I. Definitions

1. Usage (what people say in general conversation)
2. Technical
A. Defined for a specific purpose.
B. Often defined for specific replicable reason
a. foot does not work in this way
b. "Newton" does: "newton" is a measure of force. It is defined as "the force required to accelerate an object with a mass of 1 kilogram 1 meter per second".
3. SI Terms
A. technical and "approved" terms in the International System of units.
II. Temperature: speed of atoms or molecules
4. Measurement
A. device is thermometer
B. Different scales
a. Fahrenheit
b. Celsius
c. Kelvin
d. Rankine
e. Vary by definition of 0 degrees and size of degree
III. Heat - deals with the transfer of energy
5. Measurement
A. Calorimeters are one way
B. measured in joules (SI)
a. other units are BTUs (British thermal units; calories)
C. definitions
a. calorie is amount of heat needed to raise 1 gram of a substance 1 degree Celsius
b. the specific heat of a substance is the amount of calories it takes to raise 1 gram of the substance 1 degree Celsius. 1 calorie (cal) $=4.184 \mathrm{~J}$
D. Latent and sensible heat
a. latent heat cannot be measured with thermometer since it involves no change in temperature but is involved with the changing of the phase of water. (Ice->liquid->gas and back). Important source of energy in thunderstorms
b. ice->liquid->gas involves getting heat. Gas->liquid->ice involves losing heat.
c. energy used to break bonds, not increase motion.
d. sensible heat registers on a thermometer.

## IV. Energy

1. Heat is one kind of energy.
2. Kinetic and potential energy
a. kinetic energy is energy of movement $\left(\mathrm{KE}=1 / 2 \mathrm{mv}^{2}\right)$
b. potential energy deals with gravity $(\mathrm{PE}=\mathrm{mgh})$ Where m is the mass, g is the acceleration of gravity and h is the height.

V . Some terms of motion

1. speed - how fast something is moving (miles per hour, kilometers per hour)
2. acceleration: How fast the speed in increasing (miles per hour per hour, kilometers per hour per hour)
3. Nautical miles $=1 / 60$ of a minute on a meridian
a. knot $=$ about 1.15078 statute miles or 1,852 meters
b. knot $=$ nautical miles per hour. "Knots per hour" is acceleration.
VI Force
4. SI term is "Newtons"
a. definition: One newton is the force needed to accelerate one kilogram of mass at the rate of one meter per second squared in the direction of the applied force.

## VI Pressure:

1. barometer is used
a. SI term for measurement is "pascals" Pascals $=\mathrm{N} / \mathrm{m}^{2}$ Where $\mathrm{N}=$ newtons and $\mathrm{m} 2=$ square meters
b. conversions: One Pascal $=0.000145038$ pound force per square inch.
c. other conversions: $\mathrm{TM}=1.01325 \mathrm{bar}=760 \mathrm{Torr}=760 \mathrm{~mm}$ of $\mathrm{HG}=76 \mathrm{~cm}$ of HG .
d. other common terms, millibars; atmospheres; inches of mercury (hg); pounds per square inch

VII Heat transference:

1. Conduction
a. heat moves through physical contact
2. Convection
a. hot atoms are carried by macroscopic currents carrying energy with them
3. Radiation
a. atoms emit or absorb electromagnetic energy
VIII. Electro magnetic spectrum
4. Has different wave lengths measure from crest to crest.
a. longer wavelengths have less energy than shorter ones
b. a small part of the spectrum can be seen by people (visible light)
5. Everything emits radiation
a. clouds reflect infra red radiation radiating from earth.
b. greenhouse effect. Keeps Earth warmer
IX. Most energy comes from the sun.
6. Earth is an average of $93,000,000$ miles from the sun
7. has an elliptical orbit
8. axis is tilted at 23.5 degrees
X. Changes over time
9. orbit become more elliptical and then less elliptical
10. degree of tilt varied within a few degrees
11. Earth wobbles like a top that is slowing down.
XI. Annual changes and related events
12. seasonal changes
a. solstices, equinoxes
XII. Latitude determines how much direct or indirect sunlight arrives 1. sun appears overhead only from 23.5 degrees S to 3.5 degrees N
A. tropic of Cancer and Capricorn respectively
B. All other places get oblique light
C. Above the arctic and Antarctic circle there are days with no light and days with no darkness.
