

DO NOW, please:

1. **Read** the paragraphs and exam questions.
2. **Circle** the words that you think would be an *obstacle* to an English Language Learner's ability to comprehend these passages.
3. Be prepared to **share**.



SLOP in the Secondary Science Classroom:

Effective Instruction
for English Language
Learners

Changing Suburbs Institute
2013 Educational Forum
Manhattanville College
March 5, 2013

Bedford Central School District



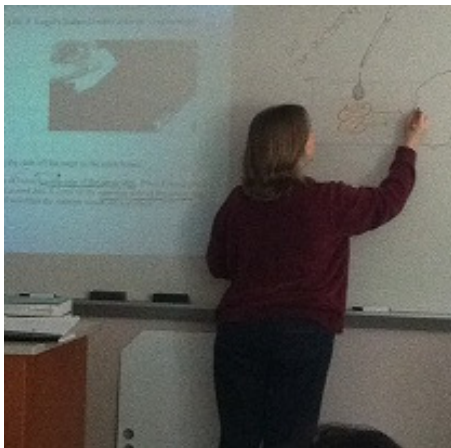
- Adrienne Viscardi
Director of ESOL Programs
- Andrea Abt
ESOL teacher,
Fox Lane High School
- Rita Sanchez
ESOL teacher,
Fox Lane Middle School

Objectives

We will

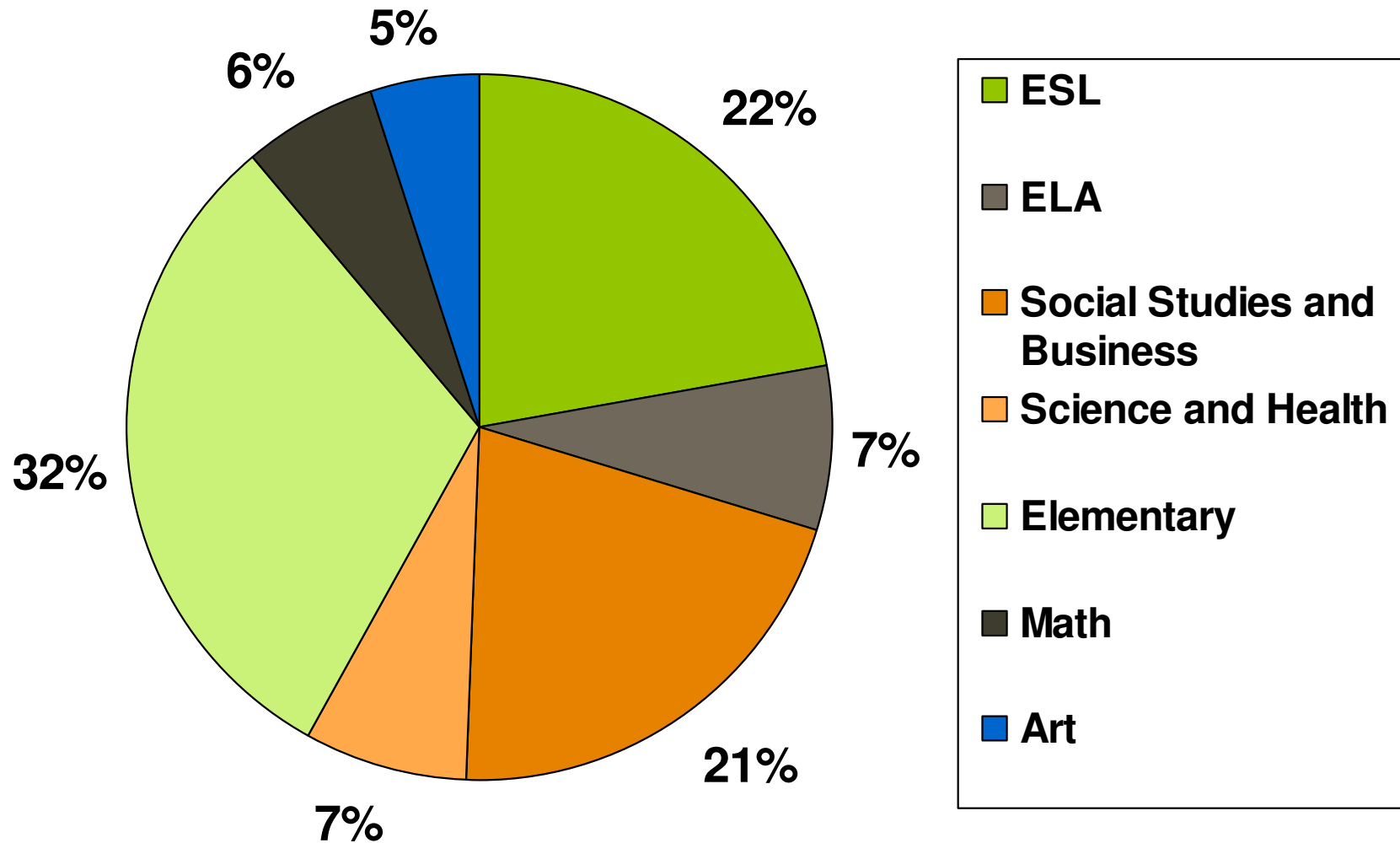
- describe one district's approach to the implementation of the Sheltered Instruction Observation Protocol (SIOP);
- describe the program design and delivery model for ELLs in science, grades 6-12;
- explain and demonstrate effective strategies for teaching ELLs in the science classroom.

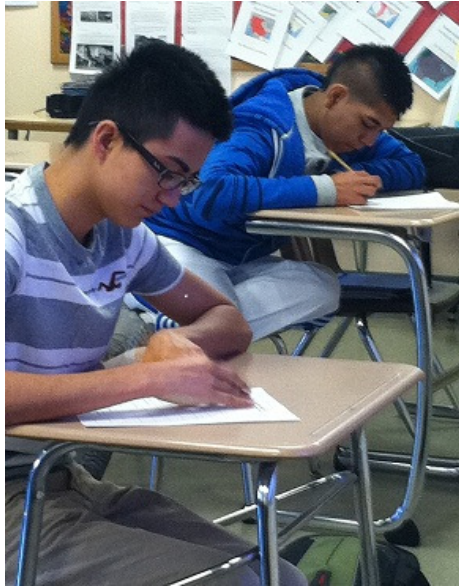
Professional development: SIOP



- Pilot began in 2006
- 5-6 day training modules
- Training, planning, and coaching
- Introduced through induction process

Distribution of 75+ teachers trained in Bedford CSD





Approach

SIOP

Framework

Protocol

What SIOP is...

- a **model** of instruction that integrates content and language instruction
- an **instrument** for planning, delivery, and assessment
- for **ESL teachers, content-area teachers, co-teachers, and collaborative teams**
- **excellent instruction** for all that has particular benefits for ELLs

What SIOP isn't...

- for English language learners only
- for content-area teachers only
- for ESL teachers only
- a model that requires cookie-cutter lessons
- just “good teaching”

ina Echevarría MaryEllen Vogt Deborah J. Shi



FOURTH EDITION
MAKING CONTENT
COMPREHENSIBLE
for
ENGLISH LEARNERS
THE SIOP® MODEL

15 YEARS
OF RESEARCH

EMPIRICALLY BASED • COLLEGE AND CAREER READINESS

Components of SIOP

- Content and language objectives
- Building background
- Comprehensible input
- Interaction

ELLs in Science, grades 6-12

Middle School

ESL Science

ESOL teacher
Beginning/intermediate
Grades 6-8

SIOP Science 7

Science teacher/ESOL teacher
Intermediate+
Grade 7

SIOP Science 8

Science teacher/ESOL teacher
Intermediate+
Grade 8

High School

ESL Science Literacy

ESOL teacher
Beginning (ESL 1)
Grade 9/newcomers

ESL Science

Science teacher/ESOL teacher
Intermediate (ESL 2)
Grades 9-10

Living Environment Regents

Science teacher with
instructional assistant
Grades 10-12



SIOP in the Science Classroom

Who Are We?

Rita Sanchez

ESOL Teacher

Fox Lane Middle School, BCSD

Class Description:

8th grade Physical Science

24 students:

6 ELLs: int./adv. - 2 newcomers

1 Special Education

15 English-Only & Former ELLs

Need to be ready for:

New York State Science test - spring



Who Are We?

Andrea Abt

ESOL Teacher

Fox Lane High School, BCSD

Class Description:

ESL 2 Science - 9th /10th graders

Living environment content

Credit bearing

19 students:

- beginner &intermediate ELLs
- 12 SIFE
- 2 newcomers

Need to be ready for:

Living Environment mainstream class

Regents exam –June



SLOP in the Science Classroom

Content-Specific Words	General Academic Words	Multiple Meanings

SLOP in the Science Classroom

To successfully learn
science content ELLs need ...



science
content-specific
words

general academic words

Science Content-Specific Vocabulary	General Academic Vocabulary	Multiple Meanings
electromagnetic	determine	table
mitosis	represent	mass
sodium chloride	attribute	wave
organelles	approximate	property

FIGURE 1.1 *Hiebert's Challenges and Assets of Learning Science Vocabulary (Hiebert, 2008)*

<i>Challenges</i>	<i>Assets</i>
1. Dense	1. Clear delineation of vocabulary
2. Conceptually difficult	2. Build-up of ideas
3. Central to text	3. Concepts can be taught thematically
4. General academic vocabulary	4. Many clear Spanish cognates
5. Not much time for science instruction	5. Potential for high levels of engagement
6. Lack of background knowledge	6. Lab experiences promote interaction
7. SIFE	7. Overlap with math concepts
8. Lack of dedicated time for labs	
9. Overlap with math concepts	

(Short, Vogt, and Echevarria, 2011)

Key SIOP Components Help Students Achieve Academically in Science



Lesson

Preparation:

- **Collaborative planning**
 - Content and language objectives
 - Enlarge/adapted text-differentiated material
 - Alternate materials
 - Scaffolded notes - key concepts and units
 - Weekly vocabulary /homework
 - Review and reteaching concepts
 - Opportunities for interaction

Objectives are key!

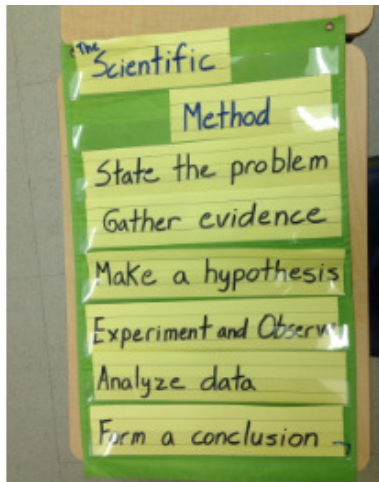
- Content Objective:
SWBAT identify the
properties of protons,
neutrons, and electrons.

- Language Objective:
SWBAT create a glossary
of terms with original
sentences.

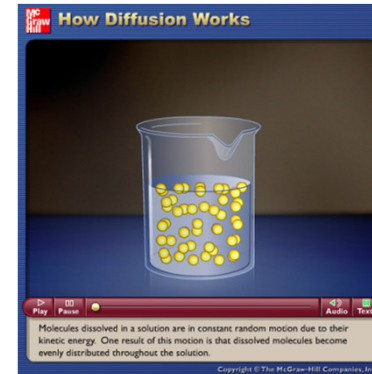


Building Background Knowledge

- ❖ *personal glossaries: terms, illustrations and definitions*
- ❖ *Frayer model*
- ❖ *Word walls*
- ❖ *Power writing*

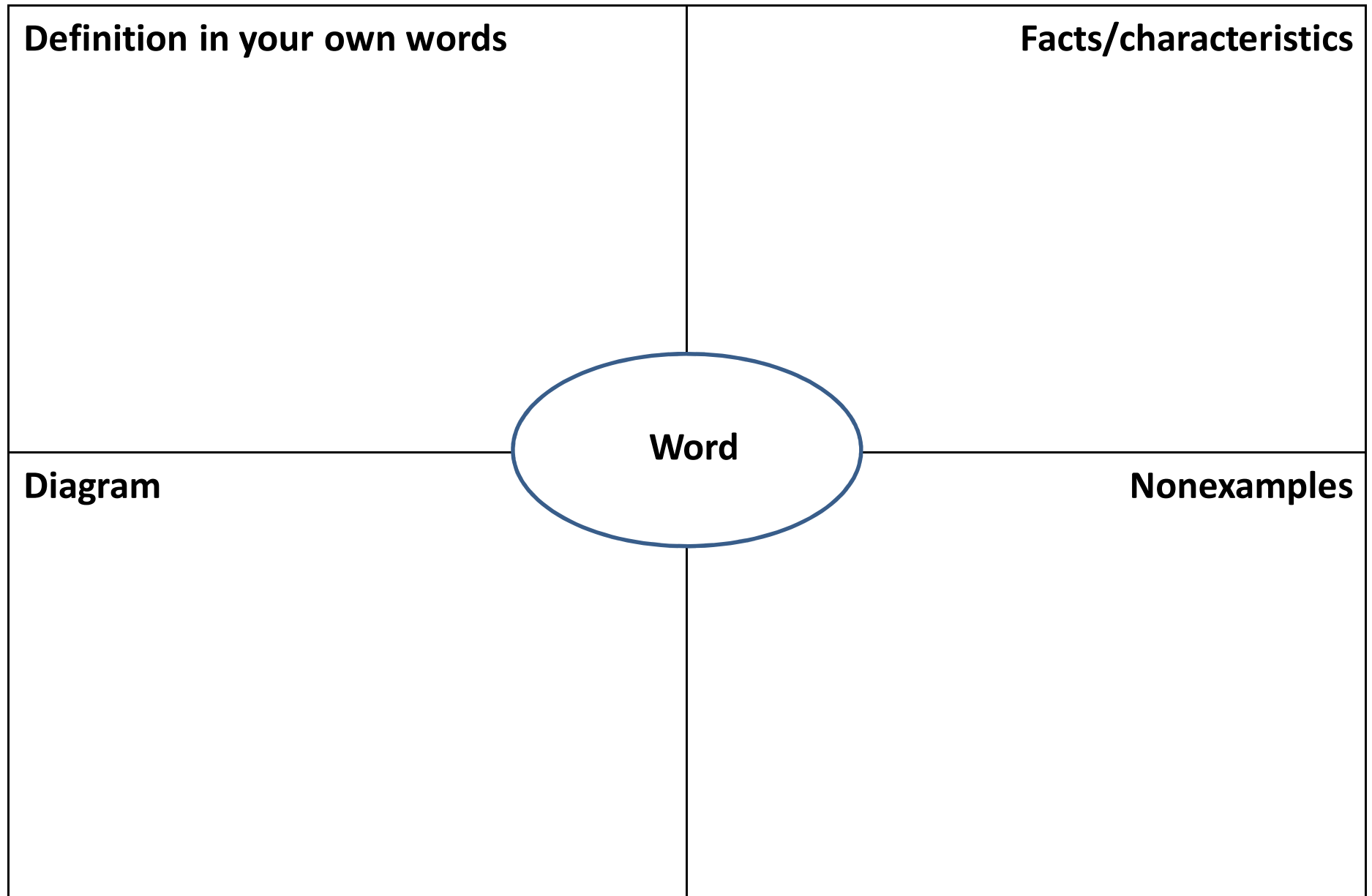


Explicit vocabulary instruction and multiple exposures are essential!



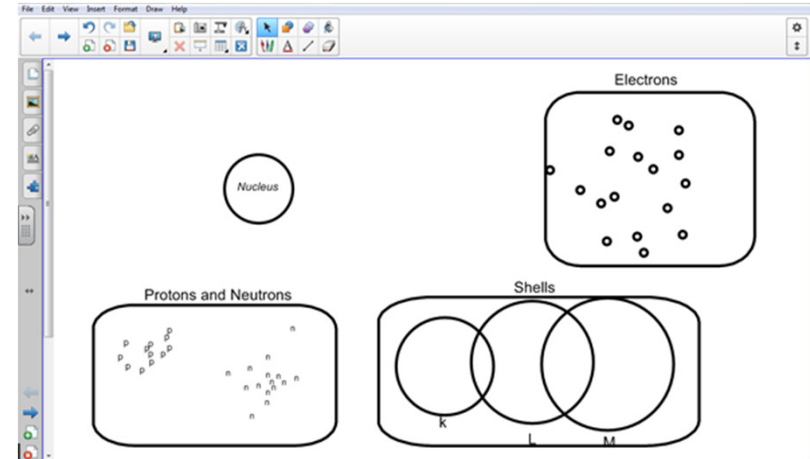
- ❖ *Vocabulary cards in key rings*
- ❖ *Word wall, signal words posters*
- ❖ *Video clips and animations*
- ❖ *Quizlet*
- ❖ *Features of text genres*
- ❖ *Science magazines*

Frayer Model



Comprehensible Input

- Hands-on activities
- Interactive SmartBoard slides
- Frayer models
- Leveled texts



- Scaffolded notes
 - Framed outlines
 - Visuals
- Graphic organizers
 - Key words
- Differentiated labs
- Conversational approach leading to content-specific words

Scaffolded Notes

Academic Vocabulary

Graphic Organizers

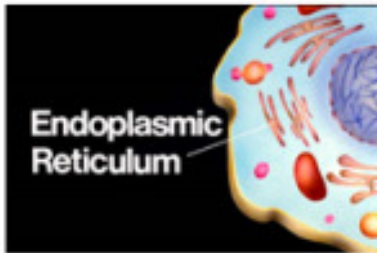
Key Words

ENDOPLASMIC RETICULUM

-system of fluid-filled canals or _____
 -paths for the transport of materials through the cell.

Rough ER - _____

Smooth ER - _____



Fill in the blank with a preposition:

Rough ER has ribosomes and provide a pathway _____ proteins being made

Smooth ER does not have any ribosomes _____ its surface.

RIBOSOMES



Small particles - site for _____ synthesis.

MR. H. STRANGER

LIFE PROCESSES	KEY WORD	EXAMPLE
METABOLISM		
REGULATION		
HOMEOSTASIS		
SYNTHESIS		
TRANSPORT		
RESPIRATION		
ASSIMILATION		
NUTRITION		
GROWTH		
EXCRETION		
REPRODUCTION		

Scaffolded Notes

Academic Vocabulary

Graphic Organizers

Key Words

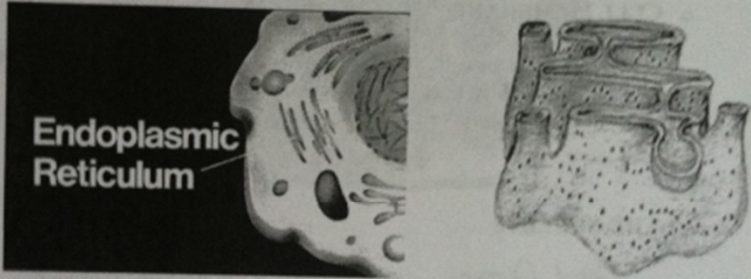
inside
within

o **ENDOPLASMIC RETICULUM (ER)**

-system of fluid-filled canals or pathways
-paths for the transport of materials through the cell.

Rough ER - canals with attached ribosomes

Smooth ER - NO ribosomes


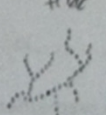


Endoplasmic Reticulum

Fill in the blank with a preposition:

Rough ER has ribosomes and provide a pathway for proteins being made.

Smooth ER does not have any ribosomes in its surface.

"attached"  "free" (floating in cytoplasm) 

o **RIBOSOMES**

Small particles - site for protein synthesis.
"place"

LIFE PROCESSES ACTIVITY

Mr. H. Stranger is a mnemonic device to help you remember the life processes of organisms. Each letter stands for one of the life processes as shown in the following table. Use the definitions in your notes to determine key word definitions to fill in column 2. You may use any organism from the 5 kingdoms of living things to use as an example of a life process.

Term	Key Word Definition	Example of Process
Metabolism	All	"SKenny boy"
Regulation	Control	shiver if you're cold Brain
****Homeostasis**** (constant)	Constant	temperature 98.6° 37°C
Synthesis	combine	photosynthesis (making food)
Transport	movement	blood moving nutrients
Respiration	energy	mitochondria
Assimilation	incorporation	food
Nutrition	taken in	eating
Growth	increase	body → boy
Excretion	waste	wine
Reproduction		

Differentiated Labs

Name:

Date:

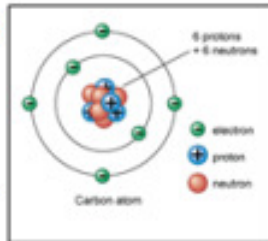
ESL 2 Science - Ions

LAB: ATOMS, IONS, AND ISOTOPES

Introduction:

An atom is the building block of all matter. Matter that is composed of only one type of atom is called an element. We can find information on chemical elements in the periodic table of elements.

An atom consists of a central nucleus (positive protons and neutral neutrons) surrounded by one or more electrons (negative charge).



The charge of an atom is neutral because it has the same number of protons and electrons, which means the same number of positive and negative charges. An atom becomes an ion if it gains or loses an electron (negative charge).

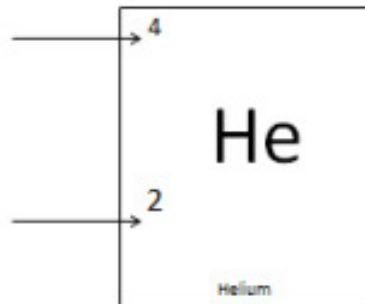
Atoms that have the same number of protons are atoms of the same element. For example, ALL ATOMS with an ATOMIC NUMBER OF 6 (6 protons) are CARBON ATOMS.

Below is the shorthand notation of an atom of Helium:

Mass number: This is the number of protons and neutrons. (A)

The unit to measure mass is amu (atomic mass units)

Atomic number: This is the number of protons (Z)



Name:

Date:

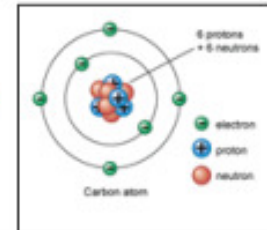
ESL 2 Science - Cheats

LAB: ATOMS, IONS, AND ISOTOPES

Introduction:

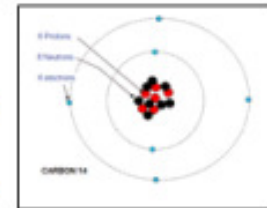
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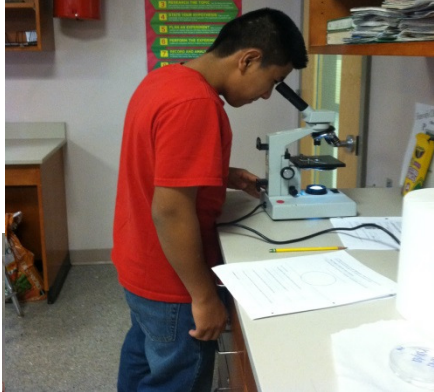
Atoms that have the same number of protons are atoms of the same element. For example, ALL ATOMS with an ATOMIC NUMBER OF 6 (6 protons) are CARBON ATOMS. So, carbon atoms always have the same number of protons, but not all carbon atoms have the same number of neutrons. ATOMS OF THE SAME ELEMENT WITH THE SAME NUMBER OF PROTONS BUT DIFFERENT NUMBER OF NEUTRONS ARE CALLED ISOTOPES.



For example, some carbon atoms have 6 neutrons (we call these carbon atoms Carbon 12), and some have 8 neutrons (we call these carbon atoms Carbon 14). These are isotopes of Carbon. Isotopes are identified by their element name and their mass number. The mass number of an atom is equal to the number of protons plus the number of neutrons. Therefore, Carbon 14 has a mass number of 14 amu (atomic mass unit) because it has 6 protons and 8 neutrons.

Interaction

- Total participation technique
- Small-group work
- Manipulatives
- Concept circles with partners
- Opportunities for students to clarify key concepts in L1 as needed
- Group projects
- Lab partners – heterogeneous and homogeneous



ELLs

Content Vocabulary

Process/Function Words

Words/ Word Parts

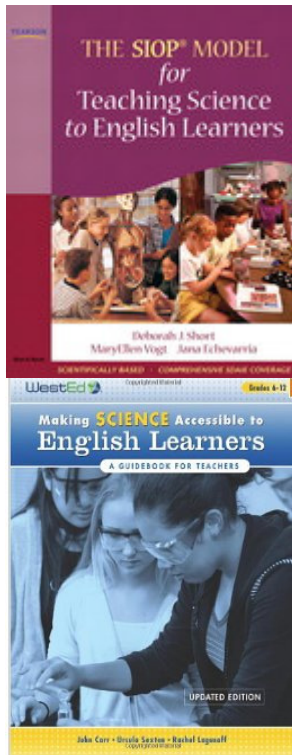
Explicit vocabulary instruction

Comprehensible Input

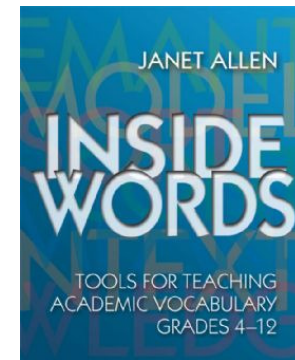
Scaffolds

Oral Academic Language

For Additional Information:



- *The SIOP Model for Teaching Science to English Learners* by Short, Vogt and Echevarria (2011)
- *Making Science Accessible to English Learners* by Carr, Sexton and Lagunoff (2007)
- *Inside Words* by Janet Allen (2007)



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