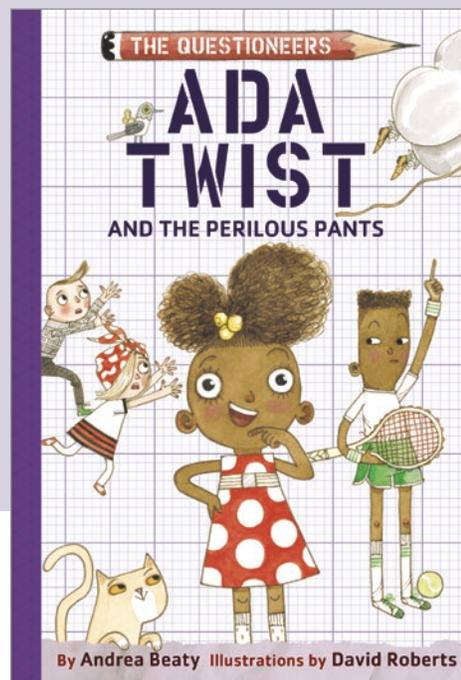


ADA TWIST AND THE PERILOUS PANTS

by Andrea Beaty illustrated by David Roberts



ABOUT THE BOOK

Ada Twist is full of questions. A scientist to her very core, Ada asks why again and again. One question always leads to another until she's off on a journey of discovery!

When Rosie Revere's Uncle Ned gets a little carried away wearing his famous helium pants, it's up to Ada and friends to chase him down. As Uncle Ned floats farther and farther away, Ada starts asking lots of questions: How high can a balloon float? Is it possible for Uncle Ned to float into outer space? And what's the best plan for getting him down?

Praise for the Chapter Books

"The Questioners—Rosie the engineer, Iggy Peck the architect, and Ada the scientist—work together, asking questions like scientists . . . Adventure, humor, and smart, likable characters make for a winning chapter book." —*Kirkus Reviews*

"The strength of this series is in the positive portrayal of diverse kids engaging in various arts and sciences." —*Booklist*

"Balance[s] entertainment with key life lessons in problem-solving, persistence, and resilience." —*Publishers Weekly*

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. Use these words as a starting point for a vocabulary study with *Ada Twist and the Perilous Pants*. Research shows that reading and discussing vocabulary within the context of reading is one of the most effective ways to learn vocabulary.

Perilous

Hazardous

Research

Eddy

Aroma

Investigating

Observations

Molecules

Buoyance

Citizen Scientist

Hypothesis

Pungent

ALL THAT MATTER

This chapter books talks a lot about one kind of matter: gas. Define matter for your students. Explain to them that matter is what stuff is made of. That sounds rather silly and not very scientific, but it's true. It is a collection of atoms, which are made of smaller parts like electrons, protons, and neutrons.

Discuss the different states of matter with your students:

Solid—A solid does not change shape based on its container or when it is pushed on by a force. That is because the atoms or molecules are bound strongly together and are in the same position to each other over a long time.

Liquid—A liquid can change shape when it is pushed on by a force. The atoms or molecules are not as strongly connected as with a solid. Liquid can pour and takes on the shape of a container.

Gas—A gas can also be poured and takes the shape of a container. The bonds between atoms or molecules in a gas are weak. Molecules interact with each other by bouncing around and sometimes bouncing into each other. Gas molecules always spread out to be evenly spaced apart and to fill the container.

Plasma—Plasma is a gas with so much energy that its electrons cannot stay in orbit around the atomic nucleus, and they fly off into a cloud of electrons and atomic particles. Stars like our sun are made mostly of plasma. On Earth, we find plasma in the Northern Lights (Aurora Borealis) and the Southern Lights (Aurora Australis). Manmade examples of plasma can be found in neon signs, fluorescent lights, and welding arcs.

Ask students if they have ever seen a substance in more than one state of matter depending on temperature. For instance, think about water. A water molecule is one oxygen atom with two hydrogen atoms (H_2O). Most water we see is liquid. Frozen water—ice—is a solid. Steam is a gas.

ACTIVITIES

SCIENCE JOURNAL

Supplies needed: composition notebook, pictures to decorate the cover, markers, scissors, glue stick

Ada says she writes down important things, so she will remember. A science journal will help you remember information. A journal will also give you a place to reflect and deeply learn something.

Take time to decorate the front and back covers of the composition notebook with photos of yourself in science gear or your favorite science images. Cut out and glue pieces of paper to label the notebook science journal. Be sure to put your name on the bottom of the cover. Clear contact paper and/or clear packing tape could be used to laminate the cover and to protect the photos and paper added to the cover. Start with a title page by writing Science Journal at the top of the page and your name at the bottom of the page. On the second page write Table of Contents at the top. Leave four pages behind the table of contents blank, so you can add to it. Each time a topic is added, write the steps of the scientific method:

1. Brainstorm questions.
2. What do the experts say? Research the answers to your questions.
3. What is your educated guess, or hypothesis?
4. Test your hypothesis.
5. Collect Data and test your hypothesis more than once.
6. Evaluate your data and draw a conclusion. What are your findings?

SKETCHNOTING

Supplies needed: pencil, markers, paper, or science journal

Sketchnoting paints a complete picture with graphics and key words. In the book, Ada talks about the importance of notetaking to help her remember information and to help her explain information. Using pencils and markers, ask students to sketchnote how they would get Uncle Ned down. Students' drawings should include key words to explain their rescue plan.

THE SMELL TEST

Supplies needed: microwave-safe dishes, cinnamon stick, mint leaf, orange peel, blind fold, pencil, paper, or science journal

In chapter four, Ada sets up a smell test to figure out why some things smell and others don't. Conduct a smell test with your students. Collect three different items with distinct odors (such as a cinnamon stick, mint leaf, or orange peel). Place each item into separate microwave-safe plastic containers. Ask students to place a blindfold over their eyes. Have them smell each dish. Ask them to describe the object's scent (e.g. fruity, woody, sweet, minty, or nutty). Have them guess what the item might be based on its scent.

After students have smelled all three dishes, ask them to rank the dishes based on strength of scent. Which dish smells the most? The least? Then, place each dish in the microwave for ten seconds and have students smell each dish again. Ask them how the scents have changed from the first round. Did the smell intensify with heat? Have students record their answers and see if you can detect a pattern. Take notes of your findings.

MAKE A COMPASS

Supplies needed: a compass, magnet, non-metallic bowl, water, metal paperclip, foam packing peanut

In chapter ten, we find out Ada always carries a compass in her pocket. Together with your students, create your own compass with a few simple supplies listed above.

First, unfold the paper clip. Straighten and lengthen the clip as much as possible. Rub the magnet against the entire surface of the paperclip repeatedly for about a minute or two. Take the paperclip and thread it through the packing peanut. Make sure the clip is centered in the middle of the peanut.

Then, fill the bowl with water. Place the packing peanut with the paperclip running through it in the dish. One end will point north, and the other end will point south. Place the homemade compass next to a real compass to verify that it works.

ADDITIONAL ONLINE RESOURCES

- Science Buddies (sciencebuddies.org)
- SciStarter (scistarter.com)
- "Kids Make Great Citizen Scientists" from Science News for Students (sciencenewsforstudents.org/article/kids-make-great-citizen-scientists)
- eBird App (ebird.org)
- Merlin Bird ID App (merlin.allaboutbirds.org)

DISCUSSION QUESTIONS

Use these questions for whole-class discussions, reading check-ins, or as writing prompts with students.

1. In chapter one, what makes Ada happy? Explain why.
2. Ada writes important things down in chapter two. Why is it important for scientists to take notes?
3. In chapter three, how does research help Ada?
4. Ada tested her hypothesis more than once in chapter four. Why is it important to test your hypothesis more than once?
5. In chapter five, what is Ada hoping to find in the data she collects?
6. How did Rosie, Iggy, and Ada get the nickname the Questioneers in chapter seven?
7. In chapter eight, how does drawing her ideas help Ada?
8. What advice does Rosie's aunt give Rosie to help her focus in chapter nine?
9. In chapter eleven, Iggy compared a river to a _____.
10. In chapter twelve, Ada's parents said the bathroom is not a science lab. Why is that a good rule?
11. Why does Ada's mom say to "start at the start" in chapter twelve?
12. What does Rosie compare Uncle Ned to in chapter fourteen?
13. Why were the Questioneers running out of time to save Uncle Ned in chapter fifteen?
14. In chapter sixteen, what caused Uncle Ned to drop the helmet?
15. Why does Ada write down important things in chapter seventeen?

MORE ABOUT GASSES

Gas molecules bounce around randomly in empty space. Gas molecules move very fast and have a lot of energy from motion. That energy is called kinetic energy. Gas molecules bounce off each other and spread out to fill a container no matter how big it is. Gas molecules always try to spread out until they all have the same amount of empty space around them.

If more gas particles are in a container, they cannot spread out as much, and they bounce off each other more often. They also bounce against the sides of the container. This force is called pressure.

Uncle Ned's helium pants were puffy because of the pressure from the helium molecules bouncing around in his pants. (Did you ever think of pants as a container before?) Uncle Ned's pants had lots of pressure pushing out from the helium molecules, but they didn't explode like a balloon, because there were also lots of air molecules outside of his pants. The pressure outside his pants balanced the pressure from inside his pants!

Gasses and the Weather

The amount of the sun's energy that is absorbed by the surface of the Earth varies from place to place. For instance, a snowy surface reflects the sun's light and absorbs less energy than a dark field. Dense clouds can also block sunlight from reaching the ground and warming it.

The seasonal position of the sun also affects the amount of energy reaching the planet's surface. In December, the southern hemisphere is closer to the sun and is warmer than the northern hemisphere. In other words, the surface of the Earth does not warm evenly. The air above the surface is also warmed or cooled depending on the type of surface.

Warm air molecules bounce around faster and spread out more than the molecules in cool air. They are less crowded, or dense, than cooler air. Molecules in the cool air are more crowded than warm air molecules.

Remember that gas molecules always spread out to be evenly spaced apart. This is important in understanding weather. Crowded molecules from cool air try to spread into nearby areas of warm air because the gas molecules there are less crowded.

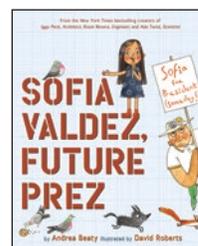
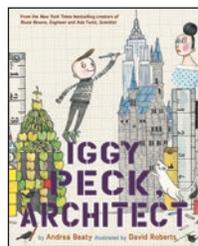
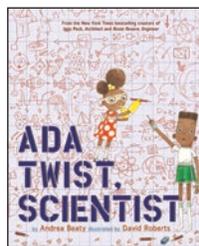
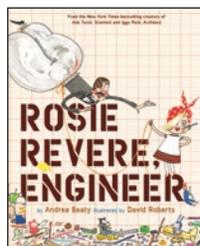
This movement of air from one area to another is wind!

On a weather map, the zones of warm air and cool air are called systems. A high-pressure system usually brings sunny skies. It is a mass of dry, cool air with light winds and fair weather. A low-pressure system is a whirling mass of moist, warm air and high winds or even stormy weather.

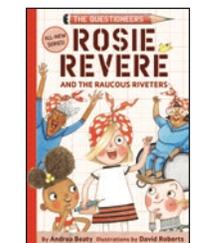
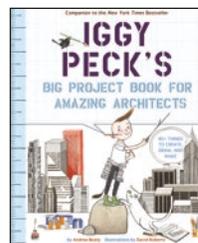
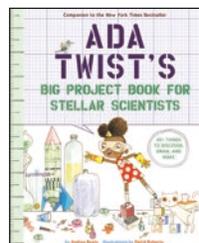
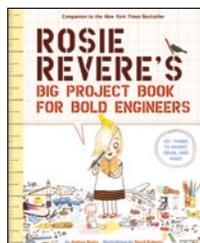
On a weather map, high-pressure systems are marked with a big H and low-pressure systems are marked with a big L. Check it out next time you watch the weather report. Follow the weather for several days to see how the map changes.

ALSO AVAILABLE

PICTURE BOOKS



ACTIVITY BOOKS



CHAPTER BOOKS

