

Making DNA

Grade Level: 1-5

Duration: 30-45 minutes

Classification: Classroom or STEM Spark

Subject(s): Biology, Biochemistry, Genetics

Categories (STEM): Science

Keywords: DNA, Base Pairs, Double Helix

Introduction

- Summary: Students will learn properties of DNA by matching base pairs to form a candy double helix.
- Background information:
 - DNA stands for Deoxyribose Nucleic Acid and forms a helix structure
 - It is composed of nitrogen bases held together by a sugar phosphate backbone
 - The bases read as a code that are instructions for organisms to develop, survive and function
 - DNA is found in almost everything and every part of our bodies
 - Our DNA forms our chromosomes that make us us!

Online Resource: <https://littlebinsforlittlehands.com/candy-dna-model-edible-science-activity/>

Materials

Materials	Quantity	Reusable?
Licorice (not pull-apart)	1 per student	No
Toothpicks	12 per student	No
Pink Marshmallows	8 per student	No
Green Marshmallows	8 per student	No
Yellow Marshmallows	8 per student	No
Orange Marshmallows	8 per student	No
Sequence Sheets	1 per student or student pair	Yes

Directions

- Hand out sequence sheets and all materials including licorice, toothpicks, and marshmallows.
- Explain what DNA is and the role it plays in our body – see Introduction
- Talk about base pairing of DNA – A bonds with T and G bonds with C. Have students begin to attach the corresponding marshmallow (base) from Sequence 1 onto a toothpick and into one strand of licorice.
- After getting Sequence 1 marshmallows checked by SRM, have students attach the corresponding marshmallows for Sequence 2 onto the same set of toothpicks and finish attaching the other strand of licorice.
- After helix is complete, show students how to twist into B (beta)-helix form using toothpicks.
- Don't let kids eat any of the helix!!!

Activity Extension

1. If you run out of marshmallows of certain colors, replace with wrong colors or leave empty and talk about mutations
 - a. Mutations occur when the wrong code is made. Our body has other enzymes read over our DNA and replace missing codes. But sometimes they are not 100% right a mutations occur.
2. Have students break toothpicks in half to demonstrate that there are bonds between GC and AT base pairs

Discussion Questions

- How many nitrogenous bases are there? **4**
- Which bases bond with each other? **AT & GC**
- Why does DNA exist twisted rather than as a ladder? **Increase bonding interactions & compression because it is smaller and more compact - heterochromatin limits expression**
- How many bonds are there between A and T? How many bonds are there between G and C? **AT has 2 bonds GC has 3 bonds**
- What has DNA? **DNA is in everything! Examples: bananas, people, plants, animals, bacteria**
- What are some things DNA is used for? **Forensics, medicine, science**
- Is everyone's DNA the same? **Human DNA is 99% unique, but the 0.1% makes us unique and different from everyone else!**

- Do identical twins have the same DNA? **Yes – during development they split the DNA in two, so they each have the same**
- What is the difference between DNA and RNA? **DNA is a double helix and RNA is only a single strand. RNA contains a U instead of a T base and contains a different sugar.**

What is happening?

- Students are making a Watson-Crick double helix by matching specific marshmallow colors representing given nitrogenous bases.

Applications:

- Majors
 - Biology
 - Biochemistry
 - Genetics
- Jobs
 - Geneticist
 - Biochemist
- Hobbies
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- Real world applications
 - Cancer – mutation in DNA that causes cells to keep dividing
 - Down Syndrome - chromosomal mutations
 - Forensics - fingerprints, cheek swabs
 - Medicine - blood types and prenatal testing



This activity was last updated in fall 2020 by Student Role Models.