

# Summary & Practice Sheets

## Grade 7



**Scientific Explanations**  
**Motion, Forces, and Newton's Laws**  
**Foundations of Chemistry**  
**Understanding the Atom**  
**The Periodic Table**

# The Scientific Method



1

## Make Observations

(use your senses to gather information)



2

## Ask a Question



3

## Formulate a Hypothesis

(explanation that can be tested)



4

## Test a Hypothesis

(design an experiment, research, or more observations)



5

## Collect Data



6

## Draw a Conclusion

(a written summary that states whether the hypothesis is correct or not)



# Measurement and Scientific Tools

Scientists across the world use a measurement system called the International System of Units (SI).

Many different tools can be used to collect both quantitative and qualitative data.

graduated cylinders



scale



ruler



thermometer



microscope



# UNITS:

Length: meter (m)

Mass: kilogram (kg)

Time: second (s)

Temperature: Kelvin (K)

Accuracy is how close a measurement is to the true value.

Precision is the degree to how close measurements are to other measurements taken the same way.

Data should be both accurate and precise!



high accuracy  
low precision



low accuracy  
high precision



low accuracy  
low precision



high accuracy  
high precision



# MOTION!

An object is in motion when it is changing its position based on a reference point.

## Scalar

physical quantity that has only magnitude

example: length, distance, temperature

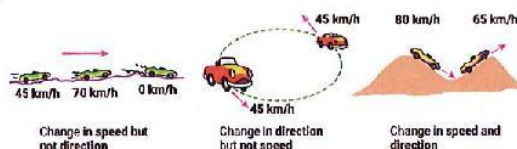
## Vector

physical quantity that has magnitude and direction

example: weight, displacement, force

Speed is how fast an object is traveling.

Velocity is speed in a given direction.



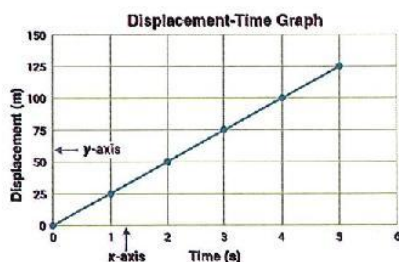
$$\text{speed} = \frac{\text{distance}}{\text{time}}$$

$$s = \frac{d}{t}$$

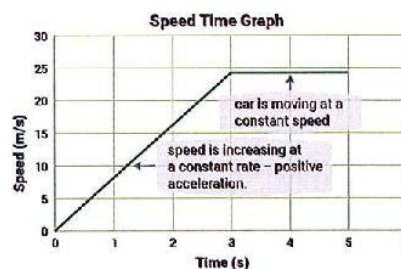
$$\text{acceleration} = \frac{\text{change in velocity}}{\text{change in time}}$$

$$a = \frac{V_f - V_i}{t_f - t_i}$$

## Representing motion using graphs



A displacement-time graph shows the relationship between the displacement traveled by an object and time.



The speed-time graph below shows the relationship between speed and time.

# Forces push or pull

**Contact forces**  
forces between objects  
that are touching



applied force



frictional force



tension force

**Non-contact forces**  
forces between objects  
that are not touching



magnetic force

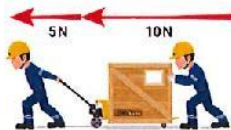


electrical force



gravitational force

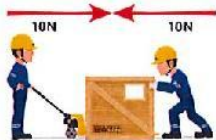
If two forces act on an object in the same direction, the net force is the sum of the two forces.



$$\text{Net force} = 5 \text{ N} + 10 \text{ N} = 15 \text{ N}$$



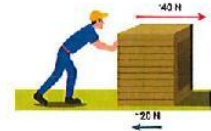
When the net force on an object is 0 N, the forces are called balanced forces.



$$\text{Net force} = 10 \text{ N} + -10 \text{ N} = 0 \text{ N}$$

If two forces act on an object in opposite directions, the net force is the difference between the two forces.

When the net force on an object is not 0 N, the forces are called unbalanced forces.



**Newton's First Law of Motion:**  
the motion of an object remains constant unless acted on by an outside force.



**Newton's Second Law of Motion:**  
the force experienced by an object is proportional to its mass times the acceleration it experiences.  
( $F = ma$ )



**Newton's Third Law of Motion:**  
for every action force there is an equal but opposite reaction force

## Revision Sheet

### Chapter 2- Motion, Forces, and Newton's Laws

#### Part A- True/False

Indicate whether the statement is true or false.

- \_\_\_\_\_ 1. To calculate speed, multiply the distance by the time.
- \_\_\_\_\_ 2. The average speed of a moving object is equal to the total distance traveled plus the total amount of time taken to travel it.
- \_\_\_\_\_ 3. To calculate average speed, use only the total time and the total distance.
- \_\_\_\_\_ 4. To find an object's velocity, you must know the speed and direction of the moving object.
- \_\_\_\_\_ 5. Weight is the upward force of Earth's gravity on all objects.
- \_\_\_\_\_ 6. There is only one type of force.
- \_\_\_\_\_ 7. The metric unit which measures force is the Newton.
- \_\_\_\_\_ 8. Net force is one force acting on an object.

#### Part B- Multiple Choice

Identify the choice that best completes the statement or answers the question.

- \_\_\_\_\_ 9. Runners competing in a race speed up and change direction as they run around a track. The runners are \_\_\_\_\_.
  - a. increasing electrical energy
  - b. increasing potential energy
  - c. accelerating
  - d. decelerating
- \_\_\_\_\_ 10. Newton's third law of motion states that for every action there is an equal and opposite \_\_\_\_\_.
  - a. acceleration
  - b. mass
  - c. force
  - d. reaction
- \_\_\_\_\_ 11. A change in an object's position is called \_\_\_\_\_.
  - a. motion
  - b. velocity
  - c. distance
  - d. acceleration
- \_\_\_\_\_ 12. An object at rest tends to stay at rest, and an object in motion tends to stay in motion. Which one of Newton's laws of motion does this statement represent?
  - a. fourth
  - b. third
  - c. second
  - d. first

- \_\_\_\_\_ 13. If you walk 1.5 kilometers in 30 minutes what is your average speed?
- a. 10 km/h  
b. .75 km/h  
c. .05 km/h  
d. 1.0 km/h
- \_\_\_\_\_ 14. If you know the speed and direction of an object, which could you find?
- a. acceleration  
b. velocity  
c. size  
d. apparent motion
- \_\_\_\_\_ 15. Any push or pull on an object is called a \_\_\_\_\_
- a. lift  
b. force  
c. thrust  
d. friction
- \_\_\_\_\_ 16. As the distance between two objects increases, the gravitational force between the objects \_\_\_\_\_?
- a. increases  
b. decreases  
c. creates friction  
d. stays the same
- \_\_\_\_\_ 17. Acceleration is a change in the \_\_\_\_\_ of an object over time.
- a. speed  
b. direction  
c. motion  
d. velocity
- \_\_\_\_\_ 18. An airplane travels 290 km between Austin and Dallas in 1 h and 15 min. What is its average speed?
- a. 160 km/h  
b. 200 km/h  
c. 232 km/h  
d. 250 km/h
- \_\_\_\_\_ 19. When net forces are equal in strength and opposite in direction, they are said to be \_\_\_\_\_.
- a. balanced  
b. unbalanced  
c. negative  
d. opposite
- \_\_\_\_\_ 20. Which represents a force pair?
- a. A book pushes down on the table, and gravity pulls the book down toward the floor.  
b. A boy's foot pushes down on a bicycle pedal, the pedal pushes up on his foot.  
c. A golf club hits a golf ball. Gravity pulls the ball back down to Earth.  
d. A person's foot pushes on the floor, and the person's weight pushes on the floor.
- \_\_\_\_\_ 21. If you take the distance that an object moves and divide it by the time it takes to move the distance, what are you calculating?
- a. the object's acceleration  
b. the object's speed  
c. the object's net force  
d. the object's friction
- \_\_\_\_\_ 22. In order to accelerate, an object must be acted on by a(n) \_\_\_\_\_
- a. force pair  
b. large mass  
c. unbalanced force  
d. balanced force

\_\_\_\_\_ 23. Which unit measures force?

- a. watt
- b. kilometer
- c. gram
- d. Newton

\_\_\_\_\_ 24. When one object exerts a force on another object, the pair of forces that act are called \_\_\_\_\_.

- a. action-reaction forces
- b. balanced-unbalanced forces
- c. friction-drag forces
- d. positive-negative forces

### Part C- Matching

*Match each term with its correct description*

- a. acceleration
- b. distance
- c. force
- d. friction
- e. motion
- f. Newton's first law of motion
- g. Newton's second law of motion
- h. speed
- i. velocity

\_\_\_\_\_ 25. A change in the velocity of an object over time.

\_\_\_\_\_ 26. A push or pull exerted by one object on another, possibly causing a change in motion.

\_\_\_\_\_ 27. The length between two places.

\_\_\_\_\_ 28. How fast an object's position changes over time

\_\_\_\_\_ 29. A description of a moving object's speed and direction.

\_\_\_\_\_ 30. A force that opposes the motion of an object in contact with a surface.

\_\_\_\_\_ 31. A change in an object's position compared to fixed objects around it.

\_\_\_\_\_ 32. An object at rest tends to stay at rest, and an object in motion tends to stay in motion.

\_\_\_\_\_ 33. An object's acceleration depends on the object's mass and the amount of net force applied to it.

### Part D- Short Answer

*Write the correct answer for each of the following questions.*

34. Car A traveled 30 miles in one half hour. Car B traveled 15 miles in one quarter of an hour. Which car traveled faster?

35. What is the difference between balanced forces and unbalanced forces?

36. The law of inertia is another name for \_\_\_\_\_.

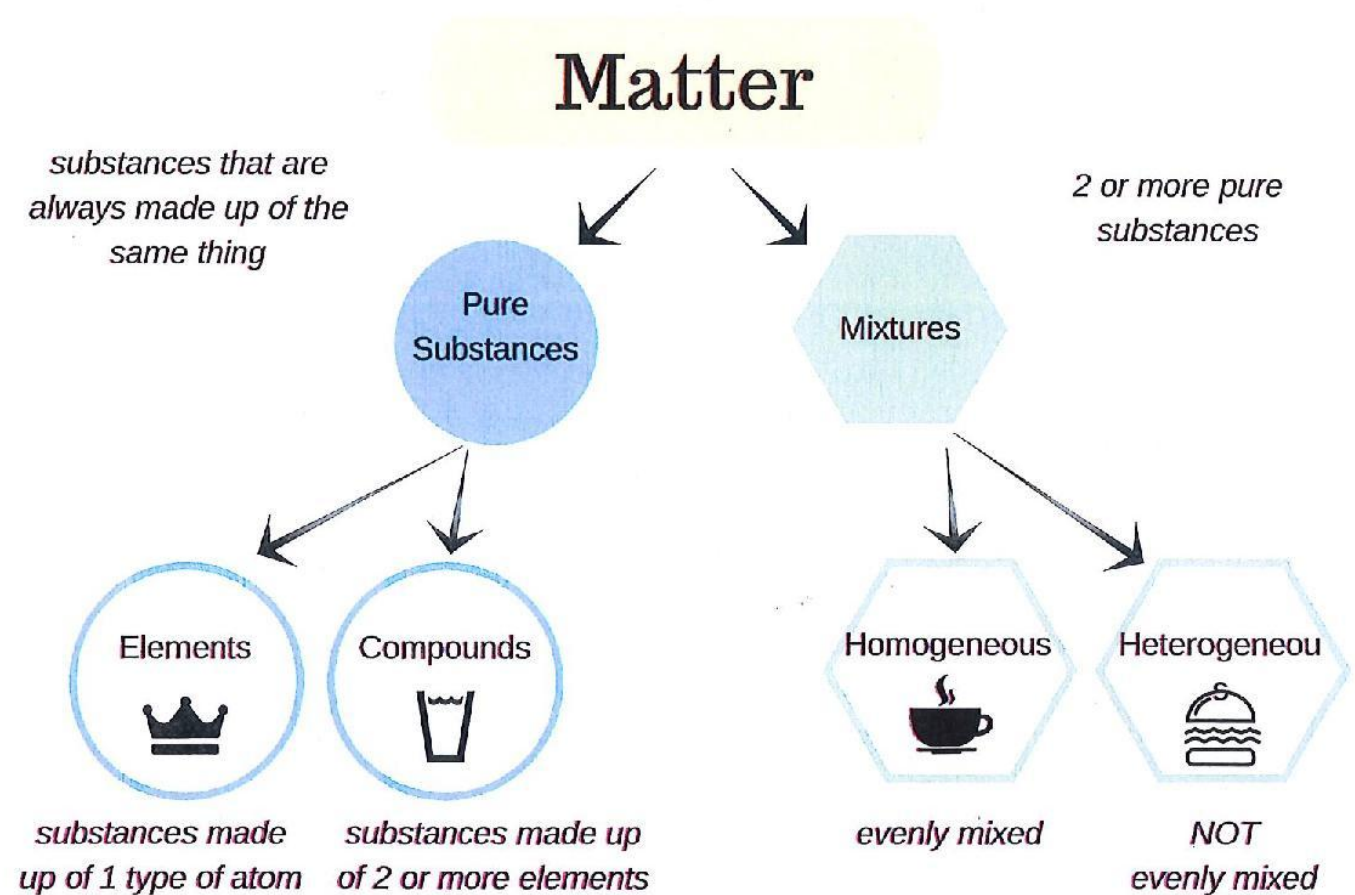


# Mass MATTERS!

You have learned matter is anything that takes up space and has a mass.

Matter can be SOLID, LIQUID, or GAS.

Energy does not have mass and is NOT matter.



1

## ELEMENTS

gold, helium, hydrogen, oxygen

2

## COMPOUNDS

water (H<sub>2</sub>O) , carbon dioxide (CO<sub>2</sub>)

## Examples

3

## HOMOGENEOUS

salt water, air, lemonade

4

## HETEROGENEOUS

salad, sand & water, burger

# Homogeneous vs. Heterogeneous



## Homogeneous

- Two or more substances are equally mixed.
- Not all the substances are seen.
- They are also called solutions.
- Solution is made of a solute (sugar) and a solvent (water).
- Examples: tea, salt water, orange juice.

VS



## Heterogeneous

- Two or more substances are not equally mixed.
- All the substances are seen.
- They can be in solids, liquids, gases. Or two or more different states together.
- Examples: Nuts, salad, air, sparkling water.

substances  
physically mix

## Parts of a Solution (Homogeneous)



Water  
250 mL

+



Lemon Juice  
45 mL

+

Sugar  
52 mL

=



Lemonade

Which ingredient is the most in the lemonade? **WATER**

Water is the **SOLVENT**.

Lemon juice and sugar are the **SOLUTES**.

**SOLVENT + SOLUTE = SOLUTION**



# PRACTICE - MATTER

Classify the following pictures as a pure substance, homogeneous mixture or heterogeneous mixture.



# Separating MIXTURES!



You can use different ways to separate mixtures

## Magnetism

Separate metals from non-metals using a magnet.  
example: paper clips and rubber bands



## Picking Apart

Big substances can be picked by hand.  
example: crayons and pens



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## Filtration

Separate particles that don't dissolve in liquids.

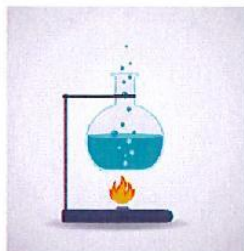


examples:  
rocks and water  
coffee and water

---

## Evaporation

Separate solids that dissolve in a liquid.  
example: water and sugar



## Distillation

Separate solvent from a solution by heating and then cooling.  
example: water from another liquid





# Physical

VS

# Chemical

## PHYSICAL PROPERTIES

Matter you can see without changing the identity of the substances that make it up.



- Changes shape
- Silver in color
- Density: 7.87
- Boiling point: 3,000• C
- Melting point: 1,536• C

## CHEMICAL PROPERTIES

A substance can or cannot combine with or change into one or more new substances.



- Iron can rust
- Reacts with acid

## PHYSICAL CHANGE

A change in the size, shape, form or matter that does not change the matters identity.



CAN  
reverse!



### EXAMPLES

melting  
boiling  
mixing  
dissolving

changing shape  
changing state

## CHEMICAL CHANGE

A change in which something new is made with different properties.



CANNOT  
reverse!



### EXAMPLES

burning  
rusting  
rotten food  
digestion

### SIGNS

release a gas  
color change  
solid forms  
heat is released

# PRACTICE-MATTER

- 1** Aisha left her bicycle in the garden for a few weeks. The bicycles' color changed to an orange color. What is the type of change that happened? How did you know?
- 
- 

- 2** Determine whether each picture is a physical or chemical change.



# Revision Sheets

## Chapter 3 – Foundations of Chemistry

### Part A- Modified True/False

Indicate whether the statement is true or false. If false, change the identified word or phrase to make the statement true.

- \_\_\_\_\_ 1. A fruit salad is a homogeneous mixture. \_\_\_\_\_
- \_\_\_\_\_ 2. Matter is anything that has mass and takes up space. \_\_\_\_\_
- \_\_\_\_\_ 3. Matter that can vary in composition is a substance. \_\_\_\_\_
- \_\_\_\_\_ 4. A(n) element is two or more atoms that are held together by chemical bonds and act as a unit. \_\_\_\_\_
- \_\_\_\_\_ 5. The properties of a compound are usually the same as the properties of the elements from which it is made. \_\_\_\_\_
- \_\_\_\_\_ 6. A homogeneous mixture is a mixture in which the substances are not evenly mixed. \_\_\_\_\_
- \_\_\_\_\_ 7. Table salt is a compound of sodium and chlorine. \_\_\_\_\_
- \_\_\_\_\_ 8. Density is an example of a size-dependent property. \_\_\_\_\_
- \_\_\_\_\_ 9. Volume is an example of a size-dependent property. \_\_\_\_\_
- \_\_\_\_\_ 10. The ability of a match to burn is an example of a chemical change. \_\_\_\_\_
- \_\_\_\_\_ 11. A physical property is a characteristic of something that allows it to change to something new. \_\_\_\_\_
- \_\_\_\_\_ 12. Matter is made up of motionless particles. \_\_\_\_\_
- \_\_\_\_\_ 13. The ability to react with oxygen is a physical property. \_\_\_\_\_
- \_\_\_\_\_ 14. In a physical change, the substance does not change its identity. \_\_\_\_\_

### Part B-Multiple Choice

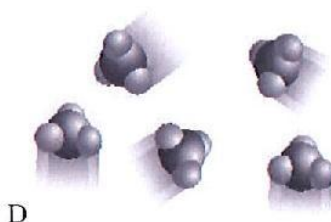
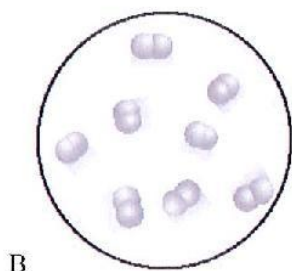
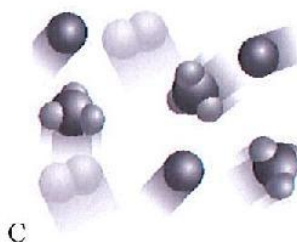
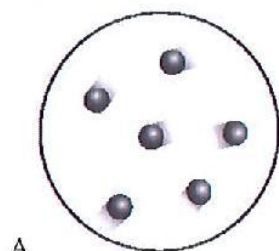
Identify the choice that best completes the statement or answers the question.

- \_\_\_\_\_ 15. \_\_\_\_\_ is another name for a homogeneous mixture.
  - a. Liquid
  - b. Solution
  - c. Substance
  - d. Suspension
- \_\_\_\_\_ 16. When two or more substances are combined so each substance can be separated by physical means, the result is a(n) \_\_\_\_\_.
  - a. chemical change
  - b. compound
  - c. element
  - d. mixture

17. Which of the following is a pure substance?

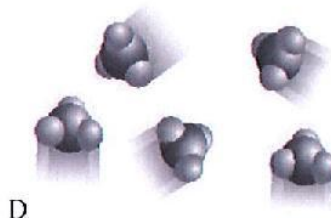
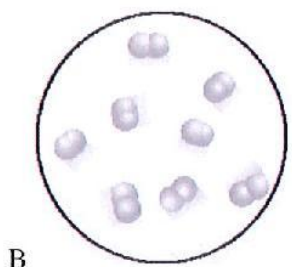
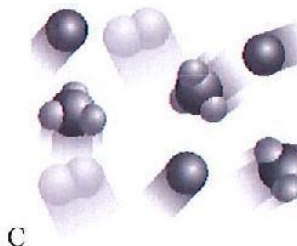
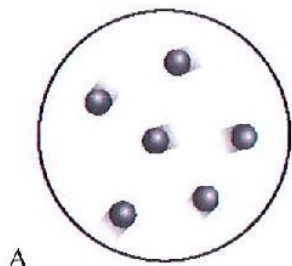
- a. soda
- b. trail mix
- c. granite
- d. gold

18. Which diagram shows a compound?



- a. A
- b. B
- c. C
- d. D

19. Which diagram shows individual atoms?



- a. A
- b. B
- c. C
- d. D



- \_\_\_\_ 20. The following are examples of physical properties EXCEPT \_\_\_\_.
- a. density
  - b. shape
  - c. color
  - d. ability to react with oxygen
- \_\_\_\_ 21. A characteristic of matter that allows it to change to something new is a \_\_\_\_.
- a. physical property
  - b. physical change
  - c. chemical property
  - d. chemical change
- \_\_\_\_ 22. The following are examples of chemical properties EXCEPT \_\_\_\_.
- a. the ability to burn
  - b. the ability to be crushed
  - c. the ability to react with oxygen
  - d. toxicity
- \_\_\_\_ 23. All of the following are examples of physical changes EXCEPT \_\_\_\_.
- a. melting
  - b. evaporating
  - c. burning
  - d. solidifying
- \_\_\_\_ 24. Which of the following is an example of a chemical change?
- a. painting a house
  - b. freezing water
  - c. bending steel
  - d. baking soda in water
- \_\_\_\_ 25. Density depends on \_\_\_\_.
- a. weight
  - b. mass
  - c. mass and volume
  - d. volume
- \_\_\_\_ 26. Titanium reacts less with oxygen than most metals do. This is a \_\_\_\_.
- a. chemical property
  - b. physical change
  - c. chemical change
  - d. physical property
- \_\_\_\_ 27. The mass of the products of a chemical reaction \_\_\_\_ the mass of the reactants.
- a. is greater than
  - b. is less than
  - c. is the same as
  - d. may be more or less than
- \_\_\_\_ 28. Which formula listed below correctly finds density?
- a.  $D = m/V$
  - b.  $D = V/m$
  - c.  $D = g/V^2$
  - d.  $D = g^3/V$
- \_\_\_\_ 29. The rusting of iron is not a physical property because \_\_\_\_.
- a. it cannot be observed
  - b. the identity of iron remains unchanged
  - c. a new substance with new properties formed
  - d. iron is magnetic
- \_\_\_\_ 30. Which explains the law of conservation of mass?
- a. Mass cannot be created or destroyed in a reaction.
  - b. The total mass before a chemical reaction is the same as the total mass after the reaction.
  - c. Every reaction creates an equal amount of mass related to the amount of energy required for the reaction.
  - d. The total amount of mass is equal to the volume of both chemicals in the reaction.
- \_\_\_\_ 31. Photosynthesis is a chemical reaction which uses \_\_\_\_ as a form of energy.
- a. heat
  - b. light
  - c. iron
  - d. gravity

### Part C- Matching

Match each term with its correct description

- element
- mixture
- substance
- compound
- matter

- ☐ 32. matter that can vary in composition
- ☐ 33. anything that has mass and takes up space
- ☒ 34. two or more elements chemically combined
- ☐ 35. consists of just one type of matter
- ☐ 36. it has a definite composition

### Part D- Short Answer

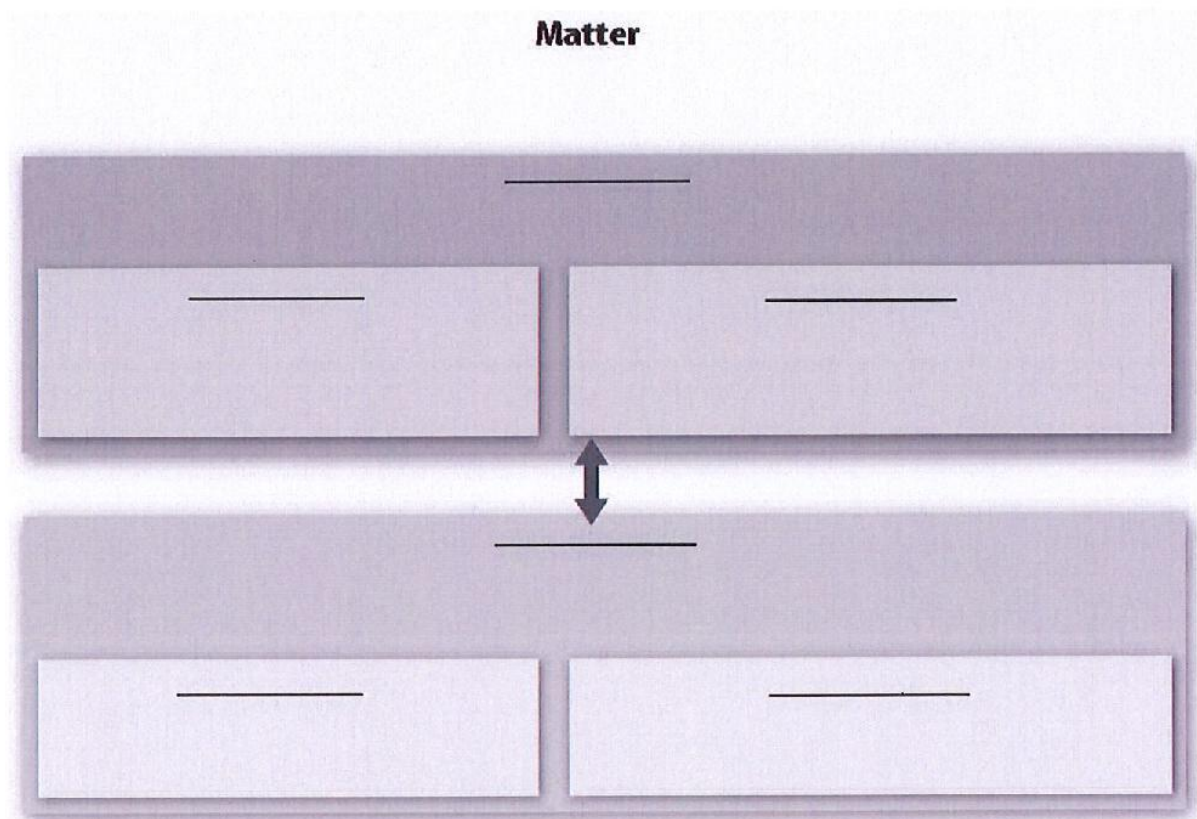
Write the correct answer for each of the following questions.

37. Give three examples of mixtures.
38. What are three physical properties of a banana?
39. What is a chemical property of a banana?

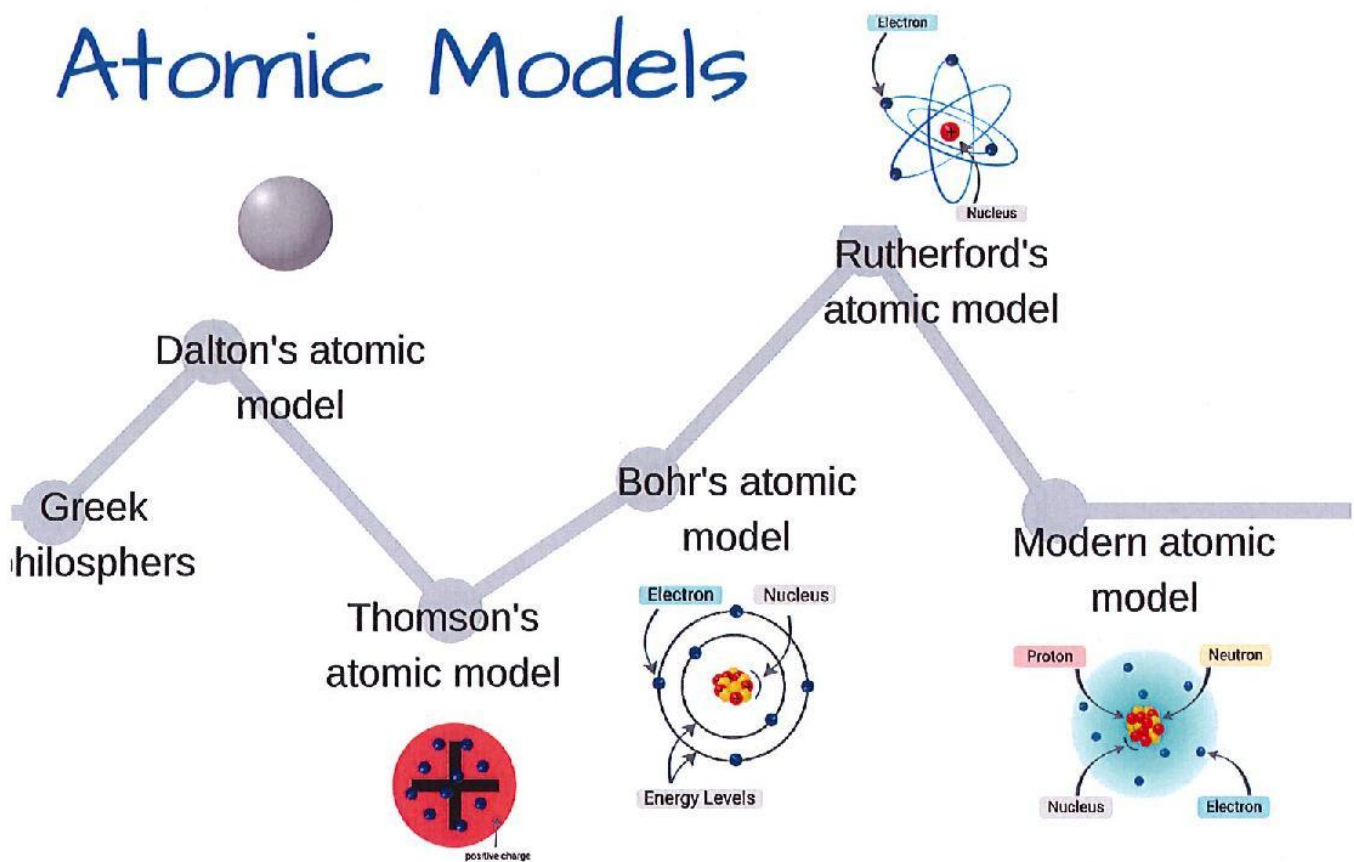
**Part E- Essay**

*Answer the following questions*

40. Fill in the chart to show the classification of matter. Describe how matter is classified.

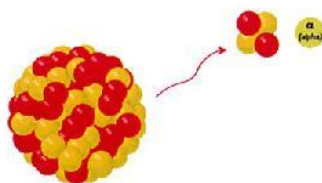


# Atomic Models



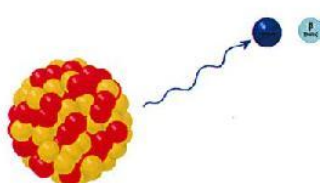
## Types of Decay

Alpha Decay



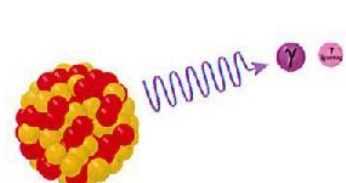
the nucleus loses 2 protons and 2 neutrons, so the atom becomes a new element

Beta Decay



the nucleus gains a proton, so the atom becomes a new element

Gamma Decay



no change in proton number occurs, so the atom does not become a new element



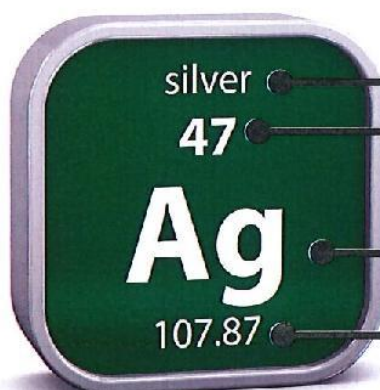
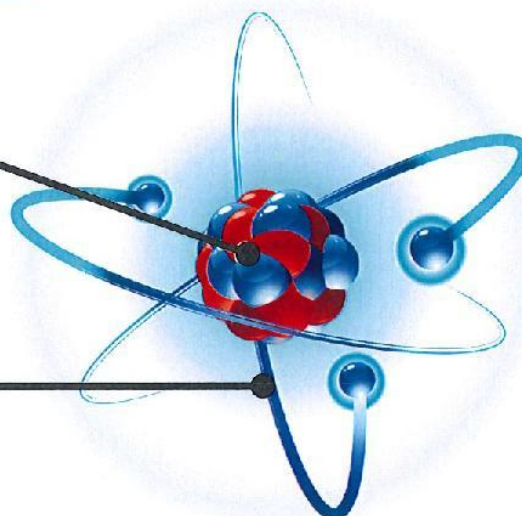
# ALL about **ATOMS!**

## NUCLEUS

- the center of every atom
- has protons (+ charge)
- has neutrons (no charge)

## ELECTRON CLOUD

- around the nucleus
- has electrons (- charge)
- mostly empty space



ELEMENT NAME

ATOMIC NUMBER  
(number of protons)

SYMBOL

ATOMIC MASS

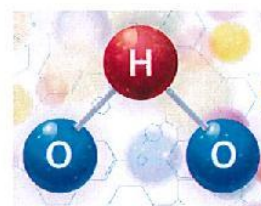
## ELEMENTS

## COMPOUNDS

When 2 or more elements **CHEMICALLY BOND** together.

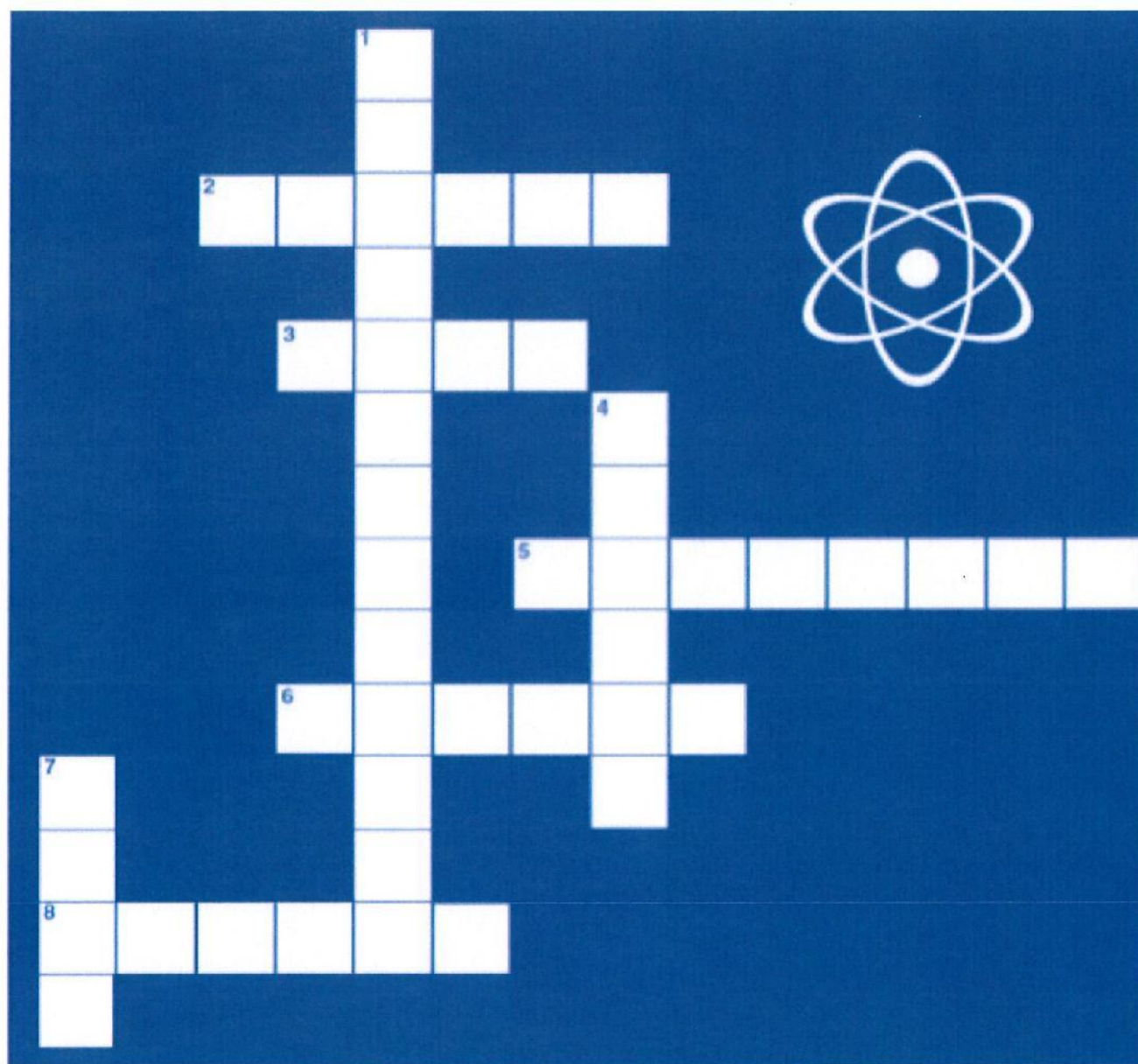
Name	Chemical Formula	Molecular Structure
Water	H <sub>2</sub> O	

Water contains  
1 hydrogen and 2 oxygens.



How many carbon atoms are in one molecule of  
C<sub>6</sub>H<sub>12</sub>O<sub>6</sub>?

# PRACTICE-ATOMS



**Across** →

**Down** ↓

2. Has a chemical symbol (C) and an atomic number = 6.

3. A shiny metal used for jewellery.

5. There are 115 of them arranged in a chart.

6. has mass and takes up space.

8. A gas in the air

1. A chart where all elements are arranged.

2. The second place medals are made of this shiny metal.

7. Tiny particles that make up all elements.



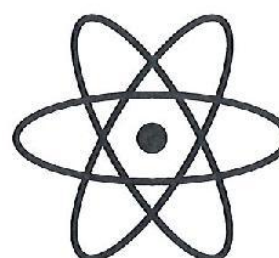
# PRACTICE-ATOMS

## True or False?

1. Scientists can see atoms with microscopes. \_\_\_\_\_
2. Neutrons are positively (+) charged. \_\_\_\_\_
3. The center of the atom is called the brain. \_\_\_\_\_
4. Protons are found in the electron cloud. \_\_\_\_\_

## Fill in the Blanks!

This is a picture of an \_\_\_\_\_. The center is called the \_\_\_\_\_ and the outside is called the \_\_\_\_\_.



## Lets Match!

- Name
- Symbol
- Atomic Number
- Atomic Mass



## Pick the correct answer.

**1. Oxygen has an atomic number of 6. How many protons does oxygen have?**

- A. 4
- B. 8
- C. 16

**2. What are atoms are made up of?**

- A. electrons
- B. protons
- C. neutrons
- D. all of the above

## Revision Sheets

### Chapter 4 – Discovering Parts of an Atom

#### Part A- True/False

Indicate whether the statement is true or false.

- \_\_\_\_\_ 1. The mass of an electron is about equal to the mass of a proton.
- \_\_\_\_\_ 2. For an atom to be neutral, the number of protons must equal the number of neutrons.
- \_\_\_\_\_ 3. The neutrons make up most of the volume of an atom.
- \_\_\_\_\_ 4. Dividing an element into smaller pieces results in a molecule.
- \_\_\_\_\_ 5. Two isotopes of the same element contain different numbers of protons.
- \_\_\_\_\_ 6. Nuclear decay occurs when an unstable atomic nucleus changes into another more stable nucleus by emitting radiation.

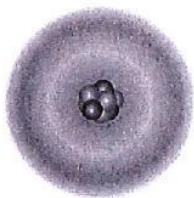
#### Part B- Multiple Choice

Identify the choice that best completes the statement or answers the question.

- \_\_\_\_\_ 7. The atomic number of calcium is 20. What can you tell about an atom of this element?
  - a. the sum of its protons and neutrons is 20
  - b. it has 20 protons
  - c. it has 40 protons
  - d. it has 20 neutrons
- \_\_\_\_\_ 8. Where is the densest part of an atom?
  - a. electron cloud
  - b. space around the nucleus
  - c. nucleus
  - d. All parts of the atom are equally dense.
- \_\_\_\_\_ 9. How small are atoms?
  - a. about the size of dust specks
  - b. about the size of pin holes
  - c. about the size of grains of salt or sand
  - d. too small to be seen by the unaided eye
- \_\_\_\_\_ 10. The sum of an atom's protons and neutrons is its \_\_\_\_\_.
  - a. atomic mass
  - b. periodic number
  - c. atomic number
  - d. atomic weight



11. What are the smallest particles of an element that have the same chemical properties as the element?



- a. atoms
- b. molecules
- c. protons
- d. electrons

12. What did Democritus believe an atom was?

- a. a solid, indivisible object
- b. a tiny particle with a nucleus
- c. a nucleus surrounded by an electron cloud
- d. a tiny nucleus with electrons surrounding it

13. What determines the identity of elements?

- a. its mass number
- b. the charge of the atom
- c. the number of its neutrons
- d. the number of its protons

14. If an ion contains 10 electrons, 12 protons, and 13 neutrons, what is the ion's charge?

- a. 2-
- b. 1-
- c. 2+
- d. 3+

### Part C- Matching

*Match each term with its correct description*

- |                        |                  |
|------------------------|------------------|
| a. atom                | g. nucleus       |
| b. electron            | h. proton        |
| c. neutron             | i. nuclear decay |
| d. isotope             | j. ion           |
| e. mass number         |                  |
| f. average atomic mass |                  |

15. The smallest particle of an element that still has the same chemical properties of that element.

16. A positively charged particle inside an atom's nucleus.

17. A particle with a negative electric charge.

18. The center of the atom which contains most of the atom's mass.

19. A particle that is found in the nucleus of an atom and has no electrical charge.

20. The average mass of the element's isotopes.

21. Atoms of the same element that have different numbers of neutrons.

- \_\_\_\_ 22. An atom that is no longer neutral because it has gained or lost electrons.
- \_\_\_\_ 23. A process that occurs when an unstable atomic nucleus changes into another more stable nucleus by emitting radiation.

**Part D- Short Answer**

*Write the correct answer for each of the following questions.*

24. When the same element has different atomic masses, it is called a(n) \_\_\_\_\_.
25. Electrons in an atom move throughout the \_\_\_\_\_ surrounding the nucleus.
26. How can radioactive decay produce new elements?
27. How can radioactive decay produce new elements?

# The Periodic Table of ELEMENTS

GROUPS																	
1	Hydrogen	2	Helium	PERIODS													
3	Lithium	4	Beryllium	5	Boron	6	Carbon	7	Nitrogen	8	Oxygen	9	Fluorine	10	Neon	11	Sodium
12	Magnesium	13	Aluminum	14	Silicon	15	Phosphorus	16	Sulfur	17	Chlorine	18	Argon	19	Potassium	20	Calcium
21	Sodium	22	Magnesium	23	Aluminum	24	Silicon	25	Phosphorus	26	Sulfur	27	Chlorine	28	Argon	29	Potassium
39	Potassium	40	Calcium	41	Scandium	42	Titanium	43	Vanadium	44	Chromium	45	Manganese	46	Iron	47	Cobalt
55	Cesium	56	Barium	57-71	Lanthanum	72	Hafnium	73	Tantalum	74	Tungsten	75	Rhenium	76	Osmium	77	Iridium
87	Rubidium	88	Strontium	89	Yttrium	90	Zirconium	91	Niobium	92	Molybdenum	93	Technetium	94	Ruthenium	95	Rhodium
137	Francium	138	Radium	139	Actinium	140	Thorium	141	Protactinium	142	Uranium	143	Np	144	Pu	145	Am
223	Fr	226	Ra	227	Ac	228	Th	231	Pa	232	U	233	Np	236	Pu	237	Am
287	Uu	288	Uu	289	Uu	290	Uu	291	Uu	292	Uu	293	Uu	294	Uu	295	Uu
113	Bohrium	114	Flerovium	115	Moscovium	116	Livermorium	117	Tennessine	118	Oganesson	119	Uue	120	Uuo	121	Uut
125	Uup	126	Uuq	127	Uus	128	Uuh	129	Uuq	130	Uuo	131	Uut	132	Uuq	133	Uuq
151	Uub	152	Uut	153	Uuq	154	Uuq	155	Uuq	156	Uuq	157	Uuq	158	Uuq	159	Uuq
163	Uub	164	Uut	165	Uuq	166	Uuq	167	Uuq	168	Uuq	169	Uuq	170	Uuq	171	Uuq
173	Uub	174	Uut	175	Uuq	176	Uuq	177	Uuq	178	Uuq	179	Uuq	180	Uuq	181	Uuq
183	Uub	184	Uut	185	Uuq	186	Uuq	187	Uuq	188	Uuq	189	Uuq	190	Uuq	191	Uuq
193	Uub	194	Uut	195	Uuq	196	Uuq	197	Uuq	198	Uuq	199	Uuq	200	Uuq	201	Uuq
203	Uub	204	Uut	205	Uuq	206	Uuq	207	Uuq	208	Uuq	209	Uuq	210	Uuq	211	Uuq
213	Uub	214	Uut	215	Uuq	216	Uuq	217	Uuq	218	Uuq	219	Uuq	220	Uuq	221	Uuq
223	Uub	224	Uut	225	Uuq	226	Uuq	227	Uuq	228	Uuq	229	Uuq	230	Uuq	231	Uuq
233	Uub	234	Uut	235	Uuq	236	Uuq	237	Uuq	238	Uuq	239	Uuq	240	Uuq	241	Uuq
243	Uub	244	Uut	245	Uuq	246	Uuq	247	Uuq	248	Uuq	249	Uuq	250	Uuq	251	Uuq
253	Uub	254	Uut	255	Uuq	256	Uuq	257	Uuq	258	Uuq	259	Uuq	260	Uuq	261	Uuq
263	Uub	264	Uut	265	Uuq	266	Uuq	267	Uuq	268	Uuq	269	Uuq	270	Uuq	271	Uuq
273	Uub	274	Uut	275	Uuq	276	Uuq	277	Uuq	278	Uuq	279	Uuq	280	Uuq	281	Uuq
283	Uub	284	Uut	285	Uuq	286	Uuq	287	Uuq	288	Uuq	289	Uuq	290	Uuq	291	Uuq
293	Uub	294	Uut	295	Uuq	296	Uuq	297	Uuq	298	Uuq	299	Uuq	300	Uuq	301	Uuq
303	Uub	304	Uut	305	Uuq	306	Uuq	307	Uuq	308	Uuq	309	Uuq	310	Uuq	311	Uuq
313	Uub	314	Uut	315	Uuq	316	Uuq	317	Uuq	318	Uuq	319	Uuq	320	Uuq	321	Uuq
323	Uub	324	Uut	325	Uuq	326	Uuq	327	Uuq	328	Uuq	329	Uuq	330	Uuq	331	Uuq
333	Uub	334	Uut	335	Uuq	336	Uuq	337	Uuq	338	Uuq	339	Uuq	340	Uuq	341	Uuq
343	Uub	344	Uut	345	Uuq	346	Uuq	347	Uuq	348	Uuq	349	Uuq	350	Uuq	351	Uuq
353	Uub	354	Uut	355	Uuq	356	Uuq	357	Uuq	358	Uuq	359	Uuq	360	Uuq	361	Uuq
363	Uub	364	Uut	365	Uuq	366	Uuq	367	Uuq	368	Uuq	369	Uuq	370	Uuq	371	Uuq
373	Uub	374	Uut	375	Uuq	376	Uuq	377	Uuq	378	Uuq	379	Uuq	380	Uuq	381	Uuq
383	Uub	384	Uut	385	Uuq	386	Uuq	387	Uuq	388	Uuq	389	Uuq	390	Uuq	391	Uuq
393	Uub	394	Uut	395	Uuq	396	Uuq	397	Uuq	398	Uuq	399	Uuq	400	Uuq	401	Uuq
403	Uub	404	Uut	405	Uuq	406	Uuq	407	Uuq	408	Uuq	409	Uuq	410	Uuq	411	Uuq
413	Uub	414	Uut	415	Uuq	416	Uuq	417	Uuq	418	Uuq	419	Uuq	420	Uuq	421	Uuq
423	Uub	424	Uut	425	Uuq	426	Uuq	427	Uuq	428	Uuq	429	Uuq	430	Uuq	431	Uuq
433	Uub	434	Uut	435	Uuq	436	Uuq	437	Uuq	438	Uuq	439	Uuq	440	Uuq	441	Uuq
443	Uub	444	Uut	445	Uuq	446	Uuq	447	Uuq	448	Uuq	449	Uuq	450	Uuq	451	Uuq
453	Uub	454	Uut	455	Uuq	456	Uuq	457	Uuq	458	Uuq	459	Uuq	460	Uuq	461	Uuq
463	Uub	464	Uut	465	Uuq	466	Uuq	467	Uuq	468	Uuq	469	Uuq	470	Uuq	471	Uuq
473	Uub	474	Uut	475	Uuq	476	Uuq	477	Uuq	478	Uuq	479	Uuq	480	Uuq	481	Uuq
483	Uub	484	Uut	485	Uuq	486	Uuq	487	Uuq	488	Uuq	489	Uuq	490	Uuq	491	Uuq
493	Uub	494	Uut	495	Uuq	496	Uuq	497	Uuq	498	Uuq	499	Uuq	500	Uuq	501	Uuq
503	Uub	504	Uut	505	Uuq	506	Uuq	507	Uuq	508	Uuq	509	Uuq	510	Uuq	511	Uuq
513	Uub	514	Uut	515	Uuq	516	Uuq	517	Uuq	518	Uuq	519	Uuq	520	Uuq	521	Uuq
523	Uub	524	Uut	525	Uuq	526	Uuq	527	Uuq	528	Uuq	529	Uuq	530	Uuq	531	Uuq
533	Uub	534	Uut	535	Uuq	536	Uuq	537	Uuq	538	Uuq	539	Uuq	540	Uuq	541	Uuq
543	Uub	544	Uut	545	Uuq	546	Uuq	547	Uuq	548	Uuq	549	Uuq	550	Uuq	551	Uuq
553	Uub	554	Uut	555	Uuq	556	Uuq	557	Uuq	558	Uuq	559	Uuq	560	Uuq	561	Uuq
563	Uub	564	Uut	565	Uuq	566	Uuq	567	Uuq	568	Uuq	569	Uuq	570	Uuq	571	Uuq
573	Uub	574	Uut	575	Uuq	576	Uuq	577	Uuq	578	Uuq	579	Uuq	580	Uuq	581	Uuq
583	Uub	584	Uut	585	Uuq	586	Uuq	587	Uuq	588	Uuq	589	Uuq	590	Uuq	591	Uuq
593	Uub	594	Uut	595	Uuq	596	Uuq	597	Uuq	598	Uuq	599	Uuq	600	Uuq	601	Uuq
603	Uub	604	Uut	605	Uuq	606	Uuq	607	Uuq	608	Uuq	609	Uuq	610	Uuq	611	Uuq
613	Uub	614	Uut	615	Uuq	616	Uuq	617	Uuq	618	Uuq	619	Uuq	620	Uuq	621	Uuq
623	Uub	624	Uut	625	Uuq	626	Uuq	627	Uuq	628	Uuq	629	Uuq	630	Uuq	631	Uuq
633	Uub	634	Uut	635	Uuq	636	Uuq	637	Uuq	638	Uuq	639	Uuq	640	Uuq	641	Uuq
643	Uub	644	Uut	645	Uuq	646	Uuq	647	Uuq	648	Uuq	649	Uuq	650	Uuq	651	Uuq
653	Uub	654	Uut	655	Uuq	656	Uuq	657	Uuq	658	Uuq	659	Uuq	660	Uuq	661	Uuq
663	Uub	664	Uut	665	Uuq	666	Uuq	667	Uuq	668	Uuq	669	Uuq	670	Uuq	671	Uuq
673	Uub	674	Uut	675	Uuq	676	Uuq	677	Uuq	678	Uuq	679	Uuq	680	Uuq	681	Uuq
683	Uub	684	Uut	685	Uuq	686	Uuq	687	Uuq	688	Uuq	689	Uuq	690	Uuq	691	Uuq
693	Uub	694	Uut	695	Uuq	696	Uuq	697	Uuq	698	Uuq	699	Uuq	700	Uuq	701	Uuq
703	Uub	704	Uut	705	Uuq	706	Uuq	707	Uuq	708	Uuq	709	Uuq	710	Uuq	711	Uuq
713	Uub	714	Uut	715	Uuq	716	Uuq	717	Uuq	718	Uuq	719	Uuq	720	Uuq	721	Uuq
723	Uub	724	Uut	725	Uuq	726	Uuq	727	Uuq	728	Uuq	729	Uuq	730	Uuq	731	Uuq
733	Uub	734	Uut	735	Uuq	736	Uuq	737	Uuq	738	Uuq	739	Uuq	740	Uuq	741	Uuq
743	Uub	744	Uut	745	Uuq	746	Uuq	747	Uuq	748	Uuq	749	Uuq	750	Uuq	751	Uuq
753	Uub	754	Uut	755	Uuq	756	Uuq	757	Uuq	758	Uuq	759	Uuq	760	Uuq	761	Uuq
763	Uub	764	Uut	765	Uuq	766	Uuq	767	Uuq	768	Uuq	769	Uuq	770	Uuq	771	Uuq
773	Uub	774	Uut	775	Uuq	776	Uuq	777	Uuq	778	Uuq	779	Uuq	780	Uuq	781	Uuq
783	Uub	784	Uut	785	Uuq	786	Uuq	787	Uuq	788	Uuq	789	Uuq	790	Uuq	791	Uuq
793	Uub	794	Uut	795	Uuq	796	Uuq	797	Uuq	798	Uuq	799	Uuq	800	Uuq	801	Uuq
803	Uub	804	Uut	805	Uuq	806	Uuq	807	Uuq	808	Uuq	809	Uuq	810	Uuq	811	Uuq
813	Uub	814	Uut	815	Uuq	816	Uuq	817	Uuq	818	Uuq	819	Uuq	820	Uuq	821	Uuq
823	Uub	824	Uut	825	Uuq	826											



# Metals, Nonmetals & Metalloids

## Metalloids

- have metallic and nonmetallic properties

<b>C</b> Carbon 6.02	Fire extinguisher
<b>Si</b> Silicon 28.09	Glass
<b>Ge</b> Germanium 72.64	Transistors
<b>Sn</b> Tin 118.71	Tin roof
<b>Pb</b> Lead 207.2	Paint

## Nonmetals

- poor conductors of heat and electricity
- brittle
- non-ductile

<b>F</b> Fluorine 18.998	Fluoroplastics
<b>Cl</b> Chlorine 35.45	Chlorinating liquid
<b>Br</b> Bromine 79.904	Photographic film
<b>I</b> Iodine 126.905	Liquid iodine
<b>At</b> Astatine 210	Radioactive

1 <b>H</b> Hydrogen 1.008	2 <b>He</b> Helium 4.0026																	18 <b>Ar</b> Argon 39.948	19 <b>K</b> Potassium 39.098	20 <b>Ca</b> Calcium 40.078	21 <b>Sc</b> Scandium 44.956	22 <b>Ti</b> Titanium 47.88	23 <b>V</b> Vanadium 50.942	24 <b>Cr</b> Chromium 52.00	25 <b>Mn</b> Manganese 54.938	26 <b>Fe</b> Iron 55.845	27 <b>Co</b> Cobalt 58.933	28 <b>Ni</b> Nickel 58.69	29 <b>Cu</b> Copper 63.546	30 <b>Zn</b> Zinc 65.38	31 <b>Ga</b> Gallium 69.723	32 <b>Ge</b> Germanium 72.64	33 <b>As</b> Arsenic 74.922	34 <b>Se</b> Selenium 78.96	35 <b>Br</b> Bromine 79.904	36 <b>Kr</b> Krypton 83.80	37 <b>Rb</b> Rubidium 85.468	38 <b>Sr</b> Strontium 87.62	39 <b>Y</b> Yttrium 88.906	40 <b>Zr</b> Zirconium 91.224	41 <b>Nb</b> Niobium 92.906	42 <b>Mo</b> Molybdenum 95.94	43 <b>Tc</b> Technetium 98	44 <b>Ru</b> Ruthenium 101.07	45 <b>Rh</b> Rhodium 102.91	46 <b>Pd</b> Palladium 106.36	47 <b>Ag</b> Silver 107.87	48 <b>Cd</b> Cadmium 112.41	49 <b>In</b> Indium 114.82	50 <b>Sn</b> Tin 118.71	51 <b>Sb</b> Antimony 121.76	52 <b>Te</b> Tellurium 127.6	53 <b>I</b> Iodine 126.91	54 <b>Xe</b> Xenon 131.29	55 <b>Cs</b> Cesium 132.91	56 <b>Ba</b> Barium 137.33	57-71 Lanthanides	72 <b>Hf</b> Hafnium 178.49	73 <b>Ta</b> Tantalum 180.95	74 <b>W</b> Tungsten 183.84	75 <b>Re</b> Rhenium 186.21	76 <b>Os</b> Osmium 190.23	77 <b>Ir</b> Iridium 192.22	78 <b>Pt</b> Platinum 195.08	79 <b>Au</b> Gold 196.97	80 <b>Hg</b> Mercury 200.59	81 <b>Tl</b> Thallium 204.38	82 <b>Pb</b> Lead 207.2	83 <b>Bi</b> Bismuth 208.98	84 <b>Po</b> Polonium 209	85 <b>At</b> Astatine 210	86 <b>Rn</b> Radon 222	87 <b>Fr</b> Francium 223	88 <b>Ra</b> Radium 226	89-103 Actinides	104 <b>Rf</b> Rutherfordium 261	105 <b>Db</b> Dubnium 262	106 <b>Sg</b> Seaborgium 266	107 <b>Bh</b> Bohrium 264	108 <b>Hs</b> Hassium 277	109 <b>Mt</b> Meitnerium 268	110 <b>Ds</b> Darmstadtium 271	111 <b>Rg</b> Roentgenium 272	112 <b>Cn</b> Copernicium 285	113 <b>Nh</b> Nihonium 284	114 <b>Fl</b> Flerovium 289	115 <b>Mc</b> Moscovium 288	116 <b>Lv</b> Livermorium 293	117 <b>Ts</b> Tennessine 294	118 <b>Og</b> Oganesson 294
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## Metals

- good conductors of heat and electricity
- malleable
- ductile

### Group 1 Alkali metals

<b>Li</b> Lithium 6.94	Batteries
<b>Na</b> Sodium 22.99	Window panes
<b>K</b> Potassium 39.10	Bananas
<b>Rb</b> Rubidium 85.47	Fireworks
<b>Cs</b> Cesium 132.91	Atomic clock
<b>Fr</b> Francium 223	Radioactive

### Group 2 Alkaline metals

<b>Be</b> Beryllium 9.01	Spacecraft structures
<b>Mg</b> Magnesium 24.31	Bananas
<b>Ca</b> Calcium 40.08	Shells
<b>Sr</b> Strontium 87.62	Fireworks
<b>Ba</b> Barium 137.33	X-ray
<b>Ra</b> Radium 226	Radioactive

### Group 3-13 Transition metals

<b>Sc</b> Scandium 44.96	Bicycle frames
<b>Ti</b> Titanium 47.88	Weight
<b>V</b> Vanadium 50.94	Computer monitor
<b>Cr</b> Chromium 52.00	Solar cell
<b>Mn</b> Manganese 54.94	Camera lens
<b>Fe</b> Iron 55.85	Bulbhead pin



## Revision Sheets

### Chapter 5 – The Periodic Table

#### Part A- True/False

Indicate whether the statement is true or false.

- \_\_\_\_\_ 1. A metalloid is an element with all of the same properties as metals.
- \_\_\_\_\_ 2. Elements were arranged in order of increasing atomic mass on Mendeleev's first periodic table.
- \_\_\_\_\_ 3. Elements on the far right of the periodic table are classified as nonmetals.
- \_\_\_\_\_ 4. Copper is a metal and is a conductor of electricity.
- \_\_\_\_\_ 5. Ductility is not a property of metals
- \_\_\_\_\_ 6. Most metals are on the right side of the periodic table.

#### Part B- Multiple Choice

Identify the choice that best completes the statement or answers the question.

- \_\_\_\_\_ 7. The atomic number of calcium is 20. What can you tell about an atom of this element?
  - a. the sum of its protons and neutrons is 20
  - b. it has 20 protons
  - c. it has 40 protons
  - d. it has 20 neutrons
- \_\_\_\_\_ 8. The scientist best known for contributions to the development of the periodic table is \_\_\_\_\_.
  - a. Dmitri Mendeleev
  - b. Democritus
  - c. John Dalton
  - d. Albert Einstein
- \_\_\_\_\_ 9. A solid solution, such as sterling silver, is a(n) \_\_\_\_\_.
  - a. alloy
  - b. metalloid
  - c. colloid
  - d. emulsion
- \_\_\_\_\_ 10. Moving from left to right across the periodic table, how do the elements change?
  - a. They change from nonmetals to metalloids to metals.
  - b. They change from metals to metalloids to nonmetals.
  - c. They decrease in atomic number.
  - d. They are in alphabetic order.

11. The sum of an atom's protons and neutrons is its \_\_\_\_.
- atomic mass
  - periodic number
  - atomic number
  - atomic weight
12. When Mendeleev published his periodic table, there were some spaces for undiscovered elements. The image below is a section of a similar table. A reasonable value for the atomic mass of the missing element is \_\_\_\_.

<b>Al</b> 27.0	<b>Si</b> 28.1	<b>P</b> 31.0
<b>Ga</b> 69.7	?	<b>As</b> 74.9
<b>In</b> 115	<b>Sn</b> 119	<b>Sb</b> 122

- 101
  - 72.3
  - 68.2
  - 34.8
13. Iodine is a solid nonmetal. What is one property of iodine?
- conductivity
  - dull appearance
  - malleability
  - ductility
14. The elements F, Cl, Br, I and At all appear in the same column of the periodic table and share many \_\_\_\_.
- atomic numbers
  - chemical formulas
  - physical properties
  - chemical properties

### Part C- Matching

Match each term with its correct description.

- atomic number
- nonmetals
- alkaline earth metals
- group
- periodic table
- alkali metals
- metal
- period

15. The number of protons in an atom of an element.
16. A chart that shows the elements in order of increasing atomic number.
17. Elements that have no metallic properties.
18. The elements that are in group 1 on the periodic table.
19. An element that is generally shiny and hard.
20. The rows on the periodic table.

- \_\_\_\_ 21. The columns on the periodic table.
- \_\_\_\_ 22. The elements that are in group 2 on the periodic table.

**Part D- Short Answer**

*Write the correct answer for each of the following questions.*

23. Describe five physical properties that can help to identify copper.
24. The \_\_\_\_\_ increases by one for each element as you move left to right across a period.
25. Classify each of the following elements as a metal, nonmetal, or a metalloid:
- |          |       |
|----------|-------|
| boron    | _____ |
| carbon   | _____ |
| aluminum | _____ |
| silicon  | _____ |
26. An element that is sometimes a good conductor of electricity and sometimes a good insulator is a(n) \_\_\_\_\_.
27. An element that is a poor conductor of heat and electricity, but is a good insulator is a(n) \_\_\_\_\_.
28. What are two properties that make a metal a good choice for use as wires in electronics?





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