to convert from one unit to another you multiply or divide by ten, which in essence means move the decimal point location.

Base units:
meter - length
liter - measure of volume
gram - measure of mass
temperature - measure of Celsius or Kelvin degrees
second - measure of time
Newton - measure of force

Prefixes:

Here are the basic prefixes used at the middle school level along with an easy way to remember the most commonly used prefixes.

Smallest					**Largest**	
milli	**c**enti	**d**eci	**BASE UNIT**	**d**eka	**h**ector	**k**ilo
My	crazy	dog	bingo	drinks	hot	koolaid

Converting from one metric unit to another:

This is as easy as multiplying or dividing by ten. I simply write the prefixes in the order from largest to smallest on the paper.

kilo hector deka base deci centi milli

Next, I place an X on what metric value I am given and count how many steps I have to move from what I am given to what I need to convert to. This number of steps tells me how many places to move the decimal. If I have to move to the right on the prefix list, then I move the decimal right that many times. Left works the same way except you move the decimal to the left that many spaces. Remember to ask yourself, "Is my answer reasonable?" Converting from millimeters to meters, you know that a millimeter is smaller than a meter, therefore, given a number of millimeters you will have a smaller meter unit compared to millimeter units.

Example: Convert 35.8 cm to hectometers.

| ← four steps ← X
kilo hector deka base deci centi milli

1. Place an X on centimeters, this is what you know.
2. Count how many steps it is from centimeter to hectometer. (4 steps)
3. This is how many places you will move the decimal. You had to move to the left on the prefix list so that is the direction you will move the decimal.

35.8 cm is equal to .00358 hm