

Cells – Creating a 3D Model and Animation with Hummingbird Robotics

Problem

You are a group of biological engineers who have been hired by the Virginia Department of Education to create a 3D model of a plant or animal cell and to use Hummingbird Robotics to animate the cell. Your model with animation will help teach 7th graders across the state of Virginia to understand the parts of a plant and animal cell.

Lesson Summary

Students will design and create a 3D model of an animal or plant cell. Brainstorming will take place as students determine how to create the cell and which materials will best represent the organelles of a cell.

Major Topic and SOL

Science SOL (2010)

LS.1d, h, j. LS.2a,b

Length of Time

1 Day - 2 hours, 30 minutes

Student Objectives

- Students will be able to identify the organelles in a plant and animal cell
- Students will create a model for a plant or animal cell with all organelles included
- Students will learn the basics of computer programming using Hummingbird Robotics

21st Century Skills

- Critical-Thinking and Problem Solving
- Communication
- Creativity and Innovation
- Collaboration
- Information and Media Literacy
- Contextual Learning

Assessment Evidence

- Formative observations by observation throughout the lesson. Teachers have the option to use further assessments for this activity.

Supplies/Materials/Technology

- Hummingbird Robotic Kits
- Laptop Computers
- Hot glue and Hot glue guns
- Poster board
- Various materials for organelles (noodles, beads, beans, etc.)
- Handouts including engineering design process sheet and “Lesson 1”
(You may want to include cell diagrams and cell vocabulary)

Lesson 1:

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Constraints: Your team must design a 3D model of an animal or plant cell. The cell must contain the organelles listed in Step 1. Your cell must also use Hummingbird robotics to animate at least one part of the cell using a motor and light.

Brainstorm /Plan/Create:

Step 1: Plant Cells vs. Animal Cells

Plant cells and animal cells are shaped differently and contain different parts. Organelles are the "mini organs" found inside every plant and animal cell. Each organelle has a different function and physical appearance, and together they work to keep the cell alive. Take a look at some cell diagrams on an interactive site like CellsAlive.com. Which organelles are found in a plant cell? Place a check in the box if an organelle is found in a plant cell. Now repeat with animal cells. Get your instructor to check your chart before going to step 2.

Organelle	Plant Cell	Animal Cell
Cell Membrane		
Cytoplasm		
Nucleus		
Cell Wall		
Vacuole		
Mitochondrion		
Endoplasmic Reticulum		
Chloroplast		
Lysosomes		
Ribosomes		
Golgi Bodies		

STEP 2: Designing your model. What items will you use to make your cell model?

First and foremost, you need to decide whether you will create a plant cell or animal cell.

Which type cell are you creating? _____

Here's where the real fun begins! It's time to decide what materials you will use to create each organelle. The best materials are ones that already look like the organelles you're trying to create. For example, the nucleus in any cell is always round so anything round would make a great nucleus in your cell model. Look at the materials on the supply table.

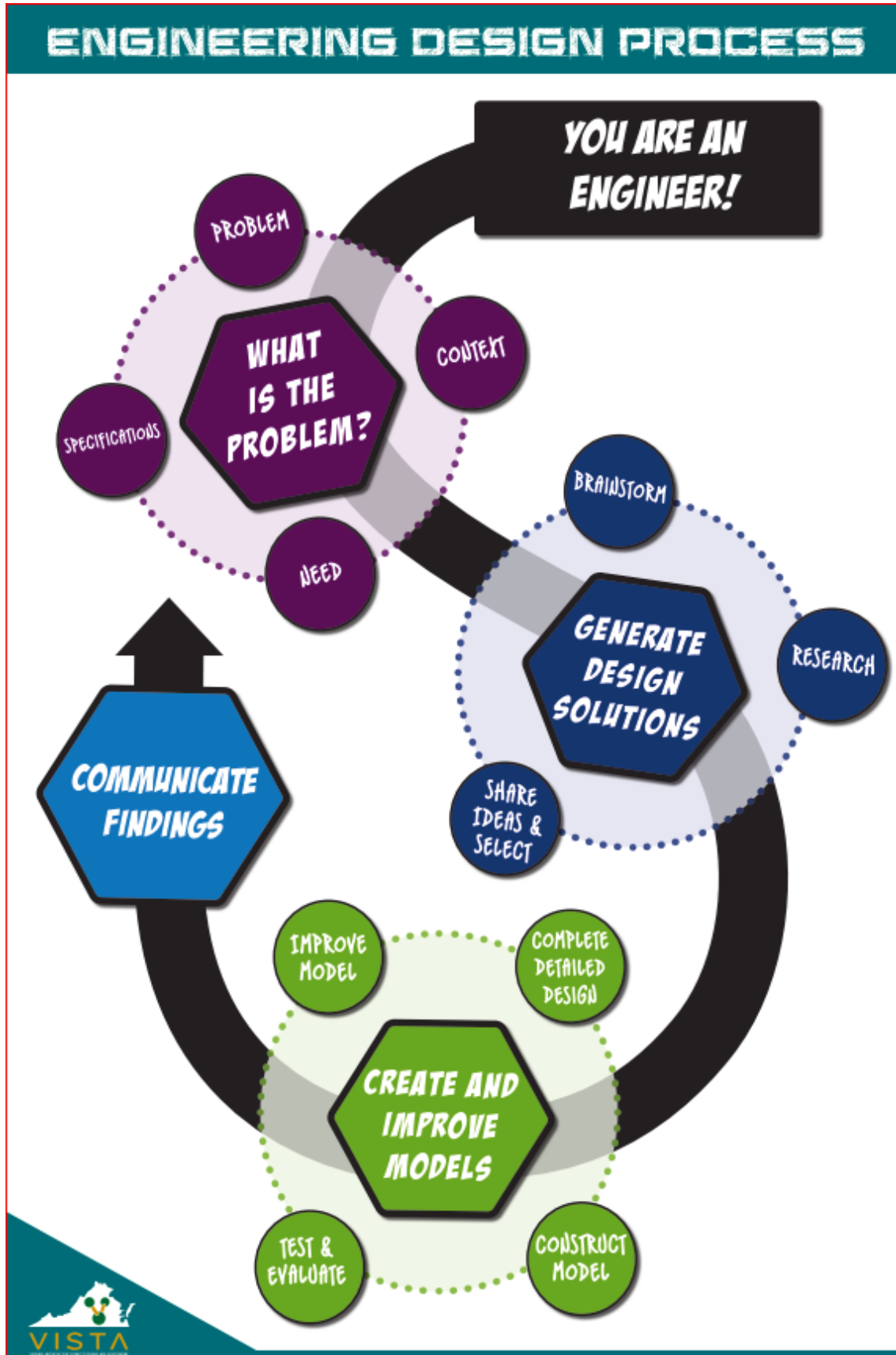
Now you need to make a list of all the organelles you will need to include in your 3D cell model. Fill in the chart. List the organelles found in your type of cell and what material(s) you will use to represent the cell.

Organelle	Material to represent organelle

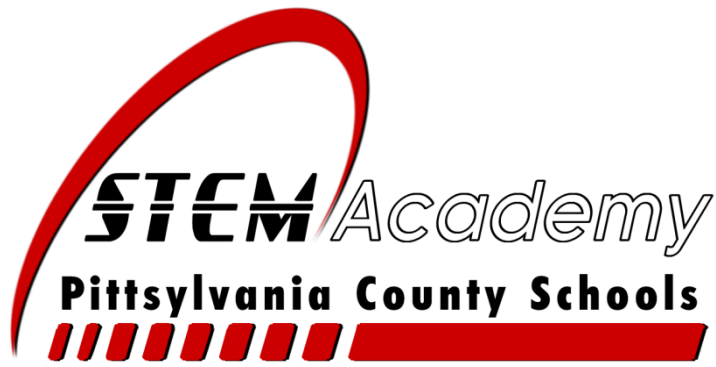
Step 3: Animating With The Hummingbird Robotics

Choose an LED or a servo motor to animate your cell. Remember what each component is capable of doing. Add the component to one of your organelles. Program the Hummingbird to animate that organelle.

Which component did you choose? Which organelle are you animating? Which cell did you animate?



Lesson Contributed by: Tommie Evans, Melissa Cassell, Jacob Taylor; Pittsylvania County Schools STEM Academy
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Creating a 3D Model

Cell Animation with Hummingbird Robotics

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