

## 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

**The New Science: 1540 to 1750, continued**

## 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

## 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

## 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?

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

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

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

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

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# 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 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  |



## Chapter 15 Mastery Test A

**Part A** Match each item on the left with a detail on the right. Write the letter of each correct answer on the line.

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|-------------------------------|---|
| _____ 1) hypothesis           | a) based on five steps                                    |
| _____ 2) scientific method    | b) Polish churchman who rejected Ptolemy's theory         |
| _____ 3) heresy               | c) a statement explaining why or how something happens    |
| _____ 4) experimental science | d) father of experimental science                         |
| _____ 5) theory               | e) an educated guess about an answer to a problem         |
| _____ 6) scientific law       | f) against the official teaching of a religious authority |
| _____ 7) community            | g) depends on careful experiments and measurements        |
| _____ 8) Copernicus           | h) made discoveries about sunlight and gravity            |
| _____ 9) Galileo              | i) predictable pattern in nature                          |
| _____ 10) Newton              | j) group of people with something in common               |

**Part B** Write the correct invention or discovery on the blank line after each name.  
Choose your answer from the words in the Word Bank.

- 1) Anton van Leeuwenhoek \_\_\_\_\_
- 2) Gabriel Fahrenheit and Anders Celsius \_\_\_\_\_
- 3) Benjamin Franklin \_\_\_\_\_
- 4) Gottfried Leibniz \_\_\_\_\_
- 5) Christian Huygens \_\_\_\_\_

**Word Bank**

calculus  
magnifying lens  
new clock  
static electricity  
thermometer

**Chapter 15 Mastery Test A, continued**

**Part C** Circle the word in parentheses that best completes each sentence.

- 1) (Harvey, Bacon, Newton) worked out the steps of the scientific method.
- 2) Ptolemy believed that the planets revolved around the (earth, sun, moon).
- 3) Scholars and church officials (absorbed, rejected, supported) Galileo's discoveries.
- 4) (Newton, Galileo, Kepler) discovered that white sunlight is a mixture of all colors.
- 5) The structure of a human or animal body is its (hypothesis, gravity, anatomy).
- 6) Copernicus believed the (earth, sun, moon) was the center of the universe.
- 7) Kepler proved that planets orbit in (ellipses, circles, straight lines).
- 8) The Roman Inquisition ordered (Newton, Copernicus, Galileo) to be imprisoned in his home.
- 9) A (theory, heresy, hypothesis) is an educated guess.
- 10) A (theory, heresy, hypothesis) is a statement that explains something.

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

- \_\_\_\_\_ 1) During the Middle Ages, people looked to the Bible for truth.
- \_\_\_\_\_ 2) Galileo discovered that heavenly bodies were perfect and unchanging.
- \_\_\_\_\_ 3) The Catholic Church agreed with Copernicus's theory.
- \_\_\_\_\_ 4) Kepler proved Aristotle's idea about the orbits of planets was wrong.
- \_\_\_\_\_ 5) Today, many scientists call Newton the father of experimental science.
- \_\_\_\_\_ 6) The Catholic Church said that dissecting the human body was wrong.
- \_\_\_\_\_ 7) A community is a group of people with something in common.
- \_\_\_\_\_ 8) William Gilbert explained why a compass needle always points north.
- \_\_\_\_\_ 9) Anton van Leeuwenhoek was the first person to see one-celled animals.
- \_\_\_\_\_ 10) Andreas Vesalius's works supported the writings of Galen.