

Discovering Nature's Laws: A Story about Isaac Newton by Laura Salas (ill. by Emily C.S. Reynolds)

Study Guide

Sir Isaac Newton changed the world. He proved the law of universal gravitation, developed calculus, and invented the reflecting telescope. He discovered and proved three laws of motion, which even today remain fundamental to all engineering. And he made most of his advances by himself, without the input of teachers or colleagues. Newton's masterpiece, *The Principia*, is still considered the most important piece of scientific writing in history. This biography follows Newton from his premature birth in 1642 to his death in 1727. It reveals Newton's personality, passions, and peculiarities. And, of course, it shares with the reader the excitement of Newton's amazing discoveries.

Teachers, you may want to use *Discovering Nature's Laws* in conjunction with units on Objects and Motion, The Earth in the Solar System, Objects in the Sky, The History of Science, The Scientific Method, Gravity, The Scientific Revolution, Britain, Famous Scientists, or The Great Plague.

Before Reading

Look at the Book - Discussion questions

1. From the cover, can you make a guess about where and when Isaac Newton lived? (in England in the 1600s and 1700s)
2. Look at the table of contents. Where could you find more information about Newton's discoveries? (page 60)
3. Look at the epilogue on page 57. What is something you've used that is based on Newton's discoveries? (microscope, camera, telescope, etc.)
4. Turn to the index on page 63. On which page could you find a reference to Henry Oldenburg? (page 36)

Focus Questions

1. What do you already know about Isaac Newton?
2. Do you know about any of Isaac Newton's discoveries?
3. What are some things you think you might learn about in this book?

During Reading

Vocabulary

Ask students to jot words from the book that they don't know. Compile a list on the board during each chapter and assign a student to look up each word and share the meaning with the class. Some words that might be new for students include botany, astronomy, chamber pot, philosopher, prism, spectrum, erratically, and mint.

Reader Journals

At the end of each chapter, have students respond to a question in their journals.

Fire in the Sky: Do you think Isaac will be good at farming? Why or why not?

Not Fit for Farming: Have you ever felt that your parents want you to be a certain kind of person, a kind that maybe you're not? Describe that or some other time when you have not been able to live up to someone's expectations.

The Miracle Years: Do you think Isaac was happy during the Miracle Years? Why or why not?

Success and Arguments: Write a letter to Newton explaining how to solve his problems getting along with other scientists.

The Principia: Explain Newton's three laws of motions in your own words.

Newton at the Mint: Do you think Newton was happier as a young man making discoveries or as an older man running the mint? Explain your opinion.

After Reading

Social Studies:

Have students research the plague that devastated London in the 1660s

Ask students to locate the important places in Newton's life on a map of England

Science:

Using everyday objects, work in groups to demonstrate Newton's 3 laws of motion

Recreate Newton's experiment with a prism and a light (page 28)

Art:

Study the illustrations in the book. What materials do you think the artist used to make them? Create a pencil drawing using lines to show shadow, as Emily C.S.

Reynolds does in this book.

Discovering Nature's Laws

C T U C N H N U G H E Y H N W T W Z L H
A A H C A Z S H J C N T O I T S S U Y A
X M M G W L K B S P G I F V D F F V U L
A O Z B I W C I I Z L V L H N T Z V L L
P V W F R N S U P I A A Q F E I V R A E
F N W Q F I K Q L S N R P G B B A E I Y
O K S D M V D B Y U D G R G L N P A D G
R O B S T Q B G S U S O W O U O I C N K
C V I W F L S A E K F J W H O O U T U I
E R D B Z A M E P O C S E L E T P I S A
P N K H Z T M C V C H R Q B X J R O H P
E I R S S O B O W O A X A L J S I N G P
C Q O I T H S Z I M S Q B T Q P N K E L
N J R I L T U R G E G W B P A L C D O E
G H O S I K R S N T F V T L N A I G L C
C N Z J X L S C D S I H Z H L G P L E D
D A P M I X A E N Z A R X H X U I X Q Z
J Z G A Z F L S D P H R C F D E A E N F
M M B U N L M O O N E N F S J B Q U N T
I M N Z F N H E P U R R G G B M G N Y E

APPLE
CALCULUS
CAMBRIDGE
CHRISTMAS
COMET
ENGLAND
FORCE
FORGETFUL
GRAVITY
TELESCOPE

HALLEY
KNIGHT
MOON
MOTION
PLAGUE
PRINCIPIA
PRISM
REACTION
SUNDIAL

Read *Discovering Nature's Laws: A Story about Isaac Newton*
by Laura Purdie Salas (ill. Emily C.S. Reynolds)
Lerner Books, 2003

NEWTON'S LAWS OF MOTION

1. **Law of Inertia**

A body at rest tends to remain at rest; a body in motion tends to remain in motion.

If you set an apple on a level surface, it will just sit there. Likewise, if you roll that apple, it will keep rolling after it leaves your hand, until gravity, friction, and other forces stop it.

2. **Law of Acceleration**

The acceleration of an object depends upon its mass and the amount of force used on it.

If you blow on a feather and then blow on a brick, the feather will move and the brick will not. This is because the feather has less mass than the brick. If you push an apple with your pinkie, it will move a little bit. If you pick it up and heave it, using your entire body, it will go a lot farther. That's because you used much more force the second time.

3. **Law of Action and Reaction**

For every action, there is an equal and opposite reaction.

If you blow up a balloon and then let the air out, the air will rush away in one direction, and the balloon itself will fly off in the opposite direction with equal force. This is also why it's true that the harder you jump down on a trampoline, the higher you'll go up into the air.

*Laura Purdie Salas
Discovering Nature's Laws: A Story about Isaac Newton
Lerner Books, 2003*