Chapters 3-5

Student Completed Diagrams
Fall 2010 GC Visual v.1

Student Names:
Teacher:
Section:
Introduction

The diagrams in your science textbook contain critical information that can help you better understand important concepts. Some students pay too little attention to diagrams or are confused by how information is presented. The purpose of this workbook is to help you improve your ability to understand science diagrams. By studying the diagrams in your textbook closely and by completing parts of similar diagrams, you will improve your ability to understand and create diagrams.

Over the next couple of weeks, you will be using this workbook alongside your textbook. For every diagram that appears in your textbook, you will find a two-page spread in this workbook with similar components. Take a moment to familiarize yourself with the parts of this workbook.

You will be working in this workbook with a partner that your teacher has assigned. You and your partner should work together on both the warm-up and diagram completion exercises, discussing your responses before you write them in the workbook. After completing each exercise, you will have the opportunity to share your answers, comments and questions during a classwide discussion.

A diagram tip—delivered by our friendly bovine mascot—will highlight strategies for understanding the diagram you are working with. A glossary of these tips appears at the end of the workbook.

A miniature version of the diagram that appears in your textbook, along with the page number in case you want to look at the original.

A warm-up activity that asks you to pay attention to particular parts of the diagram in your textbook.

Instructions for what you will be asked to do to complete a diagram that is similar to the diagram that appears in the textbook. You will be asked to complete the missing parts of the diagram, such as adding color, arrows or drawings.

Write both partner’s names if they are different from those on the cover page.

Instructions for what appears in your textbook. Write the appropriate label in each blank.

A partially completed diagram that you will finish.
**WARM-UP**

Using Figure 1 in your textbook as a guide, draw a helium atom that includes the following:

- 2 Protons (red)
- 2 neutrons (white)
- 1 energy level (blue)

Names: _______________________________________
**WARM-UP**

*Background:* Methane (CH\(_4\)) is a gas that is a byproduct of a cow’s digestive process.

Using Figure 2 as a guide, complete the following:

1. Use two colors to complete an electron cloud model of CH\(_4\).
2. Use the same two colors to complete a space-filling model of CH\(_4\).*
INSTRUCTIONS

Background: Like Sodium Chloride, Lithium Fluoride is an ionic compound.

Using Figure 3 in your textbook as a guide, illustrate each step according to the explanatory label and the list of components specified to the left of each step.

Include:
- Lithium atom (nucleus & electron cloud)
- Fluorine atom (nucleus & electron cloud)
- Electron moving Li to F

Step 1: Electron donated from Lithium atom to Fluorine atom

Lithium Atom  Fluorine Atom

Step 2: Opposite charges of Lithium and Fluorine ions attract

Lithium Ion (Li⁺)  Fluorine Ion (F⁻)

Step 3: Formation of an ionic bond

Lithium Fluorine (LiF)
INSTRUCTIONS

Background: Like Sodium Chloride, Lithium Fluoride (LiF) dissolves in water causing Lithium ions (Li⁺) and Fluorine ions (F⁻) to be surrounded by water.

Using Figure 4 in your textbook as a guide, create a color key and then apply the color key to all relevant parts of the diagram.

ColorKey

- Na⁺
- Cl⁻
- H
- O
INSTRUCTIONS

Using Figure 5 in your textbook as a guide, draw the following:

1. Four water molecules inside the xylem of a plant stem (which is provided below)
2. The symbols for cohesion using the appropriate symbol in the key
3. The symbols for adhesion using the appropriate symbol in the key
INSTRUCTIONS

Background: The methane molecule ($\text{CH}_4$) will react with two dioxide molecules ($\text{O}_2$) to form two water molecules ($\text{H}_2\text{O}$) and a carbon dioxide molecule ($\text{CO}_2$) in a process called combustion.

Using Figure 6 in your textbook as a guide and the examples of molecules below, draw the following:

1. The process of methane combustion. Hint: Read the caption to learn how this process is similar to and different from the process depicted in your textbook.

2. Assign each atom a color. Make sure the color is consistent across molecules. Remember that molecules are made up of more than one atom.

![Molecules](image-url)
INSTRUCTIONS

Using the color key and model below, draw a diagram of a fructose molecule in the style of Figure 9 in your textbook.

The sugar fructose is made up of 6 carbon atoms, 12 hydrogen atoms, and 6 oxygen atoms. Therefore, the chemical formula for fructose is C6H12O6. Sugars like fructose and glucose are the building blocks of carbohydrates.
INSTRUCTIONS

Background: There are many types of carbohydrates, including lactose (in milk), sucrose and fructose (in fruits) and starches (in bread).

Using Figure 10 in your textbook as a guide and the examples of molecules in the key below, draw the appropriate symbol next to each line.

KEY

- Complex Carbohydrate
- Simple Carbohydrate
INSTRUCTIONS

Using Figure 11 in your textbook as a guide, complete the following:

1. Create a color key

2. Apply the color key to all relevant parts of the line drawing below.

Key

[Key template with four boxes]

Names: ____________________________

Exercise 9
INSTRUCTIONS

Using Figure 12 in your textbook as a guide, complete the following:

1. Read the caption
2. Color the diagram with the appropriate color according to the color key.
3. Draw arrows to the parts of the hand that this protein might be used in.

Key
- Amino Group
- Carboxyl Group
- Variable Group
- Peptide Bond

Proteins are chains of amino acids linked together by peptide bonds. Amino acids consist of an amino group, a carboxyl group and a variant group. Proteins make up many aspects of our bodies, such as our skin, nails, and muscles.
INSTRUCTIONS

Using Figure 13 in your textbook as a guide and the chemical formula model shown below, complete the following:

1. In the large circle, recreate the model of the nitrogen-containing base, sugar and phosphate group (Figure 11.1) using shapes instead of letters. Be sure that the shapes reflect how each component (phosphate group, sugar and nitrogen-containing base) is illustrated in the colored diagram below (Figure 11.2).

2. Put a star next to the smaller circle (with dotted lines) that correctly selects the section of Figure 11.2 that is enlarged in the big arrow. Hint: Pay attention to the nitrogen-containing base and the orientation of the components.

3. Draw an arrow from the correct small circle to the larger circle.

4. Color the nitrogen-containing base the appropriate color.

Exercise 11
Names: ________________________________________
INSTRUCTIONS

Using Figure 15 in your textbook as a guide and the examples of molecules below, draw the correct molecules in each of the boxes below.

Key

No Reaction

Reaction

Orientation

Correct

Incorrect

Sufficient

Insufficient

Energy

Insufficient

Insufficient
INSTRUCTIONS

Background: Enzymes catalyze specific reactions between reactants and form a product. In the Figure 17 in your textbook, you see how an enzyme produces a single product from two substrates. This reaction can also go in the opposite direction, moving from a single substrate to two distinct products.

Using Figure 17 as a guide, illustrate the three-step process described in the explanatory labels using the symbols provided in the key.

1. A substrate binds to the active site.

2. The enzyme changes shape, which catalyzes the chemical breakdown of a substrate.

3. The products are released when the breakdown is complete.
INSTRUCTIONS

Using Figure 2 in your textbook as a guide, illustrate a four-step process of succession. Be sure your drawings demonstrate:

1. Amount of soil (include a label)
2. Type of vegetation (include a label)
INSTRUCTIONS

Using Figure 3 as a guide, complete the following:

1. Assign colors to the color key.

2. Apply the appropriate colors to the sections of the map.
INSTRUCTIONS
Using Figure 5 in your textbook as a guide, draw the missing information that is described in the explanatory labels.

Some consumers, such as snakes and hawks, get their energy from other consumers.

Some consumers, such as rodents, get their energy from other consumers, like grasshoppers.

Some consumers, such as grasshoppers, eat producers, such as flowers, to get their energy.

Producers, such as flowers, use energy from the sun to produce their own food.

The sun is the primary source of energy.
INSTRUCTIONS

Using Figure 6 in your textbook as a guide and the information presented below, draw arrows that:

1. Demonstrate the flow of energy (arrows should point towards organisms higher on the food chain).

2. Include all organisms.
**INSTRUCTIONS**

Using Figure 8 in your textbook as a guide and the explanatory labels below, draw the missing information.

The highest level of the pyramid includes carnivores and contains the least amount of energy.

The second level of the pyramid often contains herbivores like this rabbit.

The lowest level of the pyramid, which includes vegetation like grasses, contains the most amount of energy.
INSTRUCTIONS

Using Figure 9 in your textbook as a guide, draw arrows that connect all of the processes that are illustrated in the diagram in your textbook.
Using Figure 10 in your textbook as a guide and information from the explanatory labels below, complete the following:

1. Create a color key.
2. Apply the color key to the appropriate arrows.

Names: ________________________________________
INSTRUCTIONS

Using Figure 11 in your textbook as a guide, draw arrows that connect all of the processes that are illustrated in the diagram in your textbook.
INSTRUCTIONS

Background: As you probably know, the water level of the ocean changes over the course of a day with the tide. During “high tide” the water reaches its highest point and during “low tide” it reaches its lowest point. Differences between high and low tide can be witnessed on rocks in the water on which different organisms exist at different areas. For example, *Balanus* barnicles can inhabit only the bottom half of the tidal range (between low and high tide), while *Chthamalus* barnicles can inhabit the entire tidal range.

Using Figure 9 as a guide, color the appropriate area of the rock for each type of barnicle.

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Names: ___________________________
GLOSSARY

CONVENTIONS OF DIAGRAMS

Figure 9 Each of these five wasp species feeds on insects in a different portion of the same tree, as indicated by the five colors shown in the figure.

CAPTION
Captions appear next to the figure number. They tell you what to notice in the figure and give you more information about the figure. Always read the caption.

COLOR
Color is used different ways in a diagram. Photographs and life-like drawings usually use real color to show you what things look like in real life. False color is used in some diagrams to help you see how different parts of the diagram are different from one another. Other times, false color is used to show how some parts are alike or different from other parts. When false color is used, a color key is sometimes provided to explain what each color represents.

ABBREVIATIONS & SYMBOLS
Abbreviations and symbols commonly used in science appear in some diagrams. If you encounter a symbol you are unfamiliar with, look in the caption and the text to find what the context. For instance “+” may mean addition in one diagram and “a positive charge” in another. Also some diagrams use numbering to let you know the order of the steps in a process.

ZOOM-INS
Text books use zoom-ins in diagrams to show you a magnified part of an object in a diagram. This is sort of like what a biologist might see under a magnifying glass or microscope. Keep in mind that the zoomed-in portion is part of a bigger picture represented elsewhere in the diagram.
ARROWS
Diagrams use different types of arrows. Process arrows show the direction and order of a sequence of events. Arrows can also show the direction of movement. Two parallel arrows facing different directions indicate that what is on the left can be transformed into what is on the right.

LABELS
Labels are used to name specific things or structures in a diagram, such as plants, animals, or molecules. Labels which name parts of a figure or diagram are called naming labels. Labels can also be used to explain processes in the diagram. These labels are called explanatory labels. Remember to read each explanatory label in order. Since there is also a corresponding picture with each number, be sure to identify the corresponding picture.

TABLES
Tables are used to organize information. Tables have various parts: titles, rows, columns, column labels and cells. Table titles tell you what the table is about. Rows are read left to right. Columns are read top to bottom. Columns have column labels that describe the contents below it. Each box in a table is called a cell. Be sure to read the title and column labels before reading down each column and across each row when you see a table. Colors or shading on the table can help show you where to look in the table.