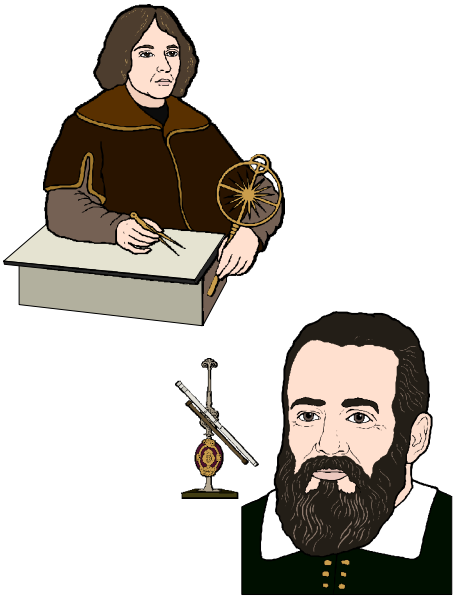
THE SCIENTIST



CFE 3293V

OPEN-CAPTIONED
BARR MEDIA GROUP
1993
Grade Levels: 12-13+
57 minutes

DESCRIPTION

Focuses on the Renaissance Era, a time when scientists strove to search for knowledge about the universe and were met with opposition from the Church. Documents this era through a study of the lives and works of the scientists such as Paracelsus, Copernicus, Kepler, and Galileo. Also mentions the contributions of Bacon, Descartes, Newton, and Pascal. Features interviews with contemporary scientists. THE RENAISSANCE SERIES.

INSTRUCTIONAL GOALS

- To illustrate the personal and social struggles of the Renaissance period.
- To study the contributions of scientists during this era.
- To compare issues faced in the past with those faced in contemporary settings.

BEFORE SHOWING

1. Preview the video to determine unfamiliar vocabulary and language concepts.
2. Make a time line detailing European history from the 1400s to the 1600s.
    a. Discuss the events prior to the Renaissance that might have led to its beginning.
    b. Discuss European culture of that time.
3. Discuss the powerful impact that religion had on the lives of people living in the pre-Renaissance age.
4. *Renaissance* means rebirth. Describe contemporary experiences which illustrate this concept.

DURING SHOWING

1. View the video more than once, with one showing uninterrupted.
2. Pause at the scenes showing portraits of each scientist. Discuss the clothing styles of that era.
3. Pause at the scenes showing the tools and workplaces used in early scientific investigations, and compare with those used today.
4. Pause at the scenes showing the early drawings. Discuss the significance of the illustrations.

AFTER SHOWING

Discussion Items and Questions

1. Prior to the Renaissance, what place did scientists hold in society?
2. What were the major contributions of each scientist presented?
    a. What problems did they face in presenting their ideas?
    b. Why did they endure such opposition?
    c. Why are revolutionary ideas upsetting to the general public?
    d. How do today's scientists view these controversies?
3. How did the scientists of the Renaissance study nature in search of knowledge?
4. Why are curiosity and creativity considered to be vital to the search for knowledge?
5. What is the role of eccentricity in scientific inquiry?
6. How did the invention of the optical lens affect scientific work?
7. In what ways did mathematics play an important role in solidifying the discoveries of this era?
8. Discuss the three different kinds of early scientists (magicians, artisans, and natural

philosophers) and their roles in the emergence of science.

Applications and Activities

1. Report on scientific theories that are still controversial today, such as the theory of evolution or the big bang theory.
2. Write a biography of each of the scientists mentioned in the video.
3. Discuss famous quotes that encourage the search for knowledge.
    a. All men by nature desire knowledge.
    b. The utmost extent of man's knowledge, is to know that he knows nothing.
    c. Many will pass through and knowledge will be increased.
4. Report on the contributions of Descartes and Pascal to the field of mathematics.
5. Research the development of scientific tools used in the laboratories during this era. Discuss how these tools have been refined.
6. Compare the problems created today by genetic engineering to those faced by Galileo.
7. Debate the pros and cons of limits being placed on scientific inquiry.

SUMMARY

At the end of the Middle Ages, traditionalists believed that the forces of nature controlled all of life. During the 300 turbulent years known as the Renaissance, a few brilliant and curious men discovered new theories that were in conflict with the traditional ideas. They strove to prove their theories and were often met with opposition.

One of the most famous alchemists of the early Renaissance was Paracelsus. He continually challenged conventional wisdom and attracted a

curious audience. Paracelsus was an arrogant man with little respect for authority. He claimed that physicians and other scholars cannot learn everything from books. They need to learn also from questioning others and observing the forces of nature at work.

Nicolaus Copernicus also raised important questions during this time. He suggested that the sun, not the earth, is at the center of the universe. He was unable to provide sufficient evidence to prove his theories.

Johann Kepler was a scientist who perceived the world to be a great machine controlled by a single force and mathematical theories. He discovered that the planetary orbits were not circular, but elliptical. He organized his observations into three revolutionary laws of planetary motion. Kepler also suggested that there are mysterious connections between music, geometry, and the universe.

Sir Francis Bacon made a powerful appeal for experimentation as the key to understanding nature. He believed that science would help solve social problems and suggested that scientists work together in a cooperative manner to further their knowledge.

A young Italian mathematician named Galileo Galilei was interested in the theories of Copernicus but dared not pursue them for fear of antagonizing authority. However, after Galileo constructed a telescope and was able to learn more through observation of the heavens, he began to openly challenge the traditional theories by publishing books of his findings. Such new ideas were a threat to the Church and Galileo was eventually summoned by the Inquisition on possible charges of heresy. Because of old age, Galileo felt he had no choice but to accept the Church's authority. Thus he recanted.

One of the scientists who felt threatened by Galileo's experience with the Church was the French

mathematician René Descartes. Descartes' theories were also challenging to authority, and he almost burned his works after he learned of Galileo's plight. Descartes made important contributions to mathematics, optics, and physics. He believed the world is ruled by mechanical forces but urged caution in suggesting new truths.

Blaise Pascal was a young French scientist who provided the foundation for the laws of probability. He also invented a calculating machine and contributed to the development of the early barometer. However, events in his later life caused Pascal to devote himself to religion and to God. He believed that science is important, but is less meaningful than faith.

Perhaps the greatest scientist of this age was Isaac Newton. His observations with a prism led him to a new understanding of the nature of light. He invented the reflecting telescope and discovered laws of gravity and motion.

Renaissance scientists sought to understand the world in which they lived. They found new solutions to old mysteries, and they created new ways of looking at the world.