

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:
Students will combine what they learned earlier in the week with what they are learning today to further grasp the concept 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 identify the different components of DNA	Which of the following is a component of DNA? A) Cell wall B) Cells C) Pyridines D) Nucleus

Engagement

Estimated time: 10 minutes

Description of activity: Students will watch the video as a recap of the week's lesson.

[Recap Video](#)

What the teacher does	What the student does	Possible questions to ask students — think like a student
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		and consider possible student responses
The teacher will show the video to the students.	Observe and prepare to answer questions.	<p>What is DNA?</p> <p>What 4 components make up DNA?</p> <p>Do they all have the same function?</p> <p>Is DNA everywhere?</p> <p>If proteins are in the wrong shape will they work?</p>

Resources needed:

Projector and powerpoint

Safety considerations:**Exploration**

Estimated time: 40 minutes

Description of activity: Students will perform a lab and extract DNA from strawberries

http://www.shsu.edu/~agr_www/documents/DNALAB.pdf

(website above has different DNA extraction worksheets and procedures than the one inserted below)

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 administer the materials to the students and will explain the lab.	The student will complete the strawberry DNA extraction lab.	<p>Why did you squish the strawberries?</p> <p>Do you think the strawberry will have a lot or a little bit of DNA?</p>

Berry Full of DNA Handout Berry Full of DNA Answer sheet *both attached documents need to be printed for each student*		What happened when you added alcohol to the strawberries?
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Resources needed per group:

- Plastic freezer bag
- Strawberries
- 10 mL detergent solution
- Funnel
- Beaker
- Inoculating loop
- Test tube and rack
- Ice-cold ethanol

Safety considerations:

Do not eat the strawberries!

Wear safety goggles (in case anything splashes).

Explanation

Estimated time: 10 minutes

Description of activity: Students will discuss their results for the DNA extraction lab.

What the teacher does	What the student does	Possible questions to ask students — think like a student and consider possible student responses
Asks questions about the students' DNA results. Have students draw and label their test tube on a white board.	Share data and what they observed with the class. The students will draw and label their test tube on their white board	Was it easy or difficult to extract the DNA? Do you think you can do the same process on other fruits to extract their DNA? Why or why not? What was done to break open the cells of the strawberry?

		<p>Why was a “lysis buffer” needed in your procedures?</p> <p>What layer is at the top of the test tube?</p> <p>What layer is at the bottom of the test tube?</p>
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Resources needed:

- Worksheet
- PowerPoint
- Projector
- White boards
- Erasers
- Markers

Safety considerations:**Elaboration**

Estimated time: 15 minutes

Description of activity: Students will use thread to further understand DNA, how it travels, and what it is made up of.

http://pulse.pharmacy.arizona.edu/10th_grade/dawn_new/science/dna_genes.html

What the teacher does	What the student does	Possible questions to ask students — think like a student and consider possible student responses
<p>Demonstrate the spool and yarn to students.</p> <p>Unwind a good bit of thread in your hand and try to throw it across the room</p> <p>Uncoil about 2 feet of thread and color it red. Ask students</p>	<p>Students will examine a spool of thread and make an analogy between the thread and spool and DNA.</p>	<p>From our previous lesson, what does DNA look like?</p> <p>What does DNA do?</p> <p>What structures do you see? (spool and thread)</p>

<p>what they think this represents. Color another 2 feet segment of the thread blue and ask students what this could represent. When finished asking students what the colored thread could represent, recoil the thread so that the red and blue appear in the linear order of the thread.</p>		<p>What substances do you see? (wool and cotton)</p> <p>What does the thread represent? (DNA)</p> <p>What does the spool represent? (Proteins that hold DNA together)</p> <p>Since the thread did not travel very far, what is a better way of transporting the thread (DNA) throughout the cell?</p> <p>What does the thread wrapped around a spool represent? (Chromosome)</p> <p>What do you think the colored portion represents? (A nucleotide sequence for a gene)</p>
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Resources needed:

Thread and a spool

Safety considerations:

Evaluation

Estimated time: 5 minutes

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

<p>What the teacher does</p>	<p>What the student does</p>	<p>Possible questions to ask students — think like a student and consider possible student responses</p>
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Hands out evaluation quizzes for students to complete on their own.	Students complete the evaluation quiz on their own.	
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Resources needed:

[Evaluation Quiz](#)

KEY

Safety considerations:



Berry Full of DNA

Exploring properties of Strawberry DNA



- Question:** What properties of DNA can be observed in a test tube?
- Lab Overview:** In this investigation you will break open strawberry cells, prepare a filtered extract containing strawberry DNA and separate out molecules of DNA in a test tube.
- Background:** The native wild or wood strawberry, *Fragaria vesca*, has only two sets of chromosomes (diploid), but the grocery store strawberry, *Fragaria ananassa*, has eight sets of chromosomes (octoploidy) and will supply an abundance of DNA. So, commercial strawberries make an excellent subject for collecting DNA.
- Another reason strawberries work so well is that they are soft and easy to smash. Also, ripe strawberries produce enzymes (pectinases and cellulases) which help in breaking down the cell walls making it easier to extract the DNA.
- First, you are going to break open the cells of a fresh strawberry by crushing it. Second, you will use a lysis buffer to break down the cellular and nuclear membranes to separate the DNA from the other cell parts. Third, you will filter the solid material out with a piece of cheesecloth and collect the liquid containing the DNA. Finally, you precipitate the DNA from the solution using cold ethanol.
- After completing this lab, you will have a sample of pure strawberry DNA and you will never again look at a strawberry in the same way.
- Materials:**
- Plastic freezer bag
 - Strawberry
 - 10 mL detergent solution
 - Funnel
 - Beaker
 - Inoculating loop

Test tube and test tube rack
Ice-cold ethanol

Procedure:

1. Place one strawberry in a plastic freezer bag. Press the air out of the bag and deal with the bag carefully. Gently mash the bagged strawberry with your fist for 2 minutes
2. Measure 10 mL of detergent solution and add it to the bag of mashed strawberries. Press the air out carefully and seal the bag again.
3. Mash the bagged strawberry again for 1 minute.
4. Obtain a funnel and beaker to filter your bagged strawberry solution.
5. Pour the liquid strawberry solution into the filter/beaker set-up and let the extract drip into the beaker.
6. When most of the liquid has filtered through, remove the funnel. Discard any mashed strawberry pulp into the trash can. Rinse out the funnel and return it to the lab table.
7. Pour the liquid extract from the beaker into a test tube. Fill the test tube only about $\frac{1}{4}$ full.
8. Slowly drizzle cold ethanol along the side of the test tube, until the test tube is about **half full** of liquid. The ethanol should form a separate layer on top of the filtered extract.
9. Dip the inoculating loop into the tube where the strawberry extract and ethanol layers come into contact with each other and pull out some DNA.

Name: _____

Date: _____ Pd: _____

Berry Full of DNA

Strawberry DNA Extraction

Draw and label the contents of your test tube:

Label the following:

Strawberry extract

Ethanol

DNA



It is important that you understand the steps in the extraction procedure and why each step was necessary. Each step in the procedure aided in isolating the DNA from other cellular materials. Match the procedure with its function:

PROCEDURE	FUNCTION
A. Filter the strawberry extract through the funnel.	___ Clumps DNA together
B. Add detergent solution and mush the strawberries again.	___ Separate components of the cell
C. Initial smashing and grinding of strawberries.	___ Break open the cells
D. Addition of ethanol to filtered extract.	___ Dissolves cell membrane of the cells

1. What is the function of DNA? _____

2. Where is DNA located in the cell? _____

3. What did the extracted strawberry DNA look like? _____

4. A person cannot see a single strand of cotton thread from 30 meters away, but if thousands of threads are wound together into a rope, the rope can be seen at some distance. How is this statement an analogy to the DNA extraction you did?

5. DNA dissolves in water but not in ethanol. Explain what happened when the ethanol came in contact with the strawberry extract during the DNA extraction.

6. In order to study our genes, scientists must extract the DNA from human tissue. Would you expect the method of DNA extraction we used for the strawberry to be the same for human DNA?

_____ Explain? _____

7. Is the DNA in any cell in the human body the same? _____ Explain your answer.

8. Why might scientists want to study the DNA of strawberries?

Name: _____

Date: _____

DNA Evaluation KEY

- 1) What 4 bases make up DNA?
 - A) Adenine, Byenine, Cystosine, and Dyenine
 - B) Adenine, Byenine, Monisine, and Thymine
 - C) Adenine, Guanine, Cytosine, and Thymine**
 - D) Byenine, Cystosine, Monosine, and Thymine

- 2) Which of the following is a component of DNA?
 - A) Cell wall
 - B) Cells
 - C) Pyridines**
 - D) Nucleus

- 3) What process was done to break open the cells of the strawberries?
 - A) They were already opened
 - B) They were crushed in a bag**
 - C) They were cut

Name: _____

Date: _____

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