

Cough, cough, wheeze, wheeze

Developed by
Barbara Hobart
New York State Biology-Chemistry Professional Development Network

For the
My Environment, My Health, My Choices project



University of Rochester
Rochester, NY

Abstract:

Abstract: Students use Problem Based Learning (PBL) to develop their understanding of allergies, asthma, and the role of molds as a trigger. They research the relationship of the respiratory and immune systems to allergies and asthma. Cooperative group and individual activities and assessment options are included. Students use Internet resources to answer specific questions (on line or hard copies provided by the teacher) and then share the researched information.

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Teachers, we would appreciate your feedback. Please complete our brief, online Environmental Health Science Activity Evaluation Survey after you implement these lessons in your classroom.

The survey is available online at: www.surveymonkey.com/s.asp?u=502132677711

Name _____ Class _____

1. Asthma is a human disease that is
 1. caused by the accumulation of glucose in the large intestine
 2. an inflammation of the airways in the lungs
 3. the number one cause of death in the USA
 4. untreatable resulting in immediate death

2. Pollen, household dust and cigarette smoke are
 1. allergens
 2. antibiotics
 3. antibodies
 4. alleles

3. Most modern scientists classify a mold as
 1. an animal
 2. a fungus
 3. a plant
 4. a protist

4. Molds reproduce through the production of
 1. eggs
 2. spores
 3. sperm
 4. cones

5. The environmental requirements for the growth of mold are
 1. water, carbon dioxide and nitrogen
 2. carbon dioxide, glucose and water
 3. warmth, food and water
 4. nitrogen, oxygen and vitamin D

6. Which part of the respiratory system is most affected by asthma?
 1. bronchial tubes
 2. trachea
 3. diaphragm
 4. nasal passageways

7. Molds can be detected in the environment by
 1. pH indicators such as litmus paper
 2. using a telescope to look into the walls of houses
 3. microscopic examination of air samples
 4. Geiger counters that detect radiation given off from the leaves

8. A molecule that the immune system recognizes as a foreign substance is called
 1. an antibody
 2. a virus
 3. an antigen
 4. a hormone

9. The components of the immune system that produce antibodies are called
 1. white blood cells
 2. red blood cells
 3. platelets
 4. phagocytes

10. Which change in an individual's home environment is most likely to reduce exposures to molds that trigger asthma attacks?
 1. using carbon monoxide detectors
 2. opening windows to increase air circulation
 3. repairing leaks to reduce moist areas
 4. installing carpet to trap spores

Pre and Post Test Questions Answer Key

1. Asthma is a human disease that is
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 1. using carbon monoxide detectors
 2. opening windows to increase air circulation
 3. repairing leaks to reduce moist areas
 4. installing carpet to trap spores

Learning Context

Subject Area: Biology

Overall Purpose: Use Problem Based Learning (PBL) to develop student understanding of allergies, asthma, and the role of molds as a trigger.

Learning Objectives: By the end of this activity, students will be able to:

- Describe asthma and identify the causes, symptoms and treatments for this disease and name the systems (and parts) affected by asthma.
- Describe an allergic reaction and identify the possible causes, symptoms and treatments for allergies. Explain actions individuals or families could take to reduce their risk of allergic reactions.
- Using taxonomy, place a mold in the appropriate classification category and discuss its reproductive strategy, list its environmental needs, and effects on humans.
- Explain how mold might threaten homeostasis for some individuals. Describe methods by which the presence of mold can be determined in an area.
- Name and diagram the parts of the respiratory system. Name the organs in this system, describe the functions of these parts and describe some common diseases affecting these organs.
- Name the parts of the immune system and describe how these parts interact in a person. Describe some diseases that result from an immune system that is not properly functioning.
- Determine what changes in the environment might improve the condition of a person with allergies and/or asthma.

Prerequisite knowledge and skills: Ability to work in groups using PBL strategies.

Procedure

Classroom Timeline:

- One class period (45 min.) to take the pre-test provided, read Part 1 and Part 2 of the PBL including completion of the PBL chart.
- One class period (45 min.) to read the articles and record individual information to answer one set of questions. This could be given as a homework assignment.
- One class period (45 min.) to work in a cooperative group to share the information gathered from the articles and to complete their personal record of this information.
- Take the post test provided (5 min).

Equipment and Supplies:

- Each group (3 or 4 students) needs
 - 2 sheets of large chart paper
 - markers for writing on the chart paper
 - 1 set of articles (these articles are listed under references – print from the websites only those pages directly needed to answer the questions).
- Each student needs a copy of:
 - Pre-Test
 - *Cough, cough, wheeze, wheeze* - Part A
 - *Cough, cough, wheeze, wheeze* - Part B
 - *Cough, cough, wheeze, wheeze* - PBL Chart
 - *Cough, cough, wheeze, wheeze* - Student Research Questions
 - Post-test
- A glossary sheet is provided. You could provide these pages as part of your group articles or provide a copy to each student at the beginning of the activity.
- A rubric for PBL and teamwork is provided. If you use these, provide a copy to each student at the beginning of the activity.

Instructions for Implementing the Activity:

1. Administer the pre-test questions and collect the papers. (5 min.)
2. Place the students in groups of 3 or 4. Distribute markers and large chart paper (2 sheets) to each group.
3. Teacher distributes a copy of the Part A narration and PBL record sheet to each student.
4. Teacher selects one student in the class for each of the following roles – Mrs. Lang, narrator, Dr. Brown
5. Students with assigned roles read their parts aloud while the rest of the students follow along on their sheets. (5 min.)
6. Students work individually to complete 3 columns on the student PBL chart. (4 min.)
7. Students work in their groups to place answers on the large group chart, using the markers. (10 min)
8. Each group reports out by listing one item from each column – only adding new items that have not been reported out by previous groups. (5 min)
9. Teacher distributes the narration sheets for Part B and students follow steps 3-7 above. (10 min)
10. Teacher distributes the question sheet and articles for Part B to each student. The group assigns questions to each group member along with the appropriate articles. (2 min)
11. Students read the articles and record answers to the questions based on their articles using the question sheet provided. (20 min)
12. Groups share the answers to the questions they have researched. Each student records the information to complete each question on their personal record sheets so that they can use these sheets for the assessment questions. (10 min)
13. Individual students reflect and answer the application questions provided for homework or continue to work as a group to complete one of the group questions.
14. Administer the post-test.

Cough, cough, wheeze, wheeze – Part A

Narrator: Mrs. Francine Lang has brought her children, Joseph aged 8 and Michelle aged 6, to the doctor's office.

Dr. Brown: I see that the office staff has made an update on your charts, indicating that you have a new address. The last time the children were in to see us was about a year ago and everything was fine then. What has brought you in to the office today?

Mrs. Lang: Both of the children have breathing problems. It seems that during the last two months, they are coughing, sneezing, and very tired a couple of days each week. Joey begins to make a wheezing sound and has trouble getting his breath. It gets better and then it gets worse again. It never goes away completely. I have tried using cough medicine and antihistamines but it just won't go away.

Dr. Brown: They seem to be fine today but let me give them a quick exam and then we will talk more.

Narrator: The doctor examines each child by checking blood pressure, respiration, temperature, and looks into ears and nostrils.

Dr. Brown: I don't see anything alarming with either Joey or Michelle today. There is some inflammation in the nasal passages and a slight redness in their throats. When was the last time that they showed the coughing and breathing difficulties?

Mrs. Lang: They were really bad on Sunday and Monday. I was able to send them to school on Tuesday and Wednesday. I would have sent them to school today but thought it was more important to have you take a look at them. They have missed several days of school lately and I do not want them to end the year on a bad note. We were able to move into the house in February and that meant changing schools. We are very happy with this school and the new neighborhood.

Dr. Brown: Are you or any other family members showing similar symptoms?

Mrs. Lang: I have had more colds than usual this year but I have attributed that to the stress of moving. I have not experienced difficulty breathing like Joe and Michelle. My husband hasn't shown any symptoms.

Dr. Brown: I need to have more information before I can make a diagnosis. I would like you to keep a record of what is happening to your family for the next 14 days. You need to record where you spend your time, what foods you are eating and check for any items that you are coming into contact with that are new – soaps, household cleaners, foods, etc.

Narrator: Using the chart paper provided by your teacher, each team should now record what facts they know based on this reading, include additional information you would like to know and possible causes for the symptoms shown by the family

Cough, cough, wheeze, wheeze Part B

Narrator: The Lang family has returned to see Dr. Brown. It has been 3 weeks since their last visit.

Mrs. Lang: I know you wanted to see us in two weeks but this was the first appointment I could schedule when all three of us could be here. I brought along the record I kept for the last three weeks. I am using the same household products that I have always used including shampoos and hand soaps. I did notice the kids developed breathing problems on Saturday evening and seemed to be the worst on Sunday. Maybe I am just more aware of how they look and sound on the days that I spend the most time with them. One of the nice things about this new house is the fact that they can play in the basement recreation room while I am doing laundry on Saturday. With the rain we have been having this spring it has been nice to have an indoor play area. I have recorded all the foods that we have eaten but again there are no foods that I haven't been using for years.

Several of my friends have mentioned the possibility of having allergy tests done. Is that something you could do?

Dr. Brown: I could refer you to an allergist for testing but I'm beginning to think there might be another area we need to investigate. From what you have said and from the symptoms I can see in your family, I think we should examine your home for the presence of mold. It is a very common allergen and grows in moist conditions. And it has been a very rainy spring. Did you have a home inspection before buying this new house?

Mrs. Lang: No we did not need an inspection to get a loan since we borrowed the money from my father. We got a really great deal on the house because it had been empty for months and the previous owners were anxious to sell.

Dr. Brown: I suggest that you keep the children out of the basement for the next few weeks and make arrangements for having your home inspected. There are several options for mold testing.

Narrator: Review the PBL chart done previously. What questions have been answered? Which possibilities have been eliminated? What new ideas could be added?

Name _____

Cough, cough, wheeze, wheeze - PBL Chart

What facts do you know from the reading?	What questions do you have? What additional information do you need?	What do you think is causing the family's problem?

Sample Answers

Cough, cough, wheeze, wheeze – PBL Chart

What facts do you know from the reading?	What questions do you have? What additional information do you need?	What do you think is causing the problem?
<p>Joey and Michelle are sick.</p> <p>The family has a new address in a new neighborhood.</p> <p>The children are having breathing problems.</p> <p>Joey has trouble getting his breath.</p> <p>The doctor has done a physical examination.</p> <p>They have missed several days of school this year.</p> <p>Mom has had more colds than usual.</p> <p>Husband has not shown any symptoms.</p>	<p>Where is the house?</p> <p>What have they been doing in or outside of the house?</p> <p>Are they eating different foods?</p> <p>Have the kids been playing with other kids who are sick?</p> <p>Is there contaminated soil around the house?</p>	<p>They do not like going to school so they are playing sick.</p> <p>They keep catching germs from the other kids at school.</p> <p>Mom is being too easy on the kids.</p> <p>They moved to a house in Love Canal.</p> <p>They have been eating some food that is making them sick.</p>

Cough, cough, wheeze, wheeze – Student Research Questions

Questions to be answered using the articles supplied or other sources.

Each group should determine who will be the primary researcher for each section and be prepared to share the information with the other group members. The group decides how to divide up the questions. If there are 4 members, they might each work on one question area and share the responsibility for researching the 5th question area.

1. Asthma
 - a. Define the term asthma.
 - b. List the triggers of asthma.
 - c. Describe the symptoms of asthma.
 - d. Describe at least 2 methods for treating asthma.
 - e. During an asthma attack, what is happening in the person's
 - i. Respiratory system
 - ii. Immune system
2. Allergic reaction
 - a. Define the terms allergic reaction and allergen.
 - b. Describe the causes of allergic reactions.
 - c. Describe the symptoms of allergic reactions.
 - d. Describe at least 2 methods for treating allergies.
3. Mold
 - a. What Kingdom would most scientists use to classify these organisms?
 - b. How do molds reproduce?
 - c. What do molds need from the environment?
 - d. How do molds affect people – give both positive and negative ways?
 - e. How do you know if undesirable molds are present in an area?
4. Respiratory System
 - a. List the organs in this system and discuss what each part does.
 - b. List at least 5 diseases that affect the organs in this system and describe the symptoms.
 - c. Diagram at least 3 structures within the system – showing structural relationships (position).

5. Immune System

- a. Discuss the function of this system and show how this system maintains homeostasis.
- b. List and describe at least two diseases that affect the parts of this system.
- c. Describe the interaction of antigens, WBC and antibodies.

Cough, cough, wheeze, wheeze – Answers to student questions.

1. Asthma

- a. Define the term asthma: Asthma is a disease of the airways or branches of the lung (bronchial tubes) that carry air in and out of the lungs. Asthma causes the airways to narrow, the lining of the airways to swell and the cells that line the airways to produce more mucus. These changes make breathing difficult and cause a feeling of not getting enough air into the lungs.
- b. List some triggers of asthma: Upper respiratory infections, inhaled allergens, medications, food and food additives, exercise, irritants (tobacco smoke, perfume odors, cleaning agents, air pollution), weather, strong emotions
- c. Describe the symptoms of asthma: Common symptoms include cough, shortness of breath, wheezing, chest tightness and excess mucus production.
- d. Describe at least 2 methods for treating asthma: Asthma medications given by inhalation, control the asthma triggers (avoid the things that start the asthma attack).
- e. During an asthma attack, what is happening in the person's:
 - i. Respiratory system – When a trigger or precipitating factor irritates your airways, causing the release of chemical mediators such as histamine and leukotrienes from the mast cells of the epithelium (the lining of the airway), the muscles around your bronchial tubes can tighten, leading to airway constriction. This process results in narrowing airways and breathing difficulty. The underlying airway inflammation in asthma can cause airway hyper-responsiveness as the muscles around your bronchial tubes twitch or feel ticklish. This twitchy or ticklish feeling indicates that your muscles overreact and tighten, causing acute bronchoconstriction or bronchospasms even if you're exposed only to otherwise harmless substances, such as allergens and irritants that rarely provoke reactions in people without asthma and allergies.
 - ii. Immune system A trigger or precipitating factor irritates your airways, causing the release of chemical mediators such as histamine and leukotrienes from the mast cells of the epithelium.

2. Allergic reaction

- a. Define the terms allergic reaction (allergy) and allergen: Allergy - an exaggerated response to a substance or condition produced by the release of histamine or histamine-like substances in affected cells. Allergen - a substance (such as a food or pollen) that your body perceives as dangerous and can cause an allergic reaction.
- b. Describe the causes of allergic reactions. Exposure to allergens – which may include everything from pollen, mold, pet dander, dust mites, certain foods, drugs and chemicals
- c. Describe the symptoms of allergic reactions: Coughing, itching

- d. Describe at least 2 methods for treating allergies: Medications (examples are: corticosteroids, antihistamines, decongestants, leukotriene modifiers, mast cell stabilizers). Immunotherapy (allergy shots containing allergen extracts)

3. Mold

- a. What Kingdom would most scientists use to classify these organisms? Fungi
- b. How do they reproduce? Spores or asexually
- c. What do molds need from the environment? Moisture, warmth, oxygen and food
- d. How do molds affect people – give both positive and negative ways? Positive: produce penicillin (an antibiotic), produce cheese, produce industrial alcohols, decompose dead organic material and return the components to the environment for reuse, used in tanning of leather, textile dyeing, produce of solvents. Negative: grows on food and spoils it, grows on books and walls damaging them, cause diseases in plants, fish, amphibians
- e. How do you know if undesirable molds are present in an area? You can see them on surfaces, dogs can detect them by their smell, people can smell the musty odor, and you can do a mold test by collecting spores from the air and look at the sample under a microscope.

4. Respiratory System

- a. List the organs in this system and discuss what each part does.
- Lungs – oxygen is taken into the body and carbon dioxide is removed
 - Trachea – windpipe, filters the air and carries the air to the bronchi
 - Bronchi – air tubes that carry the air into the lungs
 - Bronchial tubes—branching air tubes within the lungs
 - Bronchioles—microscopic air tubes that carry air to the alveoli
 - Diaphragm – muscle under the lungs that causes air to be moved in and out of the lungs
 - Alveoli – air sacs in the lungs where gas exchange occurs
- b. List at least 5 diseases that affect the organs in this system: Asthma, bronchitis, cystic fibrosis, pneumonia, emphysema
- c. Diagram at least 3 structures within the system – showing structural relationships (position).

5. Immune System

- a. Discuss the function of this system and show how this system maintains homeostasis:
The immune system includes all the mechanisms through which a multicellular organism defends itself from internal invaders such as bacteria, viruses or parasites. The innate or non-specific immune system, consists of physical and chemical barriers such as skin, gastric acid, mucus or tears as well as cells and active mechanisms such as phagocytes, natural

killer cells and the complement system. The adaptive immune system includes the antigen-specific activity by T cells and specific antibody production by B cells.

b. List at least two diseases that affect the parts of this system.

- AIDS
- Chronic granulomatous disease
- Allergies
- Asthma
- Lupus erythematosus
- Type I diabetes
- Multiple sclerosis
- Psoriasis
- Rheumatoid arthritis

c. Describe the interaction of antigens, WBC and antibodies.

Lymphocytes a type of WBC produce antibodies and arrange them on their membrane, An antibody is a molecule able to bind itself to molecules of a complementary shape called antigens, and recognize them. Every lymphocyte produces antibodies of a specific shape. Lymphocytes perform an action that is called specific in that each of them recognizes the complementary antigen only.

Alternative Assessments

1. Describe at least 3 household situations which would likely result in increased mold growth and explain how to avoid or correct these situations.
2. If you had a child with allergies or asthma, what changes would you make to improve the child's home environment or reduce his/her exposure to mold?
3. Should scientists develop a chemical that would eliminate all mold growth? Should all home residents be required to use this chemical? State your position on these ideas and give at least 2 reasons supporting your position.
4. The group would produce a brochure/booklet that covers the main points of this activity. Each group member would have the task of completing the brochure/booklet section concerning the topic area he/she had researched through reading the provided articles. The brochure/booklet must include at least one graphic item (picture, diagram, chart, graph, concept map). The brochure/booklet must contain answers to all the research questions provided.
5. Each student would produce a brochure or booklet that covers the main points of this activity using the information the group had shared. The brochure/booklet must include at least one graphic item (picture, diagram, chart, graph, concept map). The brochure/booklet must contain answers to all the research questions provided.
6. Each student would produce a concept map that covers the main points in this activity. The student's map must show correct relationships and include the following terms – allergy, asthma, mold, respiratory system, immune system, lungs, skin, antigen, antibody, WBC, spore, homeostasis, disease and 5 other terms related to this unit.

Teacher Background References

Allergies and Asthma for Dummies, Berger, William E., M.D., IDG Books Worldwide, Inc., New York, NY ISBN- 0-7654-5218-X, 2000.

Allergy and asthma basic information, taking care of your nose, asthma management, allergic skin conditions, food, insect and drug reactions, and tips for managing your allergies and asthma.

My House is Killing Me, May, Jeffrey C., The Johns Hopkins University Press, Baltimore, MD, 0-8018-6729-0, 2001

Discusses the different rooms in the house and explains where problems may exist and how to alleviate the problems.

Allergy-free Living, Beazley, Mitchell, Octopus Publishing Group Limited, London, E14 4JP, ISBN 1-84000-233-6, 2000

Defines allergies, discusses an allergy-free home and how to make a room allergy-free including case histories of individuals whose homes affected their allergies.

Allergies: The Complete Guide to Diagnosis, Treatment, and Daily Management, Young, Stuart H., M.D., Dobozi, Bruce S. M.D., Miner, Margaret, Penguin Group, New York, NY ISBN 0-452-27966-6, 1999.

Discusses hay fever, asthma, food allergies, sinus problems, drug allergies and allergies in children.

The Mold Survival Guide for Your Home and for Your Health, May, Jeffrey C., and May, Connie L., John Hopkins University Press, Baltimore, MD, ISBN 0-8018-7937-X, 2004.

Discusses types of molds, where they can be found and how to remove or prevent them from growing in our homes.

Student Resources

ASTHMA

<http://www.nlm.nih.gov/medlineplus/ency/article/000141.htm>

Illustration of body parts affected by asthma, definitions, causes, risk factors, symptoms, treatment, prevention, signs and tests for asthma.

<http://en.wikipedia.org/wiki/Asthma>

History, signs, symptoms, pathophysiology, treatment, epidemiology of asthma.

http://www.nhlbi.nih.gov/health/dci/Diseases/Asthma/Asthma_WhatIs.html

Causes, signs, symptoms, prevention, treatment, and tips for living with asthma.

<http://chemistry.org/education/chemmatters.html>

Sneeze and wheeze, written by Roberta Baxter for the April 2006 issue (pg7-10), discusses allergies, asthma, the respiratory system and immune system. There are several diagrams that clarify the steps involved in an asthma attack. This site requires a subscription charge.

ALLERGIES

http://www.mayoclinic.com/health/allergic_reactions/AA00050

Discusses allergic reactions including common allergies and complications of allergies.

http://www.mayoclinic.com/health/allergic_reactions/AA00037

Discusses the type of allergy medications currently available.

MOLD

<http://www.moldtips.com/whatis.htm>

Classification of mold. Buttons on the right link to testing for and preventing mold.

<http://www.epa.gov/mold/moldresources.html>

What is mold, how to get rid of mold from a building, the relationship of mold and asthma.

RESPIRATORY SYSTEM

<http://www.emc.maricopa.edu/faculty/farabee/BIOBK/BioBookRESPSYS.html>

Diagrams, definitions, diseases, and descriptions of the human respiratory system.

IMMUNE SYSTEM

http://en.wikipedia.org/wiki/Immune_system

How the immune system functions and some diseases of the immune system.

Glossary

Allergen: a substance (such as a food or pollen) that your body perceives as dangerous and can cause an allergic reaction.

Allergy: an exaggerated response to a substance or condition produced by the release of histamine or histamine-like substances in affected cells.

Alveoli: thin-walled, small sacs located at the ends of the smallest airways in the lungs where the exchange of oxygen and carbon dioxide takes place.

Antibiotic: medication used to treat infection caused by bacteria. Antibiotics do not protect against viruses and do not prevent the common cold.

Antihistamine: medication that stops the action of histamine, which causes symptoms of allergy such as itching and swelling.

Anti-inflammatory: medication that reduces inflammation (swelling in the airway and mucus production).

Asthma: a disease of the airways or branches of the lung (bronchial tubes) that carry air in and out of the lungs. Asthma causes the airways to narrow, the lining of the airways to swell and the cells that line the airways to produce more mucus. These changes make breathing difficult and cause a feeling of not getting enough air into the lungs. Common symptoms include cough, shortness of breath, wheezing, chest tightness and excess mucus production.

Bronchial tubes: airways in the lung that branch from the trachea (windpipe)

Bronchioles: the smallest branches of the airways in the lungs. They connect to the alveoli (air sacs).

Dander, animal: tiny scales shed from animal skin or hair. Dander floats in the air, settles on surfaces and is a major part of household dust. Cat dander is a classic cause of allergic reactions.

Decongestant: medication that shrinks swollen nasal tissues to relieve symptoms of nasal swelling, congestion and mucus secretion.

Diaphragm: the major muscle of breathing, located at the base of the lungs.

Dust mites: Tiny organisms that are a common trigger for allergies.

(HEPA) high-efficiency particulate air filter: a filter that removes particles in the air by forcing it through screens containing microscopic pores.

Histamine: a naturally occurring substance that is released by the immune system after being exposed to an allergen. When you inhale an allergen, mast cells located in the nose and lungs release histamine. Histamine then attaches to receptors on nearby blood vessels, causing them to enlarge (dilate). Histamine also binds to other receptors located in nasal tissues, causing redness, swelling, itching and changes in the secretions.

Immune system: the body's defense system that protects us against infections and foreign substances.

Irritants: things that bother the nose, throat or airways when they are inhaled(not an allergen).

Mold: heterotrophic, microscopic fungi (like Penicillin) with spores that float in the air like pollen. Mold is a common trigger for allergies and can be found in damp areas, such as the basement or bathroom, as well as in the outdoor environment in grass, leaf piles, hay, mulch or under mushrooms.

Nasal spray: medication used to prevent and treat nasal allergy symptoms. Available by prescription or over-the-counter in decongestant, corticosteroid or salt-water solution form.

Oxygen: the essential element in the respiration process to sustain life. This colorless, odorless gas makes up about 21 percent of the air.

Pollen: a fine, powdery substance released by plants and trees; an allergen.

Pollen and mold counts: a measure of the amount of allergens in the air. The counts are usually reported for mold spores and three types of pollen: grasses, trees and weeds. The count is reported as grains per cubic meter of air and is translated into a corresponding level: absent, low, medium or high.

Respiration: the process of breathing which includes the exchange of gases in the blood (oxygen and carbon dioxide), the taking in and processing of oxygen, and the delivery of carbon dioxide to the lungs for removal. See inhalation and exhalation.

Sinuses: air pockets inside the head.

Steroid: medication that reduces swelling and inflammation. Comes in pill and inhaled forms. Also called corticosteroid.

Trachea: the main airway (windpipe) supplying both lungs.

Triggers: things that cause asthma symptoms to begin or make them worse.

Wheezing: the high-pitched whistling sound of air moving through narrowed airways.

PROBLEM SOLVING RUBRIC

Student:	1 Limited	2 Developing	3 Proficient	4 Advanced	5 Exemplary	Self	Team
Identifies Relevant Facts (“What do we know?”)	Cannot identify facts, or mixes facts with opinions.		Identifies most relevant facts.		Helps distinguish facts from opinions/inferences		
Asks Relevant Questions (“What more do we want to know?”)	Asks no questions or ones unrelated to script.		Asks basic kinds of “who, what, where, when” questions.		Asks higher-level questions which reflect depth of thought.		
Organizes Questions for Research	Is unable to organize questions into categories.		Organizes questions into appropriate categories.		Identifies questions that fit into multiple categories.		
Selects Useful Information from Appropriate Sources	Cannot locate information to answer research questions.		Obtains relevant information from key sources provided.		Obtains reliable and wide-ranging information from sources beyond those provided.		
Organizes and Presents Information Effectively	Does not organize information to clearly present answers to research question(s).		Organizes information to clearly present answers to research question(s)		Summarizes information from many sources; presentation is concise accurate, and insightful.		
Identifies Major Problem(s) and Stakeholders	Cannot state a major problem or identify important stakeholders.		Identifies major problem and major stakeholders.		Distinguishes between major & minor problems; identifies direct & indirect stakeholders.		
Develops Multiple Solutions to Major Problem(s)	States only one (obvious) course of action to major problem.		Develops two or more solutions to the major problem(s)		Develops multiple solutions based on pros/cons and stakeholder perspectives.		
Chooses a Course of Action and Supports Choice	Cannot select or support a course of action.		Selects and supports a course of action based on ethics <u>or</u> risks/benefits to one stakeholder		Selects a solution based both ethics and risks/benefits to multiple stakeholders		

TEAMWORK AND TEAM PROCESSING RUBRIC

Team Members:	1 Limited	2 Developing	3 Proficient	4 Advanced	5 Exemplary	Self	Team
Distribute Tasks	Do not distribute tasks equally.		Distribute tasks equally.		Distribute tasks based on team members' skills.		
Collaborate & Contribute Equitably	Let one or two team members do most of the work.		Ensure that all team members contribute fully.		Know and encourage each other's strengths to do quality work.		
Manage Conflict	Do not recognize or take action to reduce conflict		Resolve conflicts to continue to stay "on task."		Identify and actively use "win-win" solutions to manage conflict.		
Use Brainstorm "Rules"	Do not use brainstorm "rules"; allow others to block the process.		Follow brainstorming "rules" and contribute ideas equally.		Develop new "rules" as needed to facilitate the brainstorming process.		
Effectively Reflect on Teamwork	Do not contribute to discussions about their work as a team.		Use the results of this rubric to suggest ways to improve teamwork.		Regularly monitor and assess teamwork of individuals and group as a whole.		
Build Consensus	Do not attempt consensus process.		Use consensus process to work effectively.		Seek out feedback and process this information to improve teamwork.		
Manage Time	Do not monitor their progress or recognize time constraints.		Use time efficiently and complete all tasks on time.		Regularly monitor and assess progress to exceed task expectations.		
Produce Quality Work	Show no, or limited, attention to making quality products.		Create high school products that meet expectations		Create products that resemble practicing professionals "in the field."		
Stay on Task	Are easily distracted or frequently go "off task."		Use time in focused & productive ways.		Create work-plan agenda and monitor progress.		
Come Prepared	Are not consistently prepared with needed materials.		Are consistently prepared with needed materials.		Take time daily to assure that materials are ready for next work session.		
Maintain Positive Attitude	Exhibit negative behaviors; use "put down" expressions.		Exhibits positive attitudes/behaviors towards work and others.		Assist others in maintaining positive attitudes and behaviors..		

PBL Problem Solving and Teamwork Reflection Questions:

1. Describe a specific example of something you learned from your PBL team (e.g., information or a problem solving or teamwork skill) that you probably would not have learned on your own.

2. Describe a specific example of something that your team members learned from you (e.g., information or a problem solving or teamwork skill) that they probably would not have learned without you on their team.

3. Suggest one specific, practical change the team could make that would improve the team's learning, problem solving or teamwork skills.

NYS Learning Standards and Performance Indicators

Standard 1: Students will use mathematical analysis, scientific inquiry, and engineering design, as appropriate, to pose questions, seek answers, and develop solutions.

Key Idea 1: The central purpose of scientific inquiry is to develop explanations of natural phenomena in a continuing and creative process.

Performance Indicator 1.2 Hone ideas through reasoning, library research, and discussion with others, including experts.

Major Understanding 1.2a Inquiry involves asking questions and locating, interpreting, and processing information from a variety of sources.

Major Understanding 1.2b Inquiry involves making judgments about the reliability of the source and relevance of information.

Standard 4: Students will understand and apply scientific concepts, principles, and theories pertaining to the physical setting and living environment and recognize the historical development of ideas in science.

Key Idea 5: Organisms maintain a dynamic equilibrium that sustains life.

Performance Indicator 5.2 – Explain disease as a failure of homeostasis.

Major Understanding 5.2g - Some allergic reactions are caused by the body's immune responses to usually harmless environmental substances. Sometimes the immune system may attack some of the body's own cells or transplanted organs.

Major Understanding 5.2a - Homeostasis in an organism is constantly threatened. Failure to respond effectively can result in disease or death.

Key Idea 6: Plants and animals depend on each other and their physical environment.

Performance Indicator 6.1 – Explain factors that limit growth of individuals and populations.

Major Understanding 6.1g - Relationships between organisms may be negative, neutral, or positive. Some organisms may interact with one another in several ways. They may be a producer/consumer, predator/prey, or parasite/ host relationship; or one organism may cause death in, scavenge, or decompose another.

Key Idea 1: Living things are both similar to and different from each other and from nonliving things.

Performance Indicator 1.2 – Describe and explain the structure and functions of the human body at different organizational levels (e.g., systems, tissues, cells organelles).

Major Understanding 1.2d- If there is a disruption in any human system, there may be a corresponding imbalance in homeostasis.

Performance Indicator 1.1 – Explain how diversity of populations within ecosystems relates to the stability of ecosystems.

Major Understanding 1.1f - Every population is linked, directly or indirectly, with many others in an ecosystem. Disruption in the numbers and types of species and environmental changes can upset ecosystem stability.