

**Everything I need to know to pass the NYS  
8<sup>th</sup> Grade Science Assessment!**

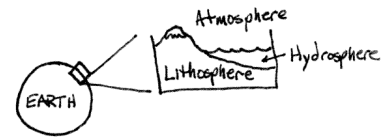
*(Intermediate Level Science)*

## Earth Science

1. Lithosphere: the earth's rock ("land") layer

Hydrosphere: the earth's water layer. Includes ice and snow.

Atmosphere: the earth's air layer.

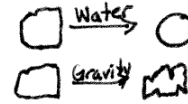


2. Erosion: **moving** rock sediments.

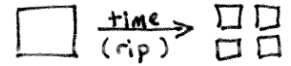
Gravity, wind, water, and glaciers are forces of erosion.

Wind and moving water make sediments round in shape.

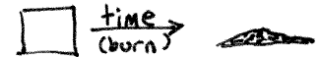
Gravity and glacier makes sediments that are angular.



3. Physical weathering: breaking down and keeping the same substance.  
ex: ripping paper, tree root action.



4. Chemical weathering: breaking down and forming a new substance.  
ex: burning paper to ash, rust



5. The crust is the outer layer of the earth. The ocean crust is thinner than the continental crust.



6. The crust of the earth is broken into large pieces called "tectonic plates".

7. Earthquakes, volcanoes, and faults (crack in the earth's crust) are found near plate boundaries.



8. The mantle is the earth's second layer. The mantle is magma which moves in currents, causing the tectonic plates to move.

9. The outer core is the third layer and is a liquid.

10. The inner core is the forth layer and is a solid, due to VERY extreme pressure.

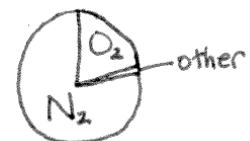
11. All the continents fit together as one super continent called Pangaea.



12. Weather is the daily conditions of the atmosphere. Climate is the yearly average of the daily weather.

13. The layers of the atmosphere are troposphere, stratosphere, mesosphere, and thermosphere. The troposphere is the only layer that has water.

14. The atmosphere contains 78% nitrogen, 21% oxygen, and 1% other.

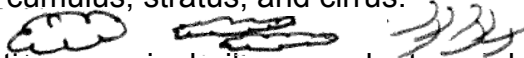


15. Air temperature is measured with a thermometer.

16. Air pressure is measured with a barometer.

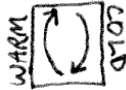
17. Wind is caused by the uneven heating of the earth's surface. We name wind by the direction in which it came **from**.

18. The three cloud types are cumulus, stratus, and cirrus.



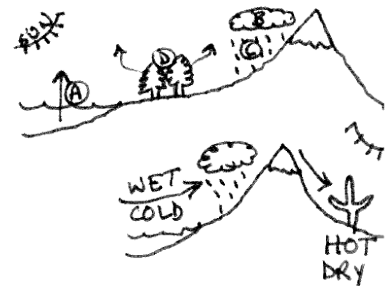
19. The five forms of precipitation are rain, hail, snow, sleet, and drizzle. We measure rain with a rain gauge.

20. Warm air rises, cold air sinks.



21. The water cycle contains the processes of evaporation, condensation, (B) precipitation (C) and transpiration. (D)

(A)



22. Climate is affected by latitude, bodies of water and mountains.

23. The windward side of the mountain is near the body of water, receives wind and clouds. The leeward side of the mountain has very little wind and a drier climate.

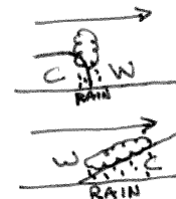
24. An air mass gets its characteristics from the area it's formed over. The four main conditions are polar (cool), tropical (warm), continental (dry), and maritime (moist).



25. High pressure systems bring dry weather and clear skies. Low pressure systems bring cloudy and damp weather.

High + Dry

26. A cold front is when a cold mass pushes a warm mass. A warm front is when a warm mass pushes a cold mass. Precipitation is found along fronts.



27. Isotherms connect points of equal temperatures.

28. Isobars connect points of equal air pressure.



29. Greenhouse effect: Trapped CO<sub>2</sub> in the atmosphere increases global warming.

30. Rotation is to spin on its axis.

Earth's Rotation rate is 15 degrees per hour or 360 degrees in 24 hours.

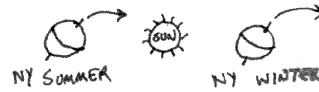
$$\frac{360^\circ}{24 \text{ hrs.}} = 15^\circ/\text{hr}$$

31. Revolution is to orbit around the sun.

Earth's revolution rate is 1 degree/day or about 360° in 365 days (1 year).

$$\frac{360^\circ}{365 \text{ days}} \approx 1^\circ/\text{day}$$

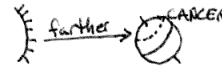
32. The main reason for seasons is the tilt of the earth.



33. Winter (N Hemisphere), tropic of Capricorn tilted towards sun.  
*and we are closer to sun.*



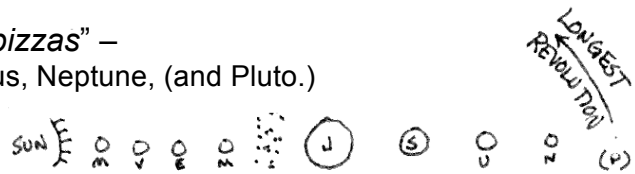
34. Summer (N Hemisphere), tropic of Cancer tilted towards sun  
*and we are farther from the sun.*



36. To remember the planets:

*"My very educated mother just served us nine pizzas" –*

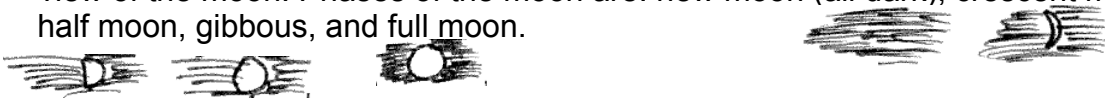
Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune, (and Pluto.)



37. Asteroid belt separates the small solid plants  
from the giant gaseous planets. It is between Mars and Jupiter.

38. The Moon orbits the Earth and spins on its axis at same rate of 29 ½ days. Rotation =  
revolution. (the same side of the moon ALWAYS faces earth.)

39. The phases of the moon are the apparent changes in the shape caused by the earth's  
view of the moon. Phases of the moon are: new moon (all dark), crescent moon,  
half moon, gibbous, and full moon.



40. If the "bright is on the right" the moon is waxing, or getting larger.  
Otherwise, the moon is waning or getting smaller.

41. The earth's tides are primarily caused by the moon's gravity and are cyclic.

42. An eclipse occurs when the earth, sun, and moon line up.

A lunar eclipse occurs when the moon passes through the earth's shadow. ,  
eclipse occurs when the moon casts its shadow on the earth.



43. In space, a rock is called a meteoroid, in the atmosphere it's a meteor  
and on earth's surface it's a meteorite.

44. The earth is in the solar system which is in the Milky Way galaxy which is in the universe.  
Planet → Solar System → Galaxy → Universe.



45. Hydrogen (H) is the main fuel of the sun, H + H = Helium (He). This is called nuclear  
fusion.



46. All rocks are composed of minerals.

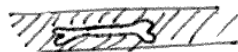
47. Physical properties of minerals are tested by streak, hardness, luster, cleavage, and color.  
Chemical properties of minerals are tested by the acid test.

48. Hot liquid rock below the crust is called magma and above the crust is called lava.

49. Rocks are classified by how they are made. There are 3 types: igneous, sedimentary and metamorphic. Any rock can be changed into another type if it goes through the right processes.

50. Igneous rock is made by cooling magma.

51. Sedimentary rocks are made by the compression and cementation of sediments. They are classified by the size of their sediments. This is the only rock type that can contain a fossil.



52. Metamorphic rocks are any rocks exposed to magma causing heat and pressure.

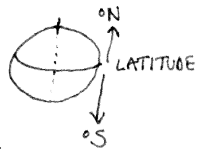
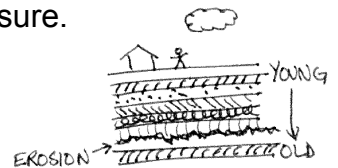
53. The rock cycle shows how any rock can be turned into any rock.

54. Rules for sequencing the history of rock layers are:

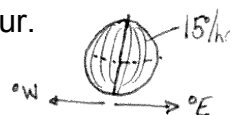
Layers form horizontally.

If not overturned, the oldest is on the bottom and the youngest on the top.

A wavy line indicates erosion.



54. Latitude lines are North and South and never touch. Longitude lines are east and west and meet at the poles. They also separate time zones which equals  $15^\circ$  per hour.



55. Contour lines connect equal points of elevation.

The rules for contour maps are:

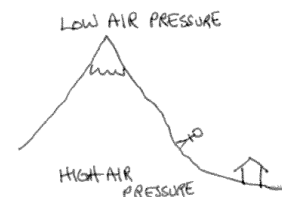
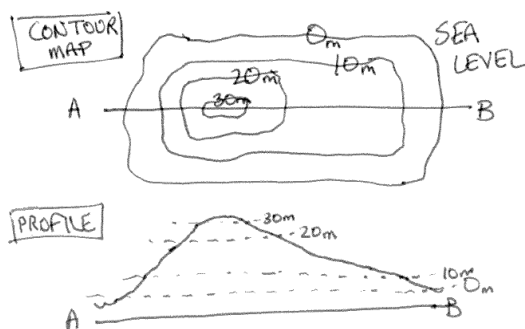
The contour interval is the space between contours lines.

The closer the lines the steeper the slope.

Sea level is 0, lowest elevation ends with a 1 and highest elevation ends with a 5 or 9.

56. A profile is a side view of a contour map.

57. As you increase elevation or altitude, air pressure decreases.



## LIFE SCIENCE

### 1. Cells are the basic unit of living things:

cells → tissues → organs → systems → organisms.

### 2. Organisms must carry out the following life processes: nutrition, transport, respiration, excretion, regulation, reproduction, and growth.

### 3. All cells have the following organelles:

Nucleus: Control center of cell, contains DNA

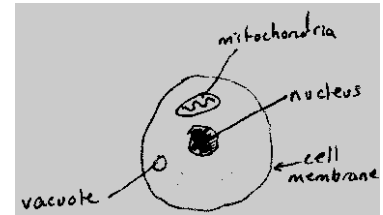
Mitochondria: powerhouse of cell, makes ATP for energy

Vacuole: storage

cell membrane: controls what goes in and out of cell

cytoplasm: fluid that contains organelles

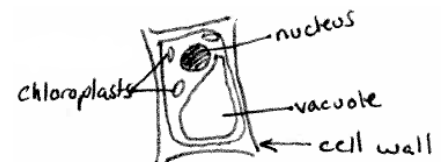
ribosome: site where proteins are made



### 4. Plant cells also have the following organelles:

Cell wall: supports and protects cell

Chloroplasts: contains chlorophyll for photosynthesis.



### 5. Nutrition consists of ingestion, digestion and excretion.

### 6. The following nutrients are important:

proteins – growth and repair

carbohydrates - quick energy,

fats and oils – stores energy

vitamins and minerals – assists in the life processes.



### 7. Sun: main source of energy for plants, animals and humans.

### 8. Asexual reproduction needs ONE parent and produces offspring that are genetically identical to that parent. Types include binary fission, budding, regeneration

### 9. Metamorphosis: A change in form as an organism develops.

Incomplete metamorphosis: immature looks like adult (grasshopper)

Complete metamorphosis: immature does not look like adult (butterfly, frog)

### 10. A compound microscope uses two lenses to view small objects.

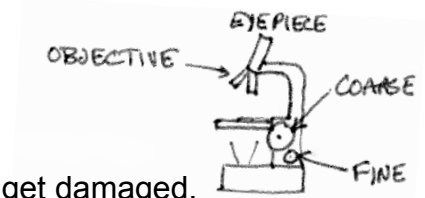
Eye piece X objective lens = total magnification.

### 11. The coarse focus should only be used with low power so lenses don't get damaged.

### 12. A stain is used to see clear objects in the field of view.

### 13. Object viewed through microscope appears upside down and backwards.

### 14. Cancer is abnormal cell division.



15. A response to a stimulus is the way we respond to a change.
16. Responses can be involuntary (heart rate increases) or voluntary (you blink your eyes)

17. Physical adaptations enable us to survive.

ex. birds having hollow bones or owls seeing at night.



18. Animals species adapt to their environment or habitat over time. Example: a polar bear having transparent fur or cactus with waxy skin.
19. Changes in an organism's environment can cause them to become endangered or extinct.
20. An ecosystem is where living and non-living interact. Sun = energy source.

Species → population → community → ecosystem.

21. Organisms get energy from the food they eat.

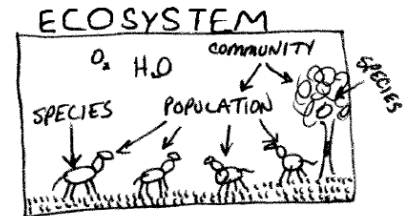
Producers are plants, make their own food (photosynthesis)

Consumers eat other organisms

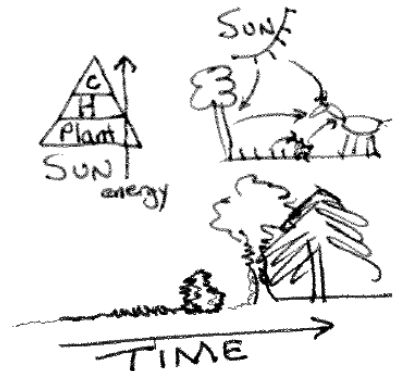
Herbivores eat plants

Carnivores eat animals

Omnivore eats plants and animals.



22. More than one food chain makes a food web.  
Food pyramid shows energy being passed.  
Producer level at bottom has most energy. Only 10% is passed up,  
Rest is used in life processes or lost as heat.



23. Ecological succession is when one community is replaced with another until climax community (most stable) is achieved.
24. Pioneer species are the first to grow in an area.
25. Primary succession occurs where there is no soil (on bare rock). Pioneer species are lichens. Secondary succession occurs where soil exists – after a forest fire or in an abandoned field. Pioneer species are annual weeds.
26. Symbiotic relationships are how living things interact.  
Mutualism: both benefit (clown fish and sea anemone)  
Commensalism: one benefits, other is unharmed (barnacles on whale)  
Parasitism: one benefits, other is harmed (fleas on a dog)
27. Renewable resources (can be recycled) water, solar, wind, and soil.  
Non-renewable resources (can't be recycled) fossil fuels ex. Coal, oil, gas
28. Living things are classified based upon their characteristics.

King Phillip Called Out For Goopy Spaghetti:

Kingdom → Phylum → Class → Order → Family → Genus → Species.

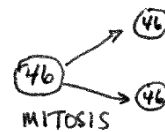
The further you go down the groups, the more they have in common or are related.

## 29. 6 Kingdoms:

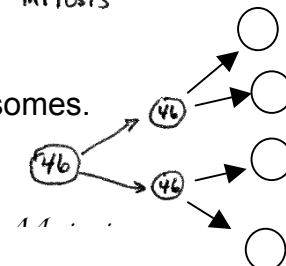
2 are prokaryotic (no true nucleus): Archaeobacteria, Eubacteria

4 are Eukaryotic (have a true nucleus): Protists, Fungi, Plants, Animals

30. Mitosis – cell division produces 2 cells with same number of chromosomes.  
Used for growth, repair, replacement. All body cells.



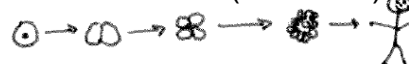
Meiosis – cell division that produces 4 cells with half the number of chromosomes.  
Used ONLY in formation of gametes (sperm and egg)



31. Fertilization: Joining of Sperm + egg. Produces a zygote.



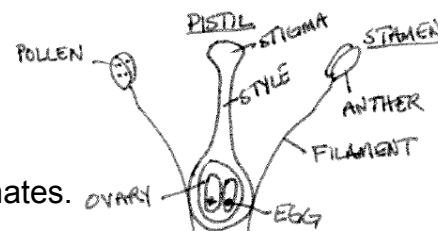
Zygote develops into an embryo through cleavage and differentiation (MITOSIS)



32. Female parts of the flower: pistil → stigma + style + ovary (egg)

Fertilized egg becomes a seed

Male parts: stamen → anther + filament and pollen (sperm)



33. Pollination – when pollen fertilizes the egg.

Self-pollination – flower has both male and female parts-self pollinates.

Cross-pollination – flower pollinates another flower.

34. Seed dispersal spreads the seeds by wind, animal, and explosion.

35. A trait is determined by the genetic material on your genes.

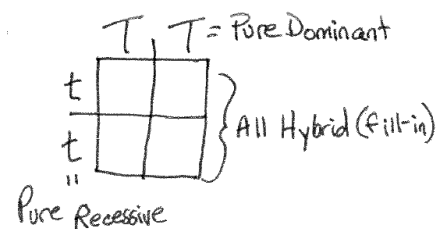
Dominant – trait that is showing

Recessive – not showing.

Punnet square shows probability.

Pure – same TT or tt

Hybrid – Tt

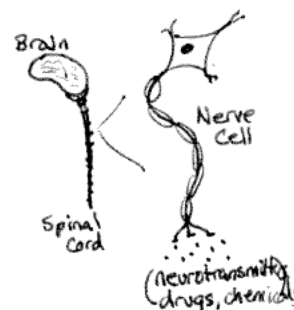
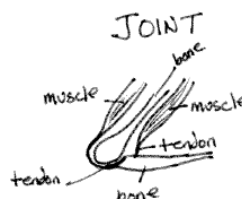


36. Evolution: a species' gradual change over time.

Evidence of evolution includes fossil record, DNA, embryonic similarities

37. The skeletal system supports the body.

Consists of bones, cartilage, joints,  
ligaments – bone to bone  
tendons – bones to muscle.





38. Muscular system – moves organs and body parts.

Voluntary - you control ex: walking.

Involuntary – no control. ex: heart beating

39. Regulatory consist of both nervous and endocrine together.

40. Nervous system – controls body activities. It contains the brain, spinal cord, nerves and sense organs. Neurons are nerve cells.

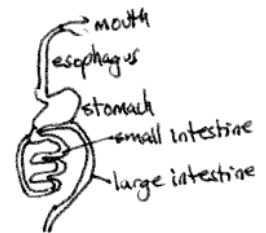
Sensory neurons gather information

Motor neurons make things (muscles) move

41. Endocrine system regulates body activities with hormones secreted by the glands.

42. Digestive system breaks down food. It contains the digestive tract and organs – pancreas, gall bladder, and liver.

43. Two types of digestion are physical and chemical digestion.



44. Circulatory system transports materials. It consists of heart and blood vessels.

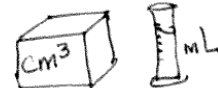
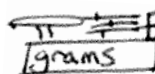
45. Respiratory system exchanges gases with the environment. It contains the respiratory tract to your lungs which end in air sacs. Gas exchange takes place between sacs (alveoli) and capillaries.

46. Excretory system removes wastes from the body. It contains the lungs, skin, kidneys – makes urine and liver- makes urea.

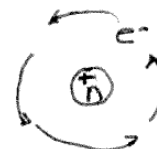
47. Reproductive system produces offspring. Males testes makes sperm and testosterone and female ovaries makes eggs and estrogen.

# PHYSICAL SCIENCE

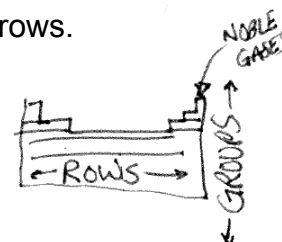
1. Matter is anything that has mass and takes up space.
2. Mass is the amount of matter in an object. (measured in grams)
3. Volume is the amount of space an object takes up. (measured in liters or  $\text{cm}^3$ )
4. The 4 common phases (states) of matter are solid, liquid, gas and plasma.
5. The phase changes are melting and evaporation (where it gains heat) and condensation and freezing (where it loses heat).



6. Elements are the basic building blocks of matter.
7. An atom is the smallest particle of an element.
8. A compound is two or more elements.  
In the formula for a compound, each element is capitalized:  $\text{H}_2\text{O}$

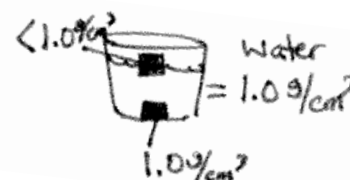


9. The parts of an atom are protons (+), electron (-), and neutron (no charge – neutral).
10. Protons and neutrons are found in the nucleus and the electrons are found moving around the outside of the nucleus.
11. Elements are organized by their properties on a periodic table.  
Groups (or families) are the vertical columns and periods are the horizontal rows.



12. Metals are on the left side and non-metals are on the right side.  
They are separated by a staircase of metalloids.  
Noble gases are the last group on the right.
13. The smallest part of a compound is called a molecule.
14. The smallest part of an element is an atom.
15. Mixtures are when two or more substances are not chemically combined. (Salt water)

16. Density is mass divided by volume. The density of water is  $1 \text{ g/cm}^3$ .  
If an object has a density more than  $1 \text{ g/cm}^3$ , it will sink in water  
If less than  $1 \text{ g/cm}^3$  it will float in water, called buoyancy.



17. Physical changes alter the size and shape but do not change the substance (ex: melting ice).  
Chemical changes create a new substance (ex: frying an egg).

18. A force is a push or pull
19. Force is measured in Newtons.

20. Weight is the amount of gravitational pull on an object. It will change when gravity changes (when you go to the moon). Mass stays the same.

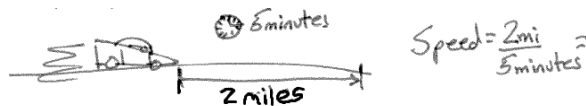


21. The 3 ways to describe the motion of an object are

speed (distance / time)

velocity (distance / time with a direction)

acceleration (final velocity – starting velocity / time).

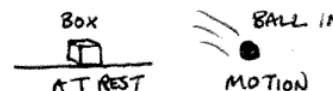


22. Newton's laws of motion:

1<sup>st</sup> – an object at rest will stay at rest and an object at motion will remain in motion, unless an outside force acts on the object-inertia

2<sup>nd</sup> - Acceleration = Force / Mass or Force = Mass X Acceleration

3<sup>rd</sup> – For every action there is an equal and opposite reaction



23. Work = Force X Distance. Measured in Joules.



24. A machine transfers mechanical energy.

25. The resistance is the force it must overcome and the effort is the force applied.

Fulcrum is the pivot point.

26. The six simple machines are:

lever

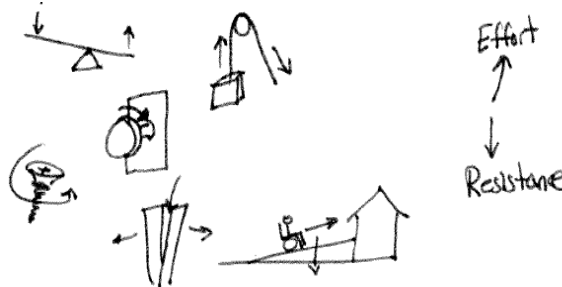
pulley

wheel and axle

screw

wedge

inclined plane.

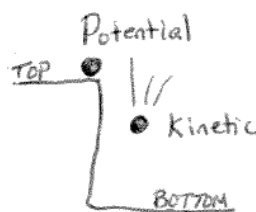


27. Friction reduces the efficiency of a machine.

28. Energy is the ability to do work.

Potential energy – stored energy

Kinetic energy – energy of motion.



29. The six forms of energy are: mechanical, chemical, nuclear, heat, electrical, and light.

30. The law of conservation of energy states that energy cannot be created or destroyed, only changed from one form to another.

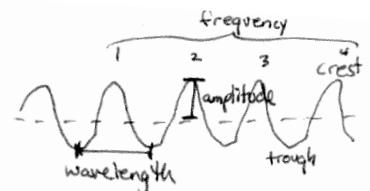
31. Light travels as an electromagnetic wave. It does not need a medium to travel through.

32. Sound is a mechanical wave and must have a medium to travel through.

33. Wavelength is the distance from crest (top) to crest or trough (bottom) to trough.

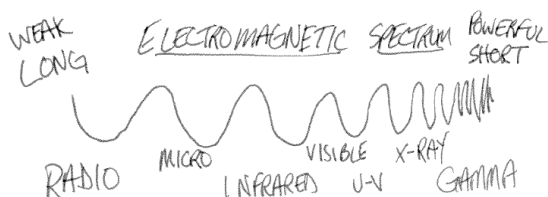
Amplitude – is the height of the wave.

Frequency – number of waves that pass a given point in a second.



34. The two main types of waves are transverse and longitudinal. Electromagnetic waves are transverse, mechanical waves are longitudinal.

35. The electromagnetic spectrum shows the range of EM waves. Low energy and long wavelengths are radio, microwave, and infrared waves. Visible light is in the middle. High energy and short wavelengths are ultraviolet, x-ray and gamma rays.



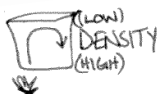
36. Heat is transfer of thermal energy. More thermal energy increases the amount of movement of molecules in a substance. The addition of heat causes expansion and the loss of heat causes contraction. Heat travels from warm to cold.

37. The 3 ways thermal energy is transferred:

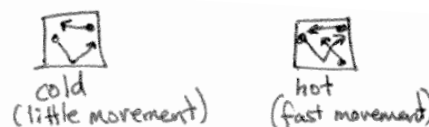
radiation – space



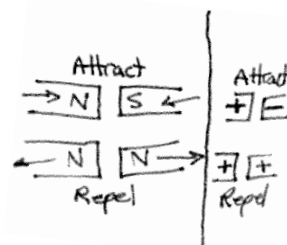
convection – fluid (liquid or gas)



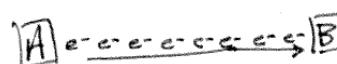
conduction – touching molecules (solid)



38. Magnetic poles: opposite charges (+, -) attract.  
The closer the distance, the stronger the force.



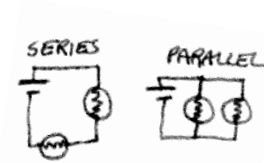
39. Electricity is produced by the flow of electrons from one point to another.  
Conductors allow electricity to flow, insulators do not.



40. Two types of electric circuits: series circuit – single path

parallel circuit – two or more paths.

A circuit must be complete to transfer electricity.



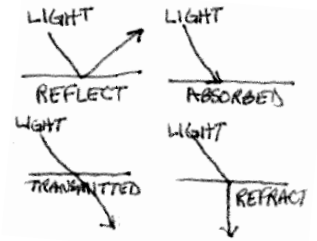
41. If one bulb blows out, the rest of series circuit dies.

42. If one bulb blows out, the rest of a parallel circuit still works.

43. Sound is produced by a vibrating object. The speed of sound depends on the density of the substance. The denser, the faster it moves. Sound travels faster through solids.

44. Light is a visible form of energy that travels in paths called rays.

Light can be reflected (bounced off), absorbed (taken in), or transmitted (go right through).



45. Refraction is the bending of light. Ex: A pencil in a glass of water looks bent.

46. Dark colors and rough surfaces absorb more light.



47. Concave lens curves inward and a convex lens curves outward.

48. A Calorie is the unit for measuring energy in food and fuel.

49. Renewable energy: water ("hydro"), solar, wind, biomass and geothermal.

Non-renewable energy: (can't be replaced) fossil fuels, nuclear (Coal, oil, gas)

50. Hydroelectric energy is electricity produced by the power of flowing water.

Ex: Niagara Falls

51. Nuclear energy is energy stored in the nucleus of an atom.

Ex: splitting uranium releases heat energy.

It creates thermal pollution and nuclear waste.



52. Problems with fossils fuels: pollution, acid rain, lung disease, oil spills, and the greenhouse effect.

53. Conservation means the saving of natural resources through wise use.