Name _____ Date _____ Class _____

MATH SKILLS TRANSPARENCY WORKSHEET 6

Using the Periodic Table

Use with Chapter 6, Section 6.2

1. Identify the number of valence electrons in each of the following elements.

   a. Ne _____ e. O _____

   b. K _____ f. Cl _____

   c. B _____ g. P _____

   d. Mg _____ h. Si _____

2. Identify the energy level of the valence electrons in each of the following elements.

   a. Br _____

   b. N _____

   c. Ra _____

   d. H _____

   e. Ar _____

   f. I _____

3. Use the periodic table to write the electron configurations (using noble gas notation) for each of the following elements.

   a. Li _____

   b. F _____

   c. As _____

   d. Sr _____

   e. Bi _____

4. Determine the group, period, and block of the elements having the following electron configurations.

   a. $1s^2$ _____

   b. $[Ne]3s^23p^1$ _____

   c. $[Ar]4s^1$ _____

   d. $[Kr]5s^24d^1$ _____

   e. $[Xe]6s^24f^{14}5d^{10}6p^4$ _____

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CHAPTER 6 STUDY GUIDE

The Periodic Table and Periodic Law

Section 6.1 Development of the Modern Periodic Table

In your textbook, reads about the history of the periodic table's development.

Use each of the terms below just once to complete the passage.

octaves	atomic mass	atomic number	nine
elements	properties	Henry Moseley	eight
protons	periodic law	Dmitri Mendeleev	accepted

The table below was developed by John Newlands and is based on a relationship called the law of **(1)**_____. According to this law, the properties of the elements repeated every **(2)**_____ elements. Thus, for example, element two and element **(3)**_____ have similar properties. The law of octaves did not work for all the known elements and was not generally **(4)**_____.

1	2	3	4	5	6	7
H	Li	G	Bo	C	N	O
8	9	10	11	12	13	14
F	Na	Mg	Al	Si	P	S

The first periodic table is mostly credited to **(5)**_____. In his table, the elements were arranged according to increasing **(6)**_____. One important result of this table was that the existence and properties of undiscovered **(7)**_____ could be predicted.

The element in the modern periodic table are arranged according to increasing **(8)**_____, as a result of the work of **(9)**_____. This arrangement is based on number of **(10)**_____ in the nucleus of an atom of the element. The modern form of the periodic table results in the **(11)**_____, which states that when elements are arranged according to increasing atomic number, there is a periodic repetition of their chemical and physical **(12)**_____.

Section 6.1 *continued*

In your textbook, read about the modern periodic table.

Use the information in the box on the left taken from the periodic table to complete the table on the right.

7
N
Nitrogen
14.007
$[He]2s^22p^3$

Atomic Mass	**13.**
Atomic Number	**14.**
Electron Configuration	**15.**
Chemical Name	**16.**
Chemical Symbol	**17.**

For each item in Column A, write the letter of the matching item in Column B.

Column A	Column B
_____ **18.** A column on the periodic table	**a.** metals
_____ **19.** A row on the periodic table	**b.** group
_____ **20.** Elements in groups 1, 2, and 13 to 18	**c.** period
_____ **21.** Elements that are shiny and conduct electricity	**d.** representative elements
_____ **22.** Elements in groups 3 to 12	**e.** transition elements

In the space at the left, write *true* if the statement is true; if the statement is false, change the italicized word or phrase to make it true.

_____ **23.** There are *two* main classifications of elements.

_____ **24.** More than three-fourths of the elements in the periodic table are *nonmetals*.

_____ **25.** Group 1 elements (except for hydrogen) are known as the *alkali metals*.

_____ **26.** *Group 13* elements are the alkaline earth metals.

_____ **27.** Group 17 elements are highly reactive nonmetals known as *halogens*.

_____ **28.** Group 18 elements are very unreactive elements known as *transition metals*.

_____ **29.** Metalloids have properties of both metals and *inner transition metals*.

Section 6.2 Classification of the Elements

In your textbook, read about organizing the elements by electron configuration.

Use the periodic table on pages 178–179 in your textbook to match each element in Column A with the element in Column B that has the most similar chemical properties.

Column A	Column B
_____ **1.** arsenic (As)	**a.** boron (B)
_____ **2.** bromine (Br)	**b.** cesium (Cs)
_____ **3.** cadmium (Cd)	**c.** chromium (Cr)
_____ **4.** gallium (Ga)	**d.** cobalt (Co)
_____ **5.** germanium (Ge)	**e.** hafnium (Hf)
_____ **6.** iridium (Ir)	**f.** iodine (I)
_____ **7.** magnesium (Mg)	**g.** iron (Fe)
_____ **8.** neon (Ne)	**h.** nitrogen (N)
_____ **9.** nickel (Ni)	**i.** platinum (Pt)
_____ **10.** osmium (Os)	**j.** scandium (Sc)
_____ **11.** sodium (Na)	**k.** silicon (Si)
_____ **12.** tellurium (Te)	**l.** strontium (Sr)
_____ **13.** tungsten (W)	**m.** sulfur (S)
_____ **14.** yttrium (Y)	**n.** zinc (Z)
_____ **15.** zirconium (Zr)	**o.** xenon (Xe)

Answer the following questions.

16. Why do sodium and potassium, which belong to the same group in the periodic table, have similar chemical properties?

_____

_____

17. How is the energy level of an element's valence electrons related to its period on the periodic table? Give an example.

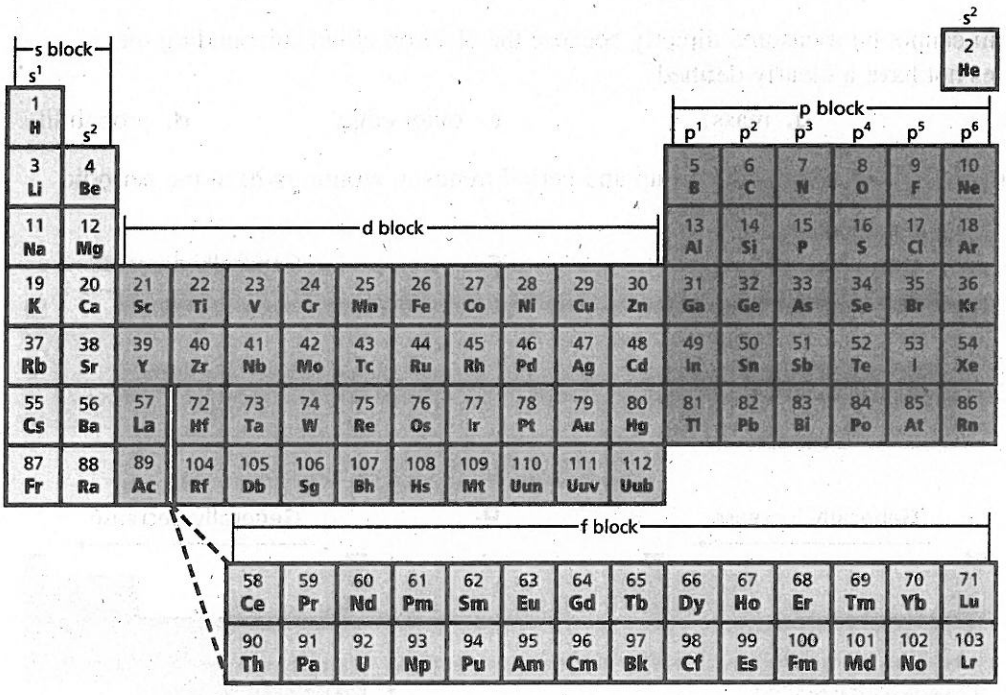
_____

_____

Section 6.2 *continued*

In your textbook, read about s-, p-, d-, and f-block elements.

Use the periodic table on pages 178–179 in your textbook and the periodic table below to answer the following questions.



18. Into how many blocks is the periodic table divided? _____

19. What groups of elements does the s-block contain? _____

20. Why does the s-block portion of the periodic table span two groups?

_____

21. What groups of elements does the p-block contain? _____

22. Why are members of group 18 virtually unreactive?

_____

_____

_____

23. How many d-block elements are there? _____

24. What groups of elements does the d-block contain? _____

25. Why does the f-block portion of the periodic table span 14 groups?

_____

26. What is the electron configuration of the element in period 3, group 16? _____

Section 6.3 Periodic Trends

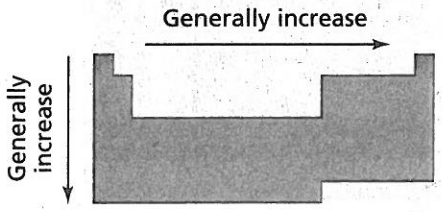
In your textbook, read about atomic radius and ionic radius.

Circle the letter of the choice that best completes the statement or answers the question.

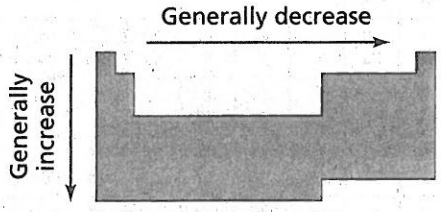
1. Atomic radii cannot be measured directly because the electron cloud surrounding the nucleus does not have a clearly defined
   a. charge. **b.** mass. **c.** outer edge. **d.** probability.

2. Which diagram best represents the group and period trends in atomic radii in the periodic table?

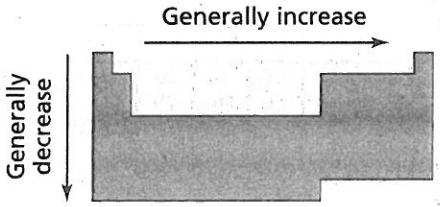
a.



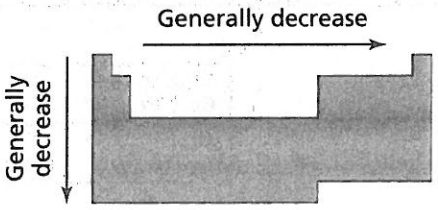
c.



b.



d.



3. The general trend in the radius of an atom moving down a group is partially accounted for by the
   a. decrease in the mass of the nucleus. **c.** increase in the charge of the nucleus.
   b. fewer number of filled orbitals. **d.** shielding of the outer electrons by inner electrons.

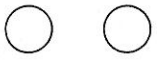
4. A(n) _____ is an atom, or bonded group of atoms, that has a positive or negative charge.
   a. halogen **b.** ion **c.** isotope **d.** molecule

5. An atom becomes negatively charged by
   a. gaining an electron. **b.** gaining a proton. **c.** losing an electron. **d.** losing a neutron.

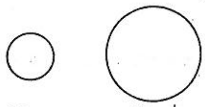
6. Which diagram best represents the relationship between the diameter of a sodium atom and the diameter of a positive sodium ion?

a.

b.



c.



Section 6.3 *continued*

In your textbook, read about ionization energy and electronegativity.

Answer the following questions.

7. What is ionization energy?

_____

_____

8. Explain why an atom with a high ionization-energy value is not likely to form a positive ion.

_____

_____

9. What is the period trend in the first ionization energies? Why?

_____

_____

_____

10. What is the group trend in the first ionization energies? Why?

_____

_____

_____

_____

11. State the octet rule.

_____

_____

12. What does the electronegativity of an element indicate?

_____

_____

13. What are the period and group trends in electronegativities?

_____

_____

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CHAPTER 6 CHAPTER ASSESSMENT

The Periodic Table and Periodic Law

Reviewing Vocabulary

Match the definition in Column A with the term in Column B.

Column A		Column B
_____	**1.** Statement that when the elements are arranged by increasing atomic number, there is a periodic repetition of their chemical and physical properties	**a.** alkali metals
_____	**2.** Groups 1 and 2, 13 through 18	**b.** alkaline earth metals
_____	**3.** Groups 3 through 12	**c.** electronegativity
_____	**4.** Group 1 elements (except for hydrogen)	**d.** halogens
_____	**5.** Group 2 elements	**e.** period
_____	**6.** A column in the periodic table	**f.** ion
_____	**7.** A row in the periodic table	**g.** ionization energy
_____	**8.** Group 17 elements	**h.** noble gases
_____	**9.** Group 18 elements	**i.** octet rule
_____	**10.** Atom or bonded group of atoms that has a positive or negative charge	**j.** periodic law
_____	**11.** Energy required to remove an electron from a gaseous atom	**k.** representative elements
_____	**12.** Statement that atoms tend to gain, lose, or share electrons to acquire a full set of eight valence electrons	**l.** transition elements
_____	**13.** Indication of an atom's ability to attract electrons in a chemical bond	**m.** group

Write a sentence that uses each group of terms.

14. transition metals, inner transition metals

_____

_____

15. metal, nonmetal, metalloid

_____

_____