Name _____ Date _____ Period _____

Anton van Leeuwenhoek

A. Early Life

Anton van Leeuwenhoek (1632-1723) was born in Delft, Holland. He attended school as a young child but received no higher education or university degrees and knew no languages other than his native Dutch. He came from a family of tradesmen. His father was a basket maker, while his mother's family were brewers. His father died when Anton was five.

In 1648, at the age of 16, Leeuwenhoek went to Amsterdam to be an apprentice in a shop that sold cloth. In 1654, he returned to Delft and married Barbara de Mey, the daughter of a silk merchant. Leeuwenhoek's wife died in 1666, and he was remarried in 1671, to Cornelia Swalmius, who died in 1694. Four of his five children died young, and his surviving daughter, Maria, looked after him until his death.

B. The Simple Microscope

Leeuwenhoek is believed to have been introduced to a simple microscope in order to count the threads in cloth to determine the cloth's quality. A simple microscope (a magnifier with a single lens) is also called a magnifying lens. During a visit to London in 1668, he saw magnified pictures of textiles in a copy of Robert Hooke's book *Micrographia.* This book may have started Leeuwenhoek thinking about magnifying things, but there is no evidence of his interest in magnification before 1671. It was in that year that Leeuwenhoek apparently began his journey into the microscopic world.

Even though Leeuwenhoek was not formally trained as a scientist, his detailed descriptions of things that he saw under his microscopes proved to be of great value to science. In 1673, Leeuwenhoek reported his first microscopic observations (bee mouthparts and stingers, a human louse, and a fungus) to the newly formed Royal Society of London (a scientific group that encouraged scientific investigations). He was appointed a member of the Royal Society in 1680 and wrote hundreds of letters to the Society during his lifetime, all in Dutch. (Most scientists were educated and wrote in Latin, which was the accepted common scientific language.)

C. Leeuwenhoek's Simple Microscope

Leeuwenhoek used simple microscopes, even though the compound microscope (a magnifier with a combination of two lenses) was invented in the early 1600s. That's because these early compound microscopes distorted the shape and the

color of the specimen under examination. This problem worsened as lenses were made larger and stronger. Leeuwenhoek discovered that simple microscopes made with very small and very convex (curved outward like the outside of a ball) lenses provided a clearer image (the likeness of an object formed by a lens or mirror). He made more than 400 simple microscopes that could magnify over 200 times, with clearer, brighter images than the compound microscopes of his day, which generally only magnified up to 50 times. Each microscope consisted of a 3- to 4- inch (12.5- to 20- cm) long brass plate body with a small hole in which a tiny lens was mounted. Some of the lenses were not much bigger than the head of a pin. The specimen (a sample or an object being studied) was mounted on a sharp point that stuck up in front of the lens. Leeuwenhoek kept his method of making lenses and illuminating the specimens a secret.

D. Early Microscopic Discoveries

Leeuwenhoek was also the first person, using a microscope, to observe clearly and to describe red blood cells, as well as sperm (male sex cells), in humans and other animals. Leeuwenhoek incorrectly believed that sperm contained a child in miniature, which grew larger inside the female's body.

Leeuwenhoek is the founder of bacteriology and protozoology (the study of protozoa- the name for animal-like single-celled organisms). On September 17, 1683, Leeuwenhoek sent the Royal Society a description of what may have been the first observation of bacteria. At least, it was the first recorded observation. He found what is now believed to be bacteria in the scrapings from his own teeth and from those of an old man who claimed never to have cleaned his teeth. He called the tiny moving creatures he saw "animalcules." He devised a counter that allowed him to count the numbers of creatures in a very small sample and then calculate numbers in a larger volume. It is not surprising that the most animalcules were found in the scraping from the old man's teeth.

E. A True Scientist

Leeuwenhoek had limited knowledge of the scientific discoveries of other scientists, since they reported their findings in Latin and he spoke only Dutch. But because of his curious nature and his interest in lenses, Leeuwenhoek made some of the most important discoveries in the history of biology. He studied anything that he could get in front of the lens of his microscope, including pepper. He wanted to see if it had spikes that might cause the hot, painful taste when eaten. (It is now known that chemicals in pepper cause its burning taste.) Once he almost lost his eyesight observing a small explosion of gunpowder.

Leeuwenhoek described himself as a person who had a greater craving for knowledge than did most other men. He felt it was his duty to record his findings so that others would be informed about his discoveries. He shared what he saw but not his procedure of making viewing instruments.

During the seventeenth century, lenses were commonly crude. Often glass was simply smashed between pieces of wood, and different broken pieces were used for lenses. In studying the Leeuwenhoek microscopes, scientists have determined that Leeuwenhoek discovered that blown glass bubbles had a thicker section at the bottom. He chipped out this think part and ground glass into particular shapes to make lenses for his microscopes. He developed a way to grind powerful lenses, but no one has discovered how he did this. Only 9 of the more than 500 microscopes made by Leeuwenhoek exist today.

Name _____ Date _____ Period _____

Read and Record: Find the boldface headings marked A, B, C, D, and E. Write them beside the same letters in this outline. Read the text under each heading. Record the subtopics (1, 2, etc.) in the outline. Clues are given.

A. _____

1. Date and place of birth _____
2. Level of education _____
3. His language _____
4. Family occupation _____
5. Reason he went to Amsterdam _____

B. _____

1. Why he was introduced to the simple microscope _____
2. Book that introduced him to magnification _____
3. Leeuwenhoek's first microscopic observation _____
4. Scientific group he was a member of _____

C. _____

1. Problem with early compound microscopes _____

   _____
2. Number of simple microscopes he made and the magnification _____

   _____
3. Describe the structure of his simple microscope _____

   _____

D. _____

1. He was the first person to observe _____
2. Founder of _____
3. Date of the first bacterial observations _____
4. Tiny moving creatures _____

E. _____

1. He recorded findings in _____
2. He had a craving for _____
3. He felt his duty was _____

"The Father of Microscopy"

Name _____ Date _____ Period _____

A. Rethink: Put an X in front of the words that best answer each sentence.

1. He married Barbara de Mey in
____ a. 1654 ____ b. 1671 ____ c. 1666 ____ d. 1648

2. Leeuwenhoek became interested in magnification after
____ a. 1668 ____ b. 1671 ____ c. 1673 ____ d. 1680

3. Compound microscopes of his day magnified
____ a. 400x ____ b. 50x ____ c. 200x ____ d. 100x

4. The number of Leeuwenhoek's microscopes around today
____ a. 9 ____ b. 500 ____ c. 200 ____ d. 50

B. Review Vocabulary: Match each word to its correct definition. Use context clues.

____ 1. simple microscope	a. the likeness of an object formed by a lens or a mirror
____ 2. compound microscope	b. the study of protozoa
____ 3. convex lens	c. a magnifier with a single lens
____ 4. image	d. a sample or an object being studied
____ 5. specimen	e. the name for animal-like single-celled organisms
____ 6. protozoology	f. a magnifier with a combination of two lenses
____ 7. protozoa	g. curved outward like the outside of a ball

C. React and Write: Answer each of the following questions. Use complete sentences.

1. Write at least two sentences that give details about the fact Leeuwenhoek wrote his science papers in Dutch.

_____

_____

_____

2. Why was Leeuwenhoek's study of bacteriology and protozoology an important contribution to the world of science? (Must be at least three sentences)

_____

_____

_____

_____

_____