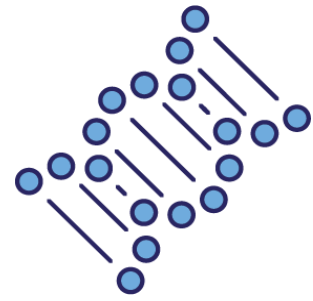


Program Plan: Incredible, Edible DNA



Introduction and Prompt

Explore DNA in Space! The Kelly twins are the only identical twin astronauts in history. And identical twins have the same genetic code. NASA scientists found this to be an excellent research opportunity to study the genes of twins. Thus, the NASA Twins Study was designed. <https://nasa.gov/twins-study>

Researchers took and analyzed biological samples taken from each twin before, during and after their missions. Compiling comprehensive genetic profiling on the Kelly twins has produced some interesting results.

Genes are the building blocks of inheritance. Passed from parent to child, they contain DNA (Deoxyribonucleic acid) the instructions for needed to develop and direct the activities of nearly all living organisms. DNA molecules are made of two twisting, paired strands, often referred to as a double helix. DNA contains the information needed to build the entire human body.

A genome is the entire genetic material in an organism. It is made of DNA and includes genes and other elements such as proteins that control the activity of those genes. The human genome is mostly the same in all people. But there are variations across the genome. This genetic variation accounts in appearance and health. People who are closely related have more similar DNA.

Audience

For younger children, have a story time using *The Baby Biochemist: DNA* to explain DNA to the participants. You may also use a book of your choice, as long as it explains what DNA is. If you are using the prompt of the NASA Twins Study, consider first reading *Mousetronaut*. Also included in the kit is *Goodnight Lab* (a scientific version of Goodnight Moon).

- *The Baby Biochemist: DNA* by Margot Alesund
- *Mousetronaut* by Mark Kelly
- Consider watching Scott Kelly's reading from the International Space Station on <https://storytimefromspace.com/mousetronaut-2>
- *Goodnight Lab* by Chris Ferrie

For older children and teens, integrate the DNA Modeling Activity into your regularly scheduled programs. Instead of a formal introduction, distribute the information on note cards and have participants read a bullet point each or have these up on a board or screen.

DNA Modeling Activity Materials

- Books
- Multi-colored candy – 12 for each person or group (3 sets of four different colors)
- Toothpicks – 16 for each person or group
- Paper or note card
- Pencil
- Note: The candy for this activity should be available in four different colors, to make three sets (for example: 3 yellow, 3 red, 3 blue, 3 green). These can be gummy bears, small marshmallows, or any type of candy that will stick into a toothpick easily.

DNA Modeling Activity Instructions

- Each participant requires 12 pieces of candy, making sure that there are 4 different colors represented to make three sets (for example: 3 yellow, 3 red, 3 blue, 3 green).
- Line up 4 candy pieces in a row, making sure that each one is a different color.
- Create two more rows, making sure that the same 4 colors are represented.
- Make your own key by assigning a color to each letter - “A”, “C”, “G”, and “T”. Record the assignments on your piece of paper or notecard.
- Begin connecting the candy with toothpicks by inserting the toothpick into the first candy’s side. This is your “primary” candy.
- Using your key, select a second candy that would be the base pair for your primary candy. For example, A pairs with T. C will pair with G.
- Take that selected second candy from Step 6 and insert a toothpick into its side. Then insert the other end of the same toothpick into the primary candy’s side.
- Repeat steps 5-7 for the rest of your gummy line to complete the base pairs.
- You should now have 6 pairs of candy connected.
- Begin connecting your pairs of candy vertically with toothpicks to create a ‘ladder’ with rungs. Insert a toothpick into the bottom of a candy and another toothpick to its pair.
- Repeat with the remaining base pairs, but not the last pair.

DNA Modeling Observations and Results

Discussion point: DNA contains complementary genetic information, like a picture and its negative.

- Do you see a pattern as you create your DNA?
- Were you able to make your DNA into a double helix?
- What other experiments could you do to learn about DNA?
- What kind of experiments would you want to send to space?

Additional Resource

Alternate lesson plans available from <https://www.yourgenome.org/activities/yummy-gummy-dna>