

Build Like Benjamin Banneker



A 2018-2019 Global Cardboard Challenge Event

*Use **cardboard** to construct your own invention like
Benjamin Banneker!*

A Brief History of Benjamin Banneker

Born on November 9, 1731 outside Baltimore, Maryland, Benjamin Banneker was an extraordinary, self-educated, free African American. His zest for knowledge led him to become an accomplished mathematician, abolitionist, and surveyor of our nation's capital. When Banneker was not stargazing, you could find him maintaining his one hundred acre tobacco farm, orchard, and apiary. Today his property serves as the location of the Benjamin Banneker Historical Park and Museum, part of the Baltimore County Department of Recreation and Parks.

“About Benjamin Banneker”. Authored by the Benjamin Banneker Foundation, Inc.
(www.bannekerfoundation.com)

This challenge is a cross-curricular activity addressing mathematics, science, history/social studies, language arts, reading, and the arts!

The Benjamin Baneker Association, Inc. (BBA) is an advocacy organization which supports high-quality learning in mathematics by converging these three ideas:

Focus



Perseverance



Inspiration



We hope Benjamin Baneker’s amazing focus and perseverance will also inspire your inventiveness and desire to exercise your creative talents through the “Build Like Benjamin Baneker” Cardboard Challenge.

Why the cardboard challenge?



Clock created by student at Knox Gifted Academy in Arizona
image taken from <https://www.flickr.com/photos/buistbunch/21114218824/>

- Cardboard is a strong and lightweight material made up of the same resource Benjamin Baneker used over 250 years ago – wood! Corrugated cardboard (the type often used for packaging materials) is made of pine chips which have been manufactured as kraft paper. (Advameg, 2017).
- Building models with cardboard fosters creativity, ingenuity, resourcefulness, perseverance and teamwork; particularly providing an opportunity for younger children to engage in creative play (Cherry Creek Schools Foundation, 2014).
- Provides individuals with an opportunity to explore their interests and passions and create things that have an impact on others.
- Bottom line - **it is fun and challenging!**



- Cardboard is being considered as a building material because it is “inexpensive, environmentally friendly, and cheap to manufacture” (Rose, 2012).
- For a more in-depth look at how cardboard can be used for major constructions, check out this presentation on [Cardboard as a Building Material](#).

Instructions

1. **Learn About Benjamin Banneker:** After studying the life Benjamin Banneker and his many inventions, design your own using cardboard as the primary material. Your invention should:
 - a. reflect the resourcefulness and imagination of Benjamin Banneker
 - b. provide purpose for / impact your community (school, neighborhood, city, etc.)
2. **Design Your Invention:** A design blueprint must be drawn on graph paper before any cardboard construction begins.
3. **Time to Build!** Build your structure using cardboard and other approved building materials (see list below).
4. **Show the World Your Masterpiece!** Take pictures of your completed structure. Make a short video (less than 5 minutes) showing how it was constructed, and how it works.

Approved Building Materials

The following materials approved for this project include **(but are not limited to)**:

- measuring tools (such as ruler, measuring tape, meter / yard sticks, protractor, or a compass)
- paper
- tape
- glue
- brads
- scissors
- pencils
- re-used / empty containers (such as plastic bottles milk cartons, egg cartons, paper towel, toilet paper tubes, stuffed animals)
- clock movement kit / parts from a working clock (which can be purchased from Hobby Lobby, Michaels, Amazon, etc.)
- art supplies (such as markers, paint and confetti to decorate your invention)
- lenses (for a telescope)

The primary material used in any invention submitted for this competition must be cardboard!

Competition Guidelines

1. There are **5 competition categories**:
 - Pre-school (ages 2 – 4);
 - Elementary (students in Kindergarten – Grade 5);
 - Middle (students in grades 6 – 8);
 - High School (students in grades 9 – 12); and
 - Adults (ages 18+)
2. You may work alone, with a partner, or in a group. Invite friends, family, classmates, and community members to help!
3. **Elementary – Adult Categories**: You must provide a written project reflection to accompany your invention that explains the **personal, civic, scientific, and mathematical** significance of what you've built. For example:
 - How did Benjamin Banneker inspire your invention?
 - How does your invention help or impact your community, our country or the world?
 - What did you learn while creating this invention?
 - Benjamin Banneker persisted in developing his inventions. Sometimes taking years to create one invention. How did you persist while creating your invention?
4. Inventions will be evaluated by the following criteria:
 - Creativity and originality of concept
 - Design blueprint
 - Long-term stability (*Benjamin Banneker's clock ran for over 40 years!*)
 - Use of cardboard as a primary material
 - Project reflection

Submission Information

- Your submission packet should be emailed to **Brea Ratliff** (bratliff@bbamath.org) no later than **February 4, 2019**. The following materials must be included in your submission packet:
 - Project reflection
 - Registration Form (please submit one form per individual)
 - Copy of the design blueprint
 - Pictures of final structure
 - Link to video showing the structure in use
- Submissions will be accepted via email only.

Awards

The top participants in each category will be featured in national BBA publications, including our website, newsletter, as well as our annual journal, The Lighthouse Almanac.

Special prizes will be awarded to the 1st, 2nd, and 3rd place participants in each category.

What Can I Build?

You can build anything!

We want you to be inspired by Benjamin Banneker, who was a mathematician, astronomer, author, abolitionist, surveyor, and farmer. Mr. Banneker, often recognized as the first African-American Man of Science, was a creative problem solver. Through this challenge, we hope you use and continue to increase your own innovative abilities!

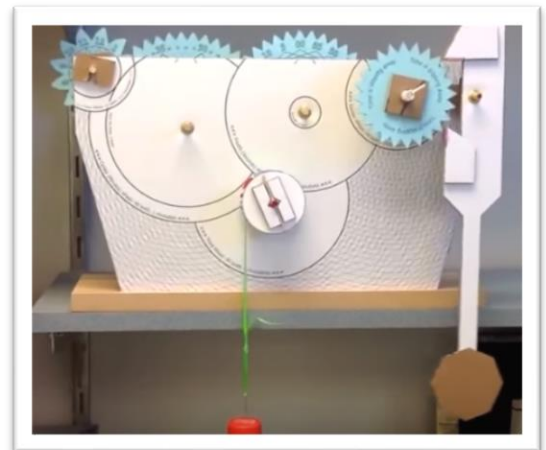
Here are a few examples of things you could build - or build upon - as well as some content connections:



Did you know farmers are mathematicians and engineers in action? Use data, mathematical modeling and technology to create a farming or gardening tool.



Observe magnification and ratio in action using a telescope!



Learn more about gears and gravity by creating a working clock made out of cereal boxes!

Images taken from <http://bit.ly/2lsl2v7>, <http://bit.ly/2yYUW8F> and <https://www.youtube.com/watch?v=jNgHeLYcTh8>

Recommended Resources

These resources will help you learn more about Benjamin Banneker and other cardboard creations:

Books

- Tick Tock, Banneker's Clock by Shana Keller
- Dear Benjamin Banneker by Andrea Davis Pinkney
- Hand in Hand: Ten Black Men Who Changed America by Andrea Davis Pinkney
- The Life of Benjamin Banneker: The First African American Man of Science by Silvio A. Bedini

Websites

- The Benjamin Banneker Association (www.bbamath.org)
- The Benjamin Banneker Foundation (www.bannekerfoundation.com)
- Mathematicians of the African Diaspora (<http://www.math.buffalo.edu/mad/special/banneker-benjamin.html>)
- PBS Africans in America: Benjamin Banneker (<https://www.pbs.org/wgbh/aia/part2/2p84.html>)
- Mathematics of Telescopes (<http://www.peterboroughastronomy.com/LearningCentre/Telescope%20Math.pdf>)
- Agriculture, Food and Natural Resources Integrated Projects (<http://www.stemtransitions.org/ag.php>)

Cardboard Creations

- Cereal Box Clock (<https://newgotland.com/2013/06/09/cereal-box-clock-working-prototype/>) and PDF gear patterns (<http://bit.ly/ng-cereal-clock>)
- Homemade Telescope (<https://www.savvyhomemade.com/building-a-homemade-telescope/>)
- Cardboard Gardening Containers (<http://www.birdsandblooms.com/gardening/gardening-basics/cardboard-gardening/>)
- Global Cardboard Challenge (<https://cardboardchallenge.com/events/build-like-benjamin-banneker-challenge/>)

Special Thanks

The Benjamin Banneker Association would like to thank the following individuals and groups for their contribution to our Benjamin Banneker Celebration and Challenge:

- Dr. Vanessa Cleaver, Past President of the Benjamin Banneker Association (BBA); creator of BBA's Benjamin Banneker Week Celebration.
- Natalie Holliman, first chairperson and organizer of BBA's Benjamin Banneker Week Celebration
- Brea Ratliff, BBA President; creator of the "Build Like Banneker Challenge"
- The Benjamin Banneker Foundation, Inc.
- The Benjamin Banneker Historical Park and Museum

“Build Like Banneker” Registration Form

Name _____

City / State _____

Contact Information (email and mailing address) _____

Title of Invention _____

Category (circle one): Pre-school Elementary Middle High School Adult

I give my permission to allow my photograph to be used on the Global Cardboard Challenge website, and in Benjamin Banneker Association, Inc. publications.

I give my permission be interviewed for Benjamin Banneker Association, Inc. publications.

Participant Signature

Parent Signature (for children under the age of 18)

I confirm this submission contains my / my child’s original design and work and I understand that all judges’ decisions are final.

Participant Signature

Parent Signature (for children under the age of 18)

Please email this form and your submission packet to Brea Ratliff (bratliff@bbamath.org) no later than **March 31, 2019**.

References

- Advameg Incorporated. (2017). Corrugated Cardboard. Retrieved on October 30, 2017 from <http://www.madehow.com/Volume-1/Corrugated-Cardboard.html>
- Benjamin Banneker Foundation (2018). About Benjamin Banneker. www.bannekerfoundation.com
- Cherry Creek Schools Foundation (2014). “Out of the Box” Cardboard Challenge 2014. <http://foxhollow.cherrycreekschools.org/resources/Documents/Cardboard%20Challenge%20packet.pdf>
- Global Cardboard Challenge. (2017). Build Like Benjamin Banneker. Retrieved on October 30, 2017 from <https://cardboardchallenge.com/events/build-like-benjamin-banneker/>
- Morgan, L. (2015). The Global Cardboard Challenge – The STEAM World Clock Challenge. Retrieved on October 23, 2017 from <https://sites.google.com/a/bisdmail.net/louise-morgan/what-s-your-passion/the-global-cardboard-challenge>
- Rose, S. (2012). Are cardboard buildings the future? Retrieved on October 30, 2017 from <https://www.theguardian.com/artanddesign/shortcuts/2012/apr/20/cardboard-buildings-future>
- Tornio, S. (2013) Cardboard Gardening. Birds & Blooms. Retrieved on October 30, 2017 from <http://www.birdsandblooms.com/gardening/gardening-basics/cardboard-gardening/>
- Wills, B. (2017). Building a Homemade Telescope. Retrieved on October 30, 2017 from <https://www.savvyhomemade.com/building-a-homemade-telescope/>