- The Renaissance gave birth to many new inventions. Gunpowder, eyeglasses, the telescope and the flush toilet are just a few. Have students select and research a Renaissance invention. Students should not only provide answers to the 5 W's and H (who, what, where, when, why and how) but should also consider both positive and negative effects of their inventions, and how the inventions impacted succeeding eras.
- Galileo was brought before the Inquisition because he held views about the universe that ran contrary to those of the Catholic church. Have students write journal entries from the perspective of Galileo speculating what his thoughts and feelings may have been regarding his situation.
- Have students compare and contrast Ptolemy's concept of the solar system with the heliocentric system promoted by Copernicus by creating illustrations of each. What was the fundamental difference between these systems? What made the Copernican model so controversial?
  Useful Web sites:
  - csep10.phys.utk.edu/astr161/lect/retrograde/copernican.html
  - www.counterbalance.net/media/ptol-body.html

Suggested Internet Resources

Periodically, Internet Resources are updated on our Web site at www.LibraryVideo.com

- **space.jpl.nasa.gov/**
  This Web site has a fantastic solar system simulator which allows students to see objects in our solar system from different vantage points. Students will be able to view Jupiter's Galilean moons.
- **64.226.212.131/03_educators/teach99/lesson4/index.html**
  This teacher resource gives a good overview of the science and technology of the Renaissance Age.
- **www.nlm.nih.gov/exhibition/dreamanatomy/index.html**
  This Web site contains very detailed historical and modern day anatomical sketches of the human body. (This site contains some illustrated images of the nude human body. Educators should preview the content of this site to determine if it is appropriate for viewing.)
- **www.imahero.com/../../herohistory/galileo_herohistory.htm**
  This Web site provides age-appropriate biographical information about Galileo.
- **http://library.thinkquest.org/3588/Renaissance/GeneralFiles/Introduction.html**
  Students can take a virtual tour through the Renaissance! This site contains information about important people, places and events of the era.

TEACHER'S GUIDE

Suggested Print Resources

- Day, Nancy. *Your Travel Guide to Renaissance Europe.* Lerner Publishing Group, Minneapolis, MN; 2000.
- Fritz, Jean & Hudson Talbott. *Leonardo's Horse.* Penguin Group, New York, NY; 2001. A nonfiction tale of Leonardo's desire to create a larger-than-life bronze horse.
- Mason, Paul. *Galileo.* Heinemann Library, Portsmouth, NH; 2002.
- O'Connor, Barbara. *Leonardo da Vinci: Renaissance Genius.* Lerner Publishing Group, Minneapolis, MN; 2003.

TEACHER'S GUIDE

Julia McMeans, M.Ed.
Curriculum Specialist, Schlessinger Media

COMPLETE LIST OF TITLES

- **A HISTORY OF THE RENAISSANCE**
- **EVERYDAY LIFE IN THE RENAISSANCE**
- **RENAISSANCE ART, MUSIC & LITERATURE**
- **RENAISSANCE SCIENCE & INVENTION**
- **RENAISSANCE TRAVEL, TRADE & EXPLORATION**

Teacher's Guides Included and Available Online at:

libraryvideo.com

800-843-3620

SCHLESSINGER MEDIA — A DIVISION OF LIBRARY VIDEO COMPANY®

D5944
V7035

TEACHER'S GUIDE

The Renaissance for Students

RENAISSANCE SCIENCE & INVENTION

Grades 5–9

The Renaissance was a unique, distinctive time in European history. It was a time when people looked back to ancient Greek and Roman civilizations for inspiration, and in doing so ignited revolutions in science, technology, religion, medicine, politics, exploration and the arts. By looking at what was old, Renaissance scientists, artists, explorers and philosophers created something new. This synthesis of old and new, and the exchange and influence of ideas across disciplines is what made the Renaissance a time of great creative endeavors. In *The Renaissance for Students,* viewers will be introduced to some of the people who had the greatest impact on their time: Queen Isabella, Leonardo, Galileo, Shakespeare, Columbus and Luther. Students will also learn about the period's many astounding works of art, the impact of new inventions, like the printing press, on the spread of humanism far and wide, and the improvements in existing tools, like the telescope, which forever changed the way we perceive our world.

SCHLESSINGER MEDIA — A DIVISION OF LIBRARY VIDEO COMPANY®

Program Summary

Question: What do you get when you cross an artist with a mathematician and an engineer? **Answer:** A Renaissance Man! The great scientists and inventors of the Renaissance — Galileo, Copernicus, Leonardo, Kepler, Vesalius, Brunelleschi and Gutenberg — are famous for what they did, and equally famous for how they went about doing it. Whether it was Galileo dropping objects from the Tower of Pisa to establish the foundations of the study of physics, or Andreas Vesalius dissecting human bodies to discover how they really worked, these men probed, prodded, dissected, designed and built their way into history. These were men of not only profound thought, but also great action! Picture Filippo Brunelleschi, scouring ancient texts, applying math, and employing the technology of shipbuilders and military engineers to design and erect a structure both balanced and beautiful. The dome of the Florence Cathedral is a monument to both his creative genius and practical, hands-on know-how.

Imagine Galileo, in his Florentine workroom, laboring to enhance the telescope by using the technology of eyeglasses, and Leonardo envisioning parachutes centuries before there were even airplanes! The discovery of Jupiter's moons, the laws of planetary motion, the development of the printing press, the rendering of more realistic people in painting and sculpture and the publication of the first modern book on anatomy are all a consequence of the fervent experimentation and cross-pollination of ideas and disciplines that define the Renaissance.

Vocabulary

Renaissance — A period in European history extending roughly from the 1300s to the 1600s. The word "Renaissance" is derived from the French word for rebirth, as the period was characterized by a rebirth of interest in the ancient world. This period was marked by great scientific and artistic achievements, especially in Italy.

physics — The study of how matter and energy interact.

engineering — The use of science and math to produce structures, machines and other systems.

navigation — The science of determining position, course and distance in order to get ships, airplanes and spacecraft from place to place.

experimentation — The act of performing a test to prove or disprove a theory.

elliptical orbits — The oval-like path on which an object in space travels.

telescope — An instrument that makes distant objects appear closer and larger.

cathedral — A Catholic church where a bishop is stationed.

dome — A large hemispherical roof or ceiling.

printing press — Developed by Johannes Gutenberg in the mid-1400s, the printing press used movable metal type and revolutionized publishing during the Renaissance.

dissection — The act of separating and cutting apart something for scientific examination.

(Continued)

anatomy — The study of the structure of living things.

heresy — From the Greek word meaning "to choose," heresy is the rejection of the accepted doctrine of a group by a member of that same group.

Inquisition — A church court whose function was to prosecute and punish people accused of heresy.

astronomy — The study of the stars, planets and other things that make up the universe.

Pre-viewing Discussion

- Discuss with your students what they think science and invention are. Why do they think it is important to study the science and inventions of a particular time period? What do the science and technology of the Renaissance tell them about the people of that era?
- Have students think about the science and inventions of contemporary times. What things have been discovered or invented during their lifetimes? What problems do they think science may solve during their lifetimes?
- During the Renaissance, a scientist could be challenged for holding a belief that contradicted the Catholic church. What effects do you think that challenge may have had on a scientist?

Focus Questions

1. Who were some of the important scientists and inventors of the Renaissance?
2. What made Galileo's Pisa experiment so unique?
3. Why was the study and application of mathematics so important to Renaissance science and invention?
4. What impact did the printing press have on the Renaissance?
5. Why is Leonardo considered the quintessential "Renaissance Man"?
6. How did ancient Greek and Roman scholars impact the Renaissance?
7. What was the relationship between art and medicine during the Renaissance?
8. What contributed to the demand for reliable technology and better ships during the Renaissance?
9. What does it mean to have "practical, hands-on" knowledge?
10. In 1633, before the Inquisition, Galileo recanted his position that the sun and not the earth was the center of the universe. What is your opinion of his recantation? What would you have done in his position?

Follow-up Discussion

- During the Renaissance, nearly all scientists and inventors were men. Based upon what students have learned about the Renaissance, discuss why men dominated these professions.

(Continued)

- Have students discuss which inventions of the 20th century have had the same or similar effects on the current era as the printing press had on the Renaissance. Why and how does the dissemination and sharing of knowledge fuel change?
- Share the statement, "necessity is the mother of invention," with your students. Discuss with them how they can apply this phrase to what occurred during the Renaissance.
- During the Renaissance, scientists and inventors used many disciplines (mathematics, anatomy, physics, etc.) to assist them in their work. Have students reflect upon their own learning experiences and discuss how knowledge in one area can help them succeed in another.

Follow-up Activities

- In the 1430s, Filippo Brunelleschi designed and built the dome of the Florence Cathedral, one of the crowning achievements of the Renaissance. Have students research the structure of the dome and investigate other famous domes: the Astrodome, U.S. Capitol, Sky Dome, Olympic Stadium, and geodesic domes. Students can then create geodesic domes out of newspapers. Excellent how-to instructions can be found at: www.pbs.org/wgbh/buildingbig/educator/act_geodesic_ho.html
- In addition to the Pisa Experiment, Galileo designed and performed many other significant experiments. Divide your class into small groups and have them recreate Galileo's inclined plane experiment, parabola experiment and pendulum experiment. Students can then report their findings to the class. Information and detailed instructions regarding these experiments can be found at: es.rice.edu/ES/humsoc/Galileo/Student_Work/Experiment95/
- Because of the dissection of cadavers during the Renaissance, the science of anatomy became much more precise and sophisticated than it had previously been. Divide your students into groups to learn more about one of the body's major systems: skeletal, muscular, circulatory, digestive, respiratory, immune, nervous or reproductive. Students should research both the anatomy and function of their system, identify the major components and then create a detailed anatomical sketch. Display these drawings to create a holistic picture of the internal workings of the human body. A good resource can be found at: users.tpg.com.au/users/amcgann/body/
- Introduce students to Leonardo da Vinci's Vitruvian Man, and his theories on bodily proportions. Divide students into groups to put Leonardo's theories to the test. Students can compare wingspan to height, and whether the hands fall halfway between the hips and the knees. Students can create graphs and data tables to record and display their results. Useful resource: kady.education.ucsb.edu/netshare/ucsbpt3/afield/teacher_projects/jimsfinal/Jimteacher.htm

(Continued)