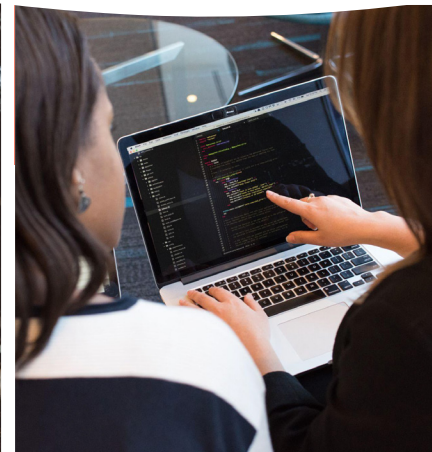


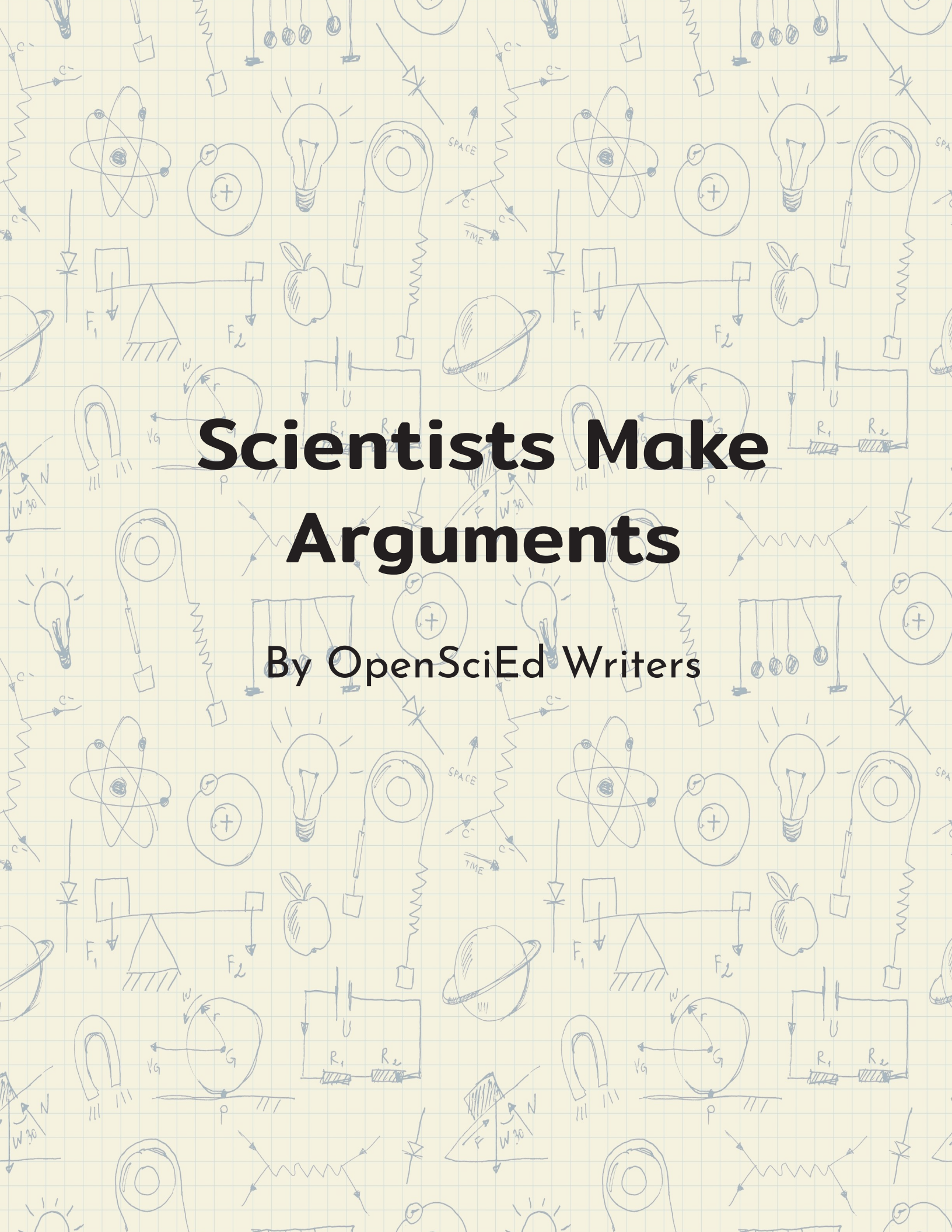
Scientists Make Arguments



5.1 ELEMENTARY SCHOOL SCIENCE

[illegible]

1. Teachers should see that the pupil's name is clearly written in ink in the spaces above in every book issued.
2. The following terms should be used in recording the condition of the book:
New; Good; Fair; Poor; Bad.



Scientists Make Arguments

By OpenSciEd Writers

OpenSciEd Writing Team for this book:

- Elaine Klein - Writer
- Brian Reiser - Writer
- Amanda Dahl - Editor
- Tanya Wright - Editor
- Kate Chambers - Graphic Designer

© 2025 Carolina Biological Supply Company. All rights reserved. First edition 2025.

ISBN 978-1-4350-3323-8

2508

Published by Carolina Biological Supply Company, 2700 York Road, Burlington, NC 27215-3398
Call toll free 800.334.5551.

The content of this work is derived and adapted from an earlier publication by OpenSciEd (<https://www.opensci.ed.org>), from which the original material can be found. The OpenSciEd material is licensed under the Creative Commons Attribution 4.0 International License (CC-BY-4.0, <https://creativecommons.org/licenses/by4.0/legalcode>) and is not subject to the Carolina Biological Supply Company copyright.

This curriculum includes some images that are in the public domain, openly licensed, or used with the explicit agreement of their owners. See the attribution information with each image for additional ownership details and any restrictions on use. Certain images are licensed for distribution under the terms of the Creative Commons Attribution License (CC-BY-4.0) as indicated in their attribution information. Unless specifically indicated in the attribution information for an image, it should not be presumed to be licensed.

The OpenSciEd name and logo are not subject to the Creative Commons license and may not be used without the prior and written consent of OpenSciEd.

OpenSciEd development was supported by the Bill & Melinda Gates Foundation, Carnegie Corporation of New York, Charles and Lynn Schusterman Family Foundation, and William and Flora Hewlett Foundation.



This work is licensed under a Creative Commons Noncommercial Attribution 4.0 International License along with OpenSciEd's License for Commercial Use of Curriculum Materials v1.0.



Have you ever wondered how and why things happen in the world around you? Scientists do, too! When scientists want to understand how and why things happen in the world, they ask testable questions.

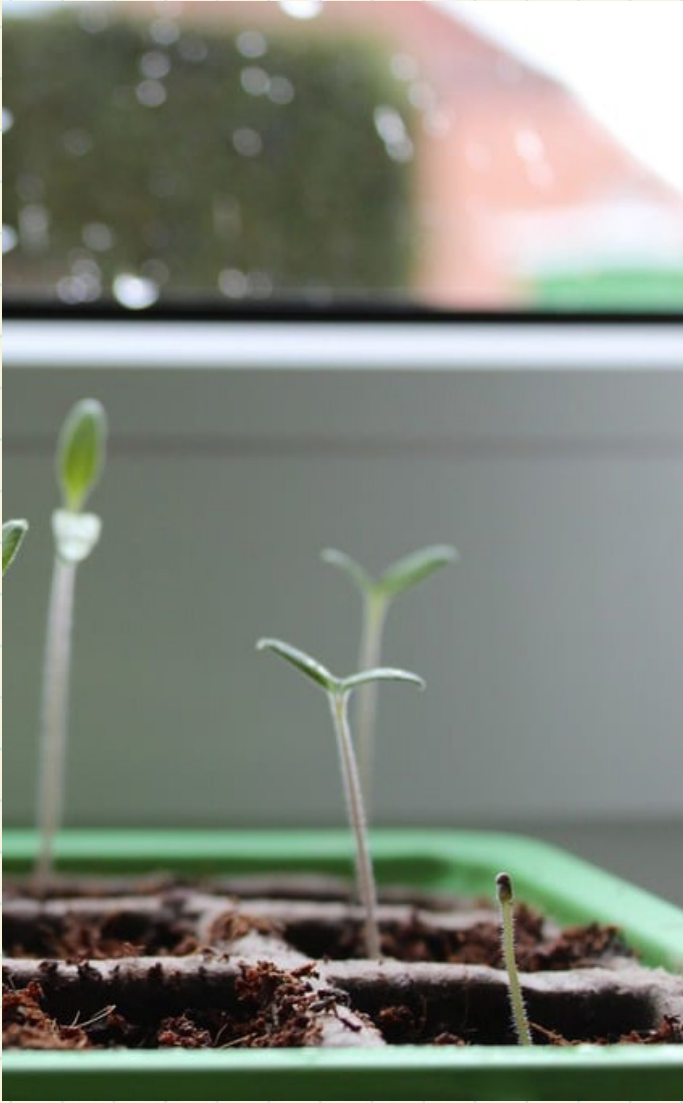


A group of fifth grade scientists are asking:
Do tomato plants grow taller inside, or do
they grow taller outside in a garden?



Sometimes scientists have different **claims** about how their testable questions can be answered. A **claim** tries to answer a testable question.





The fifth graders have two different **claims** about how their investigation will answer their scientific question. Celina claims that the tomato plants will grow taller inside. Ramy disagrees and claims that the tomato plants will grow taller outside.

When scientists disagree or have different claims about their work, they use a process called **argumentation**. This process helps scientists understand their own thinking and learn what others think, too.



Argumentation is different from having a disagreement or a fight. Scientists do not try to “win” an argument. Instead, they use their evidence and data to figure out the best answer to their scientific question.





Celina and Ramy have different claims about how their investigation will answer their question.

According to the process of argumentation, the next thing they need to do is support their claims with data.

Celina and Ramy conduct a test to collect data that will help to answer their scientific question. Every day, they measure a tomato plant growing inside and a tomato plant growing outside. To make sure the test is fair, both plants receive the same amount of light, water, air, and soil.



Record of Growth – Indoor Plant	
Day	Height (centimeters)
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	

Celina and Ramy collect and record measurements every day for 14 days. These measurements are data that can be used to support their claims. Data that support a claim are called **evidence**.

Celina and Ramy share their data with their class. Celina's data show evidence that the indoor tomato plant grew 9.8 centimeters in 14 days. Ramy's data show evidence that the outdoor tomato plant also grew 9.8 centimeters in 14 days.

Record of Growth – Indoor Plant	
Day	Height (centimeters)
1	8.7
2	9.1
3	9.7
4	10.2
5	10.9
6	11.4
7	12.3
8	13.0
9	13.9
10	14.8
11	15.6
12	16.4
13	17.7
14	18.5

Record of Growth – Outdoor Plant	
Day	Height (centimeters)
1	7.2
2	8.1
3	9.3
4	9.9
5	10.8
6	11.6
7	12.4
8	13.7
9	14.4
10	15.1
11	15.7
12	16.2
13	16.5
14	17.0

The fifth graders compare the data. They look at the data to figure out if the evidence supports Celina's or Ramy's claim.





As scientists compare data, they use a process called **reasoning**. Scientists use reasoning when they think about their evidence and use science ideas to decide if their evidence supports their claim.



The fifth-graders reasoned that the data do not support Celina's claim or Ramy's claim. Instead, the data show that the tomato plants grew about the same amount whether they were inside or outside.

Even though the evidence does not support Celina's or Ramy's claim, Celina and Ramy are excited. Now they can ask new questions about the ways that tomato plants grow.





Celina says, "Our evidence doesn't support my claim or Ramy's claim. Instead, our evidence supports the claim that tomato plants grow similar amounts whether they are inside or outside."



Ramy explains,
"As a scientist,
I know that
ideas and
explanations
can change
based on data
and evidence.
So, I stay
flexible and
keep my mind
open to new
ideas and
questions!"





Argumentation helps scientists consider their evidence and reach agreement with other scientists about which claims are supported by evidence and reasoning. You can practice argumentation with your class as you figure out what other plants need to grow.



Lesson 3 Prompts to Use

When scientists disagree or have different claims about their work, they use a process called **argumentation**. This process helps scientists understand their own thinking and learn what others think, too.



5

Page 5

- How does the explanation of scientific argumentation connect to our previous ideas about the fairest way to measure the pumpkins?

Argumentation is different from having a disagreement or a fight. Scientists do not try to "win" an argument. Instead, they use their evidence and data to figure out the best answer to their scientific question.



6

Page 6

- How is a scientific argument different from an argument you might have with a friend or sibling? How is it similar?

Record of Growth – Indoor Plant

Day	Height (centimeters)
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	

Celina and Ramy collect and record measurements every day for 14 days. These measurements are data that can be used to support their claims. Data that support a claim are called **evidence**.

9

Page 9

- What is the different between a claim and evidence?



Argumentation helps scientists consider their evidence and reach agreement with other scientists about which claims are supported by evidence and reasoning. You can practice argumentation with your class as you figure out what other plants need to grow.

Page 17

- What are other ways that we can use argumentation as we figure out more about nurse logs?

Image credits, clockwise from upper left

Cover: Kaigue Rocha, Open Source; Valeriia Miller, Open Source; Christina Morillo via Pexels, Open Source; Rhoda Baer /National Cancer Institute via Wikimedia, Public Domain; Christina Morillo via Pexels, Open Source

Page 1: Sean O’Riordan via Flickr, Public Domain; Bernard Spragg via Flickr, Public Domain; Mathias Appel via Flickr, Public Domain

Page 2: Germanna CC, Public Domain

Page 3: Jayce Q via Pexels, Open Source; Elias Tigiser via Pexels, Open Source; David Waschbusch via Pexels, Open Source; Julia Filirovska via Pexels, Open Source

Page 4: Pixabay, Public Domain; OpenSciEd

Page 5: ThisisEngineering, Open Source; Christina Morillo via Pexels, Open Source; Christina Morillo via Pexels, Open Source; RDNE Stock Project, Open Source

Page 6: Excelz, CC BY 4.0

Page 7: Flickr, Public Domain; Flickr, Public Domain

Page 8: Drake University via Flickr, Public Domain; Eleazar Ceballos via Pexels, Open Source

Page 11: VODECK VIA FLICKR, Public Domain; U.S. Air National Guard photo by Senior Master Sgt. Edward Snyder, Public Domain; Alexander Extension via Flickr, Public Domain

Page 12: fauxels via Pexels, Open source; Christina Morillo via Pexels, Open Source; fauxels via Pexels, Open Source

Page 13: Dinesh Valke via Wikimedia., Public Domain; Tomwsulcer via Wikimedia, Public Domain

Page 14: Aileen Devlin/Jefferson Lab via Flickr, Public Domain

Page 15: Aileen Devlin/Jefferson Lab via Flickr, Public Domain

Page 16: Aileen Devlin/Jefferson Lab via Flickr, Public Domain; Aileen Devlin/Jefferson Lab via Flickr, Public Domain

Page 17: Artem Podrez via Pexels, Open Source; Jonathan Cutrer via Flickr, Public Domain

This curriculum includes images that are public domain, openly licensed, or used by explicit agreement with their owners. See the attribution information with each image for ownership details and any restrictions on its use. Unless otherwise noted in the image attribution information, all images are licensed for distribution under the terms of the Creative Commons Attribution License (CC BY 4.0) by OpenSciEd or by their respective owners, or they are in the public domain.

5.1 ELEMENTARY SCHOOL SCIENCE

Scientists Make Arguments



CAROLINA[®]

ISBN 978-1-4350-3323-8



9 781435 033238

9 0000



523655D