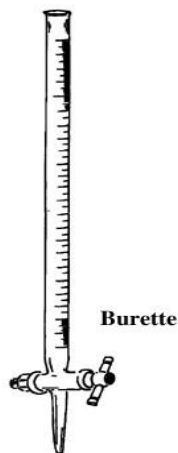


TAKS Concepts Review Sheet

Objective 1: The student will demonstrate an understanding of the nature of science.

1. Basic Safety Practices to remember
 - a. Goggles are ALWAYS the best choice for eye protection
 - b. Always tell your teacher & follow his/her instructions about any situation
 - c. Add small amounts of acid into larger amounts of water in order to dilute the acid.
 - d. Hot glassware should be handled with tongs.
 - e. When heating a test tube, etc. – make sure it is pointed away from you
2. Investigative procedures
 - a. Know the purposes of your equipment
 - i. A balance is used to measure mass in grams.
 - ii. A graduated cylinder, dropper, or volumetric flask is used to measure volume in liters.
 - iii. Beakers & regular flasks do NOT measure accurately
 - iv. A buret is the most accurate – a pipette/pipet



is the next most accurate - **Smaller increments (markings) = greater accuracy & precision**

3. Questions & Hypotheses

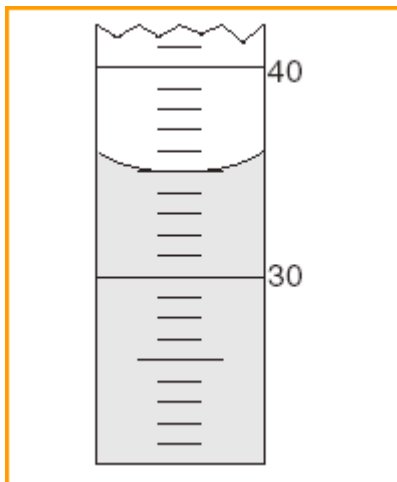
- a. You will typically be given questions that ask you to evaluate a question, hypothesis, experiment setup, etc
 - i. If an experiment: check the equipment in the picture & think about its function – what would it be used for?
 - ii. If a question or hypothesis: read the info provided & look closely at any charts/graphs given.
 1. Make sure that it is something that can reasonably be accomplished
 2. it must be something that can be tested and measured
 3. only evaluate based on the info in the question – don't read too much into it
 4. If an answer contains something not provided in the question, it is probably not the right answer!

4. Experiments

- a. Control – the setup that you DON'T have the variable in – used to compare for changes
- b. Manipulated or Independent variable = the one you are testing/changing = placed on X axis of a graph
 - i. HINT: remember MIX
- c. Dependent or Responding variable = factor affected by the independent variable = placed on Y axis of a graph
 - i. HINT: remember DRY

5. Data & Measurements

- a. The larger the amount of data collected, The larger the sample size, The more times the experiment is repeated = The more valid are the results.
- b. Know how to read the increments on equipment



- i. Read at the bottom of the meniscus (curve) – each one of these lines is 1 ml so the reading is 35 ml – **be sure to check the value of the lines** – sometimes they read by 0.5 ml and sometimes by 2 ml

c. Organizing & evaluating your Data

- i. When a question includes a table or graph, **read it first**, before the question. Don't just Look at it READ IT.

- 1. What is the Title, what is being measured or compared? What units (grams, mLs, minutes, years) are given? What are on the X & Y axis?
- 2. Are the numbers or slope increasing, decreasing?

ii. Graphs

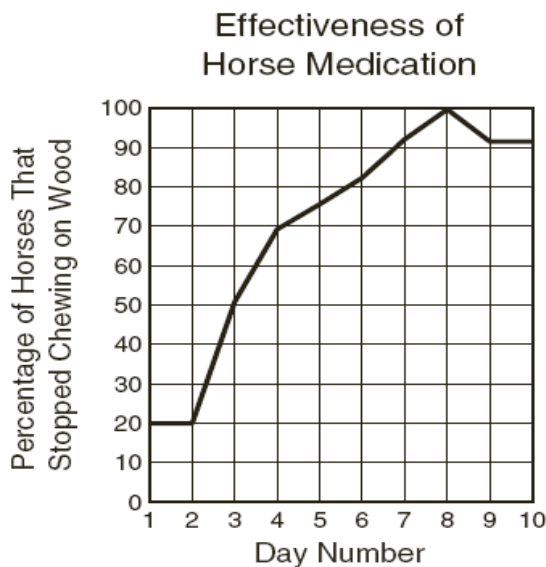
- 1. pie graphs – used for % or parts of a total
- 2. Line graphs – used for continuous info
- 3. Bar graphs – used to compare info

6. Conclusions

- Conclusions must be based **ONLY** on the information provided in the paragraph, chart, or graph that you are provided
- Read the question carefully – sometimes it will only apply to part of the info given – some of the info in the question may not be needed
- Look at the labels on the graph or chart
- If you are not familiar with the topic of the graph – **DON'T PANIC** – sometimes you don't have to know what it is – **ONLY** how to read a graph!

7. Analyzing, reviewing, drawing inferences based on data

- AGAIN:** Only base your answer on the info provided in the question
- Read the information given carefully and check out **ALL** the answer choices



Horses kept in stables sometimes chew on wood. This can lead to damage to the mouth and digestive system. The graph shows the results of

a study of a medication that prevents horses from chewing on wood. From the graph, what inference can be made about the effectiveness of the product?

- Most horses like the medication.
- The medication is most effective between Days 4 and 5.
- Most horses will show improvement within 7 days.
- The effects of the medication are long lasting.

(Letter C is correct)

Answer for the “You Try It” section.

The numbers on the slides are random. Just do them in the order they appear. Write the answer down & check it with your teacher tomorrow – be sure to ask if you need help!!

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Objective 2: The student will demonstrate an understanding of the organization of living systems

1. **homeostasis** - maintaining an internal balance through feedback mechanisms
 - a. example: you exercise – your body temperature goes up – you sweat – heat is carried away when the sweat evaporates – your body temperature returns to normal
2. **permeability** – ability of substances to go through a membrane such as the cell membrane
 - a. **active transport** – requires energy, moving from low to high concentration
 - i. **exocytosis** – leaving cell
 1. removal of cellular wastes
 - ii. endocytosis – entering cell
 - b. **passive transport** - does not require energy
 - c. **diffusion** - moving from high to low concentration
 - i. **osmosis** – diffusion of water
3. **energy production** – production of ATP(the energy molecule) for cell to use for energy
 - a. **photosynthesis** (happens in chloroplasts) – using sunlight to make glucose – primarily done by plant cells
 - b. **cellular respiration** (happens in mitochondria) – using molecules such as glucose to produce ATP – done by all types of cells

4. basic cell parts & functions

- a. **nucleus** – contains DNA – cellular/genetic instructions
- b. **ribosomes** – make proteins
- c. **mitochondria** – place of energy (ATP) production/conversion
- d. **lysosome** – cellular digestion/breakdown
- e. **cell/plasma membrane** – regulates what enters & leaves cell
- f. **chloroplast** – in plant cells, place of photosynthesis – light energy converted to food energy

5. **DNA** – contains genetic information to determine an organism's features & characteristics– cellular instructions for protein synthesis

- a. Contains deoxyribose sugar, phosphate group, & nitrogenous bases
- b. Bases are adenine (**A**), guanine (**G**), cytosine (**C**), and thymine (**T**)
- c. **DNA replication** – happens during mitosis
 - i. **Purpose:** make an exact copy of DNA for each new cell – daughter cells are identical to parent cell & to each other
 - ii. Complementary base pairing: **A – T AND C – G** (3' match with 5' if it shows the numbers)
- d. **mutation:** any change in the gene or chromosome that interferes with the coded instructions – may be helpful, harmful or neutral.
 - i. Only gamete (egg & sperm) DNA mutations & chromosomal mutations present at birth can be passed on to future offspring

- e. **Genotype** – combination of gene versions (alleles) that an organism has
 - f. **Phenotype** – physical appearance caused by genotype
6. **RNA** – chemical messenger – carries out protein synthesis
- a. **Proteins** – control cellular processes
 - b. Contains deoxyribose sugar, phosphate group, & nitrogenous bases
 - c. Bases are adenine (**A**), guanine (**G**), cytosine (**C**), and uracil (**U**)
 - d. Complementary base pairing: **A – U AND C – G**
 - e. **Transcription**: mRNA copies instructions from DNA
 - i. Happens in nucleus then brings instructions to ribosomes
 - f. **Translation**: tRNA brings correct amino acids in line to make protein - Happens in ribosomes

7. The 6 Major Kingdoms

a. **Archaeobacteria**

- i. Prokaryote – no nucleus or membrane bound organelles
- ii. Unicellular
- iii. Cell walls without peptidoglycans
- iv. May be autotrophs (make own food – producers) or heterotrophs (eat other organisms – consumers)

b. **Eubacteria**

- i. Prokaryote
- ii. Unicellular
- iii. Cell walls with peptidoglycans
- iv. Autotroph or heterotroph

c. Protista

- i. Eukaryote – has nucleus and membrane bound organelles
- ii. Some have cells walls of cellulose
- iii. Some have chloroplasts
- iv. Most unicellular
- v. Autotroph or heterotroph

d. Fungi

- i. Eukaryote
- ii. Cell walls of chitin
- iii. Most multicellular
- iv. Heterotroph

e. Plantae

- i. Eukaryote
- ii. Cell walls of cellulose
- iii. Have chloroplasts to do photosynthesis
- iv. Multicellular
- v. Autotroph
- vi. Have large central vacuole, chloroplasts, & cell wall (look for these if a diagram is shown)

f. Animalia

- i. No cell walls or chloroplasts
- ii. Multicellular
- iii. Heterotrophs

8. Major body systems (see pictures on page 893 of biology book)

a. Skeletal system

- i. Supports, protects, allows movement, site for blood cell formation, mineral storage
- ii. Major parts: bones, cartilage, tendons, ligaments

b. Integumentary

- i. Barrier against infection & injury, protection from UV radiation, helps to maintain body temperature
- ii. Major parts: skin, hair, nails, sweat & oil glands

c. Muscular

- i. Motion of skeletal muscles with help from skeletal system, motion of blood with heart (cardiac) muscle, motion of food through digestive tract with smooth muscle (this wavelike motion is called peristalsis)
- ii. Limbs = arms & legs

d. Respiratory:

- i. Provides oxygen & removes carbon dioxide (gas exchange)
- ii. Major parts: nose, pharynx, larynx, trachea, bronchi, bronchioles, lungs

e. Circulatory

- i. Transport substances that are dissolved in the blood – delivers nutrients to cells
- ii. Can transport to the cells and away from the cells
- iii. Major parts: heart, blood vessels

f. Digestive

- i. Break down of macromolecules to provide glucose for ATP production, eliminates solid waste
- ii. Major parts: mouth, pharynx, esophagus, stomach, small intestine, large intestine (colon), rectum, anus
- iii. Minor parts & glands that contribute: liver, pancreas, gall bladder

g. Excretory

- i. Eliminates waste other than solid wastes
- ii. Major parts: skin, lungs, kidneys, ureters, urinary bladder, urethra

h. Reproductive

- i. Produces gametes (egg & sperm), nurtures & protects growing embryo
- ii. Major parts – male: testes (main male organ), epididymis, vas deferens, urethra, penis
- iii. Major parts – female: ovaries (main female organ), fallopian tubes, uterus, vagina

i. Immune/Lymphatic

- i. Protect from disease, returns tissue fluids to circulatory system
- ii. Major parts: white blood cells (T-lymphocytes/cells, B-lymphocytes/cells, thymus, spleen, lymph nodes & vessels

j. Nervous

- i. Communication, coordination & control, respond to changes in internal & external environments– fast acting
- ii. Major parts: brain, spinal cord, nerves, neurons

k. Endocrine

- i. Regulation of functions through production of hormones
- ii. Major parts:

l. Each organ system is dependent on the other organ systems to maintain homeostasis.

Answer for the “You Try It” section.

The numbers on the slides are random. Just do them in the order they appear. Write the answer down & check it with your teacher tomorrow – be sure to ask if you need help!!

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Objective #3: The student will demonstrate an understanding of the interdependence of organisms and the environment

Bacteria & Viruses

BACTERIA	VIRUSES
Living	Non living
Prokaryotic unicellular A complete cell	Are not a cell, have some nucleic acid (DNA or RNA) & a protein coat
Can live on their own	MUST have a host cell to survive & reproduce – Cannot function on its own
Killed by antibiotics	Not affected by antibiotics – immune system must take care of them by producing antibodies
Example diseases: streptococcus infections (strep), staphylococcus infections (staph), diphtheria, tuberculosis	Example diseases: AIDS, colds, flu, smallpox, warts
May be helpful (as in aiding our digestion), harmful, or neutral	May be helpful (as in genetic engineering), harmful, or neutral

Biological Evolution

1. Theory that structural & functional similarities may indicate that organisms have some common ancestors.

2. Organisms will adapt to their environments in order to ensure the survival of their species so as not to become extinct.

a. **Adaptation** – feature/behavior of an organism that gives it a better chance of survival

i. Broad leaves on a plant to absorb more light energy

ii. Camouflage on an organism to help it hide from prey

3. **Genetic diversity** (differences) is always a positive thing when it comes to survival of a species.

4. **Natural Selection**

a. **Speciation** – process of 1 species developing into 2 or more different species

b. **Phylogeny** – branching diagram showing possible relationships – closer on branch = closer relationship

1. **survival of the fittest** – the more suited an organism is to its environment – the better its chances of survival and passing on its traits to its offspring

Interdependence & Interactions of Ecosystems

2. **predation** - In general, the predator species that does the feeding benefits from this relationship, while the prey species which gets eaten is harmed by the relationship.

3. **parasitism** - The dependent member (the parasite) benefits from the relationship while the other one (the host) is harmed by it.

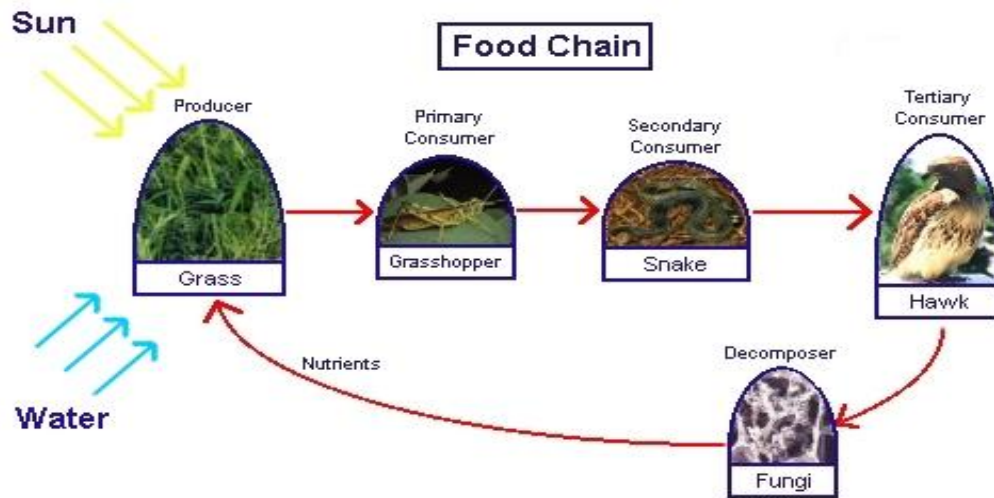
4. **commensalism** - one organism is unaffected by the relationship and the other benefits from it.

5. **mutualism** - rely on one another for nutrients, protection, or other life functions. Both (or all) of the organisms involved benefit from the relationship.

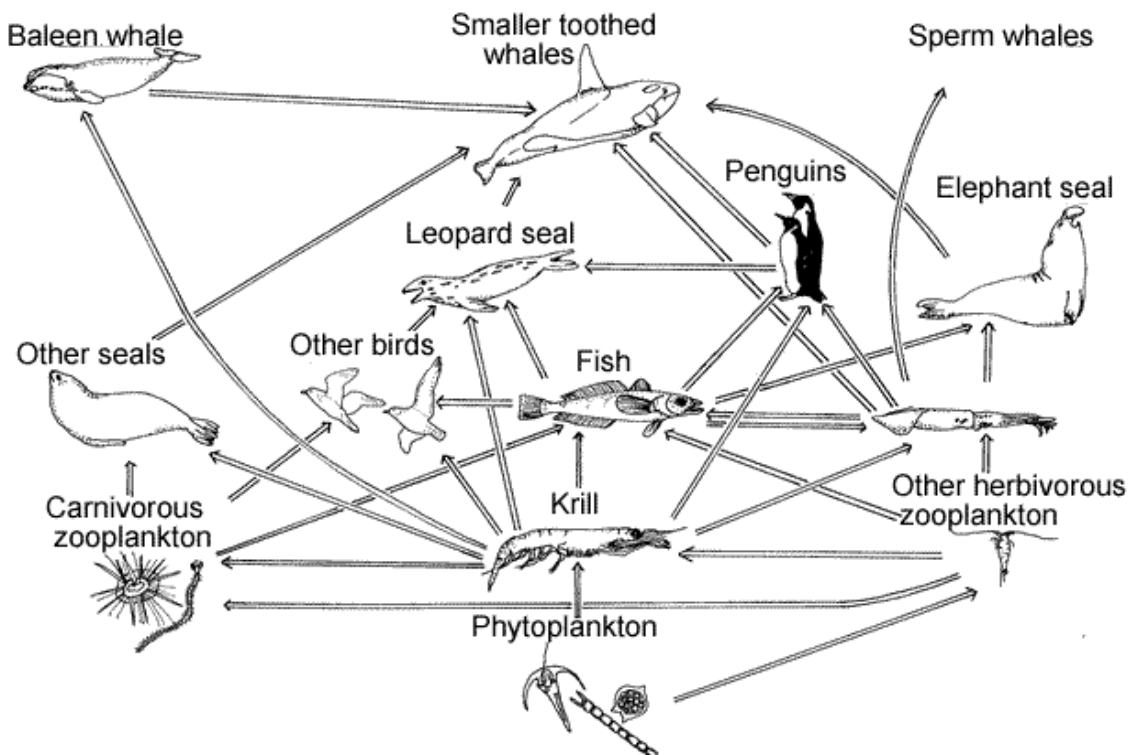
6. **food chain** – a single chain events from producer to consumers – a flow of energy

a. Know the trophic levels – primary consumer, etc

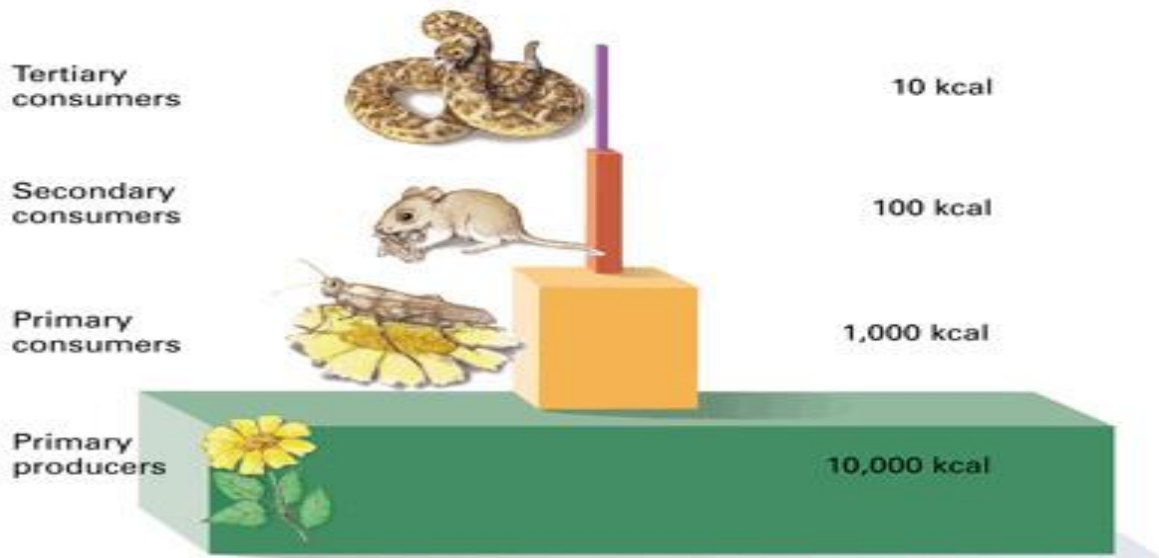
b. Arrow shows the flow of food energy – arrow points from the one being eaten to the one eating it.



7. **food web** – all the interconnected food chains in an ecosystem



8. **Pyramid** – shows flow of energy (or matter) – there is ALWAYS more biomass & energy at the bottom than at the top (NOTICE: each level only contains **10%** of the energy (and biomass) of the level below it – other 90% is used as heat which helps with body temperature)



Above is an energy pyramid. What it is showing is that the flower at the bottom has more energy and nutrients than the ones above it. Each of the ones above have only ten percent of the energy below it. This is trying to prove that if you were to eat the corn rather than let the cow eat it you would be getting more energy and nutrients that you would need to survive.

Plants

1. Nonmotile (can't move) so must find ways to adapt to the environment they are stuck in such as:
 - a. **Conserving water** (in a hot or arid(dry) environment: thin needlelike leaves (less surface area to lose water), deep roots, waxy coating (cuticle) covers leaves
 - b. **Maximize amount of sunlight** received: broad flat leaves for lots of surface area to absorb sunlight.

- c. **Seed dispersal:** to ensure survival of species, plants need to spread out as many seeds as possible – they don't want them all falling in the same location or they will all be competing for nutrients, water, soil
- i. Burrs – stick to animal fur or clothing and get carried away
 - ii. “Wings” or “Feathers” – allow wind to carry seeds
 - iii. Cones – protection of seeds
 - iv. Berries – animals eat seeds and “poop” them out later on in a different location

Answer for the “You Try It” section.

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Objective 4 - The student will demonstrate an understanding of the structures and properties of matter.

Fluids:

1. **fluids** = gases & liquids
2. **density** – how much mass is contained in a given volume –
 - a. A ratio so the size of the object doesn't matter – only what type of object it is
 - b. anything with a density less than 1 gram/ml will float in water, anything with a density more than 1 gram/ml will sink in water.
 - c. Items will float on any substance that has a greater density than the item
3. **viscosity** – resistance of a liquid to flowing (how “thick” the liquid is) – example: honey is more viscous than water
4. **buoyancy** – force that acts upward against the force of gravity – equal to the weight of the fluid displaced by the object – part of the reason objects will float on a liquid

Periodic Table: Label your PT with the information in the review powerpoint & this review sheet.

1. **group/family** – vertical column on periodic table
 - a. elements in same family will have similar properties due to same number of valence electrons
2. **period** – horizontal row on periodic table
 - a. **alkali metals**: very reactive metals, **Fr** is most reactive

- b. **halogens** – very reactive nonmetals, **F** is most reactive
- c. **noble/inert gases** – already stable so don't react/bond
- 3. **element** – cannot be broken down into another substance
 - a. **# of protons** = atomic number
 - b. All elements will gain, lose or share valence electrons so they end up with 8.
 - c. **Example:** a charge of +2 means an element has 2 extra valence electrons to donate to another element.
 - d. **Example:** a charge of -2 means an element is missing 2 valence electrons to have the stable number of 8
- 4. **compound** – elements that are chemically combined and cannot be separated except chemical means
 - a. **Writing formulas:** elements or ions will combine so that the sum of the positive & negative charges = zero

Classifying Matter

- 1. **mixture** – substances that are physically combined and can be separated easily
 - a. **homogeneous:** uniform throughout – solutions
 - b. **heterogeneous:** not uniform throughout
 - c. don't have chemical formulas since ratios vary
- 2. **Pure substances** – one type of matter
 - a. Have chemical formula to show ratio
 - b. Often called molecules
 - c. **Elements** – one type of matter – found on periodic table

d. **Compounds** – 2 or more elements chemically combined

Physical & Chemical changes

1. **physical change** – may change properties but will still be the same substance (have same identity)
 - a. phase change – ex: solid to liquid
 - b. cutting or crushing
 - c. weathering of rock
2. **chemical change** – changes into something new and different
 - a. rusting
 - b. cooking
 - c. digesting
 - d. burning
 - e. chemical reactions

Law of Conservation of Mass/Matter

1. sum of the mass of reactants must equal sum of the mass of products
2. mass/matter/energy cannot be created or destroyed
3. Equations are balanced to show that there are the same number of each kind of atoms on each side of the equation

Water

1. universal solvent
2. characteristics of water due to polarity - molecular structure of water = positive side & negative side
3. ice is less dense than liquid water so it floats on top – insulates organisms living in ponds, etc.

Properties of a solution

1. **solute** – gets dissolved
2. **solvent** – does the dissolving
3. **Solution** = solute + solvent
4. saturated, unsaturated, supersaturated
 - a. concentrations – amount of solute dissolved in solvent
5. **solubility** – ability of a substance to dissolve
 - a. effect of temperature – know the relationships
 - i. increasing temp = increasing solubility of most liquids & solids
 - ii. increasing temp = decreasing solubility of a gas in a liquid
 - b. effect of pressure
 - i. increasing pressure = increase in gas solubility in a liquid
 - ii. pressure has NO effect on the solubility of liquids & solids
6. Electrical Conductivity
 - a. more ions/charged particles/dissolved substances = more electrical conduction
7. pH
 - a. acid = pH below 7 forms H^+ ions
 - b. base = pH above 7 – forms OH^- (hydroxide ions)

Answer for the “You Try It” section.

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Objective 5 - The student will demonstrate an understanding of motion, forces, and energy.
Use the formula chart!

Concepts & Definitions:

1. Force = a push or pull
 - a. balanced force – produces no change in motion
 - b. unbalanced force – causes changes in motion
2. Work = using a force over a distance = measured in Joules
3. Friction = opposing force that causes an object to slow down & stop
 - a. Energy lost in the slow down = heat

Newton's Laws of Motion

1. **1st Law (of Inertia)** - An object in motion stays in motion and an object at rest stays at rest unless acted upon by an unbalanced force.
 - a. Inertia = a tendency of an object to keep doing whatever it has been doing.
 - b. More mass = more inertia
2. **2nd Law (of Momentum)** – The greater the mass of an object, the greater the force required to change its motion.
 - a. Force = mass x acceleration
3. **3rd Law (of Action & Reaction)** – For every action, there is an equal and opposite reaction.

Simple Machines

This section requires use of formulas both to solve calculations and to look at mathematical relationships.

Wave Concepts

1. Types of Wave

2. **Frequency**- the number of vibrations per second or the speed of the movement of the vibrating particles
 - a. Frequency = pitch of sound = color of light
3. **Amplitude** – the size of the movement of the vibrating particles
 - a. Amount of energy
 - b. Ex: increased amplitude = louder sound = brighter light
4. **Resonance** – vibration in one object causes a vibration in another nearby object
5. **Reflection**- bounce off barriers in regular ways
6. **Refraction**- waves can change direction when speed changes = bending of wave

Law of Conservation of Energy – Energy cannot be created or destroyed only converted/transformed.

1. Loss in one form = gain in an another form
2. A falling object speeds up as it falls to the ground; PE decreases as KE increases. The KE it has at impact = the PE it had before it fell.
3. Kinetic energy = energy of position = stored energy
4. Potential energy = energy of motion

Movement of Heat

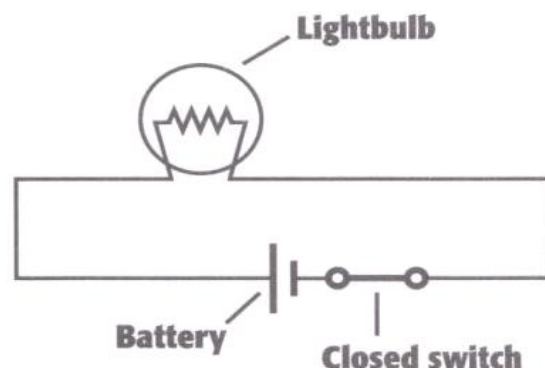
1. Conduction- direct contact
 - a. Example: a pot heating on a stove (solids), touching a hot object
2. Convection- heating by circulating fluids, (gas and liquid)
 - a. heating from a fireplace
 - b. feeling hot or cold air blowing
3. Radiation – heat from the sun

Energy Sources

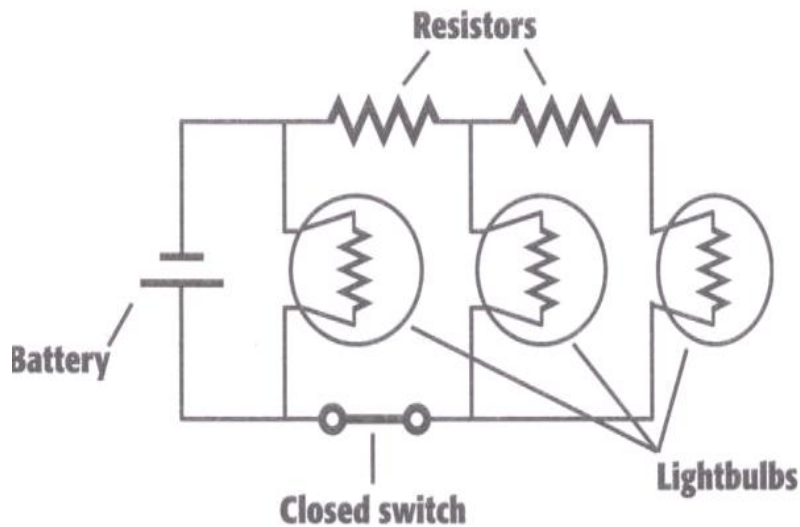
1. Nuclear Fusion occurs when two atoms combine to form a new element.
 - a. Example: The sun produces all of its energy through fusion
2. Nuclear Fission is the splitting of nuclei of large atoms such as Uranium and Plutonium
3. Fossil fuels increase pollution & acid rain.
4. Recycling conserves energy sources and natural resources.

Electrical Circuits

1. Series circuits are the most simple.
 - a. One (1) path for the current to travel.



- b. Contains an energy source, a path, and a load (something for it to do, like a lamp)
- 2. Parallel circuits provide more than one path for the current to travel.
 - a. Most circuits are parallel, since if one lamp goes out, the others can stay lit.



Answer for the “You Try It” section.

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