Benchmark Test Review Answers

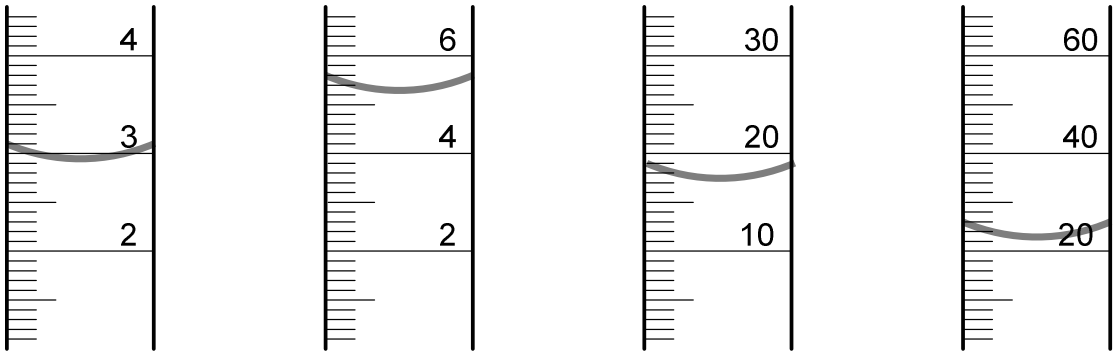
(for test on 11-30-07)

Lab Safety

- What safety equipment should always be worn when working with chemicals? (p.669) **Eye goggles**.
- How should odors be checked safely? (p.669) **Waft carefully towards nose**.

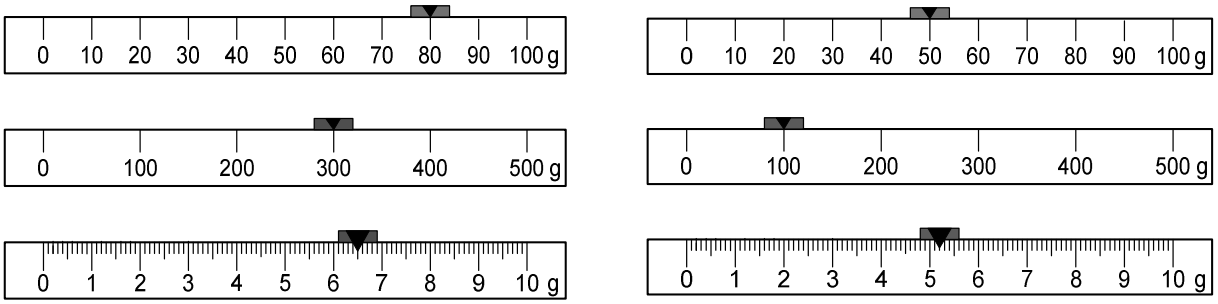
Scientific Method

- For each of the following, state the volume in the graduated cylinder. Remember to measure from the bottom of the meniscus (the curved surface of the liquid) and to first determine how much each mark on the scale represents. (p.654)



2.9 mL **5.2 mL** **17 mL** **22 mL**

- For each of the following, state the mass indicated on the triple beam balance. (p.674)



386.5 g **155.2 g**

- A scientific experiment should be designed so that all **variables** except the one being tested are controlled. The **independent or manipulated** variable is the one that is controlled or changed by the scientist. The **dependent or responding** variables are the ones measured by the scientist. (pp.12-13, 657)
- Whenever possible, eliminate all **human** sources of error, by using machines to take measurements or apply force in an accurate and repeatable way.

Metric System

- The metric units for liquid volume are **liters (L)** or **milliliters (mL)**. (p.654)

- The metric units for length are **millimeters (mm)**, **centimeters (cm)** or **meters (m)**. (p.654)
- The metric units for mass are **grams (g)** or **kilograms (kg)**. (p.655)
- The metric units for force are **newtons (N)**. (p.125)
- The metric units for energy or work are **joules (J)**. (p.159)
- The metric units for temperature are degrees **Celsius (C)**. (p.655)
- The units shown on the scale of a graduated cylinder are **milliliters (mL)**. (p.654)
- The units shown on the three scales of a triple beam balance are **grams (g)**. (p.674)

Atomic Structure

- The center of an atom is the **nucleus**. (p.61)
- The outer part of an atom is the **electron cloud**. (p.61)
- The subatomic particle with a positive charge in the nucleus of an atom is a **proton**. (p.61)
- The subatomic particle with a neutral (no) charge in the nucleus of an atom is a **neutron**. (p.61)
- The subatomic particle with a negative charge in the electron cloud of an atom is an **electron**. (p.61)
- The number of protons or electrons is indicated by the **atomic number**. (p.33)
- The sum of the protons and neutrons in an atom is indicated by the **atomic mass**. (p.32)
- The find the number of neutrons in an atom, subtract the **atomic number** from the **atomic mass**. (notes)

Periodic Table

- The horizontal (left to right) rows on the periodic table are called **periods**, and indicate the number of **electron shells**. Properties such as the size of the atom and melting and boiling points vary regularly across each **period** of the periodic table. (p.33, 36)
- The vertical (up and down) columns on the periodic table are called **groups** or **families**, and indicate (for only the representative elements) the number of **valence electrons**. (pp.33, 62)
- The elements touching the zig-zag line on the periodic table are usually **metalloids**. (pp.34-35, 54)
- The elements to the right of those elements touching the zig-zag line are **non-metals**. (pp.34-35, 48)
- The elements to the left of those elements touching the zig-zag line (except hydrogen) are **metals**. (pp.34-35, 39)
- Elements that conduct heat and electricity well, that are shiny, and that are malleable and ductile, are **metals.** (p.39)
- Elements that do not conduct heat and electricity well, that are not shiny, and that are brittle, are **non-metals**. (p.48)
- For each of the following elements, write the symbol and the atomic number (p.676-77)

Carbon	**C 6**	Oxygen	**O 8**
Hydrogen	**H 1**	Potassium	**K 19**
Sulfur	**S 16**	Aluminum	**Al 13**
Chlorine	**Cl 17**	Nitrogen	**N 7**
Calcium	**Ca 20**	Sodium	**Na 11**

Chemical Reactions

- The length, mass and temperature of an object are examples of **physical properties**. (p.25)
- The ability of a substance to react with another substance like an acid, and the ability of a substance to burn, are examples of **chemical properties**. (p.25)

- Changing the size of an object by cutting it in two, and changing the state of a substance by freezing or melting it, are examples of **physical change**. (p.27)
- Burning a substance, and mixing two substances together to make a completely new substance with different properties (like reacting an acid with a base), are examples of **chemical change (also known as a chemical reaction)**. (p.28)
- Evidence of a chemical **change** includes the release the gas bubbles, the formation of a different colored substance, and the creation of heat (like when something burns). (p.29)
- A description of the kinds of elements in a substance, and the numbers of atoms for each element, using only the one or two letter symbols for the elements and subscript numbers for the quantity of atoms for each element, is a **chemical formula**. (p.26)
- A description of a chemical reaction, showing the chemical formulas of the **reactants** (substances before the reaction takes place) on the left, and the chemical formulas of the **products** (substances after the reaction takes place) on the right, is called a **chemical equation**. (p.28)

Energy

- The process in which the **chlorophyll** in plant leaves converts electromagnetic energy from the Sun (sunlight) into chemical energy, using **carbon dioxide** and **water** as reactants, and creating **glucose (sugar)** and **oxygen** as products, is called **photosynthesis**. (pp.205-208)
- A stretched rubber band or compressed spring has **elastic potential** energy. (p.193)
- Water at the top of a waterfall, or an object at the top of a cliff, has **gravitational potential** energy. (p.200-201)
- Water falling over a waterfall, or an object falling off a cliff, has **kinetic** energy. (p.200-201)
- Gravitational potential energy will be highest at the **top** of a waterfall. (p.200)
- Kinetic energy will be highest in a falling object just before the object hits the **ground**. (p.200)
- The form of energy contained in coal or petroleum is **chemical**. (p.194)
- The form of energy contained in uranium that is used in a fission reaction is **nuclear**. (p.195)
- The form of energy given off by a fire is **thermal**. (p.194)
- The form of energy found in sunlight is **electromagnetic**. (p.195)
- The form of energy found in house wiring is **electrical**. (p.195)
- The form of energy that is found in moving objects is **mechanical**. (p.194)
- Energy resources such as petroleum, natural gas and coal are **non-renewable**. (p.623)
- Energy resources such as sunlight, wind and geothermal are **inexhaustible**. (p.623)
- Energy resources such as biomass (wood, alcohol, oil seed crops) are **renewable**. (p.623)
- Living organisms have an internal **response** to an outside **stimulus**, energy and forces like sunlight and gravity. For example, the leaves and stems of plants grow towards sunlight, while the roots of plants grow towards the source of gravity. (p.341)