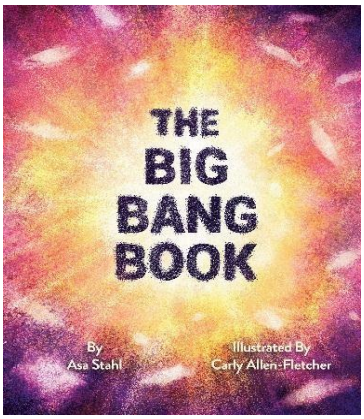



## *The Big Bang Book*

by Asa Stahl, illustrated by Carly Allen-Fletcher
ISBN: 978-1-939547-64-4
Format: Hardcover
Pages: 32pp, color
Size: 8.5in x 10.5 in.
Category: Non-Fiction/STEM
Age Range: 4 -9
Publication: April 2020
Price: 18.99

"This is the story of the universe. And it begins: Once Upon a Time, we don't know. . ."

**Background Information:**
*The Big Bang Book* presents the mystery of how the universe began in a way we can all understand. Written by an astrophysicist, the pages describe what we know – and what we don't – in a compelling, accessible way. Moving out into the farthest reaches of space, then back home on Earth again, this is a picture book Carl Sagan would love, introducing the wonder of our pale blue dot to the youngest readers.

**Standards:**
**Teks:** Grade 2, 110.13, 112.13; Grade 3 110.14, 112.14; Grade 4 110.15, 112.15
**CCSS skills:** Literacy, Foundational, Writing**; CCSS strands** RF3.3, 3c,4a, 4b, 4c, RI 3.1,2,3,4, 6, 7, 8, 9, 10, L.3, 3, 4, 4a, 4c, 5, 5a, 5b, 5c, 6, SL 3.1, 1c, 1d, 2, 3, 4,5, 6, W 3.1, 2, 3, 4, 7, 8, 10.
**Next Generation Science Standards:** 5- PS2-Motion and Stability: Forces and Interactions, 3-LS4Biological Evolution: Unity and Diversity, 3-ESS2-Earth's Systems

**Lexile Level:** 360. STEM title, astronomy, biology, earth science. Physics
**Guided Reading**: Level N
**Grade level** equivalent 3, Grade level interest 1-5;

**Educational Description:**
STEM Content, simple informative text, narrative prose, Physical & Earth Science Content; Big Bang Theory, a story of the universe, illustrations and varied font enhance meaning and tone, figurative language: simile, metaphor; Comprehension strategies: Sequencing events, compare and contrast, make inferences and draw conclusions, ask and answer questions. Back Matter: Author's Note, About the Author. Theme: Our Universe.

**Standard topics:**
- Origins of our planet
- STEM
- Inferencing
- Sequencing events

**Objectives:**

- Connect with literature.
- Teach children about the origin of the universe and its contents.
- Introduce scientific inquiry to the students

**Key Terms/Concepts:**

- The Big Bang
- Theories
- Time and space

**Discussion Questions:**

- What is the Big Bang Theory?
- Did the universe get hotter or get colder?
- What is a galaxy?
- What are some different types of planets?
- What galaxy is Earth in?
- How old is Earth?
- Why is Earth "just right"?
- What might aliens be like?

**Activities:**

*For your convenience, a list of relevant links is listed at the end of each activity. You can also use the clickable links in the text.*
*Companion worksheets are at the end of all the activities.*

**Activity 1: Planets.** Ask each of your students to imagine their very own planet, letting them make it as weird and outlandish as they want. Is it made of something special? Does anyone live on it? What color is its sky? What sort of star does it go around? Does it have any moons? What are they like? When they're done, make sure they give it a name!
Use the companion pages at the end of the activities section.

Now tell them about some of the coolest planets that have been discovered, and see if fact isn't stranger than fiction in some way:

- **PSR J1719-1438 b:** a planet that orbits its star in 2 hours.
- **Fomalhaut b:** a planet that orbits its star in 700 years.
- **Kepler-189 b:** a planet that is likely the leftover core of a planet whose atmosphere evaporated away.
- **51 Pegasi b:** a planet that's about as big as Jupiter but 5x closer in to its star than Mercury is to the Sun.
- **The TRAPPIST-1 system:** seven planets that all fit within Mercury's orbit.
- **Kepler-452 b, Kepler-62 f, Kepler-22 b:** three of the most Earth-like (and so potentially life hosting) planets known.

NASA has released vintage-style travel posters for some of these exoplanets that are perfect for hanging in the classroom[1]. Consider having your students make posters for their own planets, as well.

Finish up by telling your class they can go discover a planet tonight, if they're lucky! The NASA project *Planet Hunters*[2] allows anyone to look through space telescope observations of stars and try pick out planets. It's free, easy to use, and every star that's looked over helps a major scientific endeavor.

1. https://exoplanets.nasa.gov/alien-worlds/exoplanet-travel-bureau/
2. https://planethunters.org

**Activity 2: Galaxies.** Use beautiful photos of space to teach your students about galaxies.

Start by dissecting the different parts of Andromeda, the closest galaxy to us, with one of the famous tilt-shift images that make it look like a sparkling jewel[1]. Point out the myriad stars (there are about 1 trillion), the bright core made up of stars surrounding an invisible supermassive black hole, and the violet haze of hydrogen that suffuses all the space between.

Move on to galaxies in general, picking apart their similarities and differences. Elliptical types like NGC 3610[2] may not even look like galaxies at first glance, while spiral types like the Whirlpool Galaxy[3] are much closer to the idea people usually have in mind. Use the latter to provide a sense of what it means for us to live in a spiral arm of the Milky Way, then bring that home by showing what the Milky Way looks like from Earth (viewed side-on) with long exposure photos of the night sky[4].

Let your class explore the galaxy zoo. Wow your students with images of some of the more unusual galaxies, like the Cartwheel Galaxy[5], the Antennae Galaxies[6], and Hoag's Object[7]. Lastly, finish off by giving them a sense of scale with the Hubble Ultra Deep Field[8] or the Hubble Legacy Field[9] – highly sensitive images with thousands of galaxies fit into a tiny fraction of the sky.

1. https://imgur.com/gallery/8G83LNK
2. https://www.spacetelescope.org/images/potw1546a/
3. https://www.nasa.gov/feature/goddard/2017/messier-51-the-whirlpool-galaxy
4. https://apod.nasa.gov/apod/ap100823.html
5. https://www.nasa.gov/image-feature/goddard/2018/hubble-s-cartwheel
6. https://apod.nasa.gov/apod/ap140316.html
7. https://www.nasa.gov/multimedia/imagegallery/image_feature_1747.html
8. https://spacetelescope.org/images/heic0406a/
9. http://hubblesite.org/image/4492/news

**Activity 3: Scientific Questions.** Have your students apply the five questions of journalism (Who? What? Where? When? Why?) to themselves.

Encourage them to be as objective as possible - the point is to push them to think reductively and synthesize knowledge from different branches of science. In order to get them on the right track, consider answering one of the simpler questions, like "Where are you?" or "When are you?" in front of the class.

"Where are you?" is a good question for teaching basic geography and astronomy – you are in this town, in this country, in this world, around this star, in this galaxy. If the students are interested, pull up a map of the local universe[1] and describe the filamentary shapes that galaxy clusters make and the large, incomprehensibly empty voids between them.

"What are you?" points most straightforwardly to human biology, but can be pushed deeper to chemistry, and even deeper into physics (progressing from organs, to cells, to chemicals, to atoms).

"When are you?" helps teach basic astronomy and geology. Since we don't know what, if anything, came before the singularity, the universe could be infinitely old. But we know that it has been roughly 14 billion years since the singularity, that the Earth and Sun formed 4.5 billion years ago, humans emerged on Earth around 200,000 years ago, and that civilization began somewhere around 10,000 BC.

"Who are you?" is mostly a question of identity and psychology, and should be as easy as the class allows it to be.

"Why are you?" is a question for philosophy and religion. It may be the most controversial, but it is at least as important a question as all the others. If you do choose to ask it, consider assigning these questions as homework so that students can talk with their parents about it and keep their answers to themselves.

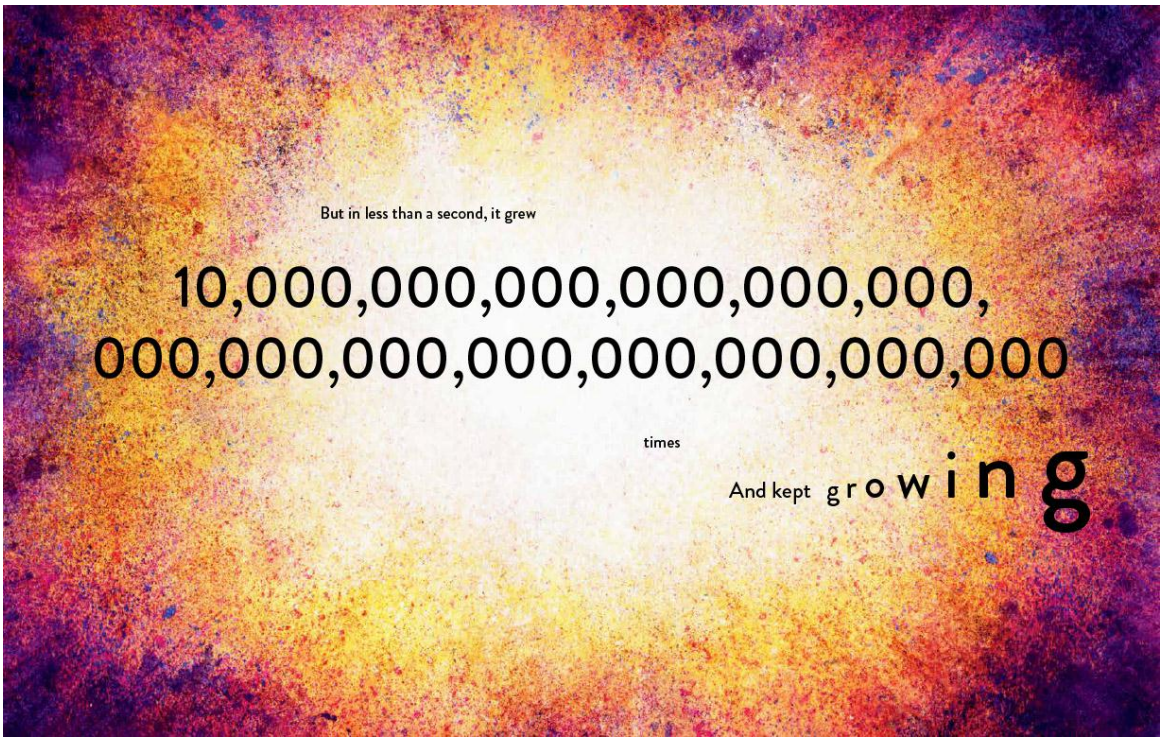
1. http://www.atlasoftheuniverse.com/nearsc.html

**Activity 4: Explore Science through Art.** Have the students express their creativity with an art project. Choose from the list below.

- **Nebula Art:** Students learn about nebulae and matter with this beautiful art project. https://mosswoodconnections.com/activity/nebula-art/
- **Universe in a Jar Craft:** Put the components of the universe in a jar and then shake it up. https://www.dltk-kids.com/crafts/space/muniverse.html
- **Create some Watercolor Planets:** Perfect for exploring the solar system. https://rainydaymum.co.uk/watercolour-planets/
- **Black Glue Galaxy Craft:** Have the students imagine their own universe. https://iheartcraftythings.com/black-glue-galaxy-craft.html
- **Crayon Resist Space Art:** Start by coloring a space scene on the cardstock. Stars, planets, shooting stars, rockets, aliens, etc. https://thecraftingchicks.com/31106/#_a5y_p=4058093

**Additional Resources:**

- **Do NASA Space Place:** Learn about NASA space and Earth science. Make the universe stretch and expand! https://spaceplace.nasa.gov/menu/do/
- **The Expanding Universe:** This activity is designed to help students gain a deeper understanding of cosmology. http://btc.montana.edu/ceres/html/Universe/uni1.html
- **Cosmic Questions:** Our Place in Space and Time was developed by the Harvard-Smithsonian Center for Astrophysics https://www.cfa.harvard.edu/seuforum/download/CQEdGuide.pdf
- **Big Bang Activity:** compare an expanding balloon to the Big Bang and attempt to explain the beginning of the Universe. https://www.monroecti.org/cms/lib07/PA03000492/Centricity/Domain/37/Big%20Bang%20Activity.pdf



imagine your very own planet. Is it made of something special? Does anyone live on it? What color is its sky? What sort of star does it go around? Does it have any moons? What are they like? When you're done, give it a name!

Label at least five elements of your planet

Write about your planet.

Write about your planet.

Put the events of The Big Bang Theory in order.

The Universe is very small

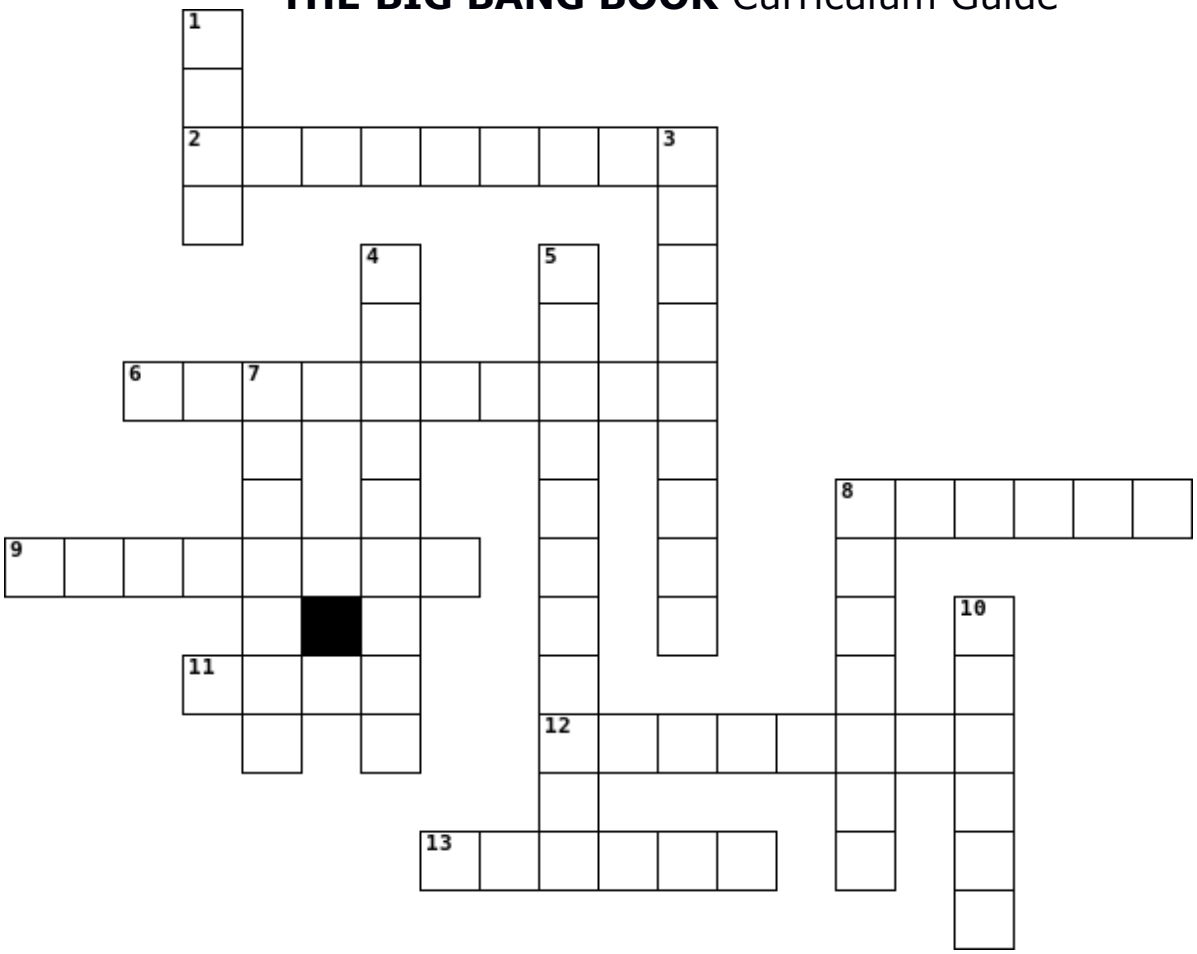
The universe beguns to cool.

Our solar system and planets are formed

Galaxies with stars start to form

The universe expands.

A planet that can support life is born.



**Across**

**2.** A person with advanced knowledge of empirical fields

**6.** A tentative insight that is not yet verified or tested

**8.** A collection of star systems

**9.** The act of moving or shaking in agitation

**11.** The smallest component of an element

**12.** Having no limits or boundaries in time or space

**13.** The act of changing location from one place to another

**Down**

**1.** Unusually great in size or amount or extent or scope

**3.** An instrument used for viewing distant objects, including planets, stars, and galaxies

**4.** The branch of science that deals with the Universe and the various objects, like stars, planets, and galaxies that we find within it.

**5.** An astronomer who studies the evolution of the universe

**7.** A celestial body moving in an elliptical orbit around a star

**8.** The force of attraction between all masses in the universe

**10.** An unproved statement advanced as a premise in an argument

**Answer Key:**

1. Vast
2. Scientist
3. Telescope
4. Astronomy
5. Cosmologist
6. Hypothesis
7. Planets
8. Galaxy
9. Churning
10. Hypothesis
11. Atom
12. Infinite
13. Motion

Help the spaceship to fly to the Moon and then return to the Earth.

Coloring Page

# **THE BIG BANG BOOK** Curriculum Guide

And how did we get here?

**About the Author:**
As the son of a children's book author and illustrator, Asa Stahl developed a love of stories from a young age and worked as a freelance editor of juvenile fiction throughout his teenage years. When he took his first physics class in high school, though, he found the stories his textbook told about the universe more compelling than any novel he'd read. He graduated from Johns Hopkins University with a BS in Physics as well as a Provost's Undergraduate Research Award. Currently a PhD student in Astrophysics at Rice University, Asa searches for planets around newborn stars. His research seeks to answer questions like just how rare is a planet like Earth?

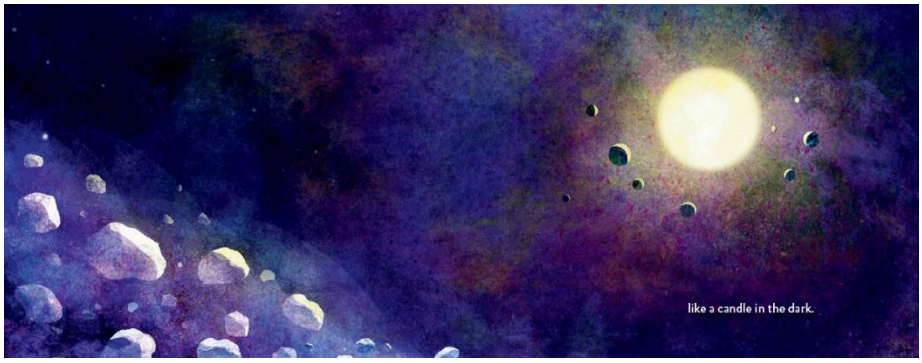
**About the Illustrator:**
Carly Allen-Fletcher is an author-illustrator based in England. Her previous picture books, *Animal Antipodes* and *Beastly Biomes,* focused on animal and environmental diversity. For *The Big Bang Book*, she broadened her perspective to be truly out of this world.
http://carlydraws.com/

Creston Books
crestonbooks.co

**About Creston Books:**
Creston Books fills the void left behind by the major New York publishers who no longer put out a broad range of quality picture books. The golden age of picture books, when fine books were edited and published despite not being blockbusters, does not have to be over. Creston Books is author/illustrator driven, with talented, award-winning creators given more editorial freedom and control than in a typical New York house
https://www.crestonbooks.co/

Mosswood Connections

**About this Curriculum:**
This curriculum was written and developed by Mosswood Connections. Mosswood Connections helps to make literature accessible and enriching for all children. Be sure to check out all their comprehensive curriculum guides and book extension activities.
https://mosswoodconnections.com/



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