

## Chemistry Review Answers

## 1. Particle Theory

1. All matter is made up of particles.
2. Particles are always moving.
3. Generally, particles at higher temperatures move faster than those at lower temperatures.
4. Each pure substance has its own kind of particle.
5. Particles attract each other.

2.
  - a. heterogeneous - more than one type of particle is visible (2 phases or more)
  - b. homogeneous - only one type of particle is visible (1 phase)
  - c. mixtures - more than one type of particle is present
  - d. pure substances - only one type of particle is present (elements & compounds)
  - e. mechanical mixtures - more than one type of particle is visible (2 or more phases)
  - f. solutions - more than one type of particle is present but they are uniformly scattered (salt in water)
  - h. compound - a pure substance in which two or more elements are chemically combined in definite proportions
  - g. element - a pure substance made up of one type of particle (on the periodic table)

3.
  - a. <sup>pure</sup> water - compound      ocean water - solution
  - b. kool-aid - solution
  - c. <sup>clean</sup> air - solution
  - d. lemonade - mechanical mixture
  - e. oil and vinegar - mechanical mixture
  - f. carbon - element
  - g. lithium chloride - compound
  - h. carbon dioxide - compound

4. Physical changes - the particles have not changed  
 Chemical changes - usually cannot be reversed ; new substance with new <sup>properties</sup> produced  
 - 5 indicators: colour change, bubbles are produced, a precipitate forms, heat is produced or absorbed, and new particles with new properties., new smell

## 5. Identify each of the following as physical(P) or chemical changes(C).

- a. ink from a pen dries on paper      P
- b. a cake is baked in an oven      C
- c. potatoes are boiled in water for 20 minutes      C
- d. vinegar is poured into a metal pail and the pail corrodes      C
- e. a tree is chopped into firewood      P
- f. silverware gets darker after using it to eat eggs      C
- g. a bottle of pop is opened and bubbles are produced by the liquid      P
- h. Shredding a piece of paper.      P
- i. Silver tarnishes over time when it is exposed to air.      C
- j. When baking soda and vinegar is mixed, the mixture "fizzes".      C
- k. A marshmallow is toasted over a bonfire.      C
- l. Water vapour in the atmosphere cools and condenses to form a cloud.      P

6. A physical property describes the attributes of an object. Quantitative properties describe measurements (mass, density, length, etc.); qualitative properties are descriptions using your senses. (colour, lustre, smell)
7. A chemical property describes how a substance reacts with other substances.
8. Carbon dioxide - extinguishes flame (more dense than air) *burning splint goes out*  
 Oxygen - relights flame (more dense than air) *glowing splint relights*  
 Hydrogen - explosive (less dense than air) *burning splint "pops"*
9. The smallest part of a compound is called a molecule. The smallest part of an element is called an atom.
10. a. 3 carbons + 8 hydrogens = 11 atoms total  
 b. 4 carbons, 16 hydrogens + 4 oxygens = 24 atoms  
 c. 3 magnesiums, 2 phosphorus, 8 oxygens = 13 atoms

11.

	State	Appearance	Conductivity	Malleability and Ductility
Metals	- solids at room temperature, except for mercury (liquid)	- shiny lustre	- good conductors of heat and electricity	- malleable and ductile
Non - Metals	- some gases at room temperature - some solids - only one liquid (bromine)	- not very shiny	- poor conductors of heat and electricity	- brittle - not ductile
Metalloids	- solids at room temperature	- can be shiny or dull	- may conduct electricity - poor conductors of heat	- brittle - not ductile

12. Bromine and Mercury are the only elements that are liquids at room temperature. Most elements are in solid form.
13. The columns of the periodic table are known as groups or chemical families. All of the elements in a column have similar chemical properties. The rows of the periodic table are known as periods.
- 1 - Alkali Metals - very reactive, 1 valence electron, soft metals  
 2 - Alkaline Earth Metals - quite reactive, harder than Gp. 1, 2 valence electrons  
 17 - Halogens - reactive non-metals, 7 valence electrons  
 18 - Noble Gases - unreactive gases, full outer energy levels
14. Electrons (very small particles found in an electron cloud around the nucleus) have a negative charge. Protons (larger particles found in the nucleus) have a positive charge. Neutrons (larger particles found in the nucleus) have a neutral charge.
15. An ion is a charged particle that has lost or gained electrons to become stable. Noble gases (Gp. 18) do not form ions. Negative ions gain electrons and positive ions lose electrons.

16. Explain the differences between the two types of bonding: ionic and covalent.

3

Characteristics	Ionic compound	Covalent compound
Types of atoms involved: - Metals, non-metals?	Metal <u>and</u> Non-metal	2 non-metals
Structure: Are the electrons: - Shared, transferred?	Transfer electrons	Share electrons
Properties: - Dissolves in water? - Conducts electricity? - other properties?	Dissolves in water Conduct electricity when dissolved	Not soluble in water Do <u>not</u> conduct electricity
Type of bond: - Ionic, molecular?	Ionic bonds	Molecular bonds

17. Identify the type of bonding for the following compounds.

Compound formula	Ionic (I) or Molecular (M)
MgF <sub>2</sub>	I
H <sub>2</sub> O	M
Al <sub>2</sub> S <sub>3</sub>	I
CO <sub>2</sub>	M

18. The columns of the periodic table are known as family or group, while the rows of the periodic table are known as periods. All of the elements in a column have similar properties.

19. For the elements Potassium and Oxygen, write down the atomic number, the mass number, the number of electrons, the number of protons, the number of neutrons, the number of electron shells, the number of valence electrons and the charge it has when stable.

	Potassium	Oxygen
Atomic number	19	8
Mass number	39	16
No. Of Electrons	19	8
No. Of Protons	19	8
No. Of Neutrons	20	8
No. Of Electron Shells	4	2
No. Of Valence Electrons	1	6
Charge When Stable	+1	-2

20. a) Draw Bohr diagrams for the elements Nitrogen, Argon and Calcium. Include the number of protons, neutrons, electron shells, and electrons.  
b) Draw Lewis electron dot diagrams for Nitrogen, Argon and Calcium.

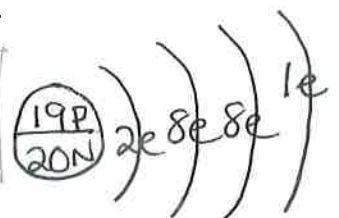
40  
18 Ar



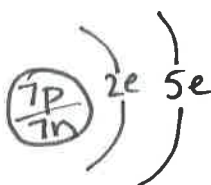
12  
6 C



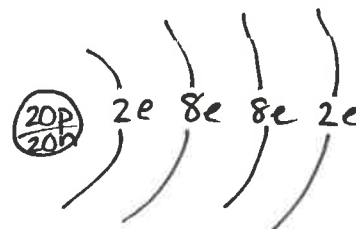
39  
19 K



14  
7 N



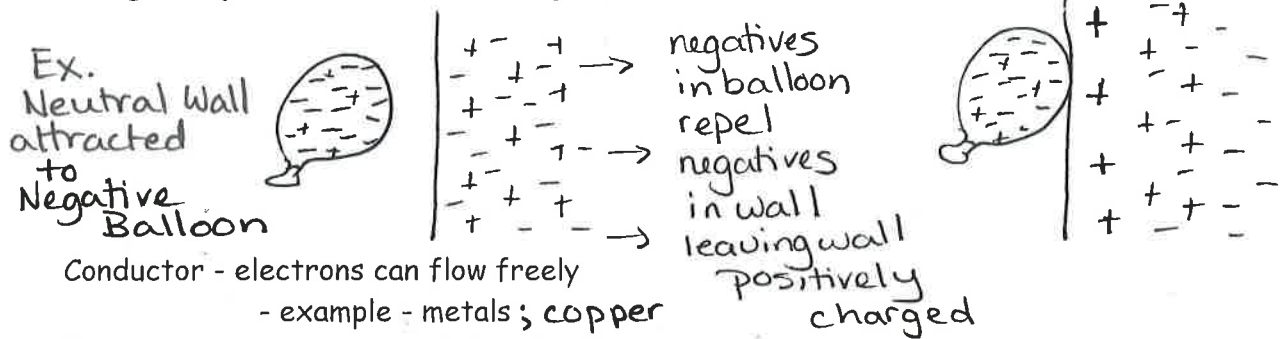
40  
20 Ca



21. Why are groups 1 and 17 the most reactive families on the periodic table? only need to lose or gain one electron to have a full shell.
22. What is matter? anything that has mass & takes up space.
23. What are the flame test colours for copper, lithium and sodium? 4.
- Copper - green  
Lithium - pink  
Sodium - orange

### Electricity Review Answers

- (Electrostatics) Static electricity; caused by friction
- Negative charges - surplus of electrons (gain electrons)  
Positive charges - deficit of electrons (lose electrons)  
Neutral charges - equal number of electrons and protons
- Opposite charges attract.  
Like charges repel.  
Charged objects attract neutral objects.



- Conductor - electrons can flow freely  
- example - metals; copper
- Insulator - electrons cannot flow freely  
- example - non-metals; rubber

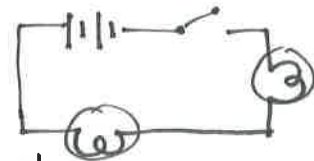
- "Grounding" occurs when an object is neutralized by the ground.

#### Lightning:

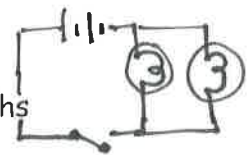
Excess negative charges build up on the bottom of a cloud inducing a positive charge on the neutral ground below. The excess charges then travel to the ground in the form of lightning.

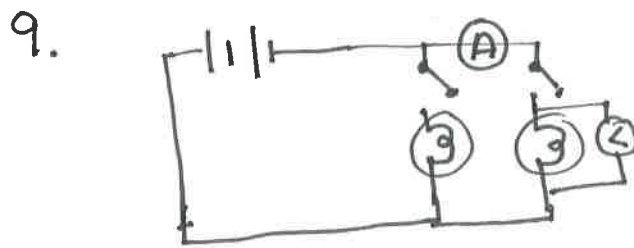
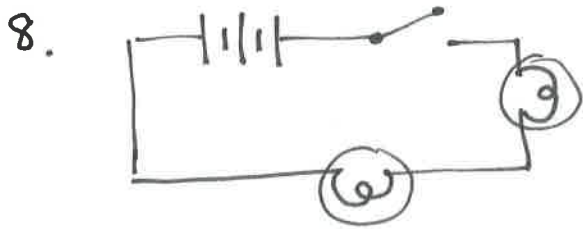
- Current is the flow of electrons past a point in a circuit in a second. Potential difference is the amount of energy gained or lost between two points in a circuit. Resistance occurs when electrons give off their energy due to different factors in the conductor they are flowing through.

- Series Circuits
  - one path
  - voltage is shared evenly
  - current is the same everywhere
  - one light goes out, all go out



- Parallel Circuits
- more than one path is available
  - each path receives a full amount of voltage
  - current through the battery is shared by the paths
  - if one light goes out, others stay lit





5.

10.  $V = IR$   
 $= 0.8(120)$   
 $= \underline{96V}$

$R = 120 \Omega$   
 $I = 0.8 A$   
 $V = ?$

11.  $I = \frac{Q}{t}$   
 $= \frac{800}{45}$   
 $= \underline{17.78 A}$

$t = 45 s$   
 $I = ?$   
 $Q = 800 C$

12.  $Q = It$   
 $= 0.14 \times (20 \times 60)$   
 $= 168 C$

$I = 0.14 A$   
 $t = 20 \text{ min.} \times \frac{60 s}{\text{min}}$   
 $= 1200 s$

$E = V \times Q$   
 $= 9 \times 168$   
 $= \underline{1512 J}$

$V = 9 V$   
 $Q = 168 C$

### Ecology Review

1. Definitions! Define each term below and also give an example.

Term	Definition	Example
Biotic	living	plants, animals
Abiotic	non-living	air, water, dirt
Ecosystem	living & non-living parts of an area	forest, pond
Producer	makes its own food	plants
Consumer	must eat food for energy	rabbits, hawks
Decomposer	breaks down dead things	worms, mushrooms
Scavenger	eats dead things	seagulls, vultures



Intraspecific competition	competition between same species	2 cats for a mouse
Interspecific competition	competition between 2 different species	cat & hawk for mouse
Predator	hunts its food	cat
Prey	hunted by predator	mouse
Species	able to breed & reproduce	cats
Population	number of species in an area	5000 squirrels in Grimsby
Community	all the different species living together	squirrels, birds, deer, etc. in forest
Density Independent	not affected by population	flood, fire
Density Dependent	is affected by population	food, disease
Niche	role or job	birds eat insects
Trophic level	level on the food chain	producers are first trophic level
Invasive Species	exotic species new to an area	Round goby in Lake Ontario

2. Label the following organisms as producers (P), consumers (C), or decomposers (D).

- a. grass P  
 b. cows C  
 c. bacteria D  
 d. fish C  
 e. spider plant P

3. Label the following organisms as herbivores (H), carnivores (C), or omnivores (O).

- a. humans O  
 b. frogs C  
 c. deer H  
 d. shark C  
 e. tadpoles H

4. There are a number of cycles that occur in nature. Try to complete the following:

**The Carbon cycle.**

- ☐ Plants require carbon dioxide (which they get from the atmosphere) and they produce oxygen in a process called photosynthesis.  
 ☐ Animals need oxygen to breathe and they exhale carbon dioxide in a process called respiration.

**The Water cycle.**

- ☐ Water enters the atmosphere by evaporation & respiration.  
 ☐ Water returns to the Earth's surface by rain/condensation.

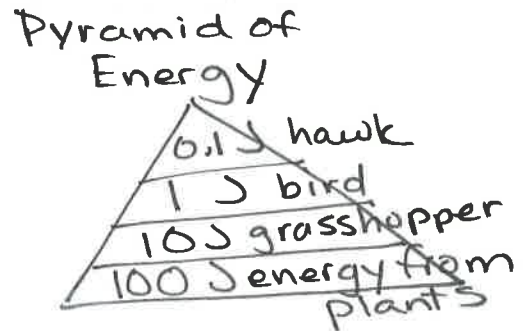
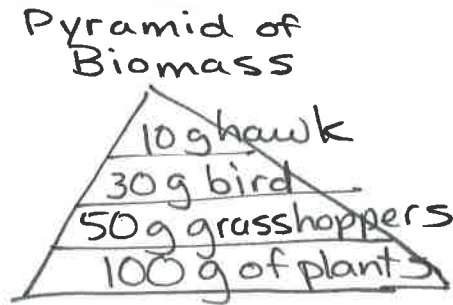
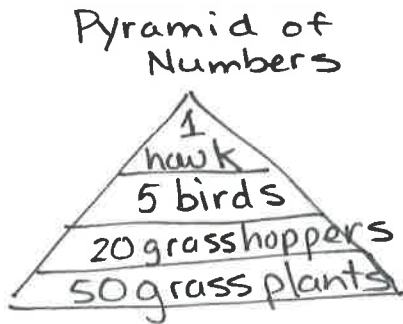
**The Nitrogen cycle. (nitrates)**

- ☐ Plants require nitrogen from the soil for growth.  
 ☐ Nitrogen is returned to the soil by bacteria who convert ammonia into nitrates.

5. Define carrying capacity. What factors would decrease the carrying capacity of an ecosystem?

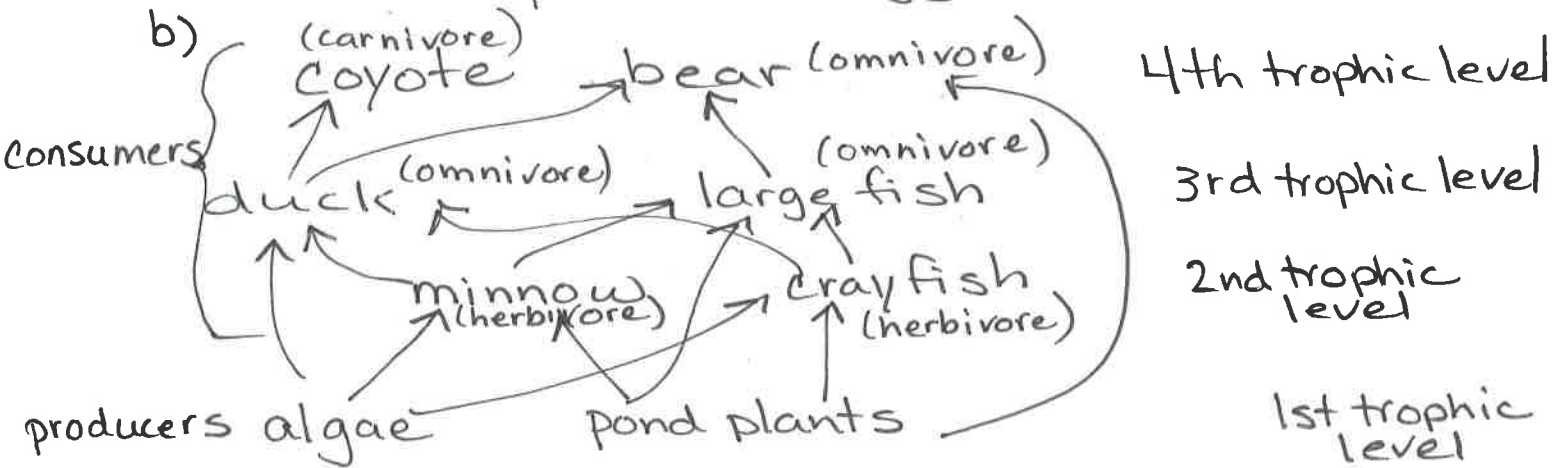
- maximum number of individuals of a species supported by an ecosystem  
 • factors are too much competition, not enough food, no water or other needed resources

6. Which level in the food chain receives the most energy from the Sun? What happens to the amount of energy through a food chain? Explain. **producers** ↑  
**energy decreases; lost to environment (heat, etc.), used up in living**
7. What are three factors that affect population size and briefly explain how each impacts the population? **food - not enough lowers population** **disease - reduces population**  
**more predators - lowers population** **flood/fire - reduces population**
8. What are the three types of food pyramids? Explain their differences.



9. a) Explain the difference between a food chain and a food web.  
 b) List 8 organisms you can find in or around a pond in Ontario. Create a food web, labelling the levels of the various organisms (primary consumer, decomposer, producer, top carnivore, etc.). Also label the trophic levels (first, second, third...).

a) web - interconnecting food chains  
 chain - one path of energy



10. What is the original source of energy for most ecosystems on earth? SUN

11. What are the three parts of the biosphere called? What does each one refer to?  
 lithosphere - land  
 hydrosphere - water  
 atmosphere - air

12. Define the following symbiotic relationships: mutualism, commensalism and parasitism.  
 mutualism: both benefit  
 commensalism: one benefits + no effect on one  
 parasitism: one benefits + one harmed

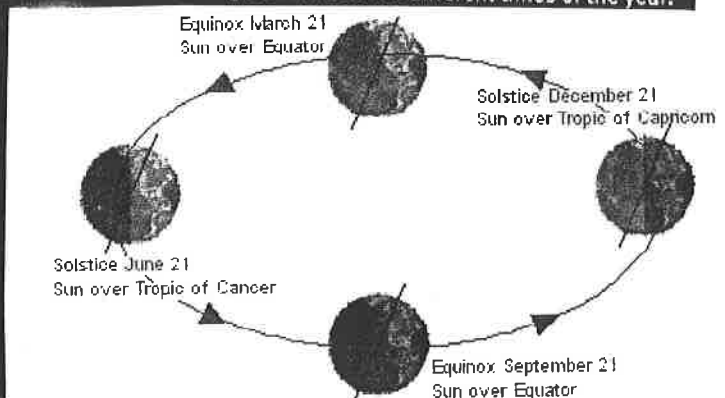
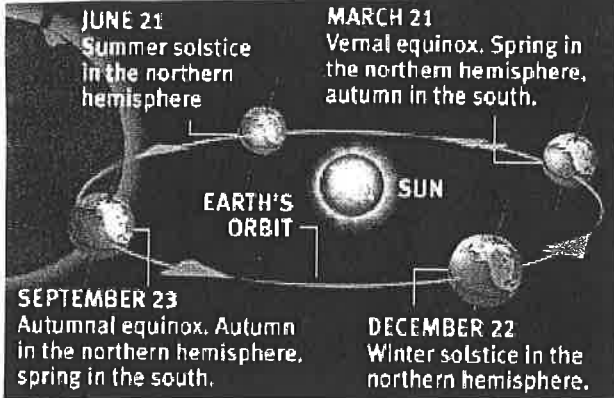
13. What can dung be used for?  
 nesting, growing plants, food, roofing, fuel, marking territory, camouflage

1. Orbital Period - how long a planet takes to revolve around the Sun  
 - Earth - 365.25 days or 1 year

Rotational Period - how long a planet(celestial body) takes to rotate around its own axis - Earth - 24 hours or 1 day

2. The Earth's tilt of 23.5° to its orbit around the Sun is responsible for the seasons on Earth.

different hemispheres to be at different angles to the sun at different times of the year. That 23.5 degree tilt causes the



3. Luminosity - Amount of energy that a star radiates per second (we compare other stars to our Sun).  
 Hot Stars - Blue, Cool Stars - Red, Our Sun - Yellow (medium)
4. Low Mass Stars - Intermediate Mass Stars - Massive Stars

5. Low Mass Stars - Intermediate Mass Stars - Massive Stars
- + 6. Low Mass Stars - consume hydrogen slowly (over 100 billion years)  
 - end up losing significant mass (evaporation)  
 - in the end → faint white dwarf (then black dwarf)

Intermediate Mass Stars(our Sun)

- last close to 10 billion years
- core collapses - expands 10 -100x when helium fuses into carbon
- Red Giant → White Dwarf → Black Dwarf

Massive Stars

- consume hydrogen rapidly (fusion occurs for many elements)
- star swells into a supergiant
- silicon fuses into oxygen in one day
- once an iron core is achieved, core collapses → **Supernova**

fate → depending on initial mass - neutron star (pulsars) or black holes result

↳ large mass stars

7. First Gas - Hydrogen  
 Waste Product - Helium  
 Helium goes towards core  
 Initial gas (hydrogen) gets used up - stars turns into Red Giant



8. The birthplace of a star is a nebula (vast cloud of gas and dust).  
 In the clouds of gas and dust, gravity works to pull the "inter-stellar" material together. This causes the temperature to rise (due to friction between particles).  
 At 10 000 000° C fusion (hydrogen into helium) begins.

10. Storms on the Sun: solar flares (violent streams of high energy particles stream into space).

11. Mercury - Venus - Earth - Mars - Jupiter - Saturn - Uranus - Neptune - Pluto  
 +12. inner rocky planets                      outer gas planets                      ↑ minor planet  
 13.

- Biggest planet - Jupiter
- Second largest - Saturn
- Smallest planet - Pluto
- Closest in size to Earth - Venus
- Between Mars and Jupiter - Asteroid Belt

- asteroid belt formed because Jupiter is too big and because its enormous gravitational pull prevented it from forming

14. Most accepted theory for the creation of the universe - Big Bang Theory

Mass - what you are made of; stays the same anywhere in the universe

Weight - the amount of force acting on you by gravity

9. Geosynchronous - over the same spot on Earth 24/7 - never ever changes









Polar

Low Altitude

15. Earth's natural satellite - MOON

16. Phases of the Moon - New Moon

- Waxing Crescent
- First Quarter
- Waxing Gibbous
- Full Moon
- Waning Gibbous
- Third Quarter
- Waning Crescent

8 PHASES OF THE MOON...	
PHASE	RISES
 1) New Moon	Sunrise
 2) Waxing Crescent	After sunrise
 3) First Quarter	noon
 4) Waxing Gibbous	afternoon
 5) Full moon	Sunset
 6) Waning Gibbous	night
 7) Third Quarter	midnight
 8) Waning Crescent	before sunrise

17. Asteroids are big chunks of rock (silicon and iron) in the asteroid belt.

Comets are dirty snowballs (ice and rock).

The tail of a comet forms when it gets close to the Sun, when the solar winds start to melt it. The tail always points away from the Sun.

18. Meteor - burns up in the atmosphere

Meteorite - hits the Earth's surface

19. A galaxy is a large group of stars and interstellar material.  
The 3 main types are: elliptical, spiral, and irregular

Our galaxy is the Milky Way

20. During a solar eclipse.

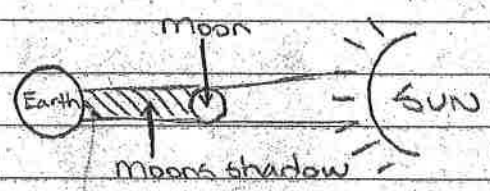
21. The distance light travels in one year.

22. Geocentric Model - Planets (& our stars) orbit the Earth

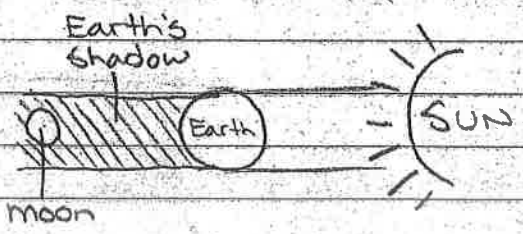
Heliocentric Model - Planets orbit the SUN

23

SOLAR ECLIPSE: Moon between Sun & Earth



LUNAR ECLIPSE: Earth between Moon & Sun



### EXPERIMENTAL DESIGN

"WHAT TYPE OF GUM PRODUCES THE LONGEST LASTING FLAVOUR?"

1. PURPOSE: To determine which type of gum has the longest lasting flavour

2. Independent variable: Type of gum  
Dependant variable: How long the flavour lasts

3. 4 CONTROLS:  
• Length of time chewed.      • Amount of gum  
• Person chewed by              • Constant rate of chewing

4. Hypothesis: IF Hubba Bubba is chewed for the longest amount of time and still has flavour, then it is the longest lasting gum.

5. MATERIALS:

- Person to chew
- Timer
- Different types of gum
- Scale.

6. MEASUREMENTS TAKEN: Mass of each type of gum.

7. OBSERVATIONS:

TYPE OF GUM	FLAVOUR LASTING TIME

8. CONCLUSION: 5 gum was chewed the longest before it's flavour ran out so it has the longest lasting flavour.

DEPENDANT VARIABLE: The effect (depends on the independant var. (y))

INDEPENDANT VARIABLE: The cause (x)

CONTROLS: Things that must remain constant in an experiment.

VARIABLES: A factor that can influence the outcome of an experiment

CONCLUSION: The summary of the outcome of an experiment.

HYPOTHESIS: A testable proposal used to explain an observation or to predict the outcome of an experiment.