Introduction
Introduction to Selected Unit
Suzanne Botta Sullivan

Title: The Respiratory System

Grade Level: 7th Grade

Target Group: Mainstream class with integrated ELL students

Source of Written Materials:
- Human Body Systems and Health; Holt, Rinehart and Winston, Holt Science and Technology
- Human Body Systems and Health, Teacher Resources; Holt, Rinehart and Winston, Holt Science and Technology
- Biology Coloring Workbook; Edward Alcami, PhD, Princeton Review
- You and Your Body, Teacher's Guide; Delta Science Modules™

Websites:
http://www.youtube.com/watch?v=HiT621PrrO0&feature=related (respiratory system)
http://www.youtube.com/watch?v=hp-gCoW8PRY (diaphragm)

Lesson Plans: Attached

3-4 Learning Goals:
- I want my students to know how air moves through the respiratory system
- I want my students to be able to explain "gas exchange"
- I want my students to understand why we breathe / respire

Students Will Know (SWK)
Students Will Be Able To (SWBAT)
Students Will Explain (SWE)
Teacher Will (TW)
Student Will (SW)
Lesson 1
Performance Indicators
Day 1

Content Objectives:
- SWK: The parts that make up the respiratory system
- SWBAT: Trace path of gas through the respiratory system

Language Objectives:
- Write a description of the pathway gas takes through the respiratory system
- Verbally describe the pathway gas takes through the respiratory system

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<td>SW explain in approximately 9 sentences the path air takes from outside the body to the cells and back out again</td>
<td>SW use sentence starters to explain in 9 sentences a description of the path air takes from outside the body to the cells and back out again.</td>
<td>SW use sentence starters and word bank to verbally explain in 4 sentences the path air takes from outside the body and back out again.</td>
<td>SW use a diagram and number the location through which the air passes on its way into and out of the body. SW use a word bank to label key anatomy in the respiratory system. SW answer yes/no questions about the process.</td>
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<td>SW use sentence starters and word bank to write 4 sentences describing the path air takes from outside the body to the cells and back out again.</td>
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Suzanne Botta Sullivan
The Respiratory System
7th Grade Science
Revised 5/1/2012
# Functional Notional Chart

## Day 1

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<th>Situation/Topic</th>
<th>Expressions</th>
<th>Vocabulary</th>
<th>Grammar</th>
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</table>
| Describe | Respiration    | Enters, Travels, moves, in, out, (sequencing words) first, second, next, before, after  
1. The diaphragm and rib muscles contract, the ribs move up and out.  
2. Lung volume increases  
3. Air enters through the nose or mouth.  
4. Moves down the trachea, bronchi, and bronchioles.  
5. Air moves out of alveoli  
6. O₂ diffuses into blood; CO₂ diffuses into alveoli  
7. The diaphragm and rib muscles relax.  
8. Air moves up bronchioles, bronchi, and trachea  
9. Air leaves nose or mouth | Gas, air, CO₂, O₂, Breathe, Inhale, Exhale, Lungs, diaphragm, nose, trachea, larynx, alveoli, moisture | Verbs, nouns |

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*The Respiratory System*
*7th Grade Science*
*Revised 5/1/2012*
Respiratory System Lesson Plan

Unit Question: How does the Body Move?
Area of Interaction: Human Ingenuity
Unit Content Objectives
SWK: The parts of the respiratory system
SWBAT: Describe how air travels through the respiratory system
SWE: How the heart and lungs work together
Vocabulary: heart, blood, red blood cells, arteries, veins, capillaries, trachea, larynx, bronchi, alveoli, oxygen, carbon dioxide, gas exchange, element, breathe, respire, inhale, exhale, gas

Day 1 ~ Exploring the Respiratory System

Content Objectives:
- SWK: The parts that make up the respiratory system
- SWBAT: Trace path of gas through the respiratory system

Language Objectives:
- Write a description of the pathway gas takes through the respiratory system
- Verbally describe the path of airflow into and out of the respiratory system

1. Schema Activator: Students to create and fill in KWHL: Respiratory (*Respirar) System (enclosed). The KWHL is a graphic organizer that is used at the beginning of each unit, students add what they have learned to it through out the unit and then use it as a study guide and to help them complete their unit reflection. Students draw a KWHL – but I provide blank KWHL templates to some students.
*Modification - TW: Provide a KWHL chart

2. Review Objectives and KWHL:
Student leaders review illicit student comments from the filled in KWHL (except L) and objectives written on the board. Per regular class procedure, following the warm-up students who are the filling the roles of “Lab Tech” and “T.A.,” walk up to the front of the class and ask students from the class to share out from the KWHL (1 min for each letter – nothing from L yet). Next they will illicit students to read the objectives for the day one at the time. The T.A. calls on the students and the Lab Tech distributes stickers.

2. Students will copy and answer the following questions in their Science journal section:
- Breathing and respiration are the same thing (True or False)
- The nose is the primary doorway into and out of the respiratory system (True or False) (txt p 40).
- TW poll the class – ask to students to answer only by a show of hands.

3. Activity: TW will direct students to place hands inside rib cage and breathe deeply (TW model) – TW ask what do you feel (gesturing)? TW will tell students to Turn and talk for one minute. Quick write, two minutes.
* Provide sentence frames:

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When I breathe in my chest  
When I breathe in my stomach  
When I breathe out my chest  
When I breathe out my stomach  

4. Direct instruction, students follow along and color biological coloring: Guide students through respiratory system and to gas exchange. Use anatomical model and gesturing to describe the steps of air entering the body, traveling through the respiratory system to the blood cells and then back out. TW import the worksheet the students are coloring into the smart board and add color where the students should add color. TW will use red to show oxygen rich air as it enters and blue to show carbon dioxide rich air as it exits the body. As teacher is demonstrating the parts of the respiratory system the TW also draw students attention back to the appropriate words of the word wall and then the words on the diagram.

TW will chart the steps on the diagram.

1) Air enters through the nose or mouth.  
2) Moves down the trachea, bronchi, and bronchioles.  
3) Air moves out of alveoli  
4) Oxygen (O$_2$) diffuses into blood; Carbon Dioxide (CO$_2$) diffuses into alveoli  
5) The diaphragm and rib muscles relax.  
6) Air moves up bronchioles, bronchi, and trachea  
7) Air leaves nose or mouth.

TW will show a short web clip of respiration:  
http://www.youtube.com/watch?v=HiT621Fr00&feature=related

**Questioning**  
TW direct student to return to their journal and look at their answers. Think and decide if the answers are true or false.

- Breathing and respiration are the same thing (True or False)  
  - TW ask for student responses: Are breathing and respiration the same thing? Yes or no? What makes you say that? Can you use your diagram to prove your stance? Do they have anything in common?

- The nose is the primary doorway into and out of the respiratory system (True or False) (txt p 40)  
  - Why is the nose the primary doorway, what else does it do for the body? Why does the air feel colder and dry when you breathe through your mouth?


*Modifications  
Additional modifications:  
Post picture / word bank  
Post color key: Red = Oxygen rich / Blue = Oxygen poor

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Word bank:

<table>
<thead>
<tr>
<th>Gas</th>
<th>Carbon Dioxide (CO₂)</th>
<th>Oxygen (O₂)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air</td>
<td>Breathe</td>
<td>Inhale</td>
</tr>
<tr>
<td>Exhale</td>
<td>Lungs</td>
<td>Diaphragm</td>
</tr>
<tr>
<td>Muscle</td>
<td>Nose</td>
<td>Trachea</td>
</tr>
<tr>
<td>Larynx</td>
<td>Alveoli</td>
<td>Moisture</td>
</tr>
<tr>
<td>Bronchi</td>
<td>Bronchioles</td>
<td>Diffuse</td>
</tr>
</tbody>
</table>
The Respiratory System

- Nasal Passage
- Nasal Conchae
- Frontal Sinus
- Sphenoid Sinus
- Pharynx
- Oropharynx
- Trachea
- Left Bronchus
- Right Bronchus
- Left Bronchial Tree
- Right Bronchial Tree
- Left Lung
- Right Lung
- Diaphragm
- Tongue
- Esophagus
- Ribs
- Sternum
- Clavicles
The Mechanism of Breathing

- Lungs: A
- Thoracic Cavity: B
- Intercostal Muscles: C
- Diaphragm: D
- Trachea: E
- Inhaled Air: F
- Exhaled Air: G
- Alveolus: H
- Pulmonary Artery: I
- Arterioles: J
- Capillaries: K
- Venules: L
- Pulmonary Vein: M
Science

Name

Homeroom Date

Topic:

<table>
<thead>
<tr>
<th>K</th>
<th>W</th>
<th>H</th>
<th>L</th>
</tr>
</thead>
<tbody>
<tr>
<td>What I KNOW</td>
<td>What I WANT to Know</td>
<td>HOW will I learn</td>
<td>What I LEARNED</td>
</tr>
</tbody>
</table>


Chest
Midterm Narrative
Suzanne Botta Sullivan

Title: The Respiratory System

Thus far the content we have covered has altered my view of teaching English Language Learners (ELLs). I learned the difference between Basic Interpersonal Communicative Skills (BICS) and Cognitive Academic Language Proficiency (CALP). The difference can put students with BICS at a distinct disadvantage since it can be wrongly assumed that they are ready for mainstream education. In addition, to the volume of content specific vocabulary, CALP provides an even greater challenge for our ELLs and that is a context-reduced environment.

Following class discussion on context-reduced versus context embedded environments I reflected on my own classroom and teaching style. Looking through the lens of an ELL without CALP I could see how challenging following my instruction could be.

I believe learning about the stages of language acquisition were especially helpful in trying to understand what I could reasonably expect from my ELLs and how I could better support their education. Interestingly, based on the stages of language acquisition I realized I have several more ELLs in my classes than I originally thought.

When I began the course I was really focused on two students who are receiving ELL services. They range between early intermediate and intermediate. But as we dug deeper into the stages and became “experts” in a stage I realized that I have additional ELLs in my classroom both Early Advanced and some whose native language is English but the parents were not native speakers and therefore could not provide English language support.

The past several lectures and chapter readings of Echevarria and Graves (E&G) have provided me with some things to consider when planning my lesson as well effective strategies to implement. Although I was using some of the supplementary materials outlined in (E&G, p32) e.g. visuals, manipulatives, multi-media, etc. I have begun to use them differently, keeping my ELLs in mind. Additionally, I have found some of the modifications and accommodations useful and exciting. In particular, I have been using the sentence frames to remove some of the stress associated with writing.

I think the most recent components that have helped me reframe my lessons are the language objectives and the functional notional chart. Although I am not truly confident in my grasp of those two components I feel that my ability to apply the concepts throughout my lesson planning is not far off. Already I find myself considering what expressions will be used in class as well as the language demands I am placing upon my students.

Overall, I feel as though I have learned a myriad of components that address teaching ELLs. I have started to think about my lessons based on the background information and modify my lesson plans based on the teaching strategies outlined in “99” and E&G. I am looking forward to additional time to better incorporate these components into my own personal teaching style.

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Lesson 2
# Day 2 ~ Build a model lung

**Performance Indicators**

**Content Objectives:**
- SWBAT: Describe the muscle used to control airflow into and out of the body
- SWBAT: Trace path of gas through the respiratory system
- SWE: What happens when you inhale and exhale (how O₂ is delivered to the lungs)

**Language Objectives:**
- Express verbally and in writing what you learned, liked, surprised you, and what you now wonder
- Express verbally and in writing what the model reminds you of
- SWE: What happens when you inhale and exhale (how O₂ is delivered to the lungs)

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<td><strong>SWBAT:</strong> Describe the muscle used to control airflow</td>
<td>Verbally name the diaphragm and describe how it functions to move air into and out of the respiratory system</td>
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<td>SW explain in approximately 9 sentences how the diaphragm moves air into and out of the body</td>
<td>SW use sentence starters to explain in 9 sentences a description of how the diaphragm moves air into and out of the body</td>
<td>SW use sentence starters and word bank to verbally explain in 4 sentences how the diaphragm moves air into and out of the body.</td>
<td>SW use the model and a diagram to demonstrate how the diaphragm moves air into and out of the body. SW answer yes/no questions about the process.</td>
<td>SW I use a model to show how the diaphragm moves air into and out of the body. SW point and repeat locations.</td>
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<th>SWE: What happens when you inhale and exhale (how O₂ is delivered to the lungs)</th>
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<td>SW explain in approximately 9 sentences the path air takes from outside the body to the cells and back out again.</td>
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<td>SW use a diagram and number the location through which the air passes on its way into and out of the body. SW use a word bank to label and say the names of key anatomy in the respiratory system. SW answer yes/no questions about the process.</td>
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<td>SW use a diagram and number the location through which the air passes on its way into and out of the body. SW point and repeat locations.</td>
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<tr>
<th>Speaking &amp; Writing</th>
<th>SW explain in approximately 7 sentences how the model affected you and what it reminds you of</th>
<th>SW use sentence starters to explain in 7 sentences a description how the model affected you and what it reminds you of</th>
<th>SW use sentence starters and word bank to verbally explain in 3 sentences how the model affected you and what it reminds you of</th>
<th>SW I use the model and a diagram to demonstrate knowledge of location and how the diagram works</th>
<th>SW use a model and a diagram to demonstrate knowledge of location and how the diagram works</th>
<th>SW answer yes/no questions about the process.</th>
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## Functional Notional Chart ~

### Day 2

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<td>Describe</td>
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<td>I learned, I wonder, I am surprised by, it reminds me of, When I breathe in my diaphragm, when I breathe out my diaphragm 1. The diaphragm and rib muscles contract, the ribs move up and out. 2. Lung volume increases 3. Air enters through the nose or mouth. 4. Moves down the trachea, bronchi, and bronchioles. 5. Air moves out of alveoli 6. O₂ diffuses into blood; CO₂ diffuses into alveoli 7. The diaphragm and rib muscles relax. 8. Air moves up bronchioles, bronchi, and trachea 9. Air leaves nose or mouth</td>
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Day 2 ~ Build a model lung

Content Objectives:
- SWBAT: Describe the muscle used to control airflow into and out of the body
- SWBAT: Trace path of gas through the respiratory system
- SWE: What happens when you inhale and exhale (how O₂ is delivered to the lungs)

Language Objectives:
- Express verbally and in writing what you learned, liked, surprised you, and now wonder.
- Express verbally and in writing what the model reminds you of
- Explain what happens when you inhale and exhale (how O₂ is delivered to the lungs)

You and Your Body, Teacher’s Guide; Delta ScienceModules™, pp49-52, (enclosed)

1. Schema Activator: Students to use Review respiration and pathway air takes (use coloring from day 1) and students to complete concept map (#23) (enclosed)

2. Review Objectives:
Student leaders review objectives written on the board. Per regular class procedure, following the warm-up students who are the filling the roles of “Lab Tech” and “T.A.” walk up to the front of the class and ask students from the class to read the objectives for the day one at the time. The T.A. calls on the students and the Lab Tech distributes stickers.

3. TW – Building Background Knowledge: Show very short segments of two videos so that students will see how air moves into and out of the respiratory system AND how the diaphragm moves.

http://www.youtube.com/watch?v=HiT621PrrOo&feature=related (respiratory system)
http://www.youtube.com/watch?v=hp-gCvW8PrY (diaphragm)

TW provide students with Verbal and Visual Word Association graphic organizer. TW will tape a paper copy to board then draw larger version on main board. TW will fill in word ask students to add an illustration. TW will ask students for definition ideas and then write definition in correct box. SW add a personal connection – to help remember. *Students are familiar with this type of graphic organizer for vocabulary. Instruction for this graphic organizer is done in fall and the organizer is used regularly.

4. Teacher to introduce task – students are going to build a model lung using common materials.
Teacher will demonstrate using building materials and add labeled items to the board.
* 2 - balloons  *clear tube  *rubber band  *clear plastic pipe with lid items will be taped to the board, and labeled so as direct instruction is underway teacher can refer to items to be used.

Two-part task:
Part 1. TW: Use hand held model to demonstrate how air flows and answer questions
Part 2. SW: Work in small groups to build the model and complete Activity Sheet 6 (enclosed), (label lung diagram, draw model and show which parts of the model represent the diaphragm, trachea, and lungs, use arrows to show air flow) anatomical part names posted on board

1. Watch teacher demonstrate how to build the model
2. Students build model together
3. Use model to see how air moves into and out of lungs

5. Building time: students to work in small groups

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6. Student Voice / Opportunity for Output: Every Student Gets a Chance (SIOP p 60) – Once the students have their activity sheet completed they will use a large anatomical model of a human torso including the respiratory system and their notes to describe the pathway air takes into and out of the respiratory system and the effect of the diaphragm muscle. As the first volunteer describes the pathway the teacher will chart his/her description on the board. Additionally, the teacher will guide the student to enumerate the following sequence:

8) The diaphragm and rib muscles contract, the ribs move up and out.
9) Lung volume increases
10) Air enters through the nose or mouth.
11) Moves down the trachea, bronchi, and bronchioles.
12) Air moves out of alveoli
13) Oxygen (O₂) diffuses into blood; Carbon Dioxide (CO₂) diffuses into alveoli
14) The diaphragm and rib muscles relax.
15) Air moves up bronchioles, bronchi, and trachea
16) Air leaves nose or mouth

Following the first student and the creation of a sequence chart each student will have the opportunity to repeat the process using the same or similar language.

Posted frames will include:
First air enters, next it, after that, when it gets to the lungs it, finally the air, _____ muscles contract

Checking for Understanding / Output
Teacher will ask students upon their completion, questions based on language ability and their description, e.g. yes/no questions, identify a part, for elaboration or a part of the process. Sample questions include:

☐ What is the muscle moves that air by contracting and relaxing (please point to it)
☐ What part of the model represents the diaphragm? How do you know? – Looking for elaboration
☐ How does air enter the body?
☐ How does O₂ get into the blood?
☐ Predict, what would happen if the alveoli got damaged?
☐ What part of the body does the balloon represent?
☐ Why does the (lung) balloon fill with air when you pull on the (diagram) balloon?
☐ What body part does the tubing represent?
☐ What happens first the air comes in or the diaphragm contracts?

Closing: Discussion & journal entry: TW direct students to turn and talk about their experiences. As a class each pair practices turning toward each other and then saying … (see below). Teacher models. Then class models (everyone together). TW give opportunity for questions. SW complete turn and talk together.

- What did you like? *I liked how *I liked when
- What did you learn? *I learned that *Something I learned today was how
- What surprised you? *I was surprised when *It was surprising that
- What questions do you now have about how our lungs work?

*Following this activity I now wonder *Now that I know _____, I wonder

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*with italics following equals sentence starters/frames

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Circulation and Respiration

Use the following terms to complete the concept map below:
arteries, cardiovascular system, bronchi, alveoli, capillaries, respiratory system, cellular respiration, blood

moves air from the trachea to the
and then to the
which are surrounded by

circulates the
through the filled with
veins

delivering the materials needed for
OBJECTIVES

In this activity, students discover what happens when they inhale and exhale. They also build a model of the lungs, diaphragm, and trachea.

The students

► build a lung/diaphragm model
► observe how the lungs work

SCHEDULE

About 40 minutes

VOCABULARY

diaphragm
lungs
respiratory system
trachea

MATERIALS

For each student

1 Activity Sheet 6

For each team of four

1 balloon, large
1 balloon, small
1 tube, clear plastic
1 vial cap, with hole

For the class

1 pair scissors*
1 transparency, lungs
1 piece tubing

*provided by the teacher

PREPARATION

1 Make a copy of Activity Sheet 6 for each student.

2 From the piece of thin tubing cut one 5-cm length for each team of four.

3 Use a pair of scissors to cut off the closed end of the clear plastic tube.

4 Cut the large balloon as shown in Figure 6-1. The balloon is cut so that it will fit over one end of the clear plastic tube.

![Figure 6-1. Where to cut the new balloon.](image)

5 Each team of four students will need a 5-cm length of thin tubing, a small balloon, a vial cap with a hole in it, a large balloon that has been cut, and a clear plastic tube.

BACKGROUND INFORMATION

Each of us has a pair of lungs in our chest. The lungs are located in a cavity that is nearly
a vacuum. When the **diaphragm** (the large muscle that divides the chest cavity from the abdomen) pulls down and the chest wall expands, the cavity in which the lungs are located also expands, pulling air into the nose and mouth to the **trachea** (windpipe).

The trachea divides into two **bronchi**, each of which enters a lung. Each bronchus subdivides into smaller tubes. The smallest tubes end in clusters of air sacs called **alveoli**. Each alveolus is surrounded by capillaries; this is where the oxygen and carbon dioxide are exchanged. Oxygen from the inhaled air is passed from the alveoli to the capillaries for use in cells throughout the body, while carbon dioxide from the "used blood" is passed back to the alveoli. Then the diaphragm relaxes, causing the chest cavity to contract and expel the carbon dioxide with the exhaled air (see Figure 6-2).

In this activity, students will construct a model simulating the chest cavity, trachea, lungs, and diaphragm, and they will view and label an illustration of the trachea and lungs.

![Figure 6-2. The chest cavity.](image)
1. Ask, What do you think happens when you inhale and exhale?

Many students may not be aware of the function of the diaphragm and what really happens when we inhale and exhale. Tell them that they will construct a model of the lungs and diaphragm to simulate what happens every time they breathe.

2. Distribute the materials and instruct the teams, step by step, on how to assemble their models.

Tell the students to attach the small balloon to one end of the 5-cm length of tubing and to push the other end of the tubing through the hole in the underside of the vial cap. Tell them to place the vial cap on the clear plastic tube so that the small balloon and tubing fit inside the larger plastic tube. Have them place the large balloon over the other end of the clear plastic tube (see Figure 6-3).

Additional Information

Most students will answer that their chest fills with air when they inhale and empties out when they exhale.
**Guiding the Activity**

After each team has assembled its model, tell the students to take turns pulling down on the large balloon and to observe what happens to the small balloon inside the plastic tube.

Write the words *lungs*, *diaphragm*, and *trachea* on the board. Explain that the **diaphragm** is a muscle that divides the chest cavity from the abdominal cavity. Display the transparency of the lungs and point out the lungs and diaphragm.

Explain that when we inhale, the diaphragm pulls downward and the chest cavity expands, pulling oxygen-rich air in through our nose and/or mouth, down through the **trachea** (a tube connecting the mouth/nose with the lungs), and into the **lungs**, where the oxygen and carbon dioxide exchange takes place.

When we exhale, the diaphragm relaxes, the chest cavity collapses, and the carbon dioxide-rich air is pushed from the lungs, through the trachea, and out through the nose and/or mouth.

Write the words **respiratory system** on the board. Tell students that the **respiratory system** includes the lungs, trachea, bronchi, and the channels leading outside of the body to the mouth and nose. The respiratory system handles the body's air supply.

**Additional Information**

*When the large balloon is pulled down, the small balloon inflates because air is being pulled into it through the small tube.*

**Ask,** Which parts of your model represent the diaphragm, the trachea, and the lungs?

**Distribute** Activity Sheet 6 and tell students to label the trachea and the lungs.

Have students complete their activity sheets.

Students should respond that the diaphragm is represented by the large balloon, the trachea is represented by the 5-cm length of tubing, and the lungs are represented by the small balloon.
1. Label the trachea and the lungs.

2. On the back of this paper, draw your lung/diaphragm model. Label the *diaphragm, trachea, and lungs.*
<table>
<thead>
<tr>
<th>Word</th>
<th>Visual Representation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Definition</td>
<td>Personal Association or Characteristic</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Word</td>
<td>Visual Representation</td>
</tr>
<tr>
<td>----------</td>
<td>-----------------------</td>
</tr>
<tr>
<td>cell</td>
<td>![Cell Diagram]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Definition</th>
<th>Personal Association or Characteristic</th>
</tr>
</thead>
<tbody>
<tr>
<td>It is a very tiny structure that makes up all plants and animals.</td>
<td>It reminds me of the rooms in a house. They have different uses, but together they make a home.</td>
</tr>
</tbody>
</table>
Lesson 3
### Day 3 ~ Carbon Dioxide Breath

**Performance Indicators**

**Content Objectives:**
- SWK: What Independent, Dependent, and Control Variables are
- SWBAT: Record data
- SWE: How exercise affects CO₂ levels

**Language Objectives:**
- Restate oral directions before beginning
- Express verbally and in writing conclusions can be made based on the data gathered

<table>
<thead>
<tr>
<th>Content Objectives</th>
<th>Language Objective</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SWE: How exercise affects CO₂ levels</strong></td>
<td>Express verbally conclusions can be made based on the data gathered</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Domain (speaking, listening, reading, writing)</th>
<th>Level 5 Advanced Fluency ~ Mainstream standard</th>
<th>Level 4 Intermediate Fluency ~</th>
<th>Level 3 Speech Emergence</th>
<th>Level 2 Early Production</th>
<th>Level 1 Pre-Production</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Speaking</strong></td>
<td>SW explain in approximately 7 sentences if the data supports a conclusion that characteristics affect CO₂ exhaled. Answer will contain references to the data gathered</td>
<td>SW use sentence starters to explain in 7 sentences if the data supports a conclusion that characteristics affect CO₂ exhaled. Answer will contain references to the data gathered</td>
<td>SW use sentence starters and word bank to verbally explain in 3 sentences if a conclusion can be made that characteristics affect CO₂ exhaled.</td>
<td>SW answer yes or no to the question: do characteristics affect the amount of CO₂ exhaled. Student will point to the data points on the graph that supports his/her answer.</td>
<td>SW answer yes or no to the question: do characteristics affect the amount of CO₂ exhaled.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Content Objectives</th>
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</tr>
</thead>
<tbody>
<tr>
<td><strong>SWE: How exercise affects CO₂ levels</strong></td>
<td>Express in writing conclusions can be made based on the data gathered</td>
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</table>

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<tr>
<th>Domain (speaking, listening, reading, writing)</th>
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<th>Level 2 Early Production</th>
<th>Level 1 Pre-Production</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Writing</strong></td>
<td>SW explain in approximately 7 sentences if the data supports a conclusion</td>
<td>SW use sentence starters to explain in 7 sentences if the data supports a conclusion that characteristics affect CO₂ exhaled. Answer will contain references to the data gathered</td>
<td>SW use sentence starters and word bank to verbally explain in 3 sentences if a conclusion can be made that characteristics affect CO₂ exhaled.</td>
<td>SW answer yes or no to the question: do characteristics affect the amount of CO₂ exhaled. Student will point to the data points on the graph that supports his/her answer.</td>
<td>SW answer yes or no to the question: do characteristics affect the amount of CO₂ exhaled.</td>
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*Suzanne Botta Sullivan*
*The Respiratory System*
*7th Grade Science*
*Revised 5/1/2012*
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<thead>
<tr>
<th>Content Objectives</th>
<th>Language Objective</th>
</tr>
</thead>
<tbody>
<tr>
<td>SWE: How exercise affects CO₂ levels</td>
<td>Restate oral directions before beginning</td>
</tr>
<tr>
<td><strong>Domain (speaking, listening, reading, writing)</strong></td>
<td><strong>Level 5</strong> Advanced Fluency ~ Mainstream standard</td>
</tr>
<tr>
<td><strong>Speaking</strong></td>
<td>SW clearly enumerate the three steps in the procedure with details and safety concerns. Student will correctly name the tools in use.</td>
</tr>
</tbody>
</table>

*Suzanne Botta Sullivan*
*The Respiratory System*
*7th Grade Science*
*Revised 5/1/2012*
<table>
<thead>
<tr>
<th>Day 3</th>
<th>Function</th>
<th>Situation/ Topic</th>
<th>Expressions</th>
<th>Vocabulary</th>
<th>Grammar</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Describe</td>
<td>Respiration</td>
<td>Enters, Travels, moves, in, out, (sequencing words) first, second, next, before, after</td>
<td>Gas, air, CO₂, O₂, Breathe, Inhale, Exhale, Lungs, diaphragm, nose, trachea, larynx, alveoli, moisture</td>
<td>Verbs, nouns</td>
</tr>
<tr>
<td>Describe</td>
<td>Science Lab</td>
<td>Blow through straw, Time how long, shows something is present, draw a conclusion, make a prediction / hypothesis. Physical characteristics can affect the amount of Carbon Dioxide a person exhales. Exercise can affect the amount of Carbon Dioxide a person exhales</td>
<td>First, next, before, last, materials, procedure, place, characteristic, chemical change, Indicator, Phenol Red, Erlenmeyer Flask, Graduated Cylinder, Pipette, medicine cup, stopwatch</td>
<td>Verbs, nouns</td>
<td></td>
</tr>
</tbody>
</table>

*Suzanne Botta Sullivan
The Respiratory System
7th Grade Science
Revised 5/1/2012*
Day 3 ~ Carbon Dioxide Breath
Grade 7, Life Science

Content Objectives:
- SWK: What Independent, Dependent, and Control Variables are
- SWBAT: Record data
- SWE: How exercise affects CO₂ levels

Language Objectives:
- Restate oral directions before beginning
- Express verbally and in writing conclusions can be made based on the data gathered

Materials:

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>150 mL Erlenmeyer Flask</td>
</tr>
<tr>
<td>150 mL graduated cylinder</td>
<td></td>
</tr>
<tr>
<td>Plastic Drinking Straw</td>
<td></td>
</tr>
<tr>
<td>Phenol Red Indicator Solution</td>
<td></td>
</tr>
<tr>
<td>Paper Towels</td>
<td></td>
</tr>
<tr>
<td>Pipette</td>
<td>Stopwatches</td>
</tr>
<tr>
<td>Goggles</td>
<td></td>
</tr>
<tr>
<td>Tray</td>
<td>(Vocab) Word Tags</td>
</tr>
<tr>
<td>Vocab Image Tags</td>
<td></td>
</tr>
<tr>
<td>Carbon Dioxide Breath – Data Sheet</td>
<td>Respiratory System Worksheet, p. 263</td>
</tr>
</tbody>
</table>

1. Warm Up:
   a. Describe the path that air travels as it moves through the respiratory system.
      (reinforcement from Day 1 & Day 2 – students will have 1 of 3 choices to “show what they know”. Worksheet p 263, The Respiratory System
      i. Write a narrative description of the process
      ii. Create a numbered list, e.g. 1. air enters nose, etc.
      iii. Draw the pathway on an image of human torso, add body part names and number the order.

2. TW Introduce “Carbon Dioxide Breath Lab”
Students will follow along as teacher reads the 2 paragraph introduction, Carbon Dioxide Breath Data Sheet. (Data sheet is posted on the board and is overhead on the smart board)
TW will ask students, what are you exploring today? Teacher will direct students to underline what they are exploring. TW write give wait time and then underline “explore” in the paragraph in the datasheet. Following wait time TW underline the remaining part of the phrase, “you will explore your own carbon dioxide exhalation” TW direct students to pair off as teacher and student, the ‘teacher’ reads his/her answer and checks that the ‘student’ has the same thing underlined. The two then switch roles.

3. TW release students to move into their lab groups and take out their lab notebooks.
   Students in the group self-select their lab role. Role sheet attached, teaching lab procedure, roles, set-up, break-down, took place over several weeks of gradual release in the first eight weeks of school.

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4. TW model procedure – but use orange food coloring in place of phenol red so that the chemical reaction does not take place. Modeling will include, gesturing, showing and naming the implements to be used during the lab.

5. SW gather appropriate materials based off teacher model and written Carbon Dioxide Breath lab data sheet.

6. TW ask students to look at the graph and introduction paragraphs. TW ask students to think, “what scientific problem are we investigating?” SW write in their lab note books. Sentence frame provided on the board: “We are investigating how do ______________ a effect the ______________. TW ask students for responses and fill in correct response. TW ask students to predict, make their own hypothesis the answers the problem we are investigating. Sentence frame: I think ______________ affect ______________. I think this because ______________.

7. TW will ask procedural questions (yes/no, first /second, etc.)

8. Students to work on Carbon Dioxide Breath lab (Human Body Systems and Health, p.45)

9. TW direct class, as they gather data in their group they are also to plot the data on a class graph on the smart board.

10. SW clean up and reset materials

11. Closing: TW ask for verbal responses: What conclusions can be drawn from the data gathered? Do characteristics affect the time it takes for the indicator to change color – the Carbon Dioxide exhaled? Chart responses SIOP “Every Students Gets a Chance”, p 60 – every student that wants to answer will have the opportunity. Also provide: Yes/No, Agree / Disagree cards. TW will ask students to elaborate and connect to the data. Students will be encouraged to come to the smart board and point the data that supports their conclusion.
Carbon Dioxide (CO₂) Breath

Plants take in carbon dioxide and give off oxygen as a byproduct of photosynthesis. Animals, including you, use this oxygen and release carbon dioxide as a byproduct of respiration.

In this activity, you will explore your own carbon dioxide exhalation. Phenol red turns yellow in the presence of carbon dioxide. You will use it to detect the presence of carbon dioxide in your breath.

For our experiment, we will test: how do physical characteristics affect the time it takes for phenol red to change color.

<table>
<thead>
<tr>
<th>Materials</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
</tr>
<tr>
<td>150 mL Erlenmeyer Flask</td>
</tr>
<tr>
<td>150 mL Graduated Cylindrical</td>
</tr>
<tr>
<td>Plastic drinking straw</td>
</tr>
<tr>
<td>Phenol Red Indicator</td>
</tr>
<tr>
<td>100 mL of water</td>
</tr>
<tr>
<td>Paper towel</td>
</tr>
<tr>
<td>Pipette</td>
</tr>
<tr>
<td>Stopwatch</td>
</tr>
<tr>
<td>Goggles</td>
</tr>
</tbody>
</table>

**Procedure**

1. Place 100 mL of water into a 150 mL flask. Using a pipette place 4 drops of phenol red indicator solution into the water. The water should turn orange.

2. Place a plastic drinking straw into the solution of phenol red and water. Lay a paper towel over the beaker to prevent splashing.

3. **Carefully** blow through the straw. **DO NOT DRINK THE SOLUTION** and do not share the straw with anyone.

4. Have your lab partner time how long it takes for the solution to change color. Begin timing when you start blowing. Record this time below.

**Questions:**

1. What color does the solution become?

---

Fill in the data table below with the times.

<table>
<thead>
<tr>
<th>Time to Color Change</th>
<th>46.3 Sec</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ex: Daysha Smith</td>
<td></td>
</tr>
<tr>
<td>Student Name</td>
<td>Student Name</td>
</tr>
</tbody>
</table>
Observations:

2. Compare your data 🌈 with those of your classmates.
   - What was the longest length of time it took to see a color change and whose was it?
     - _____________________________
   - The shortest and whose was it?
     - _____________________________

Use the ven-diagram below to make observations and compare your test subjects.

<table>
<thead>
<tr>
<th>Shortest Time to Change</th>
<th>Common to Both</th>
<th>Longest Time to Change</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

This person ____________________________
Short, small, tall, athletic, male, female

Analysis ~ Think: ☮️❓

3. Look at your ven-diagram: Is there a relationship between the length of time it takes to change the solution from orange to yellow and the person's physical characteristics, such as gender or whether the tester has an athletic build?
Going Further

Next: Do jumping jacks or sit-ups for 3 minutes, and then repeat the experiment.

Fill in the data table below with the times.

<table>
<thead>
<tr>
<th>Time to Color Change</th>
<th>46.3 Sec</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Ex: Daysha Smith</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Student Name</td>
<td>Student Name</td>
<td>Student Name</td>
<td></td>
</tr>
</tbody>
</table>

Use the ven-diagram below to make observations and compare your test subjects.

<table>
<thead>
<tr>
<th>Time to Change Before Exercise</th>
<th>Common to Both</th>
<th>Time to Change After Exercise</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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</tbody>
</table>

Did the timing change? Describe and explain any change.

__________________________

__________________________

__________________________

__________________________
<table>
<thead>
<tr>
<th>Agree</th>
<th>Agree</th>
<th>Agree</th>
<th>Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disagree</td>
<td>Disagree</td>
<td>Disagree</td>
<td>Disagree</td>
</tr>
</tbody>
</table>
Checklists
FLA 518: Sheltered ELL Strategies Checklist

Write the page numbers and any other identifying features to identify those parts of your lessons that employ the following strategies.

<table>
<thead>
<tr>
<th>SHELTERED STRATEGIES</th>
<th>Lesson 1</th>
<th>Lesson 2</th>
<th>Lesson 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. Contextualize Lesson</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I.A. Build and Activate Background Knowledge</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I.B. Develop Vocabulary</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I.C. Use extensive Visuals, Realia, Manipulatives, &amp; Gestures</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I.D. Model (Instructions, Processes)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I.E. Create Opps. To Negotiate Meaning/Check Understanding (student to student/student to teacher discussion)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II. Make Text Comprehensible</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II.A. Intentional Use of Graphic Organizers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II.B. Modify Written Text</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>III. Make Talk Comprehensible</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>III.A. Pace Teacher’s Speech</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>III.B. Use of Listening Guides</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>III.C. Use of Word Walls</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>III.D. Frame Main Ideas</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>III.E... Check for Understanding</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IV. Engage: Opportunities for Output</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IV.A. Use Teacher Questioning and Response Strategies</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IV.B. Practice Instructional Conversations</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>V. Engage at Appropriate Language Proficiency Levels</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>V.A. Use questions appropriate for language proficiency levels in conversations, activities, and assessments</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VI. Give Students Voice</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VI.A. Challenge students to produce extended talk</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VI.B. Model Language for Oral and Written Production</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VI.C. Use Group/Pr. Work to Elicit Student Talk; Students as Researchers</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Original Lessons
Introduction to Selected Unit
Suzanne Botta Sullivan

Title: The Respiratory System

Grade Level: 7th Grade

Target Group: Mainstream class with integrated ELL students

Source of Written Materials:
- Human Body Systems and Health; Holt, Rinehart and Winston, Holt Science and Technology
- Human Body Systems and Health, Teacher Resources; Holt, Rinehart and Winston, Holt Science and Technology
- Biology Coloring Workbook, Edward Alcamo, PhD, Princeton Review
- You and Your Body, Teacher’s Guide; Delta ScienceModules™

Lesson Plans: Attached

3-4 Learning Goals:
- I want my students to know how air moves through the respiratory system
- I want my students to be able to explain “gas exchange”
- I want my students to understand why we breathe / respire

Students Will Know (SWK)
Students Will Be Able To (SWBAT)
Students Will Explain (SWE)
Teacher Will (TW)
Introduction to Selected Unit
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➢ I want my students to be able to explain "gas exchange"
➢ I want my students to understand why we breathe / respire

OK, what will be the CD's for each lesson? We'll start working on the CD's for our 1st lesson.

You have good materials here! 😊
Performance Indicators

Day 1

Content Objectives:
- SWK: The parts that make up the respiratory system
- SWBAT: Trace path of gas through the respiratory system
- SWE: Why different colors are used to represent the "air"

Language Objectives:
- Write a description of the pathway gas takes through the respiratory system
- Verbally describe the path of airflow into and out of the respiratory system

<table>
<thead>
<tr>
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<th>Language Objective</th>
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<td>SWBAT: Trace path of gas through the respiratory system</td>
<td>Verbally describe the pathway gas takes through the respiratory system</td>
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<tr>
<td>Speaking</td>
<td>SW explain in approximately 7 sentences the path air takes from outside the body to the cells and back out again</td>
<td>SW use sentence starters to explain in 7 sentences a description of the path air takes from outside the body to the cells and back out again</td>
<td>SW use sentence starters and word bank to verbally explain in 3 sentences the path air takes from outside the body to the cells and back out again.</td>
<td>SW will use a diagram and number the location through which the air passes on its way into and out of the body. SW use a word bank to label and say the names of key anatomy in the respiratory system. SW answer yes/no questions about the process.</td>
<td>SW will use a diagram and number the location through which the air passes on its way into and out of the body. SW point and repeat locations.</td>
</tr>
</tbody>
</table>

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</thead>
<tbody>
<tr>
<td>Writing</td>
<td>SW write 7 sentences describing the path air takes from outside the body to the cells and back out again</td>
<td>SW use sentence starters to write 7 sentences describing the path air takes from outside the body to the cells and back out again.</td>
<td>SW use sentence starters and word bank to write 3 sentences describing the path air takes from outside the body to the cells and back out again.</td>
<td>SW will use a diagram and number the location through which the air passes on its way into and out of the body. SW use a word bank to label key anatomy in the respiratory system.</td>
<td>SW will use a diagram and number the location through which the air passes on its way into and out of the body.</td>
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</tbody>
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*Suzanne Botta Sullivan
Unit Introduction Title: The Respiratory System
Revised 3/13/2012*
## Functional Notional Chart

### Day 1

<table>
<thead>
<tr>
<th>Function</th>
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<th>Vocabulary</th>
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<tr>
<td>Describe</td>
<td>Respiration</td>
<td>Enters, Travels, moves, in, out, (sequencing words) first, second, next, before, after</td>
<td>Gas, air, CO₂, O₂, Breathe, Inhale, Exhale, Lungs, diaphragm, nose, trachea, larynx, alveoli, moisture</td>
<td>Verbs, nouns</td>
</tr>
</tbody>
</table>

Think of actual sentence frames/language models that help your ELL accomplish your COs & LOs.

Ex: When the air enters the lungs, when the heart —, the lungs —.
Respiratory System Lesson Plan

Guiding Question: How does the Body Move
Area of Interaction: Human Ingenuity
SWK: The parts of the respiratory system
SWBAT: Describe how air travels through the respiratory system
SWE: How the heart and lungs work together
Unit Vocabulary: heart, blood, plasma, red blood cells, white blood cells, platelets
arteries, veins, capillaries, lymph, trachea, bronchi, alveoli, oxygen, carbon dioxide, gas exchange

Day 1 ~

1. Warm Up: Students to create and fill in KWHL: Respiratory System

2. Science journal questions:
   - Breathing and respiration are the same thing (True or False)
   - The nose is the primary doorway into and out of the respiratory system (True or False) (txt p 40).

3. Activity: Students to place hands inside rib cage and breathe deeply – what do you feel? Turn and talk for one minute. Quick write, two minutes.

4. Direct instruction, students follow along and color biological coloring: Guide students through respiratory system and to gas exchange.


Day 2 ~ Build a model lung
You and Your Body, Teacher’s Guide, Delta ScienceModules ™, pp49-52
1. Warm Up: Students to use Review respiration and pathway air takes (use coloring from day 1) and students to complete concept map (#23)

Intro task – students are going to build a model lung using common materials.

Two-part task:
Part 1. Use model to demonstrate how air flows and answer questions
Part 2. Complete Activity Sheet 6, (label lung diagram, draw model and show which parts of the model represent the diaphragm, trachea, and lungs, use arrows to show air flow)

Building time: students to work in small groups, p 44

Closing: Discussion & journal entry: What did you like? What did you learn, what surprised you, what questions do you now have about how our lungs work?

Suzanne Botta Sullivan
Unit Introduction Title: The Respiratory System
Day 3 ~ Carbon Dioxide Breath

Content Objectives:
- SWK: What Independent, Dependent, and Control Variables are
- SWBAT: Record data
- SWE: How exercise affects CO₂ levels

Language Objectives:
- Restate oral directions before beginning
- Express verbally and in writing what you learned, liked, and surprised you.
- Express verbally and in writing what the model reminds you of

1. Warm Up:
   a. Describe the path that air travels as it moves through the respiratory system.
   b. What is the difference between respiration and cellular respiration?

2. Students to set up Carbon Dioxide Breath lab (Human Body Systems and Health, p.45)

3. Student to work in groups of 3 and chart data on smart board

Closing: discuss relationship between color change & change in person’s characteristics
- graph

Suzanne Botta Sullivan
Unit Introduction Title: The Respiratory System
## Performance Indicators
Day 1

### Content Objectives:
- SWK: The parts that make up the respiratory system
- SWBAT: Trace path of gas through the respiratory system
- SWE: Why different colors are used to represent the "air"

### Language Objectives:
1. Write a description of the pathway gas takes through the respiratory system
2. Verbally describe airflow into and out of the respiratory system

### Content Objectives

<table>
<thead>
<tr>
<th>Domain (speaking, listening, reading, writing)</th>
<th>Level 5 Advanced Fluency ~ Mainstream standard</th>
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<tbody>
<tr>
<td>Speaking</td>
<td>SW explain in approximately 7 sentences the path air takes from outside the body to the cells and back out again</td>
<td>SW use sentence starters to explain in 7 sentences the path air takes from outside the body to the cells and back out again</td>
<td>SW use sentence starters and word bank to verbally explain in 3 sentences the path air takes from outside the body and back out again.</td>
<td>SW will use a diagram and number the location through which the air passes on its way into and out of the body. SW use a word bank to label and say the names of key anatomy in the respiratory system</td>
<td>SW will use a diagram and number the location through which the air passes on its way into and out of the body</td>
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## Suzanne Botta Sullivan
*Unit Introduction Title: The Respiratory System*
Revised 3/6/2012
Respiratory System Lesson Plan

* 7th grade

Unit Question: How does the body move?
Area of Interaction: Human Ingenuity
Unit Content Objectives
SWK: The parts of the respiratory system
SWBAT: Describe how air travels through the respiratory system
SWE: How the heart and lungs work together
Vocabulary: heart, blood, red blood cells, arteries, veins, capillaries, trachea, larynx, bronchi, alveoli, oxygen, carbon dioxide, gas exchange, element, breathe, respire, inhale, exhal, gas

Day 1 ~ Exploring the Respiratory System

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<td>SWK: The parts that make up the respiratory system</td>
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<table>
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<td>Write a description of the pathway gas takes through the respiratory system</td>
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<tr>
<td>Verbally describe the path of airflow into and out of the respiratory system</td>
</tr>
</tbody>
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1. Schema Activator: Students to create and fill in KWHL: Respiratory (*Respirar) System
   *Modification - TW: Provide a KWHL chart

2. Students will copy and answer the following questions in their Science journal section:
   - Breathing and respiration are the same thing (True or False)
   - The nose is the primary doorway into and out of the respiratory system (True or False)
   (txt p 40).

3. Activity: Students to place hands inside rib cage and breathe deeply – what do you feel? Turn and talk for one minute. Quick write, two minutes.
   * Provide sentence frames:
     When I breathe in my chest
     When I breathe in my stomach
     When I breathe out my chest
     When I breathe out my stomach
     (* include picture because of homophone)

4. Direct instruction, students follow along and color biological coloring Guide students through respiratory system and to gas exchange
   *how will you do this?


*Modifications
   *Additional modifications:
     *Post picture / word bank
     *Post color key: Red = Oxygen rich / Blue = Oxygen poor

Suzanne Botta Sullivan
Unit Introduction Title: The Respiratory System
Revised 3/13/2012
## Day 2 ~ Build a model lung

**Content Objectives:**
- **SWBAT:** Describe the muscle used to control airflow into and out of the body
- **SWBAT:** Trace path of gas through the respiratory system
- **SWE:** What happens when you inhale and exhale (how $O_2$ is delivered to the lungs)

**Language Objectives:**
- **Draw airflow in diagram.**
- **Express verbally and in writing what you learned, liked, and surprised you.**
- **Express verbally and in writing what the model reminds you of.**

<table>
<thead>
<tr>
<th>Content Objectives</th>
<th>Language Objective</th>
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<tbody>
<tr>
<td><strong>SWBAT:</strong> Describe the muscle used to control airflow</td>
<td>Verbally name the diaphragm and describe how it functions to move air into and out of the respiratory system</td>
</tr>
<tr>
<td><strong>Domain</strong> (speaking, listening, reading, writing)</td>
<td><strong>Level 5</strong> (Advanced Fluency) ~ Mainstream standard</td>
</tr>
<tr>
<td><strong>Speaking</strong></td>
<td><strong>SW</strong> explain in approximately 7 sentences how the diaphragm moves air into and out of the body</td>
</tr>
</tbody>
</table>

**SWE:** What happens when you inhale and exhale (how $O_2$ is delivered to the lungs)

| **Speaking** | **SW** explain in approximately 7 sentences the path air takes from outside the body to the cells and back out again | **SW** use sentence starters to explain in 7 sentences a description of the path air takes from outside the body to the cells and back out again. | **SW** use sentence starters and word bank to verbally explain in 3 sentences the path air takes from outside the body and back out again | **SW** will use a diagram and label and say the names of key anatomy in the respiratory system. **SW** answer yes/no questions about the process. | **SW** will use a diagram and number the location through which the air passes on its way into and out of the body. **SW** point and repeat locations. |

**SWBAT:** Express verbally and in writing what you learned, liked, and surprised you what the model reminds you of

| **Speaking &** | **SW** explain in approximately 7 sentences what you learned, liked, and surprised you what the model reminds you of | **SW** use sentence starters to explain in 7 sentences what you learned, liked, and surprised you what the model reminds you of | **SW** use sentence starters and word bank to verbally explain in 3 sentences what you learned, liked, and surprised you what the model reminds you of | **SW** will use the model and a diagram to demonstrate what you learned, liked, and surprised you what the model reminds you of. | **SW** will use a diagram and repeat locations. |

_Suzanne Botta Sullivan_
_Unit Introduction Title: The Respiratory System_
_Revised 4/10/2012_
<table>
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<tr>
<th>Writing</th>
<th>approximately 7 sentences how the model effected you and what it reminds you of</th>
<th>starters to explain in 7 sentences a description how the model effected you and what it reminds you of</th>
<th>starters and word bank to verbally explain in 3 sentences how the model effected you and what it reminds you of</th>
<th>model and a diagram to demonstrate knowledge of location and how the diagram works</th>
<th>model and a diagram to demonstrate knowledge of location and how the diagram works</th>
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Suzanne Botta Sullivan  
*Unit Introduction Title: The Respiratory System*  
*Revised 4/10/2012*
# Functional Notional Chart

## Day 1

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<tr>
<td>Describe</td>
<td>Respiration</td>
<td>Enters, Travels, moves in, out, (sequencing words) first, second, next, before, after</td>
<td>Gas, air, CO₂, O₂, Breathe, Inhale, Exhale, Lungs, diaphragm, nose, trachea, larynx, alveoli, moisture</td>
<td>Verbs, nouns</td>
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</table>

## Day 2

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<td>Verbs, nouns</td>
</tr>
<tr>
<td>Describe</td>
<td>Respiration</td>
<td>I learned, I wonder, I am surprised by, it reminds me of, When I breathe in my diaphragm, when I breathe out my diaphragm</td>
<td>Gas, air, CO₂, O₂, Breathe, Inhale, Exhale, Lungs, diaphragm, nose, trachea, larynx, alveoli, moisture</td>
<td>Verbs, nouns</td>
</tr>
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*Suzanne Botta Sullivan  
Unit Introduction Title: The Respiratory System  
Revised 4/10/2012*
Day 2 ~ Build a model lung, grade 7

Content Objectives:
- SWBAT: Describe the muscle used to control airflow into and out of the body
- SWBAT: Trace path of gas through the respiratory system
- SWE: What happens when you inhale and exhale (how O₂ is delivered to the lungs)

Language Objectives:
- Draw airflow in diagram
- Express verbally and in writing what you learned, liked, and surprised you.
- Express verbally and in writing what the model reminds you of.

You and Your Body, Teacher’s Guide: Delta Science Modules™, pp49-52

1. Schema Activator: Students to use Review respiration and pathway air takes (use coloring from day 1) and students to complete concept map (#23)

Teacher to introduce task – students are going to build a model lung using common materials.
Teacher will demonstrate using building materials and add labeled items to the board.
* 2 - balloons  * clear tube  * rubber band  * clear plastic pipe with lid
items will be taped to the board, and labeled so as direct instruction is underway teacher can refer to items to be used.

Two-part task:
Part 1. TW: Use model to demonstrate how air flows and answer questions
Part 2. SW: Work in small groups to build the model and complete Activity Sheet 6, (label lung diagram, draw model and show which parts of the model represent the diaphragm, trachea, and lungs, use arrows to show air flow) anatomical part names posted on board

Building time: students to work in small groups, p 44

Every Student Gets a Chance (SIOP p 60) – Once the students have their activity sheet completed they can use a large model of the respiratory system and their notes to describe the pathway air takes into and out of the respiratory system and the effect of the diaphragm muscle. Each student will have the opportunity to repeat the process.

Posted frames will include:
First air enters, next it, after that, when it gets to the lungs it, finally the air. Teacher will ask students upon their completion, questions based on language ability and their description, e.g. yes/no questions, identity a part, for elaboration on a part of the process.

Closing: Discussion & journal entry:
What did you like? *I liked how  *I liked when
What did you learn? *I learned that
What surprised you? *I was surprised when  *It was surprising that
What questions do you now have about how our lungs work?
*Following this activity I now wonder

with italics following equals sentence starters/frames

Suzanne Botta Sullivan
Unit Introduction Title: The Respiratory System
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<th>Content Objectives</th>
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<td>SWE: How exercise affects CO₂ levels</td>
<td>Express verbally conclusions can be made based on the data gathered</td>
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<td>Speaking</td>
<td>SW explain in approximately 7 sentences if the data supports a conclusion that characteristics affect CO₂ exhaled. Answer will contain references to the data gathered</td>
<td>SW use sentence starters to explain in 7 sentences if the data supports a conclusion that characteristics affect CO₂ exhaled. Answer will contain references to the data gathered</td>
<td>SW use sentence starters and word bank to verbally explain in 3 sentences if a conclusion can be made that characteristics affect CO₂ exhaled.</td>
<td>SW will answer yes or no to the question: do characteristics affect the amount of CO₂ exhaled. Student will point to the data points on the graph that supports his/her answer.</td>
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<td>Express in writing conclusions can be made based on the data gathered</td>
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<tr>
<td>Speaking</td>
<td>Student will clearly enumerate the three steps in the procedure with details and safety concerns. Student will correctly name the tools in use.</td>
<td>Student will clearly enumerate the three steps in the procedure with details and safety concerns.</td>
<td>Student will use sentence starters to describe the three steps in the procedure and highlight safety concerns.</td>
<td>Student will mime process and use words, &quot;first&quot;, &quot;next&quot;, &quot;last&quot; to show knowledge of process.</td>
<td>Student will mime process and use words, &quot;first&quot;, &quot;next&quot;, &quot;last&quot; (words will be on vocab cards).</td>
</tr>
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**Functional Notional Chart**

<table>
<thead>
<tr>
<th>Day 3</th>
<th>Function</th>
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<td>Verbs, nouns</td>
<td></td>
</tr>
<tr>
<td>Describe</td>
<td>Science Lab</td>
<td>Blow through straw, Time how long, shows something is present, draw a conclusion, make a prediction / hypothesis[AML14]</td>
<td>First, next, before, last, materials, procedure, place, characteristic, chemical change, Indicator, Phenol Red, Erlenmeyer Flask, Graduated Cylinder, Pipette, medicine cup, stopwatch</td>
<td>Verbs, nouns</td>
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Day 3 ~ Carbon Dioxide Breath
Grade 7, Life Science

Content Objectives:
> SWK: What Independent, Dependent, and Control Variables are
> SWBAT: Record data
> SWE: How exercise affects CO₂ levels

Language Objectives:
> Restate oral directions before beginning
> Express verbally and in writing conclusions can be made based on the data gathered

Materials:

<table>
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<tr>
<th></th>
<th>150 mL Erlenmeyer Flask</th>
<th>150 mL graduated cylinder</th>
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</thead>
<tbody>
<tr>
<td>Water</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plastic Drinking Straw</td>
<td>Phenol Red Indicator Solution</td>
<td>Paper Towels</td>
</tr>
<tr>
<td>Pipette</td>
<td>Stopwatches</td>
<td>Goggles</td>
</tr>
<tr>
<td>Tray</td>
<td>(Vocab) Word Tags</td>
<td>Vocab Image Tags</td>
</tr>
<tr>
<td>Carbon Dioxide Breath – Data Sheet</td>
<td>Respiratory System Worksheet, p. 263</td>
<td></td>
</tr>
</tbody>
</table>

1. Warm Up

   a. Describe the path that air travels as it moves through the respiratory system. (reinforcement from Day 1 & Day 2 – students will have 1 of 3 choices to “show what they know”. Worksheet p 263, The Respiratory System
      i. Write a narrative description of the process.
      ii. Create a numbered list, e.g. 1. air enters nose, etc.
      iii. Draw the pathway on an image of human torso, add body part names and number the order.

2. TW Introduce “Carbon Dioxide Breath Lab”

   Students will follow along as teacher reads the 2 paragraph introduction, Carbon Dioxide Breath Data Sheet. (Data sheet is posted on the board and is overhead on the smart board) TW will ask students, what are you exploring today? Teacher will direct students to underline what they are exploring. TW write give wait time and then underline “explore” in the paragraph in the datasheet. Following wait time TW underline the remaining part of the phrase, “you will explore your own carbon dioxide exhalation” TW direct students to pair off as teacher and student, the ‘teacher’ reads his/her answer and checks that the ‘student’ has the same thing underlined. The two then switch roles.

3. TW release students to move into their lab groups and take out their lab notebooks. Students in the group self-select their lab role. Role sheet attached, teaching lab procedure, roles, set-up, break-down, took place over several weeks of gradual release in the first eight weeks of school.
4. TW model procedure – but use orange food coloring in place of phenol red so that the chemical reaction does not take place. Modeling will include, gesturing, showing and naming the implements to be used during the lab.

5. SW gather appropriate materials based off teacher model and written Carbon Dioxide Breath lab data sheet.

6. TW ask students to look at the graph and introduction paragraphs. TW ask students to think, “what scientific problem are we investigating?” SW write in their lab note books. Sentence frame provided on the board: “We are investigating how do ______________ affect the ______________.” TW ask students for responses and fill in correct response. TW ask students to predict, make their own hypothesis the answers the problem we are investigating. Sentence frame: I think ______________ affect ______________. I think this because ______________.

7. TW will ask procedural questions (yes/no, first /second, etc.)

8. Students to work on Carbon Dioxide Breath lab (Human Body Systems and Health, p 45).

9. TW direct class, as they gather data in their group they are also to plot the data on a class graph on the smart board.

10. SW clean up and reset materials

11. Closing: TW ask for verbal responses: What conclusions can be drawn from the data gathered? Do characteristics affect the time it takes for the indicator to change color – the Carbon Dioxide exhaled? Chart responses SIOP “Every Student Gets a Chance”, p 60 – every student that wants to answer will have the opportunity. Also provide: Yes/No, Agree / Disagree cards. TW will ask students to elaborate and connect to the data. Students will be encouraged to come to the smart board and point the data that supports their conclusion.
Carbon Dioxide Breath

Plants take in carbon dioxide and give off oxygen as a byproduct of photosynthesis. Animals, including you, use this oxygen and release carbon dioxide as a byproduct of respiration.

In this activity, you will explore your own carbon dioxide exhalation. Phenol red turns yellow in the presence of carbon dioxide. You will use it to detect carbon dioxide in your breath.

**Materials**
- 150 mL graduated cylinder
- 100 mL of water
- 150 mL Erlenmeyer flask
- eyedropper
- phenol red indicator solution
- plastic drinking straw
- paper towel
- clock with a second hand or a stopwatch
- protective gloves

**Procedure**
1. Place 100 mL of water into a 150 mL flask. Using an eyedropper, carefully place four drops of phenol red indicator solution into the water. The water should turn orange.
2. Place a plastic drinking straw into the solution of phenol red and water. Drape a paper towel over the beaker to prevent splashing. Carefully blow through the straw into the solution. **Caution:** Do not inhale through the straw. Do not drink the solution, and do not share a straw with anyone.
3. Have your partner time how long it takes for the solution to change color. Begin timing when you start blowing. Record the time in your Science-Log. What color does the solution become?

**Analysis**
4. Compare your data with those of your classmates. What was the longest length of time it took to see a color change? the shortest? How do you account for the difference?
5. Is there a relationship between the time it takes to change the solution from orange to yellow and the person's physical characteristics, such as gender or whether the tester has an athletic build?

**Going Further**
Do jumping jacks or sit-ups for three minutes, and then repeat the experiment. Did the timing change? Describe and explain any change.

**Answers**
4. Answers will depend on students' observations. It is typical for the solution to change color faster when the student is breathing fast after exercise.
5. In general, an athlete at rest will take the longest time to generate a color change in the indicator solution. There should be little difference observed between genders. There are exceptions, and all answers will depend on students' observations.

**Teacher's Notes**

**Time Required**
One 45-minute class period

**Lab Ratings**

**Safety Caution**
Remind students to review all safety cautions and icons before beginning this lab activity.

**Lab Notes**
Tell students that carbon dioxide is in the air of the classroom. They may need to cover their indicator solution to delay the reaction with the air. Tell them not to leave the indicator solution sitting exposed for several minutes before it is used.
**Carbon Dioxide Breath**

Plants take in carbon dioxide and give off oxygen as a byproduct of photosynthesis. Animals, including you, use this oxygen and release carbon dioxide as a byproduct of respiration.

In this activity, you will explore your own carbon dioxide exhalation. Phenol red turns yellow in the presence of carbon dioxide. You will use it to detect the presence of carbon dioxide in your breath.

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<tr>
<td>- 150 mL graduated cylinder</td>
</tr>
<tr>
<td>- plastic drinking straw</td>
</tr>
<tr>
<td>- phenol red indicator solution</td>
</tr>
<tr>
<td>- 100 mL of water</td>
</tr>
<tr>
<td>- paper towel</td>
</tr>
<tr>
<td>- eyedropper</td>
</tr>
<tr>
<td>- clock with a second hand or a stopwatch</td>
</tr>
<tr>
<td>- protective gloves</td>
</tr>
</tbody>
</table>

**Procedure**

1. Place 100 mL of water into a 150 mL flask. Using an eyedropper, carefully place 4 drops of phenol red indicator solution into the water. The water should turn orange.

2. Place a plastic drinking straw into the solution of phenol red and water. Drape a paper towel over the beaker to prevent splashing. Carefully blow through the straw into the solution. **Caution:** Do not inhale through the straw. Do not drink the solution and do not share a straw with anyone.

3. Have your lab partner time how long it takes for the solution to change color. Begin timing when you start blowing. Record this time below. What color does the solution become?

**Analysis**

4. Compare your data with those of your classmates. What was the longest length of time it took to see a color change? The shortest? How do you account for the difference?
Carbon Dioxide Breath, continued

5. Is there a relationship between the length of time it takes to change the solution from orange to yellow and the person’s physical characteristics, such as gender or whether the tester has an athletic build?

Going Further

Do jumping jacks or sit-ups for 3 minutes, and then repeat the experiment. Did the timing change? Describe and explain any change.
## The Respiratory System

Comparison Pre to Post 518: Content-based Instruction

Suzanne Botta Sullivan

May 1, 2012

<table>
<thead>
<tr>
<th>Lesson</th>
<th>Pre</th>
<th>Post</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>- No word bank</td>
<td>- Word bank</td>
</tr>
<tr>
<td></td>
<td>- Direct instruction</td>
<td>- Teacher Gesturing</td>
</tr>
<tr>
<td></td>
<td>- Impromptu questioning</td>
<td>- Use of realia, comprehensive input</td>
</tr>
<tr>
<td></td>
<td>- No sentence starters nor frames</td>
<td>- Planned questioning</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Sentence starters and sentence frames</td>
</tr>
<tr>
<td>2</td>
<td>- Lack of background knowledge</td>
<td>- Building background knowledge with video clip</td>
</tr>
<tr>
<td></td>
<td>- No manipulatives on board for reference.</td>
<td>- Adding manipulatives and their labels to the board</td>
</tr>
<tr>
<td></td>
<td>- No labels for manipulatives</td>
<td>- Student voice – opportunity for output</td>
</tr>
<tr>
<td></td>
<td>- No sentence starters nor sentence frames</td>
<td>- Sentence starters and sentence frames</td>
</tr>
<tr>
<td>3</td>
<td>- No guided reading</td>
<td>- Guided reading</td>
</tr>
<tr>
<td></td>
<td>- No student talk</td>
<td>- Student talk – student as teacher</td>
</tr>
<tr>
<td></td>
<td>- No planned modeling and gesturing</td>
<td>- Modeling, gesturing, realia</td>
</tr>
<tr>
<td></td>
<td>- Regular worksheet</td>
<td>- Modified worksheet</td>
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<tr>
<td></td>
<td>- No sentence starters nor sentence frames</td>
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