

The New Science: 1540 to 1750

Directions: Fill in the outline below. Filling in the blanks will help you as you read and study Chapter 15.

I. Section 1: The Development of Modern Science (pp. 370–371)

A. Finding Truth

1. Before 1500, truth was discovered by reading _____ and _____
2. As time passed, _____ became a popular way to find truth

B. The Scientific Method

1. Is a set of _____ to follow to _____
2. Was worked out by _____
3. Involves carefully controlled tests, or _____

II. Section 2: Copernicus (pp. 372–374)

A. Ptolemy's Theory

1. Said that the _____ is the center of the universe
2. Was accepted by the _____ and most scholars

B. Copernicus

1. Believed the _____ was the center of the universe
2. Supported his theory by using _____ thinking and the rules of geometry

C. Kepler

1. Proved that _____ was right by observing the planet _____
2. Showed the shape of a planet's orbit is an _____

III. Section 3: Galileo (pp. 375–377)

A. Using the Telescope

1. Galileo looked at _____ and _____
2. Galileo discovered that _____ had _____ moons orbiting it, and decided that _____ was right

B. Reaction to Galileo's Work

1. The Catholic Church ruled that _____
2. The _____ forced Galileo to admit he was wrong

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C. Gravity

1. Galileo showed that gravity _____
2. Galileo became known as the father of _____

IV. Section 4: Isaac Newton (pp. 378–380)

A. Sunlight

1. Newton discovered it is a mixture of _____
2. He explained that objects _____ and absorb colors of sunlight
3. He proved this by passing light through a _____

B. Gravity

1. Newton proved it caused different kinds of _____
2. The Universal Law of _____ shows the predictable pattern for objects in the universe

V. Section 5: Other Early Scientists (pp. 381–384)

A. Important Scientists

1. Belgian doctor _____ studied human _____
2. William _____ experimented on hearts and _____ of animals, and discovered the heart works as a _____
3. William _____ explained why a compass needle _____, and his work with _____ became the basis for the study of electricity
4. _____ proved that lightning was a form of _____
5. John Napier made _____ easier
6. _____ developed analytic geometry
7. _____ and _____ developed calculus

B. Important Discoveries and Tools

1. _____ made a magnifying lens
2. Christian Huygens invented a new kind of _____
3. _____ and _____ gave us the thermometer

Modern Science Develops

Directions: Write the answers to these questions using complete sentences.

- 1) How did scholars decide what was true or false before 1500?

- 2) Who worked out the five steps of the scientific method? When did he do it?

- 3) What is a hypothesis? Where does it fit in the scientific method?

- 4) How do experiments help scientists discover the truth?

- 5) What two things does a scientist do in the fourth step of the scientific method?

Isaac Newton

Directions: Read the words in the Word Bank. Choose the item that best completes each sentence. On the blank before each number, write the letter for that item.

Word Bank

- | | | |
|---------------|-------------------|-------------|
| a) absorbs | e) gravity | i) sunlight |
| b) attracts | f) prism | j) universe |
| c) Copernicus | g) reflects | |
| d) Galileo | h) scientific law | |

- _____ 1) Isaac Newton discovered that white _____ is a mixture of all colors.
- _____ 2) A blue object _____ all colors of light except blue.
- _____ 3) A _____ is a pattern in nature that someone can predict.
- _____ 4) Newton proved that _____ caused different kinds of motion.
- _____ 5) _____ showed how gravity worked on falling objects on Earth.
- _____ 6) A _____ is a three-sided object can be seen through.
- _____ 7) Newton built on the work of _____, Kepler, and Galileo.
- _____ 8) Newton's Universal Law of Gravitation showed that the _____ was orderly and logical.
- _____ 9) Newton said that gravity _____ falling objects to Earth.
- _____ 10) An object that _____ red light would appear red.

Identifying Important People

Directions: Match each name on the left with the correct detail on the right. Write the correct letter on each blank.

- | | |
|--------------------------------|---|
| _____ 1) John Napier | a) Belgian doctor who studied human anatomy |
| _____ 2) Andreas Vesalius | b) first person to see one-celled animals |
| _____ 3) Galen | c) discovered that the heart works as a pump |
| _____ 4) Charles Cavendish | d) invented a new kind of clock in 1656 |
| _____ 5) William Harvey | e) thought microscopes and telescopes were not reliable |
| _____ 6) Anton van Leeuwenhoek | f) explained why a compass needle always points north |
| _____ 7) Benjamin Franklin | g) turned multiplication and division problems into addition and subtraction problems |
| _____ 8) René Descartes | h) along with Fahrenheit, worked on the thermometer |
| _____ 9) William Gilbert | i) discovered analytic geometry |
| _____ 10) Isaac Newton | j) scientist and member of the Newcastle Circle |
| _____ 11) Gottfried Leibniz | k) proved that lightning was a form of static electricity |
| _____ 12) Gabriel Fahrenheit | l) English scientist who developed calculus |
| _____ 13) Christian Huygens | m) with Celsius, gave us the thermometer |
| _____ 14) Margaret Cavendish | n) ancient Greek doctor |
| _____ 15) Anders Celsius | o) German scientist who developed calculus |

Choose the Correct Answer

Directions: Circle the term that correctly completes each sentence. Choose your answer from the terms in parenthesis.

- 1) A (hypothesis, theory, conclusion) is a statement that explains why or how something happens.
- 2) Ptolemy believed that the (sun, moon, earth) was the center of the universe.
- 3) (Copernicus, Kepler, Ptolemy) published a book that said the earth traveled around the sun.
- 4) By using mathematics, (Aristotle, Kepler, Copernicus) showed that the shape of a planet's orbit is an ellipse.
- 5) Martin Luther thought Copernicus was (a heretic, a wise scientist, a fool).
- 6) In the past, people had often wondered if the sun (rotated, revolved, concluded) around the earth.
- 7) Copernicus believed the sun was the center of the universe based on (logical thinking, experiments, Ptolemy's theory).
- 8) To look at facts and arrive at a decision is to (ellipse, conclude, revolve).
- 9) Kepler observed the planet (Venus, Jupiter, Mars) and proved Copernicus right.
- 10) Aristotle believed that all movement in the heavens had to be shaped like (circles, ellipses, ovals).

Galileo True or False

Directions: Read each sentence. Write *T* if the statement is true or *F* if it is false.

- _____ 1) Galileo rejected Copernicus's theory of a sun-centered universe.
- _____ 2) The Catholic Church said that Copernicus's theory challenged the Bible.
- _____ 3) Heresy is a teaching or a belief that a religious authority thinks is false.
- _____ 4) Galileo's finding contradicted the teachings of Aristotle.
- _____ 5) Today, many scientists call Galileo the founder of experimental mathematics.
- _____ 6) The Catholic Church censored the work of Copernicus.
- _____ 7) The Roman Inquisition ordered Galileo to be burned at the stake.
- _____ 8) Galileo showed that gravity makes all objects in outer space fall at the same rate of speed.
- _____ 9) Until 1610, Galileo taught mathematics at the University of Padua.
- _____ 10) By looking through a telescope, Galileo found that the sun, moon, and planets were perfect, unchanging bodies.

Isaac Newton's Discoveries

Directions: Match each item in Column A with a detail in Column B.
Write the letter of each correct answer on the line.

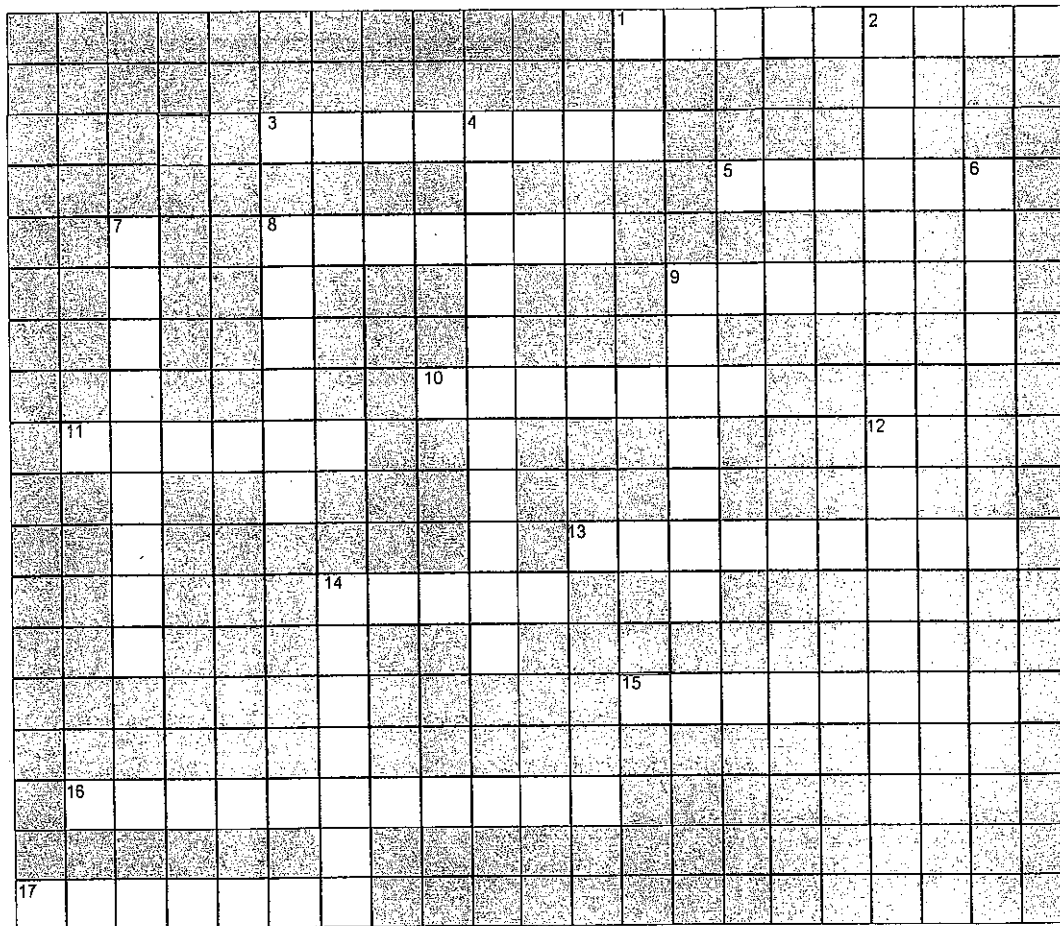
Column A

- _____ 1) reflect
- _____ 2) scientific
- _____ 3) Catholic Church
- _____ 4) attract
- _____ 5) prism
- _____ 6) absorb
- _____ 7) falling apple
- _____ 8) motion
- _____ 9) genius
- _____ 10) gravity

Column B

- a) what Newton used to explain his theory about gravity
- b) a predictable pattern in science is this kind of law
- c) Newton did not see himself as a _____, even though others did
- d) the force that pulls objects toward the center of Earth
- e) to bounce off an object
- f) Newton proved that gravity caused different kinds of this
- g) scientists feared they could be censored by the _____
- h) to pull something toward oneself
- i) to soak up
- j) a three-sided object that can be seen through

Early Science Crossword



Across

- 1) a group of people with something in common
- 3) Belgian doctor
- 5) kind of electricity
- 8) invented a new kind of clock
- 9) Vesalius's works contradicted him
- 10) Harvey studied blood _____
- 11) made mathematics easier
- 13) to move in a pattern from one place to another
- 14) hard, yellowish remains of a liquid that comes out of trees
- 15) developed by Newton and Leibniz
- 16) developed by Celsius and Fahrenheit
- 17) to make something appear larger than it is

Down

- 2) said all scientists were friends
- 4) made a lens that magnified an object 270 times
- 6) the center of something
- 7) found a way to represent points in space
- 8) discovered that the heart works as a pump
- 9) studied the compass
- 12) experimented with lightning
- 14) what Vesalius studied