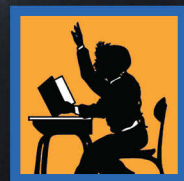


# STAAR CONNECTION™ Developmental Series™

Science  
8  
teacher

**(revised for streamlined TEKS)**



**KAMICO®**  
**Instructional Media, Inc.**

# STAAR CONNECTION™

Science  
**8**  
teacher

## Developmental Series™

XXVI/iii/MMXVIII

Version 2

**(revised for streamlined TEKS)**



**KAMICO®**

Instructional Media, Inc.

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**KAMICO® Instructional Media, Inc.**  
**STAAR CONNECTION™**  
**Introduction**

KAMICO® Instructional Media's program is validated by scientifically based research. **STAAR CONNECTION™ Diagnostic Series™** and **Developmental Series™** can be used in tandem to ensure mastery of Texas reporting categories and TEKS. The *Diagnostic Series™* consists of a bank of assessments. Each assessment covers a mixture of reporting categories and TEKS. This research-based format provides continual reinforcement for and ensures retention of mastered concepts. To take full advantage of this series, administer an assessment to students. After they have completed the assessment, use it as an instructional tool. Go over each item with the class, discussing all correct and incorrect answers. Then, use the assessment as a diagnostic tool to determine a standard for which students need remediation. Find that standard in the *Developmental Series™*.

Each book in the *STAAR CONNECTION Developmental Series™* consists of isolated activities and assessments to allow for the development of specific TEKS. For every TEKS, there is at least one individual or group activity. The activities provide a fun, challenging, yet nonthreatening, way to develop mastery of the TEKS. In addition to these activities, each *Developmental Series™* book has assessments on isolated standards to be used to identify mastery or the need for further skill development or reinforcement. Continue to alternate between the *STAAR CONNECTION™ Diagnostic Series™* and the *Developmental Series™*.

KAMICO's **DATA CONNECTION®** software prints student answer sheets on plain paper using a standard laser printer, scans answer sheets using a TWAIN-compliant scanner, scores assessments, and disaggregates student academic data, showing which goals and objectives are mastered and which goals and objectives are in need of reinforcement. The software is preprogrammed to work with all KAMICO® assessments. It is easily customized to work with other instructional materials and assessments as well as teacher-, school-, district-, or state-created assessments. **DATA CONNECTION®** analyzes academic data from individual students, classes, grade levels, and demographic groups. Reports are presented in tabular and graphic form. Item analysis is provided to help determine the most effective method of instruction.

KAMICO® Instructional Media, Inc., supports efforts to ensure adequate yearly progress and eliminate surprises in high-stakes test results.

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**Eligible Texas Essential Knowledge and Skills  
STAAR Grade 8 Science**

**Reporting Category 1:  
Matter and Energy**

**The student will demonstrate an understanding of the properties of matter and energy and their interactions.**

**Grade 8**

- (8.5) **Matter and energy.** The student knows that matter is composed of atoms and has chemical and physical properties. The student is expected to
- (A) describe the structure of atoms, including the masses, electrical charges, and locations, of protons and neutrons in the nucleus and electrons in the electron cloud.  
**Readiness Standard** Building an Atom . . . . . 17  
Assessment . . . . . 23
  - (B) identify that protons determine an element’s identity and valence electrons determine its chemical properties, including reactivity. **Readiness Standard**  
Getting a Reaction . . . . . 25  
Assessment . . . . . 31
  - (C) interpret the arrangement of the Periodic Table, including groups and periods, to explain how properties are used to classify elements. **Readiness Standard**  
What a Nice Arrangement! . . . . . 33  
Assessment . . . . . 37
  - (D) recognize that chemical formulas are used to identify substances and determine the number of atoms of each element in chemical formulas containing subscripts.  
**Readiness Standard** What's in the Formula? . . . . . 39  
Assessment . . . . . 43
  - (E) investigate how evidence of chemical reactions indicates that new substances with different properties are formed and how that relates to the law of conservation of mass.  
**Readiness Standard** Signs of Something New . . . . . 45  
Assessment . . . . . 53

## Grade 7

- (7.5) **Matter and energy.** The student knows that interactions occur between matter and energy. The student is expected to
- (B) diagram the flow of energy through living systems, including food chains, food webs, and energy pyramids.
- |                            |                         |    |
|----------------------------|-------------------------|----|
| <b>Supporting Standard</b> | Living Energy . . . . . | 56 |
|                            | Assessment . . . . .    | 66 |
- (7.6) **Matter and energy.** The student knows that matter has physical and chemical properties and can undergo physical and chemical changes. The student is expected to
- distinguish between physical and chemical changes in matter.
- |                            |                          |    |
|----------------------------|--------------------------|----|
| <b>Supporting Standard</b> | Break It Down! . . . . . | 69 |
|                            | Assessment . . . . .     | 75 |

## Grade 6

- (6.6) **Matter and energy.** The student knows matter has physical properties that can be used for classification. The student is expected to
- (A) compare metals, nonmetals, and metalloids using physical properties such as luster, conductivity, or malleability. **Supporting Standard**
- |  |   |    |
|--|---|----|
|  | All That Glitters Is Not Gold . . . . . | 78 |
|  | Assessment . . . . .                    | 85 |
- (B) calculate density to identify an unknown substance.
- |                            |                           |    |
|----------------------------|---------------------------|----|
| <b>Supporting Standard</b> | Density Matters . . . . . | 87 |
|                            | Assessment . . . . .      | 93 |

## Reporting Category 2: Force, Motion, and Energy

The student will demonstrate an understanding of force, motion, and energy and their relationships.

### Grade 8

- (8.6) **Force, motion, and energy.** The student knows that there is a relationship between force, motion, and energy. The student is expected to
- (A) demonstrate and calculate how unbalanced forces change the speed or direction of an object's motion. **Readiness Standard**
    - Which Way? How Fast? . . . . . 95
    - Assessment . . . . . 102
  - (B) differentiate between speed, velocity, and acceleration. **Supporting Standard**
    - Motion Bingo . . . . . 105
    - Assessment . . . . . 115
  - (C) investigate and describe applications of Newton's three laws of motion such as in vehicle restraints, sports activities, amusement park rides, Earth's tectonic activities, and rocket launches. **Readiness Standard**
    - Law and Order . . . . . 117
    - Assessment . . . . . 125

### Grade 6

- (6.8) **Force, motion, and energy.** The student knows force and motion are related to potential and kinetic energy. The student is expected to
- (A) compare and contrast potential and kinetic energy. **Supporting Standard**
    - Stored Energy, Moving Energy . . . . . 127
    - Assessment . . . . . 136
  - (C) calculate average speed using distance and time measurements. **Supporting Standard**
    - Speeding Car . . . . . 139
    - Assessment . . . . . 145
  - (D) measure and graph changes in motion. **Supporting Standard**
    - Measurable Change . . . . . 148
    - Assessment . . . . . 158

- (6.9) **Force, motion, and energy.** The student knows that the Law of Conservation of Energy states that energy can neither be created nor destroyed, it just changes form. The student is expected to
- (C) demonstrate energy transformations such as energy in a flashlight battery changes from chemical energy to electrical energy to light energy. **Supporting Standard**
- |                                  |     |
|----------------------------------|-----|
| Transforming the World . . . . . | 162 |
| Assessment . . . . .             | 168 |

**Reporting Category 3:  
Earth and Space**

**The student will demonstrate an understanding of components, cycles, patterns, and natural events of Earth and space systems.**

**Grade 8**

- (8.7) **Earth and space.** The student knows the effects resulting from cyclical movements of the Sun, Earth, and Moon. The student is expected to
- (A) model and illustrate how the tilted Earth rotates on its axis, causing day and night, and revolves around the Sun, causing changes in seasons. **Readiness Standard**
- |                            |     |
|----------------------------|-----|
| Days into Nights . . . . . | 170 |
| Assessment . . . . .       | 175 |
- (B) demonstrate and predict the sequence of events in the lunar cycle. **Readiness Standard**
- |                                       |     |
|---------------------------------------|-----|
| Making "Phases" at the Moon . . . . . | 178 |
| Assessment . . . . .                  | 185 |
- (C) relate the positions of the Moon and Sun to their effect on ocean tides. **Supporting Standard**
- |                                  |     |
|----------------------------------|-----|
| Keeping Earth "Tide-y" . . . . . | 187 |
| Assessment . . . . .             | 196 |

(8.8)	<b>Earth and space.</b> The student knows characteristics of the universe. The student is expected to		
	(A) describe components of the universe, including stars, nebulae, and galaxies, and use models such as the Hertzsprung-Russell diagram for classification. <b>Readiness Standard</b>		
		Universe Rummy . . . . .	198
		Assessment . . . . .	212
	(B) recognize that the Sun is a medium-sized star located in a spiral arm of the Milky Way galaxy and that the Sun is many thousands of times closer to Earth than any other star. <b>Supporting Standard</b>		
		Sunny-Side Up . . . . .	214
		Assessment . . . . .	217
	(C) identify how different wavelengths of the electromagnetic spectrum such as visible light and radio waves are used to gain information about components in the universe. <b>Supporting Standard</b>		
		The Spectrum of the Universe . . . . .	219
		Assessment . . . . .	228
(8.9)	<b>Earth and space.</b> The student knows that natural events can impact Earth systems. The student is expected to		
	(A) describe the historical development of evidence that supports plate tectonic theory. <b>Supporting Standard</b>		
		Plate Tectonics Time Line . . . . .	231
		Assessment . . . . .	236
	(B) relate plate tectonics to the formation of crustal features. <b>Readiness Standard</b>		
		Leaving Crusts on the Plate . . . . .	238
		Assessment . . . . .	243
	(C) interpret topographic maps and satellite views to identify land and erosional features and predict how these features may be reshaped by weathering. <b>Readiness Standard</b>		
		View from Above . . . . .	245
		Assessment . . . . .	250



- (8.10) **Earth and space.** The student knows that climatic interactions exist among Earth, ocean, and weather systems. The student is expected to
- (A) recognize that the Sun provides the energy that drives convection within the atmosphere and oceans, producing winds.
    - Supporting Standard** Movement from the Sun . . . . . 253
    - Assessment . . . . . 261
  - (B) identify how global patterns of atmospheric movement influence local weather using weather maps that show high and low pressures and fronts. **Supporting Standard**
    - Under Pressure . . . . . 263
    - Assessment . . . . . 271
  - (C) identify the role of the oceans in the formation of weather systems such as hurricanes. **Supporting Standard**
    - The Oceans' Influence . . . . . 273
    - Assessment . . . . . 284

**Grade 7**

- (7.8) **Earth and space.** The student knows that natural events and human activity can impact Earth systems. The student is expected to
- (C) model the effects of human activity on groundwater and surface water in a watershed. **Supporting Standard**
    - Watershed Dynamics . . . . . 286
    - Assessment . . . . . 298

**Grade 6**

- (6.11) **Earth and space.** The student understands the organization of our solar system and the relationships among the various bodies that comprise it. The student is expected to
- (B) understand that gravity is the force that governs the motion of our solar system. **Supporting Standard**
    - Solar System In Motion . . . . . 301
    - Assessment . . . . . 306

## Reporting Category 4: Organisms and Environments

The student will demonstrate an understanding of the structures and functions of living organisms and their interdependence on each other and on their environment.

### Grade 8

- (8.11) **Organisms and environments.** The student knows that interdependence occurs among living systems and the environment and that human activities can affect these systems. The student is expected to
- (A) investigate how organisms and populations in an ecosystem depend on and may compete for biotic factors such as food and abiotic factors such as quantity of light, water, range of temperatures, or soil composition. **Readiness Standard**
    - Ecosystem Population Feud . . . . . 309
    - Assessment . . . . . 318
  - (B) explore how short- and long-term environmental changes affect organisms and traits in subsequent populations. **Readiness Standard**
    - Changing Populations . . . . . 320
    - Assessment . . . . . 329
  - (C) recognize human dependence on ocean systems and explain how human activities such as runoff, artificial reefs, or use of resources have modified these systems. **Supporting Standard**
    - Depending on the Oceans . . . . . 332
    - Assessment . . . . . 341

### Grade 7

- (7.10) **Organisms and environments.** The student knows that there is a relationship between organisms and the environment. The student is expected to
- (B) describe how biodiversity contributes to the sustainability of an ecosystem. **Supporting Standard**
    - Strength through Biodiversity . . . . . 343
    - Assessment . . . . . 350

- (C) observe, record, and describe the role of ecological succession such as in a microhabitat of a garden with weeds.

**Supporting Standard**

Successful Weeding . . . . .	352
Assessment . . . . .	359

- (7.11) **Organisms and environments.** The student knows that populations and species demonstrate variation and inherit many of their unique traits through gradual processes over many generations. The student is expected to

- (A) examine organisms or their structures such as insects or leaves and use dichotomous keys for identification.

**Supporting Standard**

Your ID, Please . . . . .	362
Assessment . . . . .	370

- (C) identify some changes in genetic traits that have occurred over several generations through natural selection and selective breeding such as the Galapagos Medium Ground Finch (*Geospiza fortis*) or domestic animals and hybrid plants.

**Supporting Standard**

New and Improved! . . . . .	374
Assessment . . . . .	383

- (7.12) **Organisms and environments.** The student knows that living systems at all levels of organization demonstrate the complementary nature of structure and function. The student is expected to

- (B) identify the main functions of the systems of the human organism, including the circulatory, respiratory, skeletal, muscular, digestive, excretory, reproductive, integumentary, nervous, and endocrine systems. **Supporting Standard**

Multi-Tasking Systems Bingo . . . . .	386
Assessment . . . . .	394

- (D) differentiate between structure and function in plant and animal cell organelles, including cell membrane, cell wall, nucleus, cytoplasm, mitochondrion, chloroplast, and vacuole.

**Supporting Standard**

Cellular Coverage . . . . .	396
Assessment . . . . .	402

- (F) recognize the components of cell theory. **Supporting Standard**

Cell Theory Brochure . . . . .	404
Assessment . . . . .	407

- (7.14) **Organisms and environments.** The student knows that reproduction is a characteristic of living organisms and that the instructions for traits are governed in the genetic material. The student is expected to
- (B) compare the results of uniform or diverse offspring from asexual or sexual reproduction. **Supporting Standard**
    - Offspring Resemblance . . . . . 409
    - Assessment . . . . . 415
  - (C) recognize that inherited traits of individuals are governed in the genetic material found in the genes within chromosomes in the nucleus. **Supporting Standard**
    - Control Center . . . . . 417
    - Assessment . . . . . 421

**Grade 6**

- (6.12) **Organisms and environments.** The student knows all organisms are classified into domains and kingdoms. Organisms within these taxonomic groups share similar characteristics that allow them to interact with the living and nonliving parts of their ecosystem. The student is expected to
- (D) identify the basic characteristics of organisms, including prokaryotic or eukaryotic, unicellular or multicellular, autotrophic or heterotrophic, and mode of reproduction, that further classify them in the currently recognized kingdoms. **Supporting Standard**
    - Classified! . . . . . 424
    - Assessment . . . . . 433

## Scientific Investigation and Reasoning Skills

These skills will not be listed under a separate reporting category. Instead, they will be incorporated into at least 40% of the test questions in reporting categories 1–4 and will be identified along with content standards.

### Grade 8

- (8.1) **Scientific investigation and reasoning.** The student, for at least 40% of instructional time, will conduct laboratory and field investigations following safety procedures and environmentally appropriate and ethical practices. The student is expected to
- (A) demonstrate safe practices during laboratory and field investigations as outlined in Texas Education Agency-approved safety standards. Investigation Safety Jeopardy . . . . . 435  
Assessment . . . . . 442
  - (B) practice appropriate use and conservation of resources, including disposal, reuse, or recycling of materials. Resource Manager . . . . . 444  
Assessment . . . . . 452
- (8.2) **Scientific investigation and reasoning.** The student uses scientific practices during laboratory and field investigations. The student is expected to
- (A) plan and implement comparative and descriptive investigations by making observations, asking well defined questions, and using appropriate equipment and technology. Footprints to Discovery . . . . . 454  
Assessment . . . . . 463
  - (B) design and implement experimental investigations by making observations, asking well defined questions, formulating testable hypotheses, and using appropriate equipment and technology. Investigating Craters from Crashes . . . 465  
Assessment . . . . . 472
  - (C) collect and record data using the International System of Units (SI) and qualitative means such as labeled drawings, writing, and graphic organizers. Recording Studio . . . . . 474  
Assessment . . . . . 482

(D)	construct tables and graphs, using repeated trials and means, to organize data and identify patterns.	Data Organization Station . . . . .	485
		Assessment . . . . .	490
(E)	analyze data to formulate reasonable explanations, communicate valid conclusions supported by the data, and predict trends.	Don't Jump to Conclusions! . . . . .	493
		Assessment . . . . .	502
(8.3)	<b>Scientific investigation and reasoning.</b> The student uses critical thinking, scientific reasoning, and problem solving to make informed decisions and knows the contributions of relevant scientists. The student is expected to		
(A)	analyze, evaluate, and critique scientific explanations by using empirical evidence, logical reasoning, and experimental and observational testing, so as to encourage critical thinking by the student.	Thinking Critically . . . . .	506
		Assessment . . . . .	513
(B)	use models to represent aspects of the natural world such as an atom, a molecule, space, or a geologic feature.	Natural World Models . . . . .	516
		Assessment . . . . .	527
(C)	identify advantages and limitations of models such as size, scale, properties, and materials.	Model Imperfections . . . . .	530
		Assessment . . . . .	537
(D)	relate the impact of research on scientific thought and society, including the history of science and contributions of scientists as related to the content.	Science Baseball . . . . .	541
		Assessment . . . . .	551

(8.4) <b>Scientific investigation and reasoning.</b> The student knows how to use a variety of tools and safety equipment to conduct science inquiry. The student is expected to		
(A) use appropriate tools, including lab journals/notebooks, beakers, meter sticks, graduated cylinders, anemometers, psychrometers, hot plates, test tubes, spring scales, balances, microscopes, thermometers, calculators, computers, spectrosopes, timing devices, and other necessary equipment to collect, record, and analyze information.	Inquiring Tools . . . . .	553
	Assessment . . . . .	559
(B) use preventative safety equipment, including chemical splash goggles, aprons, and gloves, and be prepared to use emergency safety equipment, including an eye/face wash, a fire blanket, and a fire extinguisher.	Team Safety . . . . .	561
	Assessment . . . . .	571
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## Reporting Category 1: Matter and Energy

### TEKS 8.5A

*Describe the structure of atoms, including the masses, electrical charges, and locations, of protons and neutrons in the nucleus and electrons in the electron cloud.*

### ACTIVITY

#### Building an Atom

#### Materials

For each student:

Assortment of "dot" stickers of three different colors—red, blue, and yellow

Yellow colored pencil or marker

*Building an Atom* activity sheet

Science textbook

#### Background

All matter is made of elements, which are the simplest substances that exist. Elements are made of tiny particles called atoms, which determine each element's physical and chemical properties. Each element's atoms differ from atoms of other elements.

The structure of an atom includes a central body called the nucleus. The nucleus contains protons, which have a positive electrical charge, and neutrons, which have no charge. The nucleus is surrounded by "clouds" of electrons, which have a negative electrical charge. Each atom has the same number of protons and electrons, making the atom electrically neutral.

The atoms of each element contain a specific number of protons that determine the element's atomic number. However, the number of neutrons in atoms of the same element may differ because the atoms can exist in different forms. The mass of an atom is determined by the total number of protons and neutrons, but because the number of neutrons in atoms of an element may vary, the average atomic mass for each element is generally reported. Electrons are so tiny that they contain very little mass.

#### Procedure

Review the background information with students. Distribute dot stickers and the *Building an Atom* activity sheet to each student. Explain that the red dots represent protons, the blue dots represent neutrons, and the yellow dots represent electrons. Students complete their activity sheets by building atoms of elements using the dot stickers and answering the questions that follow. Circulate around the room to provide assistance as necessary.



## Building An Atom Activity Sheet Answer Key

### Evaluation Questions

- 1 The number of protons in an element's atom determines the element's *atomic number*. Fill in the atomic numbers for the following elements:

hydrogen	<u>1</u>
helium	<u>2</u>
boron	<u>5</u>
carbon	<u>6</u>
sodium	<u>11</u>

- 2 Answer "True" or "False" to the following statements. If the answer is "False," correct the statement to make it true.

True A proton has a positive electrical charge.

False A neutron has a ~~negative~~ <sup>neutral</sup> electrical charge.

False An electron has a ~~neutral~~ <sup>negative</sup> electrical charge.

- 3 Which particle or particles of an atom make up most of an atom's mass?  
The protons and neutrons contribute significantly to the atom's mass.

- 4 Which particle or particles of an atom have little mass?  
Electrons have very little mass.

- 5 Of which two particles of an atom are there equal numbers?  
Atoms have an equal number of protons and electrons.

- 6 Why do some atoms of the same element have different masses?  
Some atoms of the same element have the same number of protons but may have different numbers of neutrons.

## Building An Atom Activity Sheet

### Background

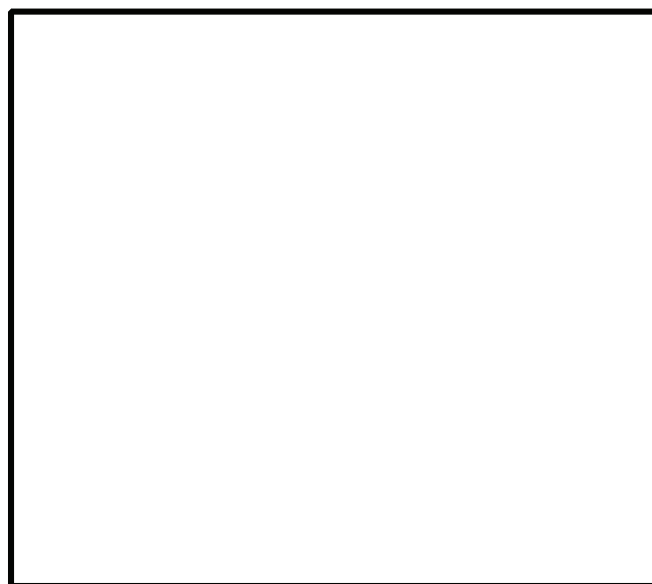
All matter is composed of elements. Elements are made out of atoms that determine the elements' physical and chemical properties. Atoms are so tiny that they cannot be seen with the naked eye. The ideas about the structure of atoms changed throughout the centuries as scientists used indirect evidence to determine how atoms were put together. In 1803, John Dalton theorized that atoms were solid masses containing no particles. This view changed in 1898 when J. J. Thomson suggested that the electrons in atoms were scattered within a positively charged fluid. Ernest Rutherford and H. G. J. Moseley proposed in 1913 that atoms contained a nucleus of positively charge matter with electrons orbiting the nucleus. Since 1926, scientists' understanding of an atom's structure is that the nucleus contains protons and neutrons surrounded by "clouds" of electrons, rather than by orbiting electrons.

### Procedure

In the boxes drawn below and on the following pages, build an atom of each named element using the dot stickers. Use the red stickers to represent protons, the blue stickers to represent neutrons, and the yellow stickers to represent electrons. Use the yellow pencil or marker to draw a cloud around the electrons. Answer the evaluation questions that follow, using a science textbook if necessary to obtain information.

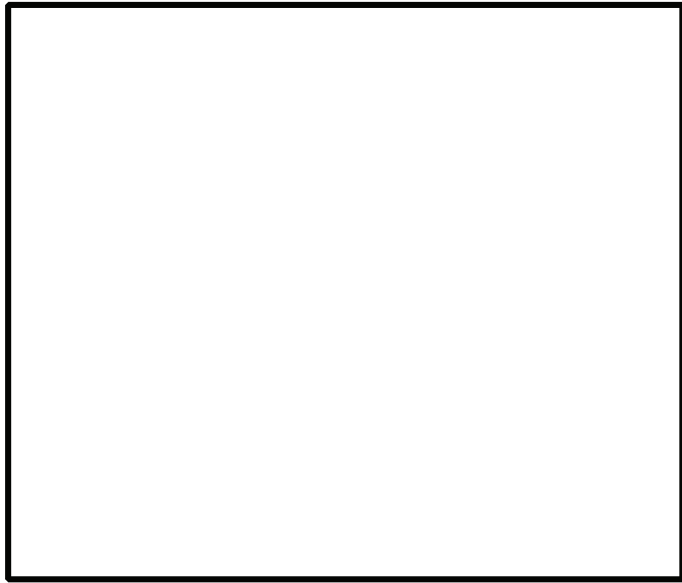
#### Hydrogen Atom

number of protons—1  
number of electrons—1  
number of neutrons—0



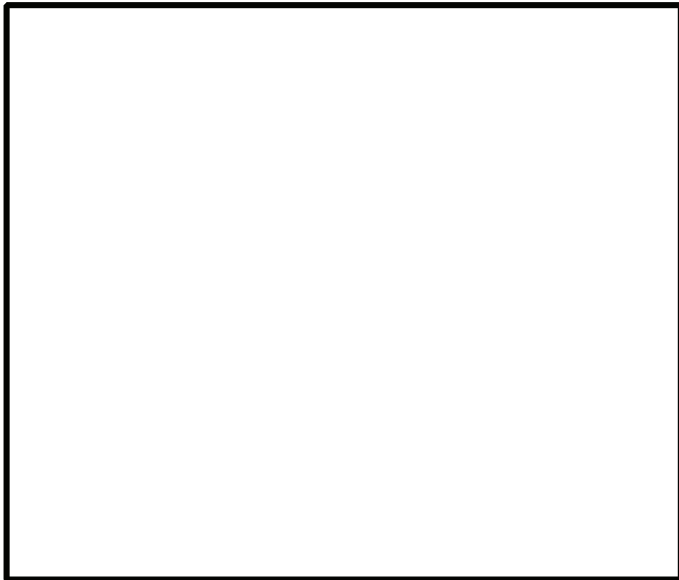
**Helium Atom**

number of protons—2  
number of electrons—2  
number of neutrons—2



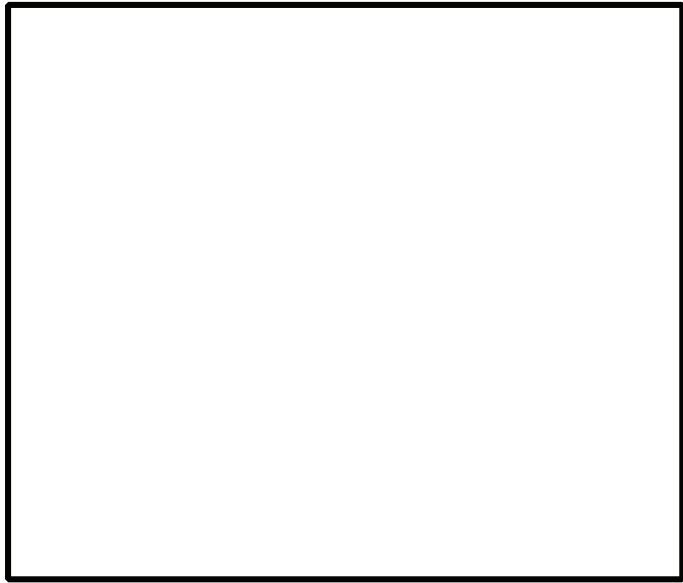
**Boron Atom**

number of protons—5  
number of electrons—5  
number of neutrons—6



**Carbon Atom**

number of protons—6  
number of electrons—6  
number of neutrons—6



**Sodium Atom**

number of protons—11  
number of electrons—11  
number of neutrons—12



## Evaluation Questions

- 1 The number of protons in an element's atom determines the element's *atomic number*. Fill in the atomic numbers for the following elements:

hydrogen \_\_\_\_\_

helium \_\_\_\_\_

boron \_\_\_\_\_

carbon \_\_\_\_\_

sodium \_\_\_\_\_

- 2 Answer "True" or "False" to the following statements. If the answer is "False," correct the statement to make it true.

\_\_\_\_\_ A proton has a positive electrical charge.

\_\_\_\_\_ A neutron has a negative electrical charge.

\_\_\_\_\_ An electron has a neutral electrical charge.

- 3 Which particle or particles of an atom make up most of an atom's mass?

- 4 Which particle or particles of an atom have little mass?

- 5 Of which two particles of an atom are there equal numbers?

- 6 Why do some atoms of the same element have different masses?

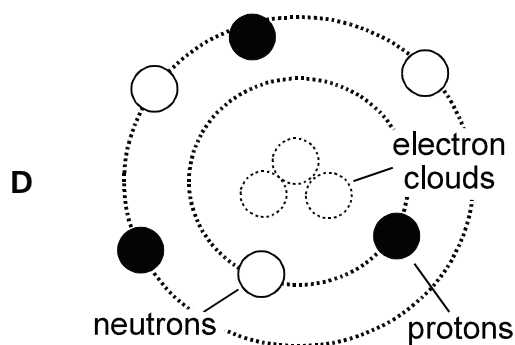
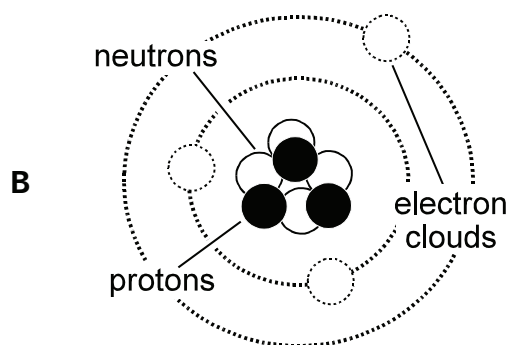
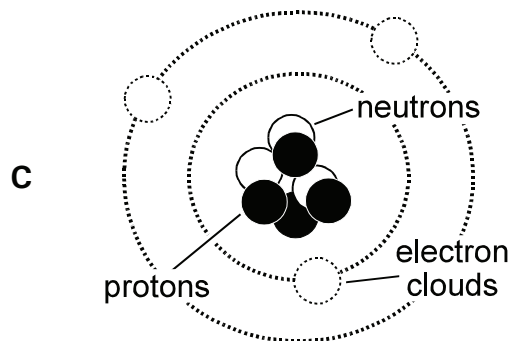
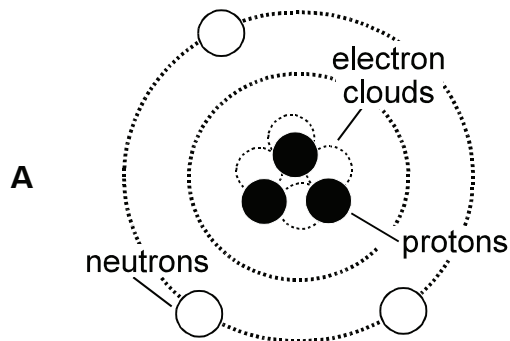
Name \_\_\_\_\_

RC1/TEKS 8.5A

*Describe the structure of atoms, including the masses, electrical charges, and locations, of protons and neutrons in the nucleus and electrons in the electron cloud.*

- 1 Beryllium is an element with an atomic number of four. Beryllium's atomic number tells you that the element's atom has —
- A four electrons.
  - B four neutrons.
  - C four protons.
  - D four nuclei.
- 2 Which atomic particle or particles contribute to most of an atom's mass?
- F neutrons and protons
  - G protons only
  - H protons and electrons
  - J electrons and neutrons

- 3 Lithium is a metallic element that has three protons, three electrons, and four neutrons. Which drawing represents the atomic structure of lithium?



- 4 An atom's electrical charge is neutral because —
- F an atom has more neutrons than protons or electrons.
  - G the negative charge of the neutrons cancel out the positive charge of the protons.
  - H the electrons' mass is much smaller than the mass of the protons or neutrons.
  - J an atom has the same number of protons as electrons.