



Chapter 15 Project

Let's Make a Movie!

Project Goal + Timeline

In this project, we will be reviewing your knowledge of protein synthesis and the relationship between genes and proteins by making a short movie. This project should be completed in groups of three to five within two to three hours.

Directions

Part 1: Make Your Movie

Make a short movie depicting protein synthesis in a eukaryotic cell. Here are the details.

- **Story:** A cell teeters on the brink of death. If a protein doesn't get synthesized quickly, the cell and all the biomolecules within it dies. Can the cell be saved?
- **Cast:** The characters are the biomolecules involved in transcription and translation. Cast members of your group to play these parts. The cast must include an RNA polymerase, a ribosome, and a tRNA molecule. Consider also having a dramatic narrator to narrate events as they occur.
- **Settings:** Two settings, the nucleus and the cytoplasm, must be featured in your movie.
- **Props:** Use props to represent molecules not played by the cast. At a minimum, you should include props to represent a DNA molecule, an mRNA transcript, and a polypeptide. These molecules should not be played by cast members. They should be items.

To get started, review all the details and requirements as a group. That includes the story, cast, settings, props, and requirements. Work together to choose members for each character in the cast. Next, determine how you will distinguish between the two settings, the nucleus and cytoplasm. A sign clearly stating the location is enough to satisfy this requirement. Locate or create items to serve as the props for DNA, mRNA, and a polypeptide. Select prop items that can be separated into smaller pieces to represent monomer units. Make labels for those props. Make signs for settings. Make nametags for all characters.

After reviewing the requirements, write or type a simple script and submit a copy to your instructor. The script doesn't need to be formatted in a particular way. However, it should list the cast assignments and include short scene descriptions, character entrances and exits, and character dialogue.

Try doing mini rehearsals while you're all working out the details of your script. When you're ready, start filming! You may choose to film using a phone or a computer. You can film all in one take, or film parts separately and use film editing software to combine them. Have fun and be creative!

Here are the requirements for your movie:

- Transcription must be demonstrated in detail. You must show how the nucleotides in DNA are transcribed into the mRNA transcript. You do not need to explain every nucleotide, but at least once, a character or narrator should explain the relationship between the DNA and the new mRNA transcript.
- Translation must be demonstrated in detail. For example, a character must identify a codon and demonstrate how that codon specifies a particular amino acid. You do not need to explain every codon, but at least one codon must be associated with the correct amino acid.
- Identify all characters (RNA polymerase, ribosome, and tRNA) using nametags.
- Label all props and settings.

- Use props that can break down into smaller parts to represent the monomer units. For example, a string of connected paper balls can represent the polypeptide. Each paper ball would then represent an amino acid.
- The film must convey what's happening. You may achieve this via a dramatic narrator, who narrates the action of the cast as it's happening, or you can have the cast talk to one another to show what they are doing. For example, perhaps the tRNA cast member speaks to the ribosome, "Hey bud, here's that methionine you needed."
- The movie concludes when the ribosome finishes making the polypeptide.

One last thing! Here are a few things that your movie does not need to include. Your movie need not involve the Golgi apparatus or endoplasmic reticulum. You also do not need to depict any mRNA processing, such as intron removal or addition of a 5' cap.

Part 2: Complete Prokaryotic Protein Synthesis Questions

Complete your project by answering the following questions regarding prokaryotic protein synthesis.

1. Compare and contrast the steps in prokaryotic transcription with the steps in eukaryotic transcription.
2. What is the role of the promoter in prokaryotic transcription?
3. In prokaryotes, how might transcription be terminated?

Project Materials

- Recording device (such as phone or computer)
- Items for props
- Large blank nametag stickers
- Project questions
- Pen or pencil
- Blank paper
- *Optional: Film editing software*

Student Checklist

- ☐ Create the script
- ☐ Film your movie
- ☐ Complete prokaryotic protein synthesis questions