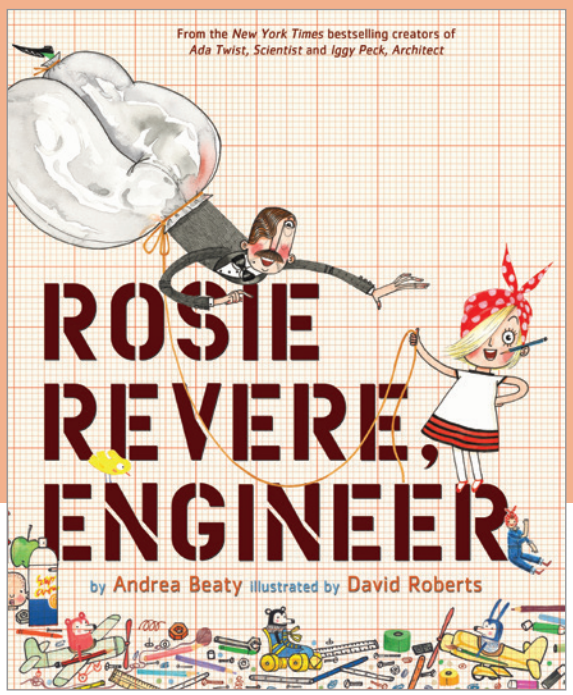
ROSIE REVERE, ENGINEER

by Andrea Beaty illustrated by David Roberts



ABOUT THE BOOK

Rosie Revere has a passion for engineering imaginative inventions. She can turn ordinary trash into extraordinary gizmos and gadgets such as hotdog dispensers and even helium pants. ***Rosie Revere, Engineer***, from the powerhouse team of Andrea Beaty and David Roberts, celebrates the intrepid spirit of courageous inventors, emboldening young girls and boys to follow in Rosie's footsteps and be unafraid to test their ideas, make mistakes, and learn from them.

Rosie's wild and outlandish inventions give her a sense of purpose and pride. That is, until Uncle Fred the Zookeeper unintentionally dampens Rosie's spirit of invention by laughing at her gift, a cheddar-cheese-spray-hat to keep pythons away. It takes a visit from Aunt Rose (Rosie the Riveter) to teach Rosie a valuable lesson about the design process.

Rosie's spirit of invention lies within every young child. ***Rosie Revere, Engineer*** underscores the value of a wild imagination as Rosie learns that "The only true failure can come if you quit."

About the Author and Illustrator

Andrea Beaty and David Roberts are the creators of ***Ada Twist, Scientist***; ***Iggy Peck, Architect***; and ***Happy Birthday, Madame Chapeau***, among other award-winning children's books. Out-of-this-world ***Rosie Revere, Engineer*** is currently orbiting Earth aboard the International Space Station as part of the Story Time from Space program, storytimefromspace.com. Beaty lives just outside of Chicago. Visit her online at andreabeaty.com and on Twitter: @AndreaBeaty. Roberts lives in London.

VOCABULARY

These vocabulary words can be found throughout the book (in the order they are listed). Use these words as a starting point for a vocabulary study with ***Rosie Revere, Engineer***. Research shows that reading and discussing new words within the context of reading is one of the most effective ways to learn vocabulary.

Stash	***Gizmos***	***Pythons***	***Goals***	***Sputtered***
Eaves	***Inventions***	***Perplexed***	***Hauled***	***Whirled***
Gadgets	***Helium***	***Dismayed***	***Flop***	***Lever***

FUN ACROSS THE CURRICULUM

ACTIVITIES: Use these activities to extend student learning with *Rosie Revere, Engineer*

MOTHERS OF INVENTION Female Inventors

Students learn about famous female designers and pilots. Begin by sharing the famous aviators noted in the spread of Rosie's journal, i.e., Harriet Quimby, Elisabeth Thible, E. Lillian Todd, Bessie Coleman, Amelia Earhart, and Lynn Rippelmeyer. Research other professions in which women have been successful as inventors. Visit Famous women-inventors.com to learn about other female inventors, such as Mary Anderson, who invented the windshield wiper; Marion Donovan, inventor of disposable diapers; and Stephanie Kwolek, the inventor of Kevlar. Brainstorm characteristics that made them successful inventors.

INVENTION SPAN The Design Process

Explore the steps of the design process, i.e., observe, ask, build a prototype, test, improve, retest. Fill in the following chart with students' examples at each stage of the design process.

Observe: What types of things can you observe?

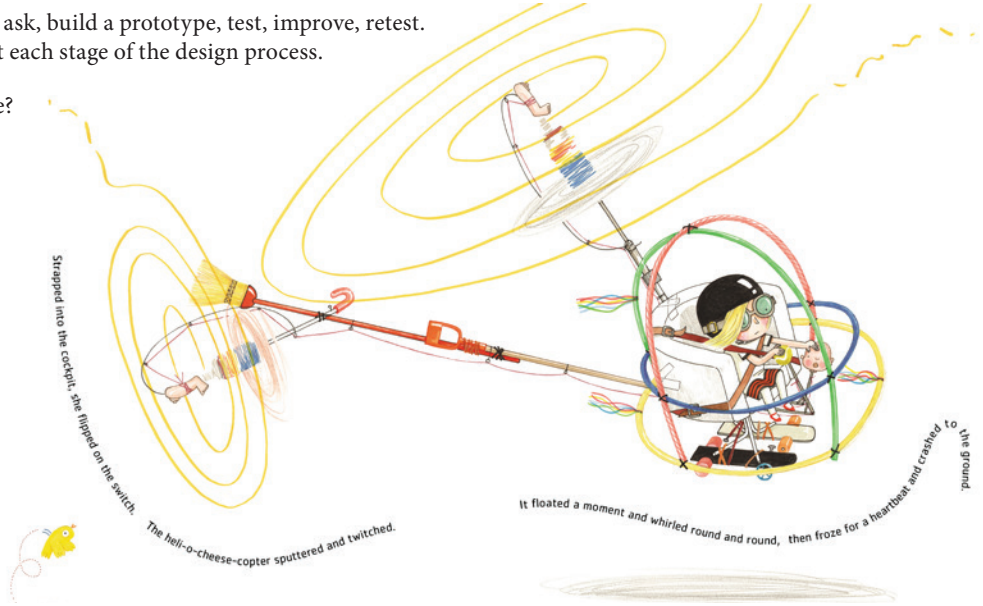
Ask: What types of questions can you ask?

Build: What recyclables can you use to build your invention?

Test: How can you test it?

Improve: How can you improve it?

Retest: What happened when you retested it?



QUIRKY QUESTIONS Developing questions that improve inventions!

Turn each invention into a question that could spark a new, improved version of the same invention.

EXAMPLE

Dishwasher *How can a dishwasher stack dishes?*

INVENTION	QUESTION
pencil	_____
shoe	_____
chair	_____
notebook	_____

BACK TO THE DRAWING BOARD Drawing Designs

Rosie draws a plan for each of her inventions. Students will draw a plan for a prototype of a new invention based on one of their questions from "Quirky Questions," using recycled elements from the home or the classroom. Review the materials Rosie used, e.g., broom, skate, umbrella, streamers, doll leg, doll head, skateboards, Hula-Hoop, belts, steamers, spray bottle, fishing line, tennis ball, sander, shovel. All parts and materials should be labeled in a pencil-sketched plan first. Students will share their designs with the classroom.

WILD, WILD TEST Test and Retesting

Students will develop working prototypes of their plans from "Back to the Drawing Board," using recycled elements. Students will test their inventions; record their findings; make improvements based on their findings; and retest their inventions. *Note that the retesting phase should repeat over and over again, and usually does.

DESIGN JOURNAL

QUESTION 1

What happened the first time you tried your invention?

What can you improve?

QUESTION 2

How can you improve your invention?

QUESTION 3

What happened when you retested?

QUESTION 4

How can you improve your invention?

FAMOUS FAILURES Individuals who failed before they succeeded

"If I find 10,000 ways something won't work, I haven't failed. I am not discouraged, because every wrong attempt discarded is another step forward." — Thomas Edison

Each of the following individuals made mistakes and learned from them.
Match each individual in the first column with his/her great accomplishment.

1. J.K. Rowling	a. pop singer, songwriter, pianist
2. Walt Disney	b. mathematician and physicist
3. Albert Einstein	c. inventor of the Apple computer
4. Steve Jobs	d. creator of Mickey Mouse
5. Lady Gaga	e. author and creator of Harry Potter

UNCONDITIONAL INVENTOR Inventions that made people laugh

Rosie's invention makes Uncle Fred and his pythons laugh, but some of the inventions we use today may have seemed absurd at the time they were invented. Review each invention and infer why it might have seemed ridiculous at the time it was invented.

INVENTION	INVENTOR	YEAR IT WAS INVENTED	WHY DID PEOPLE LAUGH?
light bulb	Thomas Edison	1879	_____
airplane	Wright Brothers	1903	_____
solar panels	Dr. Mária Telkes	1947	_____

FRANKEN-DESIGNING Toy Deconstruction/Reconstruction

Explore the design process with recycled elements and old toys. Instruct students to bring old dolls, electronics, remote controls, and windup toys to class. Allow students to deconstruct and the mix parts to reconstruct new toys or inventions. *Visit the San Francisco Exploratorium's website for more ideas: exploratorium.edu/explore.

HI-TECH INVENTORS Design technologies for budding designers

- Visit Scratch (scratch.mit.edu) with students to explore how coding may be used to design and invent. This is a free website from MIT.
- The following technologies allow students to explore invention using the gizmos and gadgets that real inventors use, e.g., levers, switches, and gears with:

  Wonder Workshop,
  LittleBits,
  Thymio robotics,
  Snap Circuits,
  PiperCoding,
  Chibitronics, Bloxels,
  3Doodler START,
  Wearable Technology: LilyPad

DISCUSSION QUESTIONS: Use these questions as whole-class discussions, reading check-ins, or as writing prompts with *Rosie Revere, Engineer*

Explain how some inventions are ahead of their time.

Define the characteristics that make Rosie and her Aunt Rose successful inventors. Compare and contrast Rosie to famous inventors discussed in this packet. How is she the same or different?

Why did Uncle Fred laugh at Rosie's invention? How do you think he would feel if he knew that Rosie stopped inventing because of his laughter? What do you think he might say to her?

COMMON CORE STANDARDS

Here are a few examples of English Language Arts Common Core Anchor Standards that can be met by extending ***Rosie Revere, Engineer*** with the above discussion questions/activities.

CCSS.ELA-LITERACY.CCRA.R.1
Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.

CCSS.ELA-LITERACY.CCRA.R.2
Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas.

CCSS.ELA-LITERACY.CCRA.R.3
Analyze how and why individuals, events, or ideas develop and interact over the course of a text.

CCSS.ELA-LITERACY.CCRA.R.4
Interpret words and phrases as they are used in a text, including determining technical, connotative, and figurative meanings, and analyze how specific word choices shape meaning or tone.

CCSS.ELA-LITERACY.CCRA.R.5
Analyze the structure of texts, including how specific sentences, paragraphs, and larger portions of the text (e.g., a section, chapter, scene, or stanza) relate to each other and the whole.

CCSS.ELA-LITERACY.CCRA.W.7
Conduct short as well as more sustained research projects based on focused questions, demonstrating understanding of the subject under investigation.

CCSS.ELA-LITERACY.CCRA.W.9
Draw evidence from literary or informational texts to support analysis, reflection, and research.

NEXT GENERATION SCIENCE STANDARDS

Here are Next Generation Science Standards Topics from grade Kindergarten-Middle School that can be met by extending ***Rosie Revere, Engineer*** with the above discussion questions/activities.

K-2-ETS1-1 Engineering Design
Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.

K-2-ETS1-2 Engineering Design
Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.

K-2-ETS1-3 Engineering Design
Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.

3-5-ETS1-1 Engineering Design
Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.

3-5-ETS1-2 Engineering Design
Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.

3-5-ETS1-3 Engineering Design
Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.

MS-ETS1-1 Engineering Design
Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.

MS-ETS1-2 Engineering Design
Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.

MS-ETS1-3 Engineering Design
Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.

MS-ETS1-4 Engineering Design
Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.

ALSO AVAILABLE

This educator's guide was written by Julia Dweck,
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