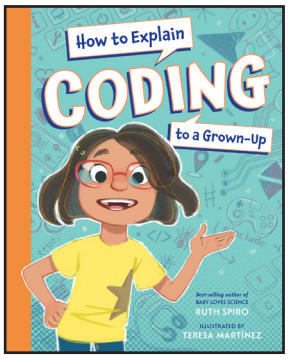
How to Explain Science to a Grown-Up
SERIES ACTIVITY KIT

Table of Contents



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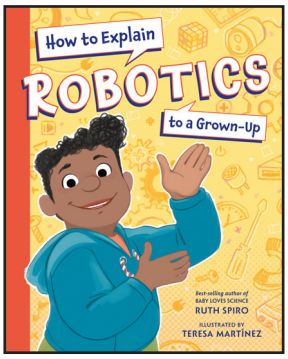

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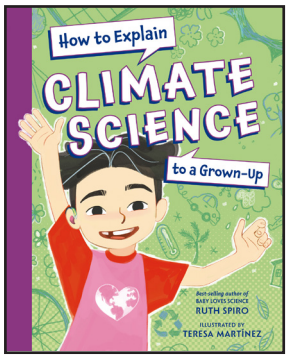

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About the Books

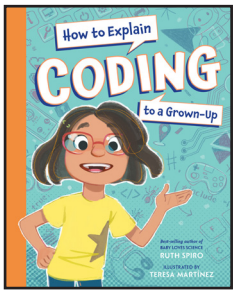
Grown-ups do NOT have all the answers! Fun and fact-filled, the How to Explain Science series will empower kid experts to explore complex scientific concepts with any grown-up who will listen.

About the Author

Ruth Spiro is the author of the bestselling Baby Loves Science series, which has been praised for introducing "big science to little minds with the skill of a neurosurgeon" (Matthew Winner, *All the Wonders* podcast). Ruth also wrote the Made by Maxine picture-book series. She speaks regularly at STEM and early-childhood conferences across the country.

About the Illustrator

When Teresa Martínez was a child, her family moved from a small town to the city. Drawing helped shy Teresa connect with the other kids at school. Now she connects with children across Mexico and around the world through the books she illustrates, including *Mario and the Hole in the Sky; Again, Essie?;* and *Sing with Me.*



Activity Kit

Before Reading

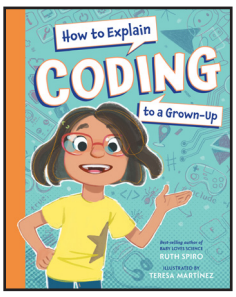
Pre-reading concept reviews help enrich students' learning experience!

For younger students (K-2nd):

- After looking at the cover of the book and reading the title, ask students what they think *How to Explain Coding to a Grown-Up* is about. Write their responses on chart paper.
- Explain what a computer is. Discuss how computers are part of everyday life. Can your students identify a computer? Do they ever play with toys or use tools that have computers in them?

For older students (3rd-5th):

- Based on the title and cover, ask students to describe what they think the book is about. Write their responses on chart paper.
- Have students discuss the following questions in small groups. Tape questions to a wall and ask students to tape their answers beneath the questions.
    - What is a computer?
    - What is coding?
- Discuss how computers play a role in your students' lives. Would it be possible to go a day without using any computers (including devices that contain computers, like cars, smartphones, microwaves, or programmable ovens, etc.)?
- Have students ever needed to explain how something works to a peer, younger kid, or grown-up? How did they explain? What do they think is helpful when someone explains something to them?



Activity Kit

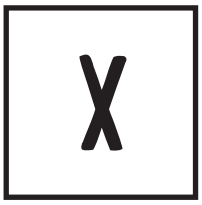
Math: Hopscotch Algorithms

Name: _____

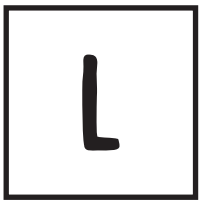
Date: _____

Use at least four of the components below to plan a hopscotch algorithm. Sketch your algorithm on a spare sheet of paper and then use chalk or large paper cutouts to create an algorithm you and your classmates can jump on!

Jump once in the direction of the arrow



Jump over this block (Do not land on it)



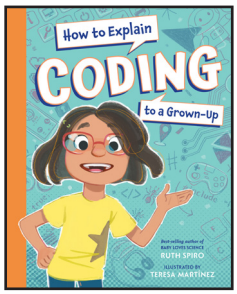
Land on this block with your left foot

Land on this block with your right foot

Turn around and jump backwards in the direction of the arrow

Return to the start of the hopscotch algorithm

The end



Activity Kit

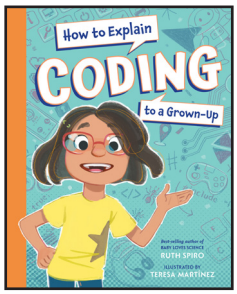
Technology: Computers Everywhere!

Name: _____

Date: _____

For one day, write down every computer or computerized device you use in the table below. Add a tally mark in the second column every time you use the device.

Device Name	Number of Uses



Activity Kit

History: Where Coding Began

Use this guided research project for older students to explore the origins of coding and learn more about how the profession has changed over time.

Procedure

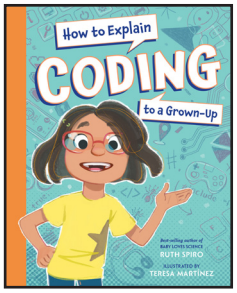
1. **Pre-project discussion.** Computers are a major part of modern society, but they are still a relatively new invention. What do your students know about the history of computers and coding? What are they curious about?

2. **Group projects.** Divide students into small groups and assign them a research topic related to the history of coding or ask them to pick their own topic. Sample topics include:

    - The origins of computing and the first computer
    - Ada Lovelace (the first computer programmer)
    - Katherine Goble Johnson and the human "computers" of NASA
    - The origin of the internet
    - Alan Turing (decoder of the Enigma cipher and creator of the first modern computer)
    - Linus Torvalds (creator of Linux)
    - The origin of video games

3. **Work time.** Offer students research support through your school library. Encourage them to consult both digital and print sources. See the "History of Coding" section on page 8 of this kit for some suggestions.

4. **Presentation of results.** Ask students to collect their research and present it to the class with a slide presentation, trifold board, or other visual aid. All group members should contribute to the final presentation.



Activity Kit

Language Arts: How to Explain (Anything!)

Use this guided writing project for older students to develop expository reading and writing skills.

Materials

- One jar of jam
- One loaf of bread
- One butter knife
- A plate or other sanitary surface like a cutting board

Procedure

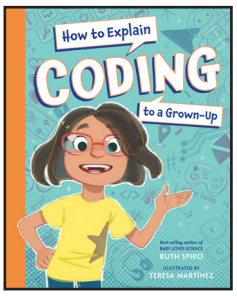
1. **Pre-project discussion.** What is expository writing? What kinds of expository writing have your students read? (For example: recipes, video game instructions, student handbooks, the Help section on their phone or computer.) What are some characteristics of good expository writing? How is expository writing like or unlike coding?

2. **Introduce the task.** Show students your materials and tell them that today, you will be the computer and they will be the coders. Your task is to spread jam on a slice of bread. They will give you step-by-step instructions.

3. **Attempt number one: verbal.** Spreading jam on bread is easy, right? Invite a couple of students to verbally give you the instructions. Follow their instructions precisely (for example, if they tell you to put your knife in the jar without first telling you to open the jar, tap the lid a couple of times with the knife).

4. **Attempt number two: written.** Divide the class into small groups and ask each group to write down step-by-step instructions for spreading jam on a piece of bread. Come around to each group when their work is finished and demonstrate following their instructions.

5. **Independent work.** In class or as homework, assign students to independently write an "algorithm" for a common task, such as tying their shoes, putting on a winter coat, feeding a pet, or watering a plant.



Activity Kit

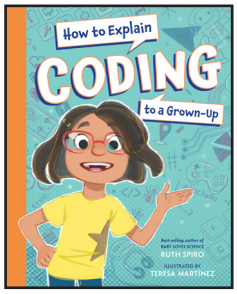
Word Search

Name: _____

Date: _____

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

CODE
ALGORITHM
COMPUTER
DEBUG
LOOP
SOFTWARE
DATA
VARIABLE
PROGRAM



Activity Kit

Related Reading

How to Code

Briggs, Jason R. *Python for Kids: A Playful Introduction to Programming*. No Starch Press, 2022.

Dickins, Rosie, and Jonathan Melmoth. *Coding for Beginners Using Scratch.* Usborne Publishing, 2019.

Funk, Josh, and Sara Palacios. *How to Code a Rollercoaster.* Viking Children's Books, 2019.

Singh, Komal, and Ipek Konak. *Ara the Star Engineer.* Page Two Books, 2018.

Spiro, Ruth, and Irene Chan. *Baby Loves Coding!* Charlesbridge, 2018.

History of Coding

Calkhoven, Laurie, and Alyssa Petersen. *Women Who Launched the Computer Age*. Simon & Schuster, 2016.

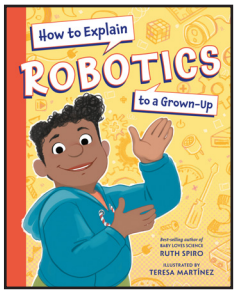
Robbins, Dean, and Lucy Knisley. *Margaret and the Moon: How Margaret Hamilton Saved the First Lunar Landing*. Knopf, 2017.

Slade, Suzanne, and Veronica Miller Jamison. *A Computer Called Katherine: How Katherine Johnson Helped Put America on the Moon.* Little, Brown Books for Young Readers, 2019.

Stanley, Diane, and Jessie Hartland. *Ada Lovelace: Poet of Science.* Simon & Schuster, 2016.

Wallmark, Laurie, and Katy Wu. *Grace Hopper: Queen of Computer Code.* Union Square Kids, 2017.

Wallmark, Laurie, and Katy Wu. *Hedy Lamarr's Double Life: Hollywood Legend and Brilliant Inventor.* Union Square Kids, 2019.



Activity Kit

Before Reading

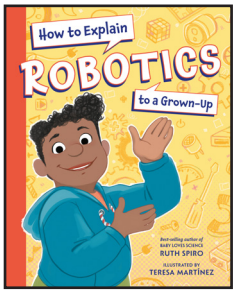
Pre-reading concept reviews help enrich students' learning experience!

For younger students (K-2nd):

- After looking at the cover of the book and reading the title, ask students what they think *How to Explain Robotics to a Grown-Up* is about. Write their responses on chart paper.
- Explain what a robot is. Discuss how robots are part of everyday life. Can your students identify a robot? Do they ever play with toys or use tools that are actually robots?

For older students (3rd-5th):

- Based on the title and cover, ask students to describe what they think the book is about. Write their responses on chart paper.
- Have students discuss the following questions in small groups. Tape questions to a wall and ask students to tape their answers beneath the questions.
    - What is a robot?
    - How are robots made?
    - What kinds of jobs do robots do?
- Discuss how robots play a role in your students' lives. What distinguishes a robot from a computerized device?
- Have students ever needed to explain how something works to a peer, younger kid, or grown-up? How did they do it? What do they think is helpful when someone explains something to them?



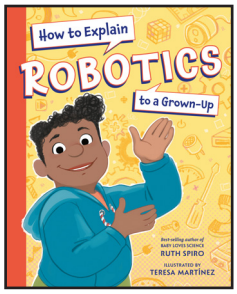
Activity Kit

Art: Design Your Robot

Use the space below to draw a robot design! Don't forget to label the sensor(s), computer, and end effector(s).

Name: _____ Date: _____

What my robot does: _____



Activity Kit

Technology: Real-Life Robots

Use the worksheet below to organize your research about a real-life robot!

Name: _____

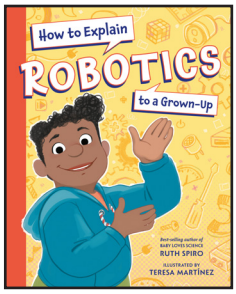
Date: _____

The robot	Designed by

What it does

How it works

Sources



Activity Kit

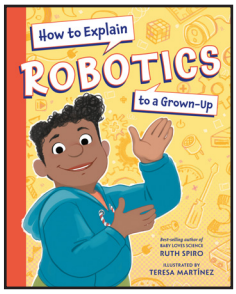
Word Search

Name: _____

Date: _____

L E A R N I N G A
E S H E L H C L C
T E R N U N I A T
A N D I M O R S U
O S R H B R C C A
I O O C E A U O T
N R B A U I I D O
S C O M P U T E R
D A T A C M S P I

ROBOT
SENSOR
CIRCUIT
COMPUTER
CODE
ACTUATOR
DATA
MACHINE
LEARNING



Activity Kit

Related Reading & More Activities

Read About Robots

Nordstrom, Kristen, and Paul Boston. *Mimic Makers: Biomimicry Inventors Inspired by Nature*. Charlesbridge, 2021.

Funk, Josh, and Sarah Palacios. *How to Code a Rollercoaster.* Viking, 2019.

Lu, Jenny, and George Sweetland. *Emma Ren, Robot Engineer.* Lulu Books, 2021.

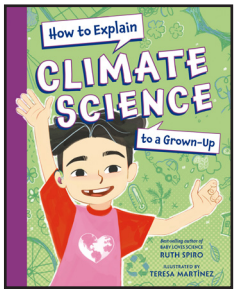
Siy, Alexandra. *Cars on Mars: Roving the Red Planet*. Charlesbridge, 2011.

More Robotics Activities

Science Buddies, "Robotics STEM Activities for Kids." https://www.sciencebuddies.org/stem-activities/subjects/robotics

Research Parent, "Easy Robotics Projects for Kids." https://researchparent.com/learn/technology-engineering/robotics/

Scholastic, "Robot-Themed Activities." https://www.scholastic.com/parents/kids-activities-and-printables/activities-for-kids/math-and-science-ideas/robot-themed-activities.html



Activity Kit

Before Reading

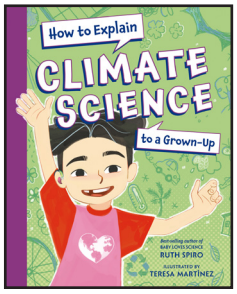
Pre-reading concept reviews help enrich students' learning experience!

For younger students (K-2nd):

- After looking at the cover of the book and reading the title, ask students what they think *How to Explain Climate Science to a Grown-Up* is about. Write their responses on chart paper.
- What does the word "climate" mean? Discuss the difference between "climate" and "weather."

For older students (3rd-5th):

- Based on the title and cover, ask students to describe what they think the book is about. Write their responses on chart paper.
- Have students discuss the following questions in small groups. Tape questions to a wall and ask students to tape their answers beneath the questions.
    - What's the difference between "climate" and "weather"?
    - How do scientists know that climate change is happening?
    - What are some ways that you can help the planet?
- As a class, listen to the first five minutes of Ayana Elizabeth Johnson's TED Talk, "How to Find Joy in Climate Action." https://youtu.be/VsOJR40M0as?si=OcG-ZBcvovSNDHGC. Why does joy matter in climate action? What does your climate action venn diagram look like?



Activity Kit

Writing: Find Joy in Climate Action

Find the unique way each student can contribute to climate action in this Venn diagram writing activity for older kids inspired by marine biologist and climate leader Dr. Ayana Elizabeth Johnson.

You will need

- Writing materials for each student

Procedure

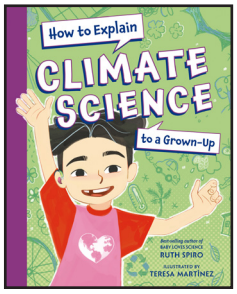
1. Open your copy of *How to Explain Climate Science to a Grown-Up* to pages 26–27 ("You've explained a LOT about climate science to your grown-up. Now is a good time to make your own Climate Action Plan together."). Discuss: What is a Climate Action Plan? You've seen in this book that climate change affects many parts of our planet and there are lots of ways to help. How do you decide which actions to take? Where do you start when you're stuck?

2. As a class, listen to the first five minutes of Dr. Ayana Elizabeth Johnson's TED Talk, "How to Find Joy in Climate Action." https://youtu.be/VsOJR40M0as?si=OcG-ZBcvovSNDHGC. Discuss: why does joy matter in climate action?

3. Invite students to create their own climate joy Venn diagram. The first circle is for what you're good at, the second for what brings you joy, and the third for what needs to be done to help the planet. In the middle, put one or two actions that are inspired by these circles. Not everything in the Venn diagram has to fit together perfectly! It's okay if students list something in one of their circles that doesn't end up contributing to the center. What matters is letting the ideas flow.

4. Provide time for students to work. If someone gets stuck, show them the list "Ways you and your grown-up can take action TODAY!" at the back of *How to Explain Climate Science to a Grown-Up.*

5. Invite students to share their Venn diagrams with the class. Encourage them to reflect on how they feel about the actions in the center of their diagram: Are they excited? Curious? Who could they ask to help them get started on these actions?



Activity Kit

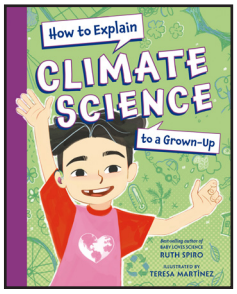
Writing: Go Big

The planet needs us to go big! Use this chart to brainstorm how you can turn small planet-helping actions at home into big planet-helping impacts in your community.

Name: _____

Date: _____

At home, I can . . .	And I can go big by . . .
Compost my food waste from dinner	Convincing my school district to compost food waste from student lunches



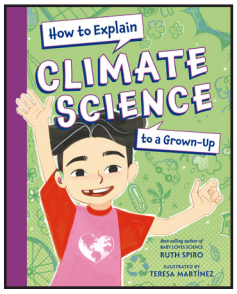
Activity Kit

Art: Earth Is Awesome!

On page 27 of *How to Explain Climate Science to a Grown-Up*, the kid comes up with a list of what makes Earth the best planet. Use the space below to draw your favorite things about planet Earth!

Name: _____

Date: _____



Activity Kit

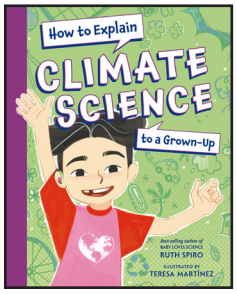
Word Search

Name: _____

Date: _____

A E S W F P G T C
T T R E O H L E I
M A D A S C I N N
O N L T S W D O C
S I B H I O H M H
P F U E L R P O A
H O M R F N A D N
E C L I M A T E G
R E N E W A B L E
E H S C I E N C E

CLIMATE
WEATHER
MODEL
RENEWABLE
ATMOSPHERE
FOSSIL
FUEL
SCIENCE
CHANGE



Activity Kit

Related Reading & More Activities

Read About Climate Science

Heffernan, Nanette. *Earth Hour: A Lights Out Event for Our Planet*. Charlesbridge, 2020.

Herman, Gail. *What Is Climate Change?* Penguin Workshop, 2018.

Metcalf, Lindsay, Keila V. Dawson, and Jeanette Bradley. *No World Too Big: Young People Fighting Global Climate Change*. Charlesbridge, 2023.

Miller, Debbie. *Glaciers Are Alive*. Charlesbridge, 2023.

Reynolds, Emma. *Drawn to Change the World Graphic Novel Collection: 16 Youth Climate Activists, 16 Artists*. HarperAlley, 2023.

Spiro, Ruth. *Baby Loves Green Energy*. Charlesbridge, 2018.

More Climate Science Activities

NASA ClimateKids. https://climatekids.nasa.gov/menu/make

Subject to Climate, "10 Climate Change Lab Activities." https://subjecttoclimate.org/teacher-guides/10-climate-change-lab-activities

We Are Teachers, "16 Meaningful and Hands-On Climate Change Activities for Kids." https://www.weareteachers.com/climate-change-activities

Climate Kids, "Education Tools." https://www.climatekids.org/resources

Ready.gov, "Ready Kids Resource Library." https://www.ready.gov/kids/kids-resource-library