

DNA Replication and Transcription Modeling

Suggested Time: 50 minutes

Overview

- This lesson will review and solidify the concepts of DNA replication and RNA transcription. Upon completion of this lesson, students should be able to demonstrate a working knowledge of the processes involved in replication and transcription.

Vocabulary

- DNA
- RNA
- Transcription
- Replication
- Base
- Codon
- Double Helix
- Sugar
- Adenine
- Thiamine
- Cytosine
- Guanine
- Uracil
- Enzyme

Objectives

- Students will review the structure of DNA and RNA.
- Students will be able to demonstrate the processes of replication and transcription.
- Students will collaborate to design strands of DNA and RNA, and construct models of each.
- Students will present their findings in a digital and tangible format.

Next Generation Science Standards

- LS 1-1 Constructing Explanations and Designing Solutions; Structures and Functions; Systems and System Models
- LS 1-4 Developing and Using Models;
- LS 3-1 Asking Questions and Defining Problems; Structure and Function; Inheritance of Traits; Cause and Effect

Common Core Mathematical Standards

- MD Measurements and Data
- RST 11-12.1 Cite specific textual evidence to support analysis of science and technical texts
- SL 11-12.5 Making Strategic Use of Digital Media
- WHST 9-12.7 Draw evidence from informational texts to support analysis, reflection, and research.

Required Project Materials

- Rulers
- Bag of Multi Colored Mini-Marshmallows
- Twizzlers Candy
- Tooth Picks
- Cell Phone, Tablet or other Device with Camera
- Small Poster Board or Construction Paper
- Colored Pencils
- Pen

Multimedia Resources

- DNA Replication. Biotech Gaza. <https://www.youtube.com/watch?v=J6jixbyMFx8>
- Short video showing transcription. <https://youtu.be/gG7uCskUOrA>

Optional Multimedia Resources

- Google Docs App.
https://play.google.com/store/apps/details?id=com.google.android.apps.docs.editors.docs&hl=en_US&gl=US
- Google Slides App.
https://play.google.com/store/apps/details?id=com.google.android.apps.docs.editors.slides&hl=en_US&gl=US
- Stop Motion Studio App.
https://play.google.com/store/apps/details?id=com.cateater.stopmotionstudio&hl=en_US&gl=US

Before the Lesson/ Background Information

- This lesson should be done after teaching on the process of DNA replication and transcription.

Homework from Previous Session

- Have students bring colored pencils and their device to class. Encourage students to have devices fully charged.

The Lesson

Part 1:

1. Review material defining and describing DNA, RNA, replication and transcription by discussing them in class and using the YouTube videos.
2. Explain the materials that will be used for this lesson, and the conduct expectations for this exercise. (I.e: electronic devices should only be used as instructed, no eating of the materials until given permission to do so, etc.)

Part 2:

1. Divide the students into groups of two to four.
2. Each group will assign a colored marshmallow to each base and determine the proper sequence for their DNA strand. Each group will design a strand of DNA containing three codons of three bases each, equally spaced along their "sugar." (le: AAT GGC CGA)
3. They will construct a diagram of their model with labels using the posterboard or construction paper. It should include a key identifying each base with its corresponding color, and the sugar.
4. After successful completion of building a complete DNA strand with both sides of the double helix, the students will demonstrate the process of DNA replication using the given materials.
5. They will use their electronic device to take pictures of their DNA model before, during and after replication. They should pick the best way to turn in their pictures: google docs, google slides, printed out, stop-motion video, etc.
6. Next students will use their original DNA strand to demonstrate RNA transcription, by making a corresponding RNA model based on their DNA model.
7. They will use their electronic device to take pictures of their DNA/RNA model before, during and after transcription. They should pick the best way to turn in their pictures: google docs, slides, printed out, stop-motion video, etc.

Part 3:

1. After successfully completing all parts of the exercise, the students may eat their results!
2. Students should turn in their pictures/video of the assignment by either direct email or file sharing to the teacher.
3. The hand-drawn diagrams should be turned in to the teacher.