

DNA

Teach 1	Names of student(s) teaching:
Teach date: Teach time: Teach length: 45 minutes	Title of lesson: DNA Source (Kit, Lesson, Page #):

Concept statement/Main idea:
The students will be introduced to DNA and base pairing and learn how DNA is put together. Students will also be introduced to the structure of DNA.

Standards for the lesson:

Objectives	Evaluation
Write objectives in SWBAT form	Write at least one question to match the objective you listed or describe what you will look at to be sure that students can do this.
SWBAT describe the structure of the DNA molecule.	
SWBAT explain the rules of base pairing.	

Engagement

Estimated time: 10 minutes

Description of activity: Popsicle "tower"

What the teacher does	What the student does	Possible questions to ask students — think like a student and consider possible student responses
The teacher will pass out popsicle sticks, tape, and glue to each group of students and delegate 8 minutes for	The students will work in groups to build a stable tower. After time is up, each group will stack books on top	Ask the students what would make the structure more stable.

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<p>them to build something that can stay standing even if a book was placed on it.</p>	<p>of their design and see which tower can hold the most books.</p>	<p>Why does the structure of the design matter so much?</p> <p>What happens to things that are not stable?</p> <p>*This will tie into the structure of DNA and how it needs to be organized in a specific way to stay stable.</p>
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Resources needed:

Popsicle sticks, string, duct tape, and glue.

Safety considerations:

Do not horseplay with the materials.

Exploration

Estimated time: 15 minutes

Description of activity: Students will build their own DNA ladder.

What the teacher does	What the student does	Possible questions to ask students — think like a student and consider possible student responses
<p>The teacher will discuss the procedures and distribute materials to the students.</p>	<p>The students will put together a DNA ladder with the materials provided to them.</p>	<p>Why did you pair ____ color marshmallow with ____ color marshmallow?</p> <p>Why or (why not) are you keeping 2 colors always paired together?</p> <p>What does the licorice represent?</p> <p>What do the marshmallows represent?</p>

Resources needed per group:

- 2 pieces of licorice
- 12 toothpicks
- 9 pink marshmallows
- 9 yellow marshmallows
- 9 orange marshmallows
- 9 green orange marshmallows
- 4 paper clips
- Masking tape
- Worksheet with procedures
 - [DNA Ladder Activity](#)

Safety considerations:

Do not eat the materials.

Be careful with sharp objects.

Explanation

Estimated time: 5 minutes

Description of activity: Students will share their experience making their DNA molecule and will explain the reasoning behind their structures.

What the teacher does	What the student does	Possible questions to ask students — think like a student and consider possible student responses
<p>The teacher will have the students talk about their DNA molecule and will discuss the different components.</p>	<p>The student will share their experience of making the DNA molecule.</p>	<p>Does your molecule look similar to the one on the left? Why or why not?</p> <p>Was it hard to twist the molecule?</p> <p>Why did you keep pink and green or yellow and orange together?</p>

Resources needed:

DNA molecule

Safety considerations:

Elaboration

Estimated time: 10 minutes

Description of activity: The teacher will introduce mutations to the students and list the different types of mutations that occur between bases.

What the teacher does	What the student does	Possible questions to ask students — think like a student and consider possible student responses
The teacher will introduce mutations to students; talking about the different types of mutations, the results of the different types of mutations and what diseases (if any) are caused by these mutations.	The student will take notes on the different types of mutations	<p>Do you think the pairs can get mismatched? Why or why not?</p> <p>What do you think happens when the bases get mismatched?</p> <p>Do you think they get deleted from a molecule? Why or why not?</p> <p>What do you think happens when a base gets deleted?</p>

Resources needed:

Powerpoint

Safety considerations:

Evaluation

Estimated time: 5 minutes

Description of activity: Students complete evaluation quiz on their own.

What the teacher does	What the student does	Possible questions to ask students — think like a student and consider possible student responses

Distributes evaluation for students to complete on their own. *1 more question needs to be added to the evaluation	Complete the evaluation on their own.	
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Resources needed:[Evaluation Quiz](#)**Safety considerations:**

Name _____

Date _____

Build a DNA Ladder

Purpose: To better understand the way in which the DNA ladder is constructed.

Materials: 2 pieces of licorice, 12 toothpicks, 9 pink marshmallows, 9 yellow marshmallows, 9 orange marshmallows, 9 green orange marshmallows, 4 paper clips, and masking tape, worksheet with procedures

Procedure:

1. Follow this for the duration of the lab:

G = green

A = green

T = pink

C = yellow

2. Choose from one of the following sequences below.

Sequence 1: T A C G T A T G A A A C

OR

Sequence 2: T G G T T T A G A A T T

- 3. Assemble one side of your DNA molecule.** A piece of licorice will form the backbone and marshmallows will be the chemical bases. Place a marshmallow on the end of a toothpick so that the point of the toothpick goes all the way through. Anchor the toothpick into the licorice backbone. Refer to the table above to choose the correct color marshmallow to represent the chemical bases in your sequence.
- 4. Label the backbone.**
- 5. Match the chemical base pairs according to the key above.** Remember: A always pairs with T and C always pairs with G!
- 6. Complete your DNA model**
- 7. Twist your DNA model.**

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8. Label the remainder of your model.

Using the following information, answer the analysis questions.

Licorice represents a backbone.

T represents _____.

G represents _____.

A represents _____.

C represents _____.

Analysis:

1. Cytosine is always joined to _____ and a _____.
2. Thymine is always joined to _____ and a _____.
3. Guanine is always joined to _____ and a _____.
4. Adenine is always joined to _____ and a _____.
5. Sugars are joined to _____.
6. The rungs of the ladder are represented by which letters? (Circle all that apply.)

Licorice T G A C Toothpicks

7. Which letters represent the sides of the ladder? (Circle all that apply.)

Licorice T G A C Toothpicks

8. Explain what you have constructed. _____

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Name: _____

Date: _____

DNA Evaluation

- 1) True or False: Cytosine and Guanine can bond together with each other?
 - A) True
 - B) False
- 2) Which of the following is NOT a form of mutation?
 - A) Deletion
 - B) Substitution
 - C) Copying
 - D) Insertion
- 3) Why is the structure of DNA so important? What would happen if a mutation caused DNA unstable?

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