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Midterm Review

Review Sheet for “Lab Safety”

* You need to know examples of safe/unsafe lab situations
* You need to know when you would need to wear safety goggles
* **Volume** = the amount of space an object takes up
* **Volume** = length x width x height (cubic units)
* **Meter** = basic unit of metric length
* Kilometer = **1000** meters
* Know how to measure in centimeters and convert it to millimeters
* **Mass** = measured with a triple beam balance
* Know these steps of the Scientific Methods in order!
* State the problem
* Gather information
* State a hypothesis
* Perform an experiment
* Record and analyze data
* State a conclusion to prove/disprove hypothesis
* Repeat the work
* Know that a cubic centimeter is the same as a mL

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Review Sheet “Properties of Matter”

* Matter is anything that has mass and volume
* Specific properties of matter include color, shape, and size.
* The unit for mass is grams
* The unit for weight is Newtons
* Inertia is the resistance of an object to changes in motion
* Gravity is the force of attraction between objects
* Density is mass per unit volume
* The density of fresh water is 1.0 g/ml
* Objects that have a density greater than 1.0 g/ml will sink in water
* Objects that have a density equal to 1.0 g/ml will be suspended in water.
* Objects that have a density less than 1.0 g/ml will be float in water. (like ice!)

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Review Sheet “Phases of Matter”

* The 4 phases of matter are solid, liquid, gas and plasma.
* Solids have definite shape and volume.
* Liquids have no definite shape but definite volume.
* Gases have no definite shape or volume.
* Solid to liquid →→→ melting
* Liquid to solid →→→ freezing
* Gas to liquid →→→ condensation
* Liquid to gas →→→ boiling/evaporation
* Melting point of ice →→→ 0º C
* Gases →→→ most spread out and have more energy
* Solids →→→ packed close together and have little movement
* Physical changes don’t change substances into new substances
* If temperature increases →→→ the volume increases
* During a phase change, temperature doesn’t change but the amount of energy does change.

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Review Sheet “Heat Energy and Atoms”

* Energy in motion is kinetic
* The more you have of a substance the more thermal energy you have
* As temperatures get hotter…
  + molecules start to spread out
  + the particles get more kinetic energy
  + they get faster
  + go through thermal expansion
* Heat moves from hot to cold
* Insulators stop the flow of heat (Styrofoam)
* Conductors help the flow of heat (metals)
* There are 3 types of heat transfer:
  + conduction (touching)
  + convection (differences in densities in liquids or gases)
  + radiation (through space from the sun)
* Thermal Expansion is when a substance increases its size when the temperature gets hotter
* Proton = positive, located in the nucleus
* Neutron = no charge, located in the nucleus
* Electron = negative charge, located in the cloud outside nucleus
* Atomic number = protons
* Mass number = protons and neutrons

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Review Sheet “Atoms and Energy”

* Energy in motion is kinetic
* The more you have of a substance the more thermal energy you have
* As temperatures get hotter…
  + molecules start to spread out
  + the particles get more kinetic energy
  + they get faster
  + go through thermal expansion
* Heat moves from hot to cold
* Insulators slow the flow of heat (styrofoam)
* Conductors help the flow of heat (metals)
* There are 3 types of heat transfer:
  + conduction (touching)
  + convection (differences in densities in liquids or gases)
  + radiation (through space from the sun)
* There are 5 types of energy, which is the ability to do work:
  + heat (changes solids to liquids to gases)
  + chemical (stored in our food)
  + nuclear (splitting an atom; very dangerous!)
  + electromagnetic (light & electricity)
  + mechanical (anything moving or sound)
* Potential energy depends on height and weight (PE=w x h)
  + Elastic potential (stretched rubberband)
  + Gravitational potential (something at the top of a cliff)
* Kinetic energy depends on mass and velocity (KE = ½ m x v2)

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Review Sheet for “Motion”

* something in motion is compared to something stationary
* motion is a change of position of an object
* speed is not the same as velocity because it doesn’t include direction
* acceleration could one of these 3 things
  + speeding up
  + slowing down
  + changing direction
* things with larger masses have more inertia
* things with smaller masses have less inertia
* a force is a push or pull and is measured in Newtons
* forces come in pairs
* a force that goes opposite to motion and slows things down in friction
* there are 3 types of friction
  + rolling (something on wheels)
  + sliding (something pushed across the floor)
  + fluid (water OR air)
* speed is calculated by dividing the distance by the time
* Newton’s 1st Law: (law of inertia)
  + an object in motion will stay in motion until acted on by an unbalanced force
  + an object at rest will stay at rest until acted on by an unbalance force
  + an object will move at a constant velocity until acted on by an unbalanced force
  + you can’t put an object into motion without a force acting on it
* Newton’s 2nd Law:
  + force is equal to the mass times the acceleration
  + F = m x a
  + the greater the force, the more it will accelerate
* Newton’s 3rd Law: (action-reaction)
  + every action has an equal an opposite reaction
  + for example, Billy sitting on a chair with a 4 N force make the chair push back up with a 4 N force
* acceleration due to gravity is 9.8 m/s2
* an object falling through the air is opposed by air resistance