

Women's Studies Curriculum Fifth Grade Science Lesson Plan Gertrude Elion

Concept/Theme: Recognizing women and their accomplishments

Grade: Fifth

Textbook Connection: Harcourt: Grade 5 *Science* Unit E50-E56 "Discovering Elements," references pages R2-R5

Primary Benchmark:

- SC.5.N.1.1 Define a problem, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigations of various types such as: systematic observations, experiments requiring the identification of variables, collecting and organizing data, interpreting data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.

Time: 1-2 Class Periods

Objectives:

1. The student will understand Gertrude Elion made discoveries in science that helped sick children and people.
2. The student will identify how Gertrude Elion has used the microscope and the scientific method in her experiments.

Differentiated Instruction Activities: Teachers may choose to do one or more of the activities. Activities cover elements of Bloom's taxonomy.

Note To Teacher: Teachers may find this lesson compatible with learning to use the microscope, learning about scientific inquiry, and studying women in science.

Teacher Preparation/Materials: Reading passage, vocabulary handouts, United Streaming video clip: *How Scientists Work: What Is Scientific Inquiry?* 20 minutes in length, Video Quiz, Scientific Handouts, Quiz, Concept Maps

Activities:

Pre-reading Activities:

1. Have students read Pages E50-E56 in the Science Text. Students now are aware of what a chemist is and what and they work with and how they work. Students may have worked with the content of these pages earlier. If so, ask students to recall that they learned about chemists, how they work, and what they work with on these pages.
2. Write the name Gertrude Elion on the board. Ask students if they have heard of her, and let them know we will be learning about her.
3. Tell students that Gertrude has something to do with what they have been learning in the text, now, ask students to make a prediction about who she is. Tell students to quick write on paper. Have students share their responses.
4. Tell students that scientists often predict something based on prior knowledge and then attempt to prove or disprove their prediction. Many discoveries and inventions have come about in this manner.

5. Review vocabulary before reading the passage with students, ask students if they have never hear of, had heard before, know it well. Discuss the words, pronounce them and present their definitions.

During Reading Activities:

1. Distribute the reading passage to students. Tell students to underline vocabulary words as they come to them in the reading passage.
2. Read the passage aloud to students. Stop after each paragraph, say “Stop and Write!” for one minute have students stop and write about what they are thinking about, or if they have a question, or one thing they learned from that paragraph.

Post-Reading Activities:

1. Discussion: After the class completes reading the reading passage, have a discussion on the content of the reading passage:
 - What does it mean in the reading passage when it says Gertrude was the daughter of immigrant parents? ***Gertrude’s parents were not from the U.S. Her father was from Lithuania and her mother was from an area in Russia that is now Poland.***
 - What factors in Gertrude’s life made it difficult for her to attend school, what made it easier? Although her family lost money in the ***Stock Market Crash of 1929, she had very good grades; Hunter College was a city college that accepted her on scholarship, and she lived at home.***
 - Why did Gertrude decide to major in chemistry? ***Her grandfather had just died from stomach cancer and she wanted to help find cures for horrible diseases.***
 - Why was it difficult for Gertrude to get a job in a science laboratory? ***At this time in our history women were not usually hired for these positions.***
 - What finally happened to help Gertrude get a job as a chemist? ***World War II started and men were called to war, making it necessary for companies to hire women in the place of men.***
 - Explain some sad portions in Gertrude’s life. ***Her fiancée died of a bacterial infection and she was too busy with her work to pursue romance.***
 - Why did the invention of penicillin hurt Gertrude’s feelings? The drug would have saved her fiancée.
 - What motivated Gertrude to invent things? What did she invent? She ***invented a new way to design drugs. She developed a way to see how a specific disease worked and then built drugs to fight the particular disease. Three drugs Gertrude helped design were: 6-MP, Azathioprine, and AZT.***
 - After Gertrude retired what did she do? ***Gertrude became a scientist emeritus with Duke University, an advisor for many companies, and a mentor for a third year medical student.***
 - Why did Elion win the 1988 Nobel Prize? ***She won the Nobel Prize in physiology or medicine for her discovery of important principles for drug treatment.***
 - Gertrude was the first in something. What was it? ***Gertrude was the first woman admitted into The Inventors Hall of Fame.***
 - What did Gertrude try to inspire young people to do? ***Gertrude tried to inspire young people to work with something they loved and to consider working in one of the many fields of science.***

2. If available, show the United Streaming video, *How Scientists Work: What Is Scientific Inquiry?* Students will take the video quiz. **Answers: 1. True, 2. False, 3. True, 4. True, 5. True.** Discuss the scientific inquiry and the video. Ask the following question: **What is scientific inquiry?** Chart responses from the discussion and answers to the question on chart paper, white board, or chalkboard.
3. Discuss how Gertrude Elion used scientific inquiry. Correct Response: **Gertrude Elion might choose a particular disease and ask how it takes over one's body. She would investigate the way this particular disease invaded and destroyed one's body. She might look at lab tests, x-rays, cells under the microscope, and a host of other ways to watch the invasion of a particular disease. After she completes the first stage of investigation, she would form a hypothesis. Next, she would develop an experiment that would prove or disprove her hypothesis. If the experiment produced unsatisfactory results, she would continue her investigation and/or form a new hypothesis. She would continue with this process until a satisfactory conclusion was reached.**
4. Take students on an exploration walk around the classroom to see if they have any inquiry questions about how or why something occurs in the classroom. An example of an inquiry question is the following: **Why does chalk make dust?** Take students on an exploration walk outside to develop an inquiry question about nature. **Where do mosquitoes go in the daytime?** After students return to their seats instruct them to take out a piece of paper and a pen and to write down the inquiry question they developed on one of the exploration walks. Their question must be in question format and be a complete thought. Have students fill out the Investigation Plan or model one as a class first. Next, students can come up with a hypothesis. Let students know they can continue this process and have a great scientific experiment for science fair that year.
5. Distribute the Student Quiz to students. Students will now take the quiz. **Answers: 1. b, 2. 3. d, 4. a, 5. d, 6. c, 7. -8. Answers will vary. 9. -10. Answers will vary.**

ESOL Strategies: Alternative Assessment, Modeling, Read Alouds

Assessments: Student Participation, Quick Write, Video Quiz, Investigative Plan, Quiz

Resources:

Mini Lesson - The Scientific Method/English <http://breeze.palmbeach.k12.fl.us/p27318062>

Mini Lesson - The Scientific Method/Spanish <http://breeze.palmbeach.k12.fl.us/p38829213/>

<http://www.jwa.org/exhibits/wov/elion/>

<http://nobelprize.org>

<http://www.pwcs.edu/curriculum/sol/scientific.htm>

Women's Studies Curriculum Gertrude Elion



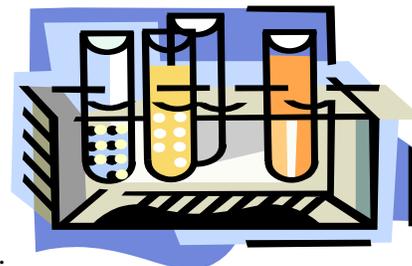
Gertrude Elion was a scientist who won the 1988 Nobel Prize in medicine for her discovery of using drugs in a new, special way to treat and help people. Gertrude was the first woman admitted into the National Inventors Hall of Fame.

Gertrude was the daughter of immigrant parents. Her father came to America from Lithuania. He studied hard and became a dentist. Her mother came to America from the part of Russia that is now Poland. Gertrude had a younger brother whom she adored. She lived with her family in an apartment in Manhattan with her father's dental office above. Later she moved with her family to the Bronx in New York. She was very happy, loved to go to the zoo, and was eager to learn new things. Gertrude was a good student and was promoted ahead two grade levels in elementary school. She was fifteen when she graduated from high school.

During the United States Depression, Gertrude's father lost a lot of money in the Stock Market Crash of 1929. This made it difficult for Gertrude to attend college because there was no money for college. Other sadness in her life included her grandfather dying of stomach cancer. But his death influenced the direction Gertrude's life would follow. She now wanted to help find cures for the horrible diseases that affected humans. She decided to major in chemistry. Because she made good grades and Hunter College was a city college, she was able to attend. She had no idea what she wanted to study. She loved all subjects. It was not popular for women to major in the sciences at this time. Many people believed that women were not capable of completing such a difficult degree, or that they were able to do well in that kind of career. Many of her professors wondered if the young women they taught would be successful and get a job in their career. Gertrude would.

After college graduation, Gertrude wanted to attend graduate school. But she had to get a job to make money as well as go to school, so she looked for a job in a laboratory.

At this time, it was not common to find female chemists in scientific laboratories. It never occurred to Gertrude that she was searching for a job where women were not wanted. It shocked her to find the doors closed. During this time she worked a many different jobs from teaching to working in the lab.



She made a little bit of money, and with a little help from her parents, she enrolled in graduate school. She entered New York University. She was the only female enrolled in graduate chemistry studies. In 1941, Gertrude graduated with a Master of Science degree in chemistry.

When Gertrude was in graduate school, she was engaged. Her fiancée died of a bacterial infection. She never married, but this tragedy reinforced her drive to find cures for horrible diseases. Two years after her fiancée died, penicillin was discovered. It upset her so much that his new drug would have saved her fiancée's life if it had been available to him.

In 1942, because the United States was involved in World War II, jobs for women were opening up because men were being called away to war. Gertrude was able to get a even more laboratory jobs. When she was hired by George Hitchings, she worked and studied in microbiology and in the activity of drugs and sicknesses. Gertrude was now able to work in biochemistry,

pharmacology, immunology, and virology all of these studies of drugs and diseases would help her find cures and treatments to help people who were sick.

In this job, Gertrude developed a new way to design drugs. She developed a way to see how a specific disease worked and then built new drugs to fight the particular disease. She had begun the process of chemotherapy treatments. Chemotherapy treatments would help people who have cancer and other diseases. Because of Gertrude Elion, other important drugs such as 6-MP, an early drug to fight childhood leukemia, Azathioprine, a drug used to suppress the body's immune system and help transplant patients, and AZT, the first drug to fight AIDS, were designed to help save peoples' lives.



Gertrude Elion achieved all of these accomplishments by using the scientific method. Before any drug Elion developed was given to patients, they went through many experimental trials. Elion would repeat the same experiment many times to prove that her hypothesis was correct. She knew experiments had to be repeated and conducted under the same conditions in order to convince the medical world that they were safe and effective to treat patients with particular diseases.

Gertrude Elion was appointed Head of the Department of Experimental Therapy for Burroughs Wellcome. She worked for this company for the remainder of her career. In 1983, Gertrude retired and assumed the status of scientist emeritus with Duke University. For the next 16 years, she remained active in her field as an advisor to many organizations, including the World Health Organization and the American Association for Cancer Research. She also mentored one student from Duke University medical school each year. This student would take a year from his/her studies and work with Gertrude doing research under her direction.



Throughout Gertrude Elion's lifetime, she received many rewards in addition to the 1988 Nobel Prize. Some of these rewards were: National Medal of Science, The Lemelson/MIT Lifetime Achievement Award, the Medal of Honor from the American Cancer Society, the Garvan Medal of Honor from the American Chemical Society, the Judd Award from Memorial-Sloan Kettering Institute and the Cain Award from the American Association for Cancer Research.

Gertrude Elion was the president of the American Association for Cancer Research and served as a Presidential appointee on the National Cancer Advisory Board. She was elected to the National Academy of Sciences, the Institute of Medicine, the Royal Society, and to The American Academy of Arts and Sciences.

Gertrude's work was her vocation as well as her avocation. Learning was her first love. She enjoyed talking with young people and encouraging them to find something, they loved to devote their life's work to. She loved getting young people interested in science. "Work with what you love," was her motto. She lived this way until her death in 1999.

Gertrude Elion was a woman admired by many. Her accomplishments live on and help others each day, and will continue to do so for many centuries to come. After learning about this woman, young women often strive to follow in her path.

VOCABULARY CHART

AIDS				a disease of the human immune system that is highly life-threatening conditions
Azathioprine and AZT				drugs that are used to help people with the AIDS condition
Bacteria				microorganisms that may cause disease, requiring treatment with an antibiotic
Cancer				a tumor that is life threatening of potentially unlimited growth that expands by invasion and is abnormal to the body
Chemistry				a science that deals with the composition, structure, and properties of substances and with the transformations that they undergo
Chemotherapy				a medical treatment that uses chemicals to help people with cancer or other illnesses
Compounds				something formed by a union of elements or parts
Immune system				a system in your body that protects it from foreign substances
Laboratory				a place equipped for experimental study in a science or for testing and analysis
Leukemia				an life threatening disease in humans and other warm-blooded animals that causes an increase in the number of white blood cells in the tissues and often in the blood
Microbiology				a branch of biology dealing especially with microscopic forms of life
Penicillin				a variety of antibiotic drugs made from mold or synthetics and fight infections
Scientist				a person learned in science and especially natural science, a scientific Investigator
Transplant				to transfer (an organ or tissue) from one part or individual to another
Virology				a branch of science that deals with viruses
Assistantship				a paid appointment awarded annually to a qualified graduate student that requires part-time teaching, research, or residence hall duties
Consultant				one who gives professional advice or services, expert
Fellowship				the position of a fellow (as of a university), the stipend of a fellow, a foundation for the providing of such a stipend
Fiancée				a woman or man engaged to be married
Great Depression				this was a huge period where money was low in the capital the stock market, and in many homes. The Stock Market Crash of 1929 occurred at this time where many people lost their savings and money.
Immigrant				one that immigrates, a person who comes to a country to live permanently
Mentored				to give someone help and advice because you an expert in that field
Nobel Prize				prizes given out in peace, literature, medicine to those who Alfred Nobel and his committee deems the expert in the field of humanity and peace
Principles				a comprehensive and fundamental law, doctrine, or assumption, a rule or code of conduct
Vocation				the work in which a person is regularly employed

Gertrude Elion
United Streaming Video Quiz

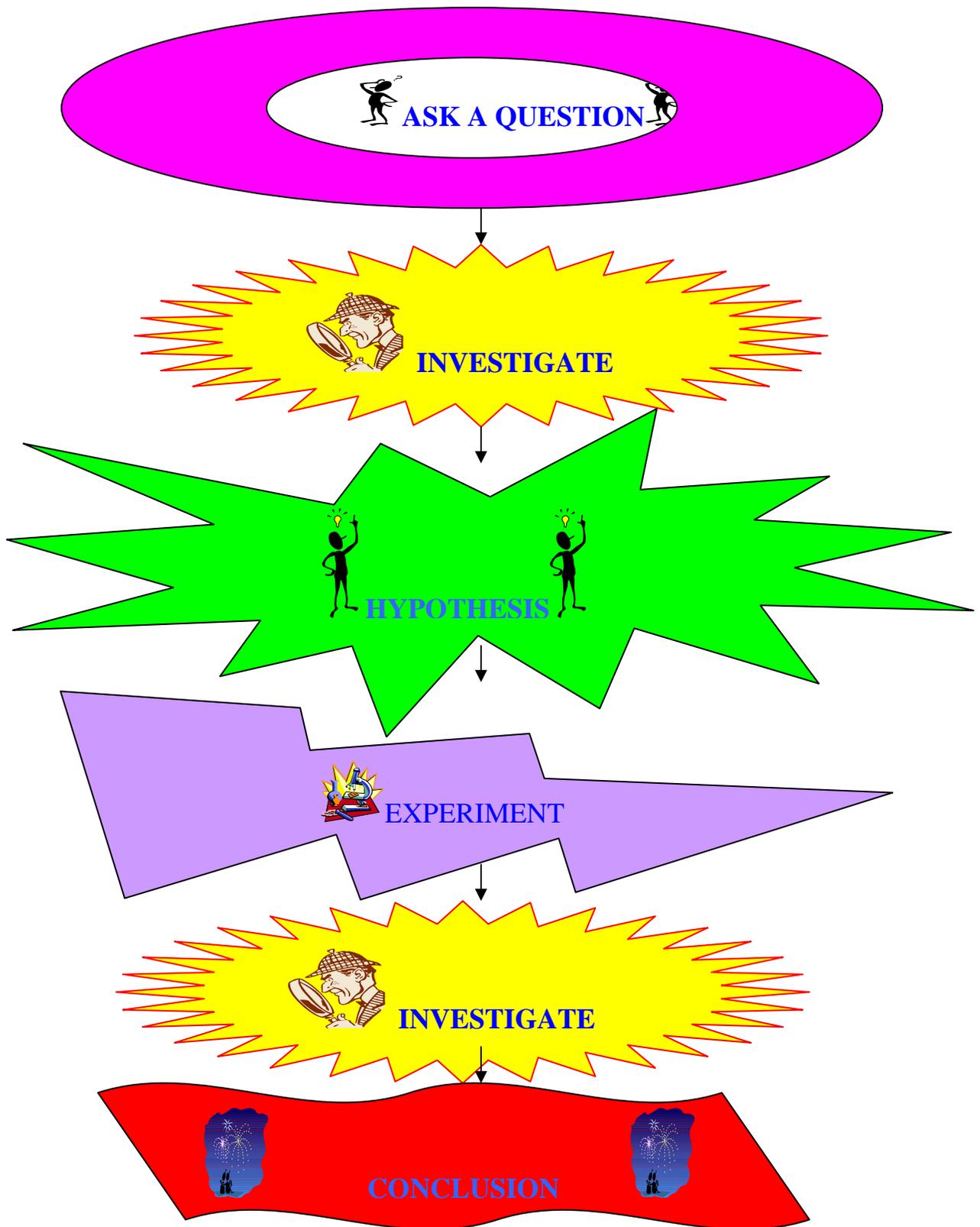


NAME _____ DATE _____

DIRECTIONS: Read each statement. Decide if the statement is true or if it is false. In the blank, following each question, place a T if the answer is true and an F if the answer is false.

1. Asking a question is the starting point for all scientific inquiry. ____
2. Observation is not necessary in the investigative process. ____
3. In any scientific investigation, the leads that you follow can raise new questions. ____
4. Community resources can help you with your investigation and observation. ____
5. What is most important about scientific inquiry is using your curiosity and being persistent in trying to find an answer. ____

SCIENTIFIC INQUIRY





NAME _____ DATE _____

DIRECTIONS: You are the investigator. First, write the question you are going to investigate. Next, develop a step-by-step plan of investigation. Write each step in detail.



What question are you going to investigate?



Write your investigative plan. Place each step on a new number. Use details as you develop your investigative plan.

1.

2.

3.

4.

5.

QUIZ

NAME _____ DATE _____

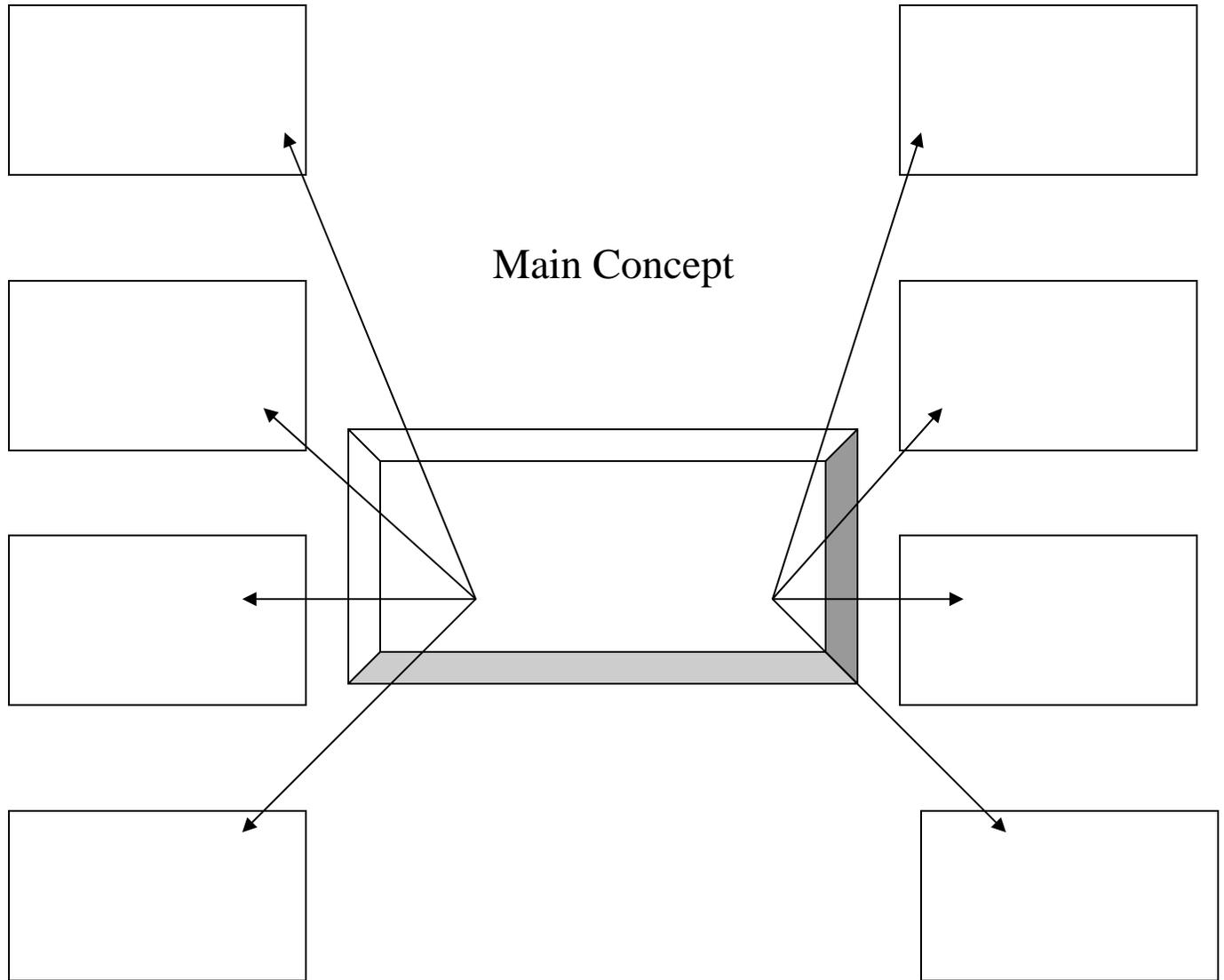
DIRECTIONS: Read each question carefully. Circle the best answer.

- Gertrude Elion is recognized as the first woman admitted into _____.
 - the Baseball Hall of Fame
 - the National Inventors Hall of Fame
 - the Woman Scientists Hall of Fame
 - the Nobel Prize Winners Hall of Fame
- What influenced Gertrude into studying chemistry in college?
 - her grandfather's death from stomach cancer
 - her love for experiments
 - the money she would make as a chemist
 - all of the above
- Gertrude loved to learn new things. Which word describes her best?
 - athletic
 - nurturing
 - energetic
 - curious
- Gertrude had difficulty getting a job in a science laboratory. Which was a factor in her getting a job?
 - World War II
 - The Great Depression
 - The Stock Market Crash of 1929
 - Man landed on the moon
- Why did Gertrude win the Nobel Prize in 1988?
 - She discovered a cure for cancer.
 - She discovered a cure for the common cold.
 - She discovered a new way to test for the flu.
 - She discovered a new way to design drugs and help treat people with diseases.
- Which of the following diseases did Gertrude Elion help treat by designing drugs.
 - lung cancer
 - the common cold
 - childhood leukemia
 - the flu

CONCEPT MAPS

- Fill out Concept Map one to explain the scientific method that Gertrude used to conduct her experiments. Place the word scientific inquiry in the middle square and fill out the map from there.**
- Fill out Concept Map two to explain the steps you will take to conduct an experiment of your own. You can use the example from class earlier or make up a new question to**

CONCEPT MAP #1



CONCEPT MAP #2

