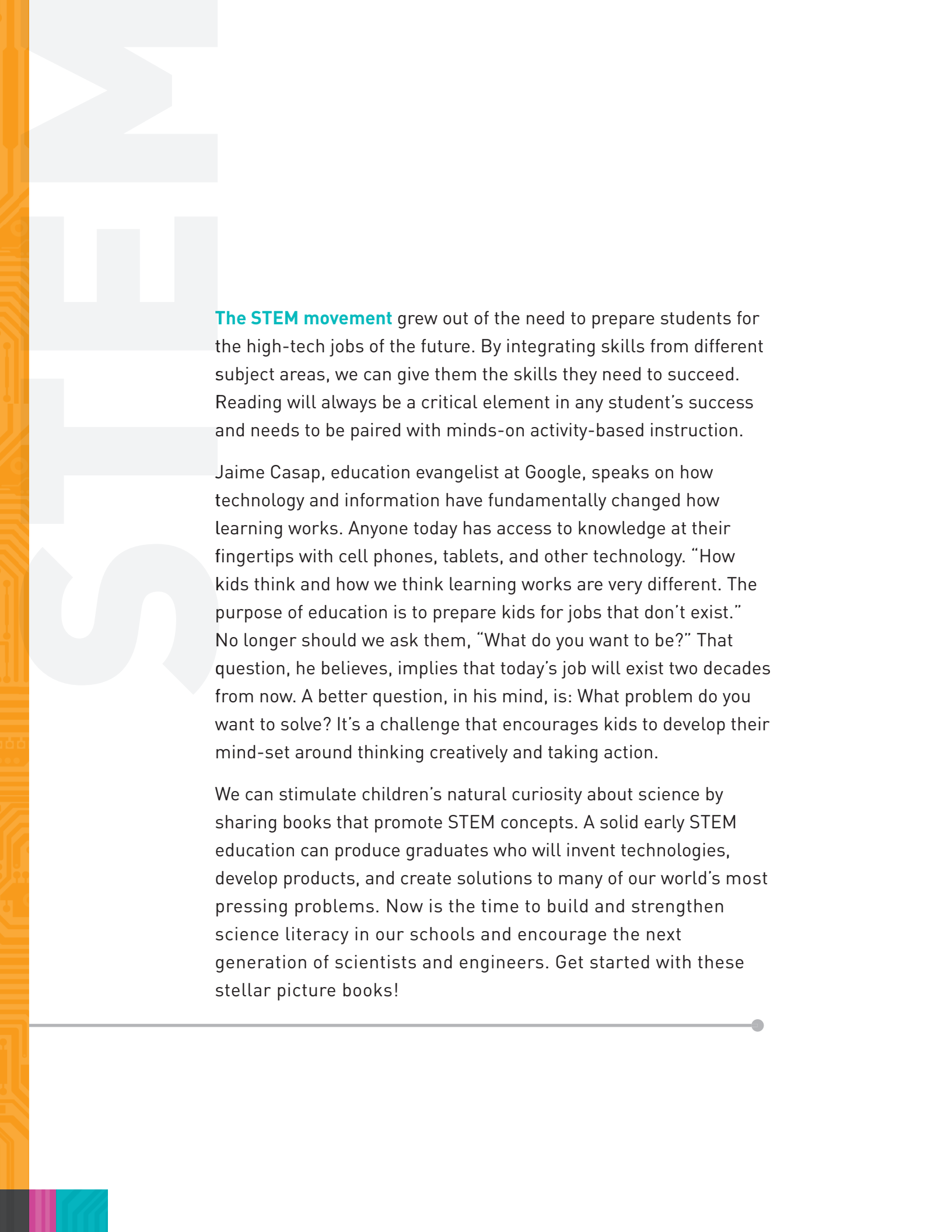




Science Technology Engineering Math PICTURE BOOK EDUCATORS' GUIDE

STEM is an integrated and creative approach to discovering and applying knowledge to solve problems in the real world. Picture books that deliver background knowledge and model the potential uses of STEM provide context and inspiration to readers. Look inside this Picture Book Educators' Guide for activities based on the Next Generation Science Standards that are designed to challenge students to go beyond their limits.



The STEM movement grew out of the need to prepare students for the high-tech jobs of the future. By integrating skills from different subject areas, we can give them the skills they need to succeed. Reading will always be a critical element in any student's success and needs to be paired with minds-on activity-based instruction.

Jaime Casap, education evangelist at Google, speaks on how technology and information have fundamentally changed how learning works. Anyone today has access to knowledge at their fingertips with cell phones, tablets, and other technology. "How kids think and how we think learning works are very different. The purpose of education is to prepare kids for jobs that don't exist." No longer should we ask them, "What do you want to be?" That question, he believes, implies that today's job will exist two decades from now. A better question, in his mind, is: What problem do you want to solve? It's a challenge that encourages kids to develop their mind-set around thinking creatively and taking action.

We can stimulate children's natural curiosity about science by sharing books that promote STEM concepts. A solid early STEM education can produce graduates who will invent technologies, develop products, and create solutions to many of our world's most pressing problems. Now is the time to build and strengthen science literacy in our schools and encourage the next generation of scientists and engineers. Get started with these stellar picture books!



THE NEW OCEAN: The Fate of Life in a Changing Sea

Bryn Barnard

Grades K-3

HC: 978-0-375-87049-1

GLB: 978-0-375-97049-8

EL: 978-0-307-97403-7



A fascinating look at the future of our oceans—
and how human actions may change it.

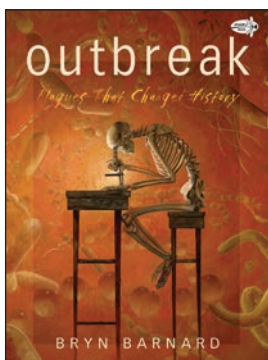
IN THE CLASSROOM

- **Oceans cover most of the Earth's surface**, yet they have been explored less than the moon. Human activity is having a devastating effect on marine life and the ability of the ocean to regulate our climate. The six ocean dwellers profiled in this book provide a peek into ocean life and the interconnected nature of our planet. What can we do as citizen-scientists to protect our oceans and waterways? Think about the waterways in your hometown. What can you and your classmates do to increase community awareness of this important issue? Write an action plan, and get involved.
- The six ocean dwellers (jellyfish, orcas, sea turtles, tuna, corals, and blue-green algae) represent different sizes and classes of animals. Research their life cycles and habitats around the world. Outline some basic facts about each species, and see if you can find anything strange or particularly interesting. Pick one species and find out how

it interacts with the rest of the food chain. Research how humans interact with this species. Do some people rely on this organism for food? Does this species affect the survival of people on Earth?

- The ocean contains three things of great importance to humanity: animal life, water, and dissolved minerals. Each of these will be of great use in the future. Explore in depth!
- A lot of our food is harvested from the ocean. At the same time, most of the pollution produced by our industries ends up in our waterways. This reduces the ability of the ocean to support life generally, but also has dire consequences on the health of organisms within the ocean, some of which we eat. Discuss society's needs versus the needs of the ocean. What will be the outcome if humans continue to ignore the health of the ocean?

ALSO BY BRYN BARNARD



OUTBREAK: Plagues That Changed History

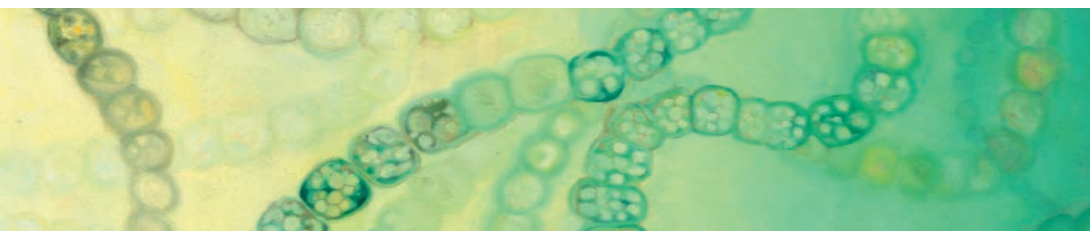
Grades 3-7

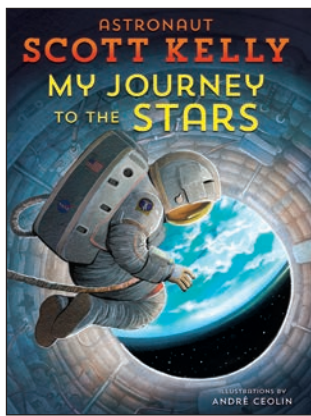
PB: 978-0-553-52222-8

EL: 978-0-307-48925-8



Art © 2017 by Bryn Barnard





MY JOURNEY TO THE STARS

Astronaut Scott Kelly; Illustrated by André Ceolin

Grades K–3

HC: 978-1-524-76377-0

GLB: 978-1-524-77031-0

Available October 2017



NASA astronaut Scott Kelly was the first American to spend an entire year in space! Discover his awe-inspiring journey in this fascinating picture-book memoir that takes readers from Scott's childhood as an average student to his record-breaking year among the stars.

IN THE CLASSROOM

- Scott and Mark Kelly are the first twin astronauts in history! The fact that they share the same genes has made NASA's study on them all the more insightful. Twins present scientists with a unique opportunity to have a control subject. In fact, they are in such high demand that an annual twins fair is held in Twinsburg, Ohio, where scientists set up booths hoping to attract twins to their studies. Investigate important twin studies in the fields of medicine and genetics. Have there been twin studies on siblings who were your age?
- Have you ever wondered what it would be like to live and work in space? Describe what you think eating, sleeping, exercising, and playing on the International Space Station would be like. Make sure you include everyday tasks like brushing your teeth.



Photo © 2017 NASA/Tim Peake



Photo © 2017 NASA



Photo © 2017 NASA



MARGARET AND THE MOON:

How Margaret Hamilton Saved the First Lunar Landing

Dean Robbins; Illustrated by Lucy Knisley

Margaret Hamilton loved numbers as a young girl. Soon math led her to MIT and then to helping NASA put a man on the moon!

IN THE CLASSROOM

- Scientists ask questions . . . lots of questions. Margaret asked a lot of questions her entire life. Are you curious like Margaret? Science is built upon questions, ranging from the deceptively mundane to the mind-bendingly complex. Today we want to know about the question that is most intriguing to you. Maybe it doesn't have an answer yet, or it could be a question that is all the more intriguing for having a partial answer. It could even be a question with multiple answers! Once everyone has a question or topic, compile a class list. What scientific question most piques your curiosity? Whatever it is, tell us why it fascinates you. See if you can find an answer! Research and report.
- Women have made significant contributions to science throughout history. When it comes to the topic of women in science, Marie Curie usually dominates the conversation. After all, she discovered two elements and won two Nobel Prizes. But she was not the first woman scientist—there have been many brilliant women who have pursued science over the years. Your mission is to investigate one living female scientist, and write a press release about her work and accomplishments.

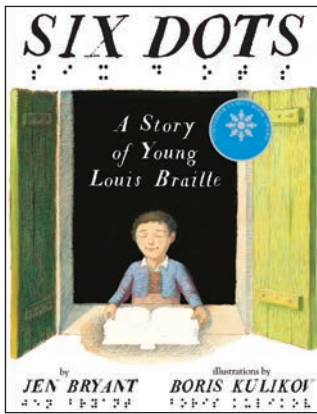
Grades 4–8

HC: 978-0-399-55185-7

GLB: 978-0-399-55186-4

EL: 978-0-399-55187-1





SIX DOTS: A Story of Young Louis Braille

Jen Bryant; Illustrated by Boris Kulikov

Grades PreK–3

HC: 978-0-449-81337-9

GLB: 978-04-49-81337-9



A 2017 NSTA
Best STEM
Book

An inspiring picture-book biography of Louis Braille—a blind boy so determined to read that he invented his own alphabet.



Art © 2017 Boris Kulikov

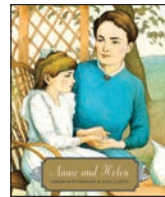
IN THE CLASSROOM

- Braille is a system of printing and writing for the blind and visually impaired. Invite a blind person who reads Braille (there may be a student in your school) to your classroom, and ask the person to describe the challenges and opportunities that come from having access to this system. Students should compile questions prior to the visit. Take into account that most people think of reading Braille, but there is also a writing component. How long does it take to read a Braille book compared to a standard book?
- Collaborate with your school librarian to research and discuss the development of Braille translation software. Transcription refers to the process by which a person converts the text of a print document to Braille, but if the task is done by a computer program, it is often called translation.

The first Braille translation software was developed in the 1960s, which is more than a century after the code was developed by Louis Braille.

- Louis Braille became blind from an accident at the age of five. How do you think his life would have been different had he been born blind?

Related Title



ANNIE AND HELEN

Deborah Hopkinson;
Illustrated by Raul Colón

Grades PreK–3

HC: 978-0-375-85706-5



THE SECRET SUBWAY

Shana Corey
Illustrated by Red Nose Studio

Grades PreK–3

HC: 978-0-375-87071-2

GLB: 978-0-375-97071-9

schwartz & wade books

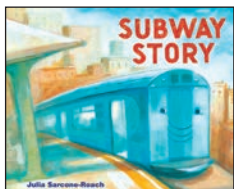
A 2017 NSTA
Outstanding Science
Trade Book for
Students K–12

This picture book tells the story of Alfred Ely Beach, whose Beach Pneumatic Transit was an early version of the New York subway and was eventually abandoned to the shadows of history.

IN THE CLASSROOM

- Compile a list of major world cities that have subway systems. If your city doesn't have a subway system, investigate why.
- Airports use trams or trains to transport passengers; Disneyland and Disney World also use trams and trains to support park visitors. Parts of these transport systems travel underground. There are similarities between these transport systems and subways. What is needed to successfully build an underground transportation infrastructure, such as a subway? If subways were invented earlier in human history, do you think they would have become a major form of transit?
- Alfred Beach's invention was initially a success, but then it failed. William Marcy "Boss" Tweed, who dominated local politics, would never allow the development of a transportation system that might threaten his investments in existing horse-drawn cabs. This is a revealing story of the interplay between science and culture. Can you find other instances where science was thwarted by culture or personal interest?
- On an average day in New York City in 2015, 5.7 million people rode the subway. Do you think this is a good thing? Discuss the positives and negatives of widely used public transport.

More New York City Stories with STEM Connections



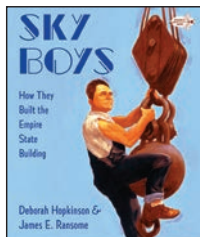
SUBWAY STORY

Julia Sarcione-Roach

Grades K–4

HC: 978-0-375-85859-8

EL: 978-0-375-98471-6



SKY BOYS: How They Built the Empire State Building

Deborah Hopkinson;
Illustrated by James E.
Ransome

Grades PreK–3

HC: 978-0-375-86541-1

MAD SCIENTIST ACADEMY

Matthew McElligott



Grades K-3

IN THE CLASSROOM

- The students of the Mad Scientist Academy use Dr. Cosmic's crazy inventions to learn about different environments. How would you go about researching these topics? As a group or class, compile a list of future science topics for the Mad Scientist Academy students. Pick one, and discuss how you could learn more about it.

Dr. Cosmic's class of clever monsters at the Mad Scientist Academy solve the greatest challenges in science in this perfect blend of adventure and exploration.

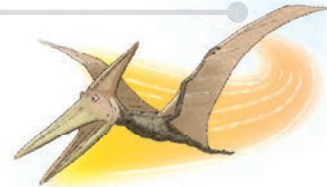
- What is a "mad scientist"? Many of the world's greatest discoveries were the result of experiments that were initiated by so-called mad scientists: Sidney Gottlieb, Jack Parsons, and José Delgado, for example. In reality, is there such a thing as a mad scientist?



PB: 978-0-553-52378-2
HC: 978-0-553-52374-4
GLB: 978-0-553-52375-1

THE DINOSAUR DISASTER IN THE CLASSROOM

- Dr. Cosmic is a science teacher. As you read the book, determine which of his actions are those of a teacher and which are those of a scientist. How are they different? Why are the students so excited to be in his class?
- Cloning animals is increasingly common. We know that dinosaurs are extinct, but is there a chance that in the future scientists will be able to clone a dinosaur? Read this *Time for Kids* article at timeforkids.com/news/article-theyre-back/98981, and discuss the pros and cons of de-extinction. Do you believe scientists should intervene? Why or why not?



HC: 978-0-553-52376-8
GLB: 978-0-553-52379-9

THE WEATHER DISASTER IN THE CLASSROOM

- Select an animal that lives in an extreme environment, and research how this species survives the weather in their natural habitat.
- With advances in science and engineering, we can forecast catastrophic events and develop technologies to mitigate their effects. Scientists have created the Eden Project, a hot and humid tropical environment in Cornwall, in southwest England, by building an enormous greenhouse made of a special plastic foil. The material is transparent, allowing sunlight to reach the plants. Can you think of other ways scientists have used STEM to alter an environment?



HC: 978-0-553-52382-9
GLB: 978-055-352383-6

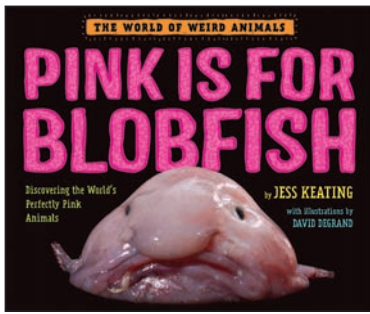
THE SPACE DISASTER IN THE CLASSROOM

- Since ancient times, humans have studied the stars. As science progressed and scientific instruments and equipment were developed and improved, scientific data and real-time space exploration became a reality. The students at Mad Scientist Academy simulated visits to some out-of-this-world locations. In groups, discuss what you think was accurate about the simulations. Talk about the challenges of space travel.
- NASA's New Horizons mission is helping us understand worlds at the edge of our solar system by making the first reconnaissance of the dwarf planet Pluto and venturing deeper into the distant Kuiper Belt. STEM was involved in every aspect of this mission, which you can learn more about at NASA.gov/mission_pages/newhorizons/overview/index.html. Investigate the people and planning involved, as well as problems and solutions leading up to the launch and beyond.

THE WORLD OF WEIRD ANIMALS

Jess Keating

Grades K-3



PINK IS FOR BLOBFISH: Discovering the World's Perfectly Pink Animals

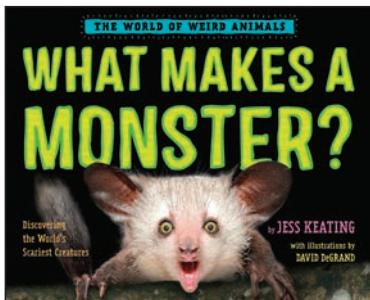
HC: 978-0-553-51227-4

Meet the weirdest, wildest, pinkest critters in the animal kingdom!



IN THE CLASSROOM

- Who knew there were so many pink animals? What is your favorite color? Individually or in a group, choose another color. Research creatures of that color, and write a page for a class book!
- The blobfish (*Psychrolutes microporosus*) is a species that lives at great depths, is rarely seen, and has been voted the world's ugliest animal by the Ugly Animal Preservation Society. Do you think the blobfish is ugly? Why? What are some other animals that are considered ugly? How do their "ugly" traits help them survive?



WHAT MAKES A MONSTER? Discovering the World's Scariest Creatures

HC: 978-0-553-51230-4

GLB: 978-0-553-51231-1

Monsters are real—and they're everywhere in nature! This picture book puts the "Ack!" into backyard science.

Share Jess Keating's Animals for Smart People YouTube channel with your students and stay up to date on cool zoology news.

IN THE CLASSROOM

- Plants and animals develop distinct survival mechanisms to combat their harsh environments and predators. Often it is an organism's appearance that makes us think of it as a monster or its behavior that makes us think of it as being weird. Make a list of weird animals in your area. Describe the animal and its appearance or behavior.
- A monster is in the eye of the beholder. For example, humans don't find kittens very threatening, but mice do. Imagine that you were shrunk down to the size of a pigeon, a frog, an ant, or any other animal. What creatures would scare you the most? Why?

MORE STEM READS



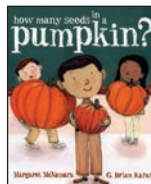
THE BOY WHO INVENTED TV: The Story of Philo Farnsworth

Kathleen Krull;
Illustrated by Greg Couch

Grades 1-4

PB: 978-0-385-75557-3

HC: 978-0-375-84561-1



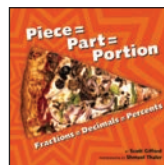
HOW MANY SEEDS IN A PUMPKIN?

Margaret McNamara;
Illustrated by G. Brian Karas

Grades PreK-2

HC: 978-0-375-84014-2

EL: 978-0-307-55680-6



PIECE = PART = PORTION: Fractions = Decimals = Percents

Scott Gifford;
Photographed by Shmuel Thaler

Grades 1-4

PB: 978-1-582-46261-5



VELMA GRATCH & THE WAY COOL BUTTERFLY

Alan Madison;
Illustrated by Kevin Hawkes

Grades PreK-3

PB: 978-0-307-97804-2

HC: 978-0-375-83597-1

EL: 978-0-307-56096-4

INTERNET RESOURCES

For the resourceful educator, there's no shortage of exciting projects and activities for teaching STEM. These sites will guide you to use STEM lessons effectively in your classroom, help students to practice cross-disciplinary thinking, and build skills.

The Next Generation Science Standards (NGSS)

ngss.nsta.org

Become familiar with the NGSS and explore how to include them in your lesson plans.

The American Association for the Advancement of Science

ScienceNetLinks.com

This website provides K-12 lesson plans, a science history calendar to learn about important historical dates, and the latest science news.

National Geographic Society

nationalgeographic.org/education/stem-education/?ar_a=1

This website offers ideas, activities, lessons, and units that are connected to real-world applications.

PBS Learning Media

ny.pbslearningmedia.org

With more than 4,000 STEM resources available in its database, this website has a vast array of lesson plans, videos, and interactive resources to help you infuse both fun and rigor into your STEM classroom.

STEMfinity

STEMfinity.com/Free-STEM-Education-Resources

This site hosts free STEM resources to complement project-based learning for pre-K to 12.

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Prepared by Terrence Young, Jr., M.Ed.,MLS who has been a librarian and science educator for 40 years and gives presentations on STEM Literacy across the country.