RRP01-178579B01-MATRIX-XXXXXX

New Development Lesson Script

Key for use in this script:

- Create headings using the **Heading 2 style** (from the home tab).
- Click-to-reveals, accordions, tabbed panels, or pop-ups need to include a begin and an end. For example, **Begin Tabbed Panel** followed by **End Tabbed Panel** after the content.
- See end of script for tables to be used for interactives, video, and art design needs.
- Place comments, design instructions, and/or questions in pink highlight.
- Place glossary, tooltips, or rollovers in green highlight.

Date:	**11/10/16**	**Version #:**	
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Lesson Number and Name:	**3.02 The Periodic Table**
Course:	MJ Comprehensive Science 3
Reading Level	10.4
Lesson Benchmarks / Standards:	SC.8.P.8.6: Recognize that elements are grouped in the periodic table according to similarities of their properties. Learning Targets • Define element. • Recognize columns on a periodic table. • Recognize rows on a periodic table. • Recognize groupings of elements on the periodic table. • Recall the similar properties that exists within elements in a column on a periodic table. • Recall the similar properties that exists within elements in a row on a periodic table. • Recall the similar properties that exists within elements in a grouping of elements on the periodic table. • Retrieve information about an element by reading the periodic table. • Describe the number of sub-atomic particles a given element has by reading the periodic table. • Predict properties of an element when given either its name or atomic number.

Lesson Content Begins Below

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Lesson Objectives

After completing this lesson, you will be able to:

- describe the similar properties that exists between elements in the same row, column, or grouping
- describe the number of sub-atomic particles a given element has by reading the periodic table
- predict properties of an element when given either its name or atomic number

Page 1

Title: The Elements of Success

Definitions: Enter word(s) and definition(s) here for page

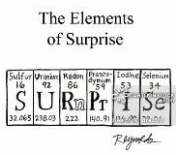
Standards Addressed: Enter relevant standards here

The Elements of Success

Art Design

Images: Squares from periodic table that spell "Success"

Example:



Instead of elements of surprise, create elements of success in colorful squares from the period table. The element sulfur (S), Uranium (U), Carbon (C), Cerium (Ce), and two sulfurs (S).

Periodic Table

http://develop.flvs.net/collaborate/nsnell/Angular/periodic-table/index.html

The human mind loves organization. We organize our songs in playlists, clothes in our closets, and the food in our pantries. Why? Because it makes finding things, like a chocolate chip cookie when you are hungry, a lot easier and quicker.

Do you know who else loves organization? Scientists. So when scientist Dmitri Mendeleev was faced with the known elements at the time, his first instinct was to organize them. He had been working on it for months but he hadn't figured out a way to do it that made sense. Then one night, the solution came to him in a dream. He saw all the elements in a table organized by similar traits.

Mendeleev organized the elements successfully, even finding spots for elements that had not yet been discovered. An updated version of Mendeleev's table is still used today. Its organization has made learning properties of elements so much easier.

Be sure to use the Guided Notes as you read through the lesson.

Begin Notes

Key Questions and Terms	Notes

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What are the differences between metals and non-metals?	
What makes metalloids a group of their own?	
What are the different families present in the periodic table?	
Which families are highly reactive? Which family is unreactive?	
Which families of metals are not so reactive which allows them to exist by themselves in nature?	
How do you determine the chemical reactivity for metals using the periodic table?	
How do you determine the chemical reactivity for non-metals using the periodic table?	
What trend is observed about atomic radii based on the placements of elements on the periodic table?	
What information about elements can be collected from the periodic table?	
What is the purpose of a chemical symbol?	

End Notes

Page 2

Notes: Matching Families
Learning Targets:
Define element.
Recognize columns on a periodic table.
Recognize groupings of elements on the periodic table.
Recall the similar properties that exists within elements in a column on a periodic table.
Recall the similar properties that exists within elements in a grouping of elements on the periodic table..

Definitions: Metalloids: an element whose properties are between those of metals and solid nonmetals
Ductile: able to be pulled into wires or rolled into thin sheets
Family: a group of elements with similar properties that are usually in the same column on the periodic table

Standards Addressed: SC.8.P.8.6: Recognize that elements are grouped in the periodic table according to similarities of their properties.

We Are Family

Icon and Div

Focus Question: What are the properties of elements based on their placement on the periodic table?

End div

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Art Design
Image- Can we get an image of two groupings side-by-side.

Group by Color	Group by Type
Green [image of frog, grass, and lime]	**Animal [image of frog, yellow tang fish]**
Yellow [image of yellow tang fish, sun, and lemon]	**Nature [image of grass, sun]**
	Fruit [image of lemon, lime]

There are many ways to sort different items based on similarity. Mendeleev used this idea to start his creation of the Periodic Table of Elements. He needed to find the similarities between elements in order to group them together. He started with grouping elements that were metals and non-metals, based on their physical properties. If an element did not fully fit either grouping, they went to a group called **metalloids**, which had characteristics of both metals and non-metals.

Metals	Non-Metals
Physical Properties: 1. Good conductors of electricity and heat 2. Solid at room temperature 3. Malleable, flexible, and **ductile** 4. Lustrous (shiny) 5. Higher density	Physical Properties: • Poor conductors of electricity and heat • Solid, Liquid or Gas at room temperature • Solids are brittle and break easily • Dull (not shiny) • Lower density

With further investigation, elements were categorized into more groups. Each grouping is called a **family** and often falls into columns on the periodic table.

Interactive- Periodic Table Interactive		
Interactive Library Template/Example: http://develop.flvs.net/collaborate/nsnell/Angular/periodic-table/index.html		
Description: **Directions:** Select each colored section of the periodic table to review the properties of each family.		
VISUALS	**TEXT / AUDIO**	**NOTES / OTHER**

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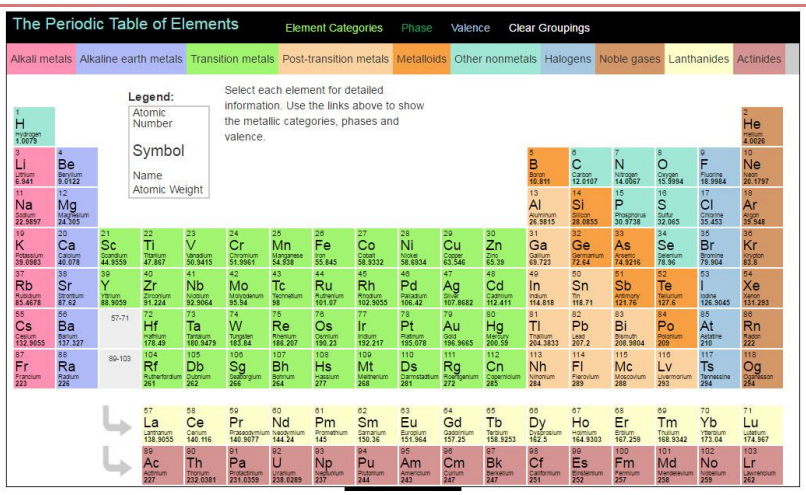
		This interactive is already created. We just need a few adjustments. 1. Remove the Legend and the options Phase, Valence, and Clear Groupings. We only need Element Categories
		2. Instead of each element opening with information about the element, we need the entire family to be selectable and information about the family will open instead. For example, if a student selects any element in the pink group (alkali metals)- information about alkali metals appears.
Alkali Metals Alkali metals have a silvery appearance and are very soft and shiny. These metals are also extremely reactive. This makes them rare to find alone in nature. Usually found in substances. For example, a common alkali metal is sodium which is found in table salt. Alkaline earth metals The alkaline earth metals are similar to alkali metals, but tend to be harder and denser. They are less reactive than alkali metals, but still too reactive to be found in nature. Elements		

of this family can be found in fireworks, batteries, and flashbulbs. The elements magnesium and calcium are important to the health of your body. The Transition metals The transition metals are common metals like gold, silver, or copper (very shiny). They share similar physical properties with other metals. Transition metals are usually harder than the alkali and alkaline metals. But, they are less reactive and many can exist in nature. You can see these metals in construction and jewelry, for example. Post-Transition metals The post transition metals are opaque (milky) solids with higher densities. They do not conduct heat and electricity as easily as the other metals. Common examples from this family are aluminum (aluminum foil), zinc (important mineral for the body), and lead and mercury (highly toxic). Metalloids Metalloids have properties of both metals and non-metals. Some of the metalloids, such as silicon, are semi-conductors. They can conduct electricity or act like insulators (non-conducting), depending on the temperature. Non-metals Non-metals can be gases. They are very brittle (breakable) when they are solids. They are not able to conduct electricity or heat very well. Non-metals don't reflect light so they are not shiny like metals. Halogens The halogens are known for their high reactivity as non-metals. They are more willing to bond with lots of different substances. Many of the members of the halogen family go through phase changes (solid, liquid, gas) at room temperature. Noble gases Non-metals to the right of the reactive halogens are the unreactive noble gases. Because they are unreactive, you will not find noble gases naturally reacting with other elements. Some samples from this family are neon, argon, xenon, which are used in lighting. Helium is used in balloons. Lanthanide Series The lanthanides are soft, rare-earth metals. These elements		

are useful in production of many items, including glass and laser technologies. Actinides Series All the elements of Actinides series are man-made and do not occur in nature. They have a silvery-white luster in their metallic form. They are also radioactive.		

Page 3

Notes: Follow the Rows
Learning Targets:
Recognize rows on a periodic table.
Recall the similar properties that exists within elements in a row on a periodic table.

Definitions: Atomic radius: the distance from an atom's nucleus to the outermost orbital of electron
Chemical Reactivity: the readiness of a substance to undergo a chemical reaction with another substance

Standards Addressed: SC.8.P.8.6: Recognize that elements are grouped in the periodic table according to similarities of their properties.

Periodic Trends

Icon and Div

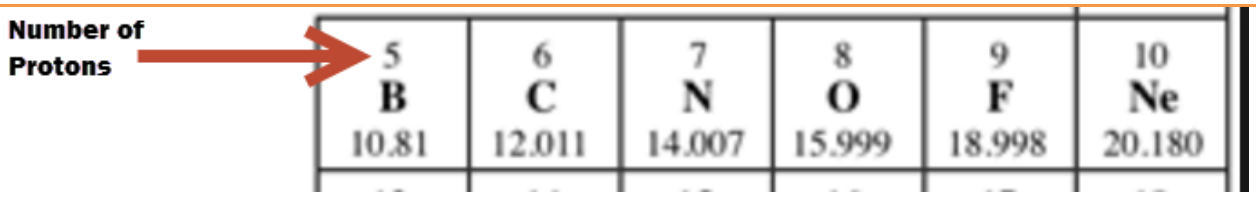
Focus Question: What trends exist in elements based on the structure of the periodic table?

End div

Dmitri Mendeleev was the first person to create a periodic table based on similar properties. But he made one mistake, he organized the rows on his periodic table by atomic mass. By doing so, some of the families down each column did not match as well as they should.

Another scientist named Henry Mosley fixed the problem. He organized the rows by the number of protons in each element. The rows of elements increase from left to right by number of protons. This adjustment to the table allows each family of elements to align more closely.

Art Design



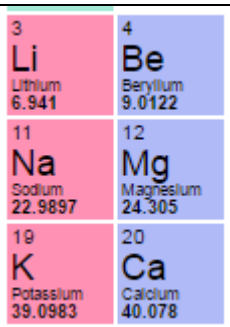
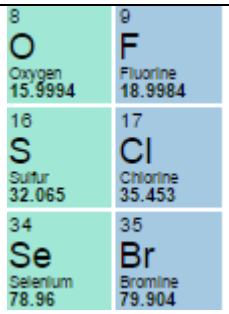
Alt tag- A row of elements from boron to neon is shown with an arrow pointing to the top number that is labeled number of protons.

But this piece of information is not the only useful structure of the periodic table. Once the rows of the periodic table were organized by proton number, scientists noticed other patterns (or trends).

Possibly a tabbed treatment

Reactivity

Scientists noticed that **chemical reactivity** for metals and non-metals behave oppositely on the periodic table.

Metals	**Non-metals**
As you go **down** a column, the chemical reactivity **increases**. As you go **right** across a period, the chemical reactivity **decreases**. Example: Looking at the periodic table, sodium (Na) is more reactive than lithium because it is below it on the periodic table. Magnesium is less reactive than sodium because it is to the right of sodium.	As you go **down** a column, the chemical reactivity **decreases**. As you go **right** across a period, the chemical reactivity **increases**. Example: Looking at the periodic table, chlorine is less reactive than fluorine because it is below it on the periodic table. Chlorine is more reactive than sulfur because it is to the right of sodium.
Art Design  Alt tag: First two columns of the periodic table are shown starting with lithium and beryllium and ending with potassium and calcium.	Art Design  Alt tag: Columns 16 and 17 of the periodic table are shown starting with oxygen and fluorine and ending with selenium and bromine.

Radius

Take what you know about the radius of a sphere and apply it to an atom. An atom has its nucleus in the center with a cloud of electrons around it. **Atomic radius** is the measurement of the size of an atom. For both metals and non-metals, scientists recognized two things about atomic radius:

1. Atomic radius increases moving down the column.

2. Atomic radius decreases moving across the row from left to right.

Art Design	
Image- an image showing the elements organized by atomic radius.  showing the relative sizes of elements Alt tag: A portion of the periodic table showing three rows starting with boron, aluminum, and gallium and ending with fluorine, chlorine, and bromine. Spheres are used to show that size decreases going right and increases going down.	Why does the radius of the elements decrease moving across a row when the atomic masses increase going in the same direction? Click to reveal A- A larger number of protons increases the overall mass of an atom. However, it doesn't necessarily increase its radius. More protons equal more positive charges that pull at the negatively charged electrons. This pulls the electrons inward, which decreases the radius of the atom.

Page 4

Title: Read the Table
Learning Targets:
Retrieve information about an element by reading the periodic table.
Describe the number of sub-atomic particles a given element has by reading the periodic table.
Predict properties of an element when given either its name or atomic number.

Definitions:

Standards Addressed: SC.8.P.8.6: Recognize that elements are grouped in the periodic table according to similarities of their properties.

Reading is Fundamental

Icon and Div

Focus Question: What information about elements can be retrieved from reading the periodic table?

End div

The location of an element on the periodic table can tell you a lot about its properties. But there's even more information about an element inside each individual box.

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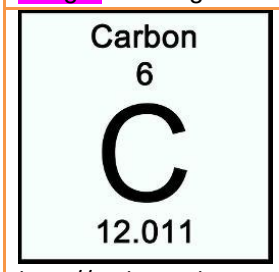
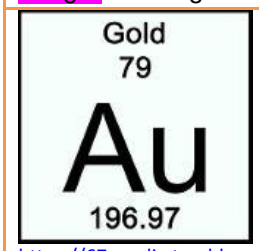
Art Design	This will be an audio clip, not to appear on screen	Art Design
Image- an image  http://taylormadescience.com/wp-content/uploads/2014/04/periodic-table.jpg Alt tag- An image the carbon box on a periodic table showing the letter C with a 6 on top and 12.011 on bottom.	Let's look at the chemical symbol, which is often used when working with elements. Chemical symbols are a shorthand version of writing down elements rather than spelling out their entire name each time. Do not think this is just a simple abbreviation. For each element, the chemical symbol is usually derived from the first letter or two of the element name. However, in many instances, it does not match. Carbon is labeled with the letter C. Gold is labeled Au not G or Go. Gold's symbol comes from the Latin word aurum meaning gold. Unless you have the chemical symbols of all elements memorized, it's best to look for it by name or number.	Image- an image showing  https://67.media.tumblr.com/a9d57d4966360270222991577f1ec943/tumblr_ngt8vyvQSH1tmd161o1_250.jpg Alt tag- An image the gold box on a periodic table showing the symbol Au with a 79 on top and 196.97 on bottom.

Speaking of numbers, what do those tell us? Watch this video to see properties of elements come alive and learn what the numbers can tell you about the sub-atomic particles.

Open these Video Guided Notes and fill them in as you learn how to read the information on the periodic table.

Video	
Description:	
VIDEO	**AUDIO**
	Video- • Predict properties of an element using a periodic table when given information about other elements in the same column. • Retrieve information about an element by reading the periodic table. • Describe the number of sub-atomic particles a given element has by reading the periodic table.

	Notes and Ideas: You can identify the atomic number and atomic mass within each box of an element. Break down how to use these numbers to find the number of electrons, protons, and neutrons. Use the atomic number to explain similarities in properties of elements in the same columns or rows of the periodic table.

Page 5

Title: Read the Table

Learning Targets:

Retrieve information about an element by reading the periodic table.
Describe the number of sub-atomic particles a given element has by reading the periodic table.
Predict properties of an element when given either its name or atomic number.

Definitions:

Standards Addressed: SC.8.P.8.6: Recognize that elements are grouped in the periodic table according to similarities of their properties.

Practice Like a Scientist

Print this **periodic table** and use it for the activities and assessment of this lesson.

Interactive- Periodic Table Scavenger Hunt		
Interactive Library Template/Example: **http://develop.flvs.net/collaborate/develop/angular/module08/lesson00/08_00_01.htm**		
Description: concentration game/scavenger hunt **Directions: Find a match with the elements. Find any pair of matching chemical symbols, atomic name, atomic number, or atomic mass.**		
VISUALS	**TEXT / AUDIO**	**NOTES / OTHER**
Example Image:	Chlorine – 17 (atomic number) Ag- Silver He – 4.00 (atomic mass) Hg- Mercury Titanium- 22 (atomic number) Zinc- 65.38 (atomic mass) Pb- Lead K- 19 (atomic number)	Just like the example, a mix of atomic numbers, masses, abbreviations, and elements can be used in the concentration game as matches. Place numbers at top, middle, or bottom, as they would be in the element box. I'm not sure of the picture that should be hidden underneath the matches.

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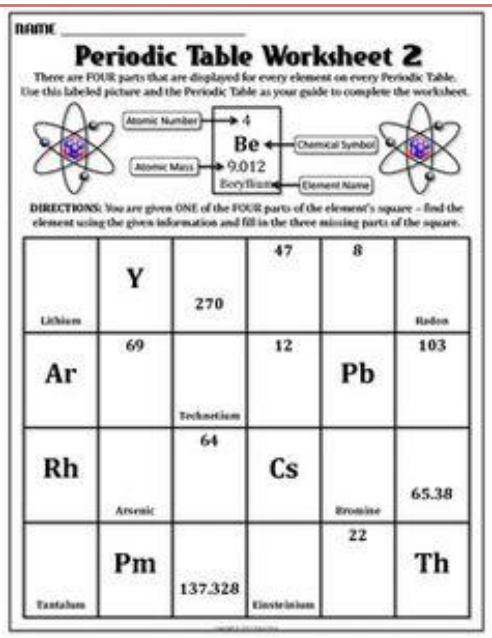


NAME _____

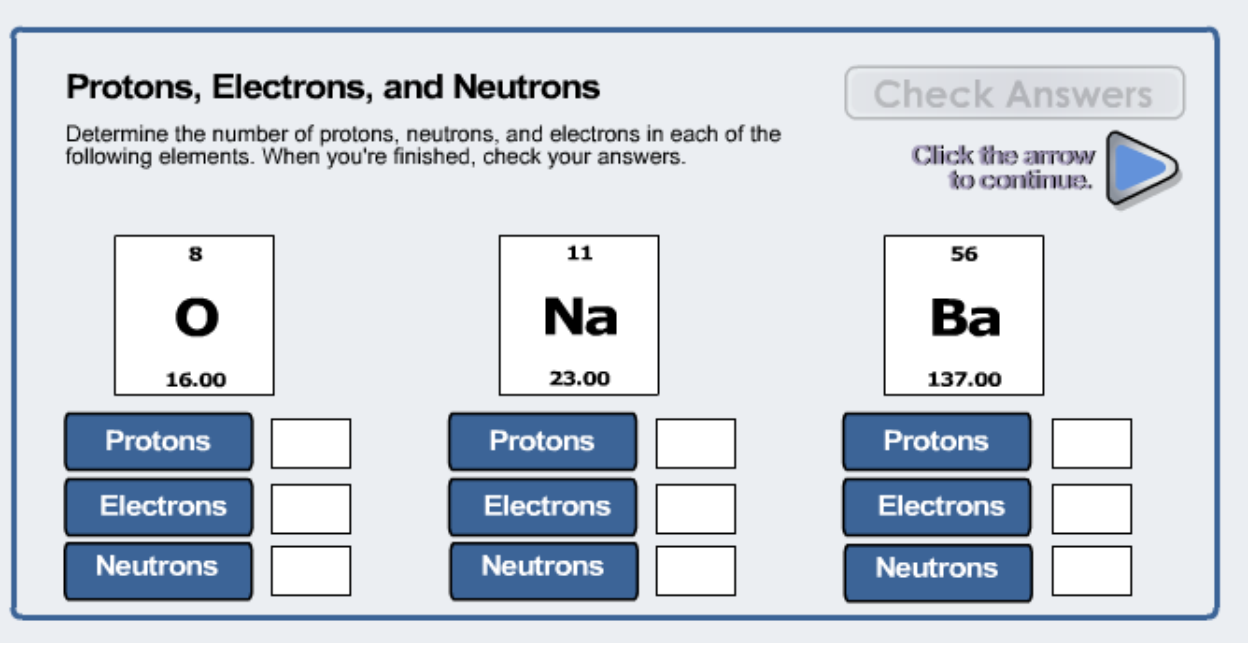
Periodic Table Worksheet 2

There are FOUR parts that are displayed for every element on every Periodic Table. Use this labeled picture and the Periodic Table as your guide to complete the worksheet.

DIRECTIONS: You are given ONE of the FOUR parts of the element's square – find the element using the given information and fill in the three missing parts of the square.

Lithium	Y	270	47	8	Radon
Ar	69	Technetium	12	Pb	103
Rh	Arsenic	64	Cs	Bromine	65.38
Tantalum	Pm	137.328	Einsteinium	22	Th

Slide 2: Can you pull the content from MJ 3 2182, 04.04 Lesson tab, and make a new FIB interactive.



Assessment Page

Lesson Summary *(if needed)*

Our current periodic table has grown in size but still uses many of Mendeleev's core ideas for organization. Thanks to his work and the work of other scientists, the periodic table has become a one-stop shop for the physical and chemical properties of each element. Now scientists are able to get all the information they need about an element from one location.

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Think Like a Scientist

Now that you have learned about the periodic table of elements, you should be able to answer the following focus questions:

- What are the properties of elements based on their placement on the periodic table?
- What trends exist in elements based on the structure of the periodic table?
- What information about elements can be retrieved from reading the periodic table?

Talk Like a Scientist

There are important vocabulary terms in this lesson. Don't forget to include these new words in your guided notes.

- **Atomic radius:** the distance from an atom's nucleus to the outermost orbital of electron
- **Chemical Reactivity:** the readiness of a substance to undergo a chemical reaction with another substance
- **Ductile:** able to be pulled into wires or rolled into thin sheets
- **Family:** is a group of elements with similar properties that usually falls into columns on the periodic table
- **Metalloids:** an element whose properties are between those of metals and solid nonmetals

Assessment Introduction *(if needed)*

Assessment Instructions (assignment box)

Assessment

Periodic Table

1. Check your understanding of important concepts by completing the practice activities in the lesson.
2. In the **Assessments** area, submit the **03.02 The Periodic Table** quiz.

Assessment Details

Rubrics, worksheets, or anything else required for completing an assessment is placed below.

Lesson time: 50

Assessment time: 20

MJ Comprehensive Science 3 #4566
Lesson Level Assessments – Exams
Module 03
Exam Name: 03.02 The Periodic Table

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Total points: 20
Partial-Autograde

Group	Group Position on Test	# Qs from Group on Test	Question Pts	Comp Level	Benchmark
1		1	2	LC	SC.8.P.8.6
2		1	2	MC	SC.8.P.8.6
3		1	4	MC	SC.8.P.8.6
4		1	2	MC	SC.8.P.8.6
5		1	2	MC	SC.8.P.8.6
6		1	3	MC	SC.8.P.8.6
7	7	1	5	MC	SC.8.P.8.6

fib:(03.02 LC)<object:SC.8.P.8.6>The element manganese is represented by the symbol ____. (Capitalization is important)
Mn
points:2
group:1

fib:(03.02 LC)<object:SC.8.P.8.6>The element chlorine is represented by the symbol ____. (Capitalization is important)
Cl
points:2
group:1

fib:(03.02 LC)<object:SC.8.P.8.6> The element zinc is a represented by the abbreviation ___. (Capitalization is important)
Zn
points:2
group:1

tf:(03.02 MC)<object:SC.8.P.8.6>Sodium is more reactive than magnesium.
true
points:2
group:2

tf:(03.02 MC)<object:SC.8.P.8.6>Oxygen is more reactive than nitrogen.
true
points:2
group:2

tf:(03.02 MC)<object:SC.8.P.8.6>Copper is more reactive than calcium.
false
points:2
group:2

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matching:label:(03.02 MC)<object:SC.8.P.8.6>Match the element with its description.
Lithium-Malleable, soft, and shiny
Lead-Opaque solid with higher density
Fluorine-Highly reactive gas
Krypton-Non-reactive gas
points:4
group:3

matching:label:(03.02 MC)<object:SC.8.P.8.6>Match the family with its description.
Sodium-Malleable, soft, and shiny
Silicon-Has properties of both metals and non-metals
Bromine-Highly reactive gas
Argon-Non-reactive gas
points:4
group:3

matching:label:(03.02 MC)<object:SC.8.P.8.6>Match the element with its description.
Potassium-Malleable and highly reactive
Barium-Great conductor of heat and electricity
Boron-Has properties of both metals and non-metals
Neon-Non-reactive gas
points:4
group:3

mc:radio:(03.02 MC)<object:SC.8.P.8.6>Which of the following elements has the largest atomic radius?
x-Potassium
Calcium
Cobalt
Nickel
points:2
group:4

mc:radio:(03.02 MC)<object:SC.8.P.8.6>Which of the following element has the smallest atomic radius?
Carbon
Nitrogen
Oxygen
x-Fluorine
points:
group:4

mc:radio:(03.02 MC)<object:SC.8.P.8.6>Which of the following element has the largest radius?
Silicon
x-Aluminum
Sulfur
Phosphorous
points:2
group:4

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mc:radio:(03.02 MC)<object:SC.8.P.8.6>Which of the following elements is the most reactive?
Potassium
Lithium
Sodium
x-Rubidium
points:2
group:5

mc:radio:(03.02 MC)<object:SC.8.P.8.6>Which of the following element is the most reactive?
Chlorine
Bromine
x-Fluorine
points:2
group:5

mc:radio:(03.02 MC)<object:SC.8.P.8.6>Which of the following element is the most reactive?
Beryllium
Calcium
Magnesium
x-Barium
points:2
group:5

mc:radio:(03.02 MC)<object:SC.8.P.8.6>A neutral atom of Potassium (K) has an average mass of 39 amu and 19 electrons. How many neutrons does it have?
10
19
x-20
58
points:3
group:6

mc:radio:(03.02 MC)<object:SC.8.P.8.6>A neutral atom of Chlorine (Cl) has an average mass of 35 amu and 17 electrons. How many neutrons does it have?
17
35
x-18
52
points:3
group:6

mc:radio:(03.02 MC)<object:SC.8.P.8.6>A neutral atom of Beryllium (Be) has an average mass of 9 amu and 4 electrons. How many neutrons does it have?
13
x-5

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9

4

points:3

group:6

essay:(03.02 MC)<object:SC.8.P.8.6 >Use your periodic table of elements. Take any element of your choosing and answer the following questions:

What is the element name and symbol?

Is it a metal, non-metal, or metalloid?

Which family does it belong to?

How many protons, neutrons, and electrons does its neutral atom have?

points:5

group:7