

**LESSON**  
**13**

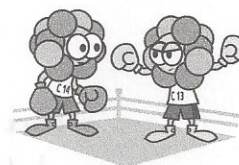
CLASSWORK

# Subatomic Heavyweights

## Isotopes

Name \_\_\_\_\_

Date \_\_\_\_\_ Period \_\_\_\_\_

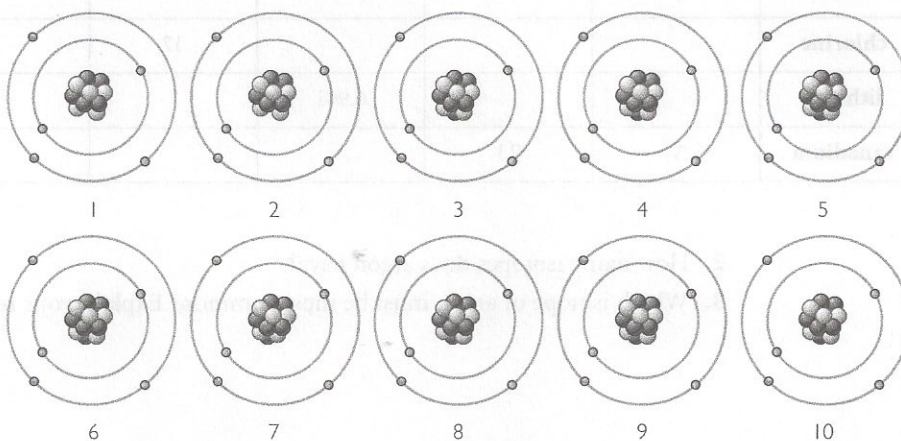


**Purpose**

To investigate isotopes and average atomic mass.

**Part I: The Average Boron Atom**

- Below is a drawing representing atoms you might find in a ten-atom sample of boron. Fill in the information for each atom shown.



Boron atom	1	2	3	4	5	6	7	8	9	10
Number of protons										
Number of neutrons										
Number of electrons										

- How many different isotopes of boron are shown?
- How many of each type of isotope are present in the sample of ten atoms? What is the atomic mass of each type of isotope?
- What is the average atomic mass of the ten atoms? How does this answer compare to the average atomic mass of boron listed in the periodic table?

5. Imagine that you could examine a randomly chosen sample of 100 boron atoms. What isotopes would you expect to find? How many of each? Express your answers as percents.

### Part 2: The Number of Neutrons

1. Complete the table.

Element	Symbol	Atomic number	Average atomic mass	Number of protons	Number of electrons	Possible number of neutrons
boron	B					5 or 6
chlorine				17		
lithium			6.941			
vanadium	V	23				

2. How many isotopes does argon have?
3. Which isotope of argon must be most common? Explain your reasoning.
4. If you somehow managed to isolate a single atom of lithium, how many neutrons would it probably have in its nucleus? Explain.
5. **Making Sense** Explain why the average atomic masses of the elements listed in the periodic table usually are not whole numbers.
6. **If You Finish Early** The element copper, Cu, has two naturally occurring isotopes: 69.2% of all copper samples consist of atoms with 34 neutrons, and 30.8% of all samples consist of atoms with 36 neutrons. Calculate the average atomic mass of copper atoms.