

## Reporting Category 1: Matter and Energy

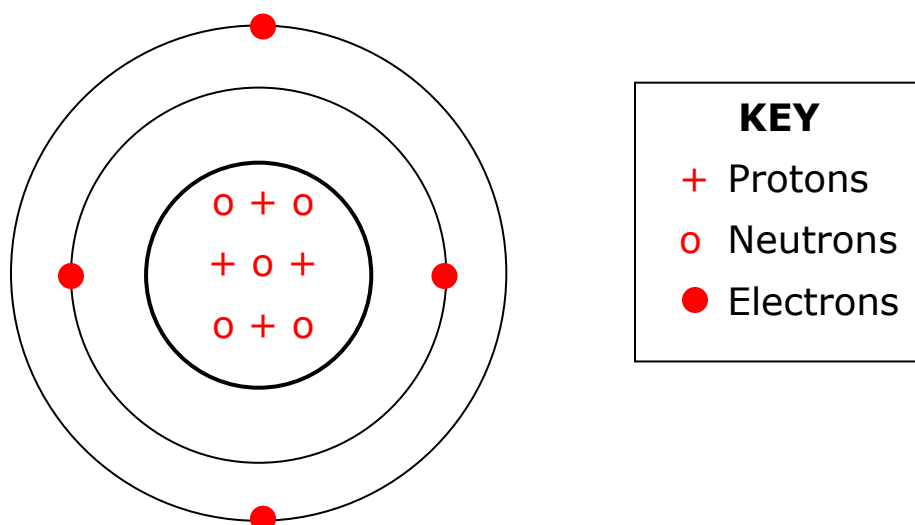
### Atoms

Fill in the missing information to summarize what you know about atomic structure.

Name of Subatomic Particle	Location within the Atom	Electrical Charge	Relative Mass
proton	inside the nucleus	positive	1 amu
neutron	inside the nucleus	neutral	1 amu
electron	outside the nucleus	negative	1/1836 amu

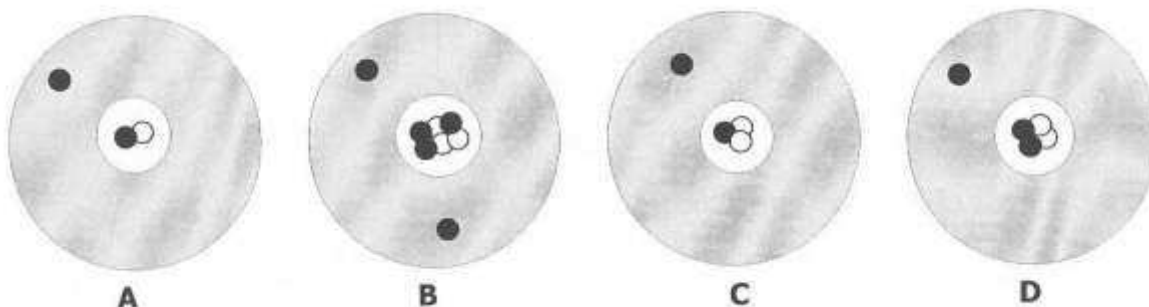
Bohr Model –

Draw an atom that has four protons, five neutrons, and four electrons. Complete the key to identify the three major subatomic particles.



What determines the identity of an element? **# of protons**

The diagram below shows models of four different atoms. Use the models to answer the following questions:



Which atom has the greatest mass? **B**

Which atom(s) have a neutral electrical charge? **A and C**

Which atom(s) have a positive electrical charge? **B and D**

Which atom(s) have a negative electrical charge? **none**

## Periodic Table

Atomic number = # of protons and # of electrons

Atomic Mass = # of protons plus # of neutrons

\*\*\* Electrons are not included in the atomic mass

	Metals	Non-Metals	Metalloids
Where located	left of stair step	right of stair step	along stair step
Luster	shiny	dull	shiny to dull
Conductivity	good	poor	some good, some poor
Malleability	yes	no - brittle	some yes, some no
Most Reactive found where	far left (Group 1)	far right (Group 17)	depends

Group 18 – Noble Gases – unreactive (inert) – full set of valence electrons

Period – horizontal rows ( $\longleftrightarrow$ ) – different properties – same # energy levels

Family/group # – vertical columns ( $\updownarrow$ ) – same properties – same # valence electrons

On the Periodic Table below:

Shade in the group of elements that are called the Noble Gases red.

Shade all of the elements in Period 4 blue.

Circle three elements that are classified as metals.

Draw triangles around three elements that are classified as metalloids.

1 H																	2 He
3 Li	4 Be											5 B	6 C	7 N	8 O	9 F	10 Ne
11 Na	12 Mg											13 Al	14 Si	15 P	16 S	17 Cl	18 Ar
19 K	20 Ca	21 Sc	22 Ti	23 V	24 Cr	25 Mn	26 Fe	27 Co	28 Ni	29 Cu	30 Zn	31 Ga	32 Ge	33 As	34 Se	35 Br	36 Kr
37 Rb	38 Sr	39 Y	40 Zr	41 Nb	42 Mo	43 Tc	44 Ru	45 Rh	46 Pd	47 Ag	48 Cd	49 In	50 Sn	51 Sb	52 Te	53 I	54 Xe
55 Cs	56 Ba	57 La	72 Hf	73 Ta	74 W	75 Re	76 Os	77 Ir	78 Pt	79 Au	80 Hg	81 Tl	82 Pb	83 Bi	84 Po	85 At	86 Rn
87 Fr	88 Ra	89 Ac	104 Rf	105 Db	106 Sg	107 Bh	108 Hs	109 Mt									

How many groups or families of elements are on the table? 18

How many periods of elements are on the table? 7

Valence Electrons – outermost electrons, determine chemical properties and reactivity

Elements have similar properties because? They have the same # of valence electrons

Reactivity – how easily elements combine to form compounds; elements with 1 or 7 valence electrons are the most reactive

Molecule – 2 or more atoms combined

Compound – 2 or more different elements combined

Physical Change – change in appearance without a change in properties

Chemical Change – change in properties – new substance formed

Chemical Reaction – same as chemical change

Evidence of Chemical Reaction – unexpected color change, precipitate forms, gas production (bubbles, fizzes), change in temperature, change in odor, change in properties

Chemical Equation – combination of symbols and formulas that describe a chemical reaction

What does a coefficient tell you? # of molecules

What does a subscript tell you? # of atoms

Are they balanced?



E	R	P
C	1	6
H	2	12
O	1	6

E	R	P
Ag	2	2
H	2	2
S	1	1

Conservation of mass – # atoms in reactants = # atoms in products  
mass of reactants = mass of products

How can we show conservation of mass?  
balanced equation

Fill in the missing information to complete the chart.

Substance	Check One		Check One		# of Elements	# of Atoms	# of Molecules
	Chemical Symbol	Chemical Formula	Element	Compound			
H <sub>2</sub> O		X		X	2	3	1
O <sub>3</sub>		X	X		1	3	1
CaCO <sub>3</sub>		X		X	3	5	1
He	X		X		1	1	0
Ag	X		X		1	1	0
2 CO		X		X	2	4	2

Organic Compounds – contain **carbon** and other elements such as hydrogen, oxygen, phosphorus, nitrogen, or sulfur

Substance	Formula	Organic	Inorganic
sugar	C <sub>6</sub> H <sub>12</sub> O <sub>6</sub>	X	
salt	NaCl		X
methane	CH <sub>4</sub>	X	
water	H <sub>2</sub> O		X

Digestion

Structure	Physical	Chemical
Mouth	X	X
Esophagus	X	X
Stomach	X	X
Small Intestine		X

Energy Flow through Living Systems

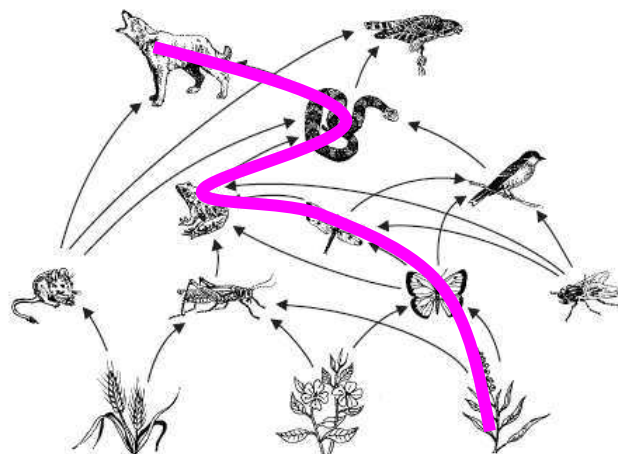
Highlight one complete food chain on the food web.

What organisms on the food web have the most available energy?

plants / producers

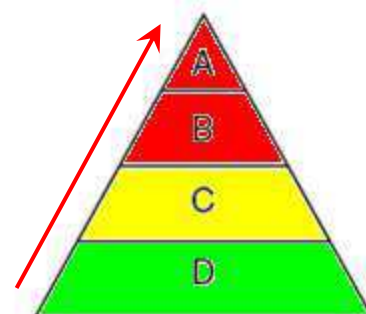
What organisms on the food web have the least available energy?

coyote & hawk



Draw arrows on the energy pyramid to show the direction of energy flow from greatest to least.

Color producers green, herbivores yellow, and carnivores red.

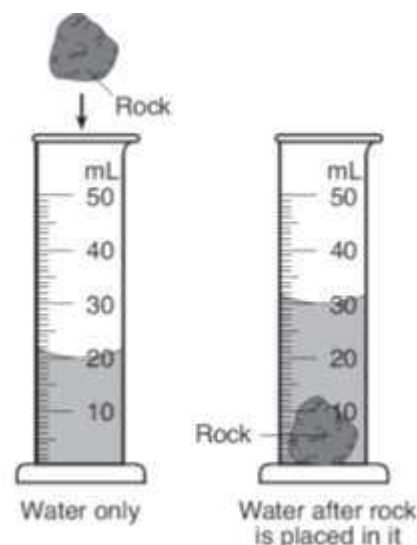
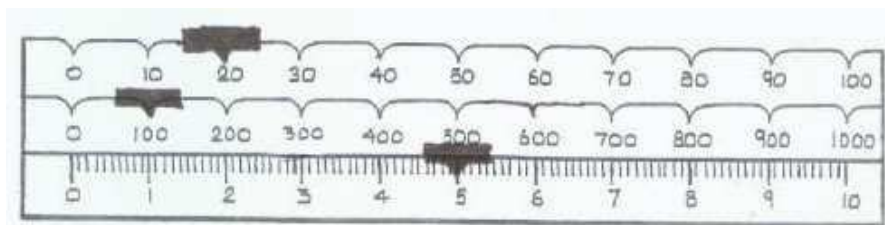


Density = mass ÷ volume

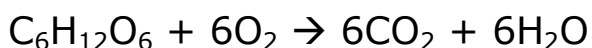
Use the pictures of the triple beam balance and graduated cylinder to find the density of the rock.

Density = 12.5 g/mL

$$\begin{array}{r}
 12.5 \\
 10 \overline{) 125.0} \\
 \underline{10} \phantom{0} \\
 25 \\
 \underline{20} \\
 50 \\
 \underline{50} \\
 0
 \end{array}$$



- Which two elements are most similar?
  - Fe and Co
  - Li and F
  - Cu and Ag
  - H and O
- What are metalloids?
  - The metal elements with small atomic numbers
  - The elements between metals and nonmetals on the periodic table
  - Chunks of metal ore
  - Nonreactive metal elements
- Which of the following elements is a liquid at room temperature?
  - N
  - B
  - Br
  - Si
- Which of the following elements is the least reactive metal?
  - K
  - Ca
  - Mn
  - Zn
- Which of the following is a noble gas?
  - Ne
  - N
  - O
  - H
- Which of the following is the better conductor?
  - Ge
  - S
  - Au
  - C
- What elements are contained in the compound LiBr?
  - Lithium, Iodine, and Boron
  - Lithium and Bromine
  - Lithium and Boron
  - It is a compound, so it does not contain elements.



- During cell respiration, sugar ( $\text{C}_6\text{H}_{12}\text{O}_6$ ) reacts to form carbon dioxide ( $\text{CO}_2$ ) and water ( $\text{H}_2\text{O}$ ). Which of the following best explains what happens during cell respiration?
  - Single atoms are formed into different elements.
  - Atoms are rearranged into different compounds.
  - A molecule is broken down into its pure elements.
  - Two elements are formed into one compound.