



DNA Discovery Using 3D Molecular Designs Models

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3/9/2023



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BS Biology- UW Parkside
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National Board Certified Teacher
Case High School Racine, WI
Currently teach PLTW Principles of
Biomedical Science and Chemistry.
3DMD/ CBM courses taken:
Modeling the Molecular World,
Cohort 3 Science and Ethics of
Genome Editing

Workshop Learning Goals

1. Learn how the Dynamic DNA models can be used to explore the structure and function of DNA.
2. Learn how to connect the Dynamic DNA to other models.



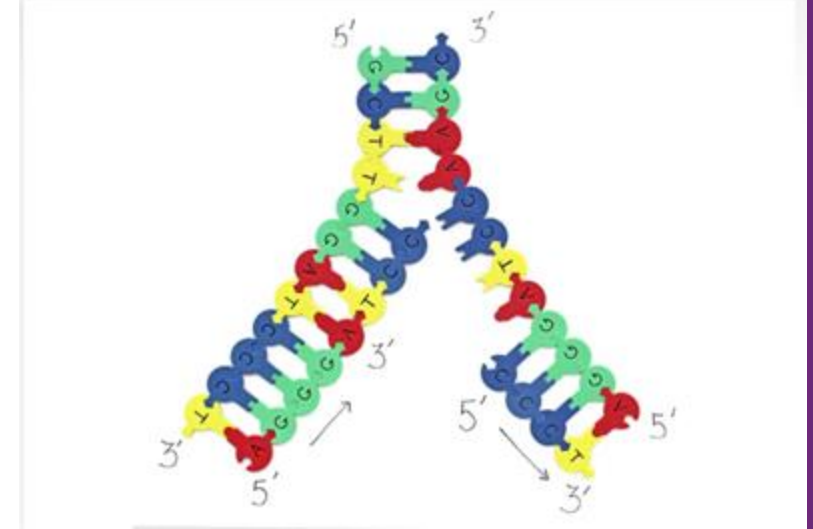
Kits Shown and used today



Dynamic DNA Kit



DNA Starter Kit



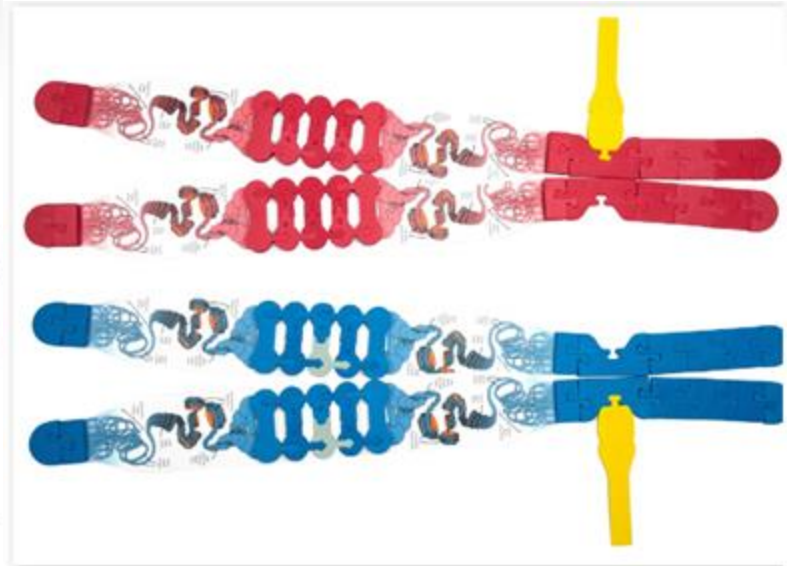
Demo DNA
Nucleotides



Kits Shown and used today



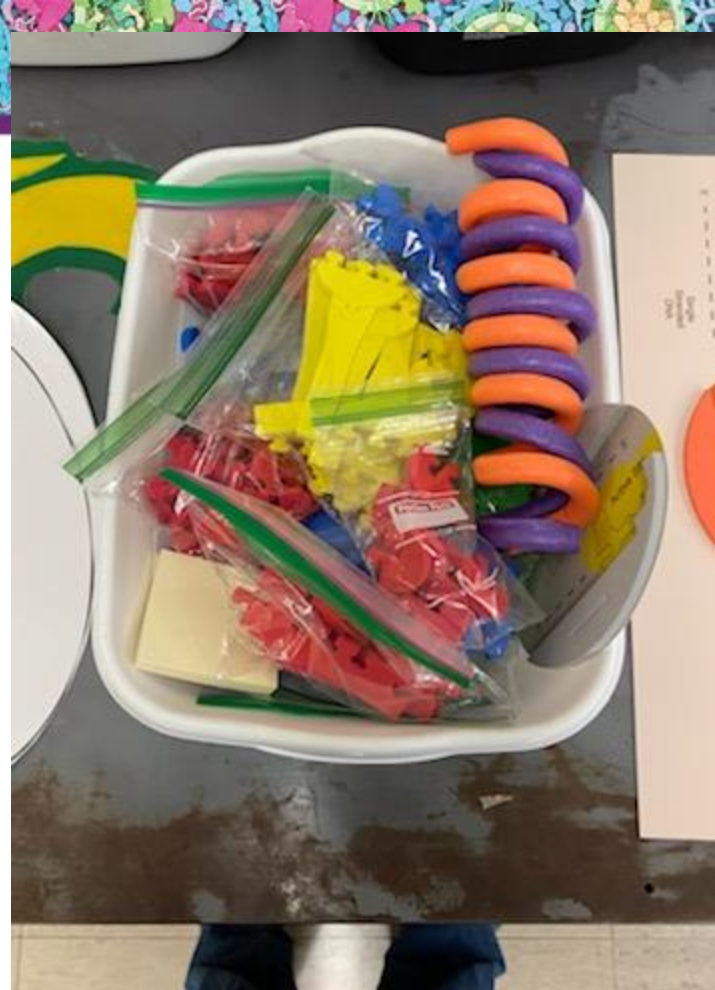
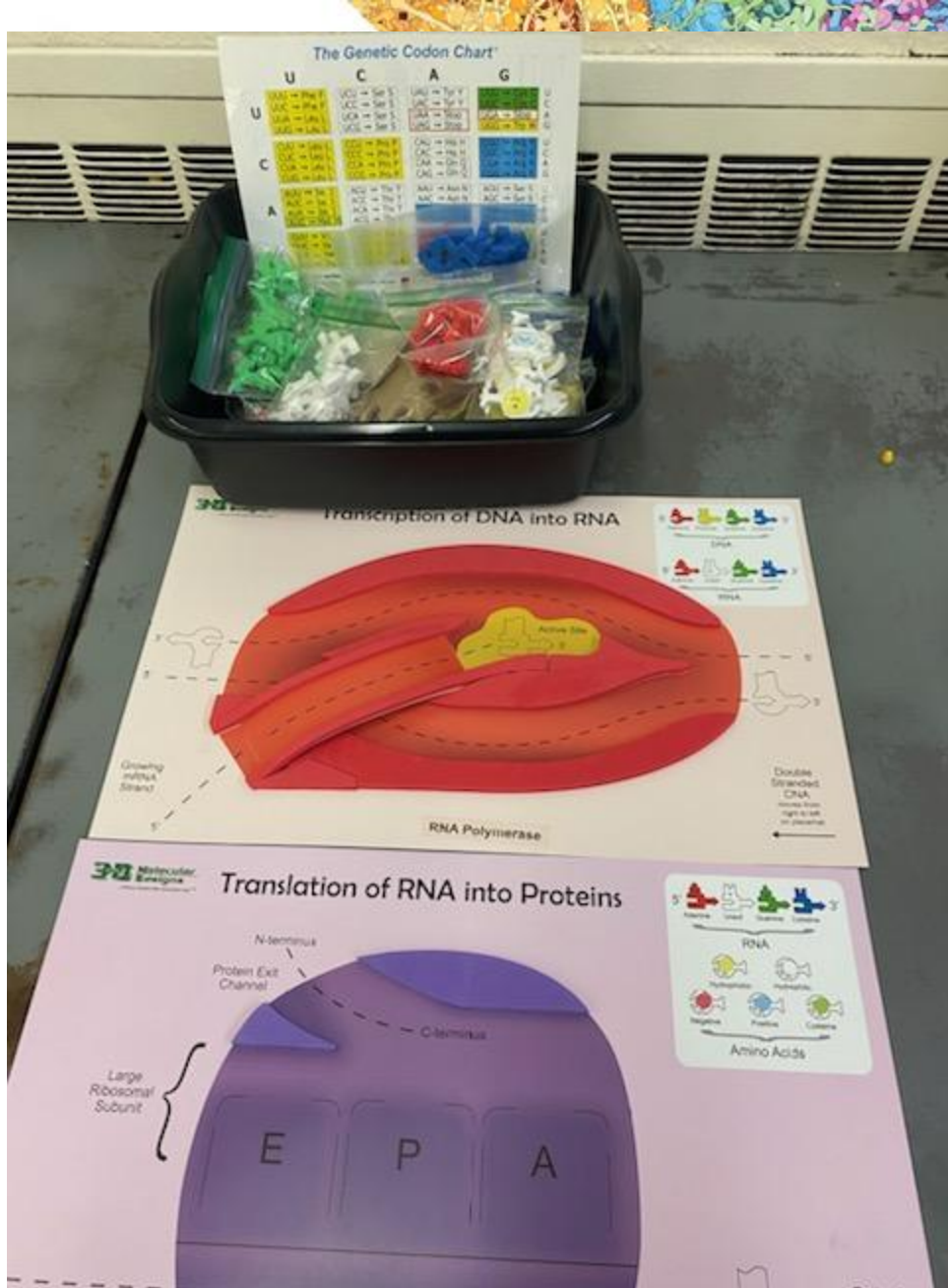
Flow of Genetic Information Kit



Chromosome Connections Kit



Nucleosome Mini Model



Kit Management-
Use Bins
Only give students what they need at the
time

What is a model? List the things you think are a model and Explain your thinking in your notebook. (From MMW 2019)

building a paper airplane

making an analogy (example, the heart is like a pump)

observing a bird's behavior at a bird feeder

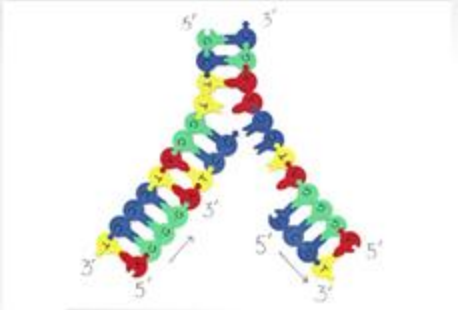
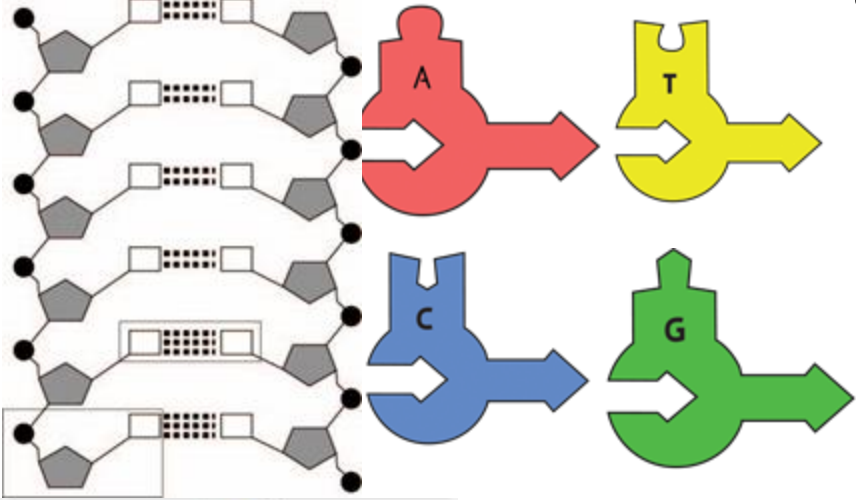
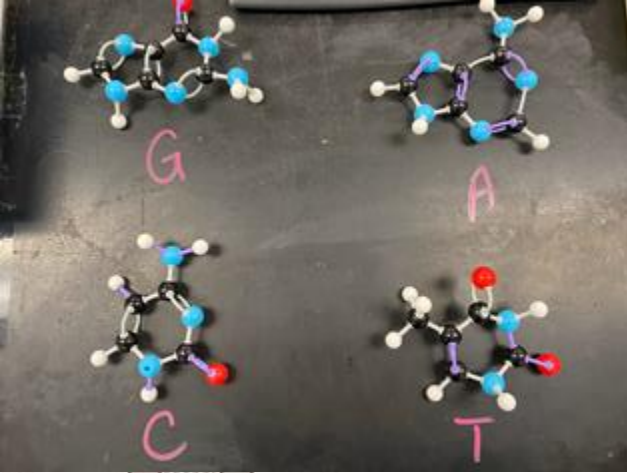
developing a mathematical equation to solve a science problem

making a plant cell out of household materials

analyzing whale migration patterns with a computer program

building and testing a bridge made of toothpicks

drawing an electrical circuit



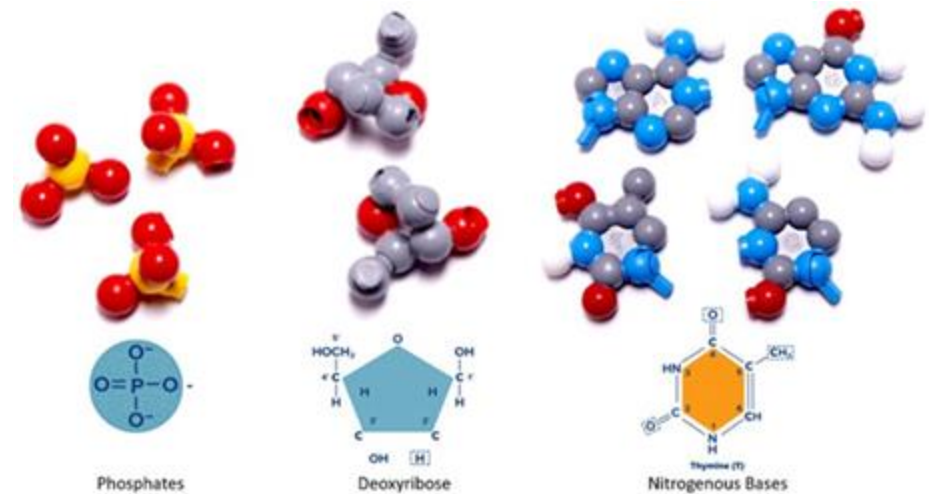
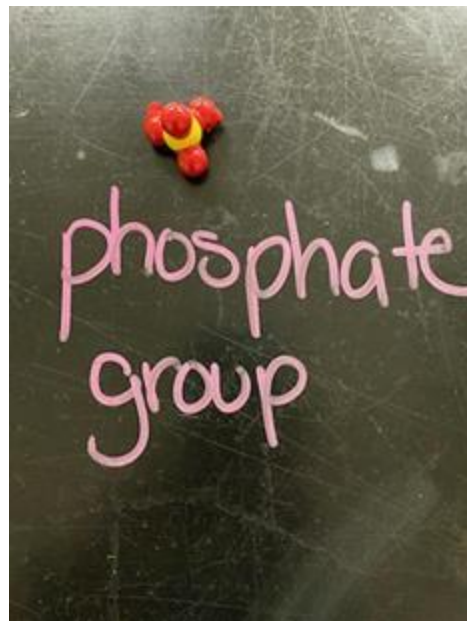
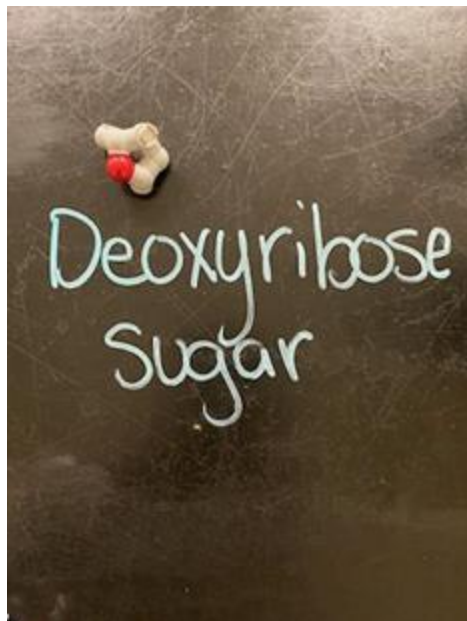
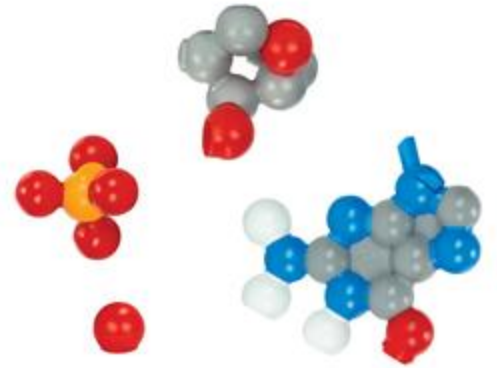
What is DNA?
What are
similarities and
differences in
our models?



First Activity with Dynamic DNA

Give students materials to make 6 nucleotides

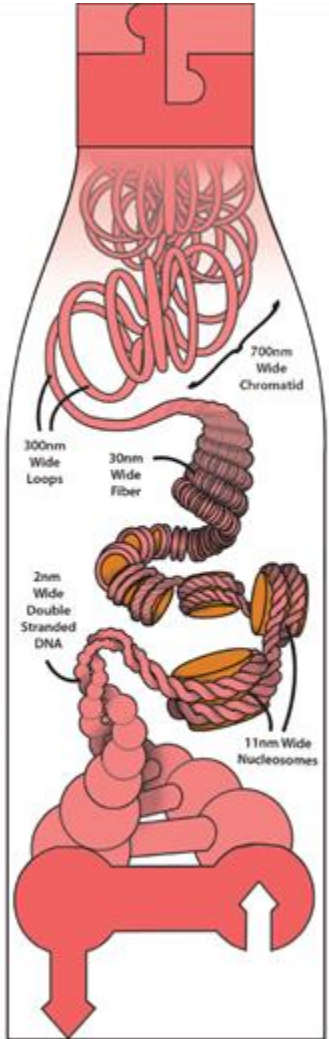
1. In your notebook sketch the different parts of a nucleotide using color.





2. Find the nitrogenous bases. In your notebook compare and contrast each of these. Explain to me what is the same for each of them and what is different.
3. Adenine and Guanine are purines and Thymine and Cytosine are pyrimidines. After looking at each of the different nitrogenous bases what similarities and differences of purine and pyrimidines?
4. Try to put the different pieces together to make as many nucleotides as possible. Sketch one nucleotide in your notebook.
5. As you try to put the different pieces together what is representing a hydrogen bond? What represents a covalent bond? Explain.

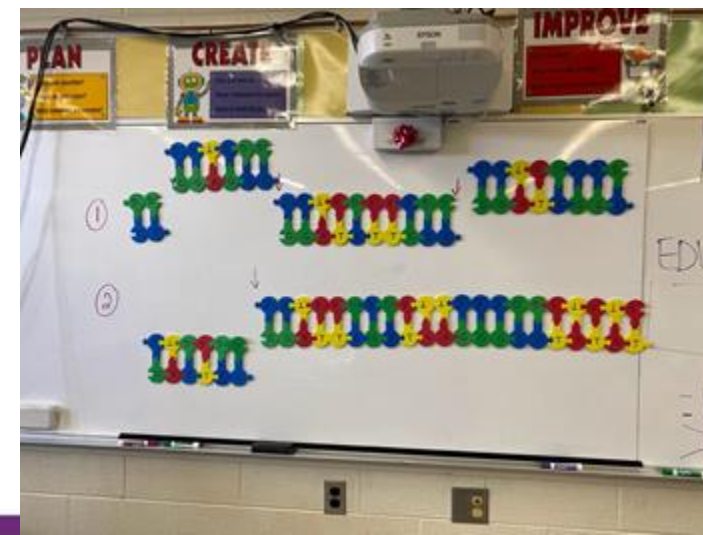
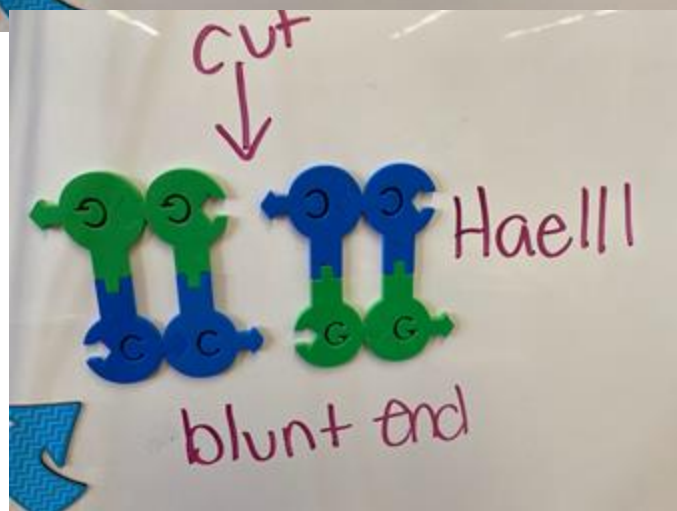
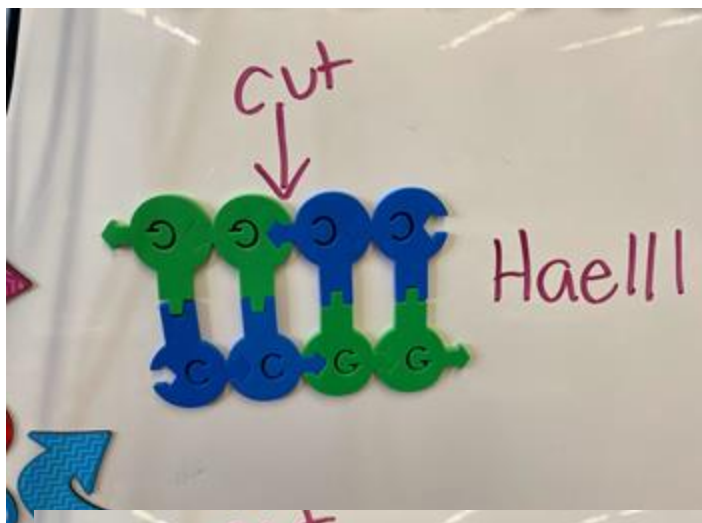
Talk about how chromosome condense



Organization of Eukaryotic Chromosomes	
DNA double helix	
DNA wrapped around histone	
Nucleosomes coiled into a chromatin fiber	
Further condensation of chromatin	
Duplicated chromosome	

Restriction Enzymes

How can you show restriction enzyme cuts using the Dynamic DNA?



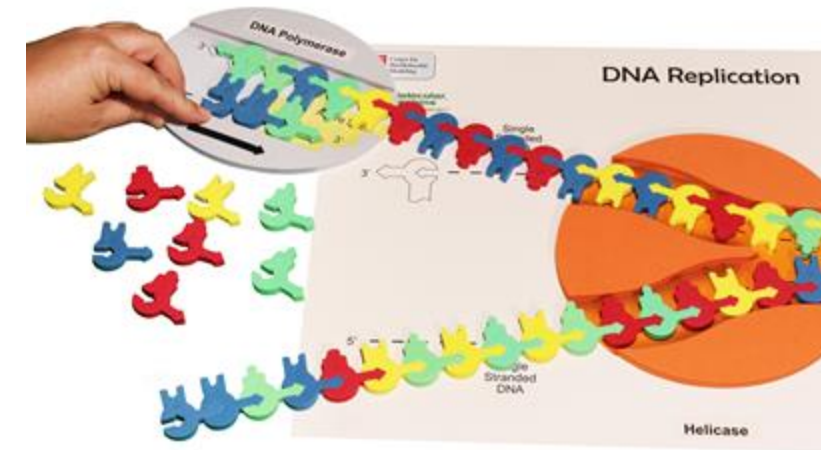
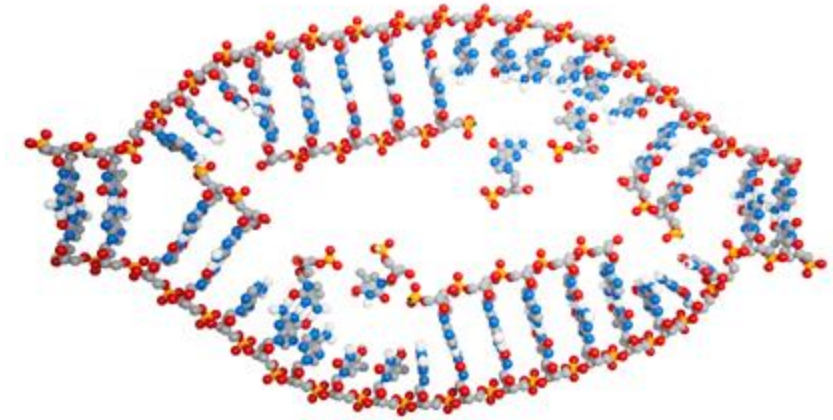
Gel electrophoresis

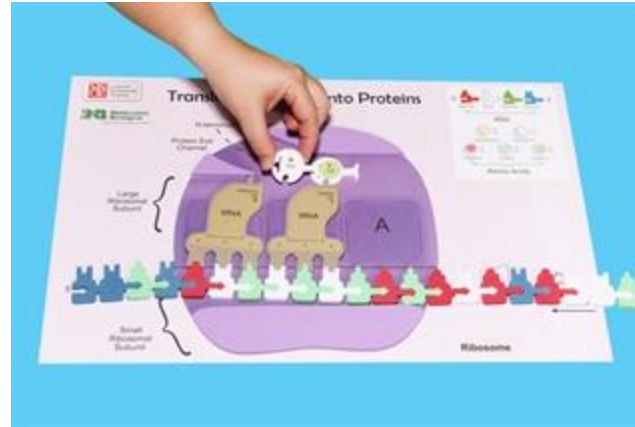
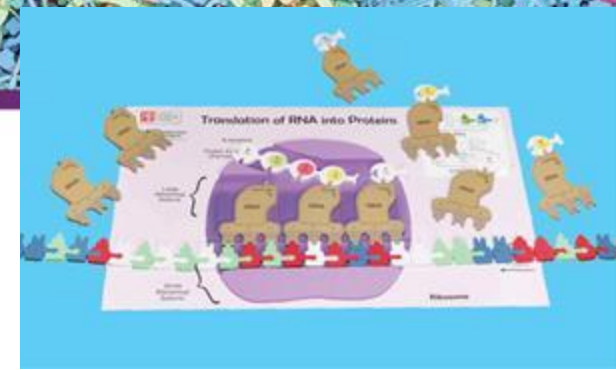
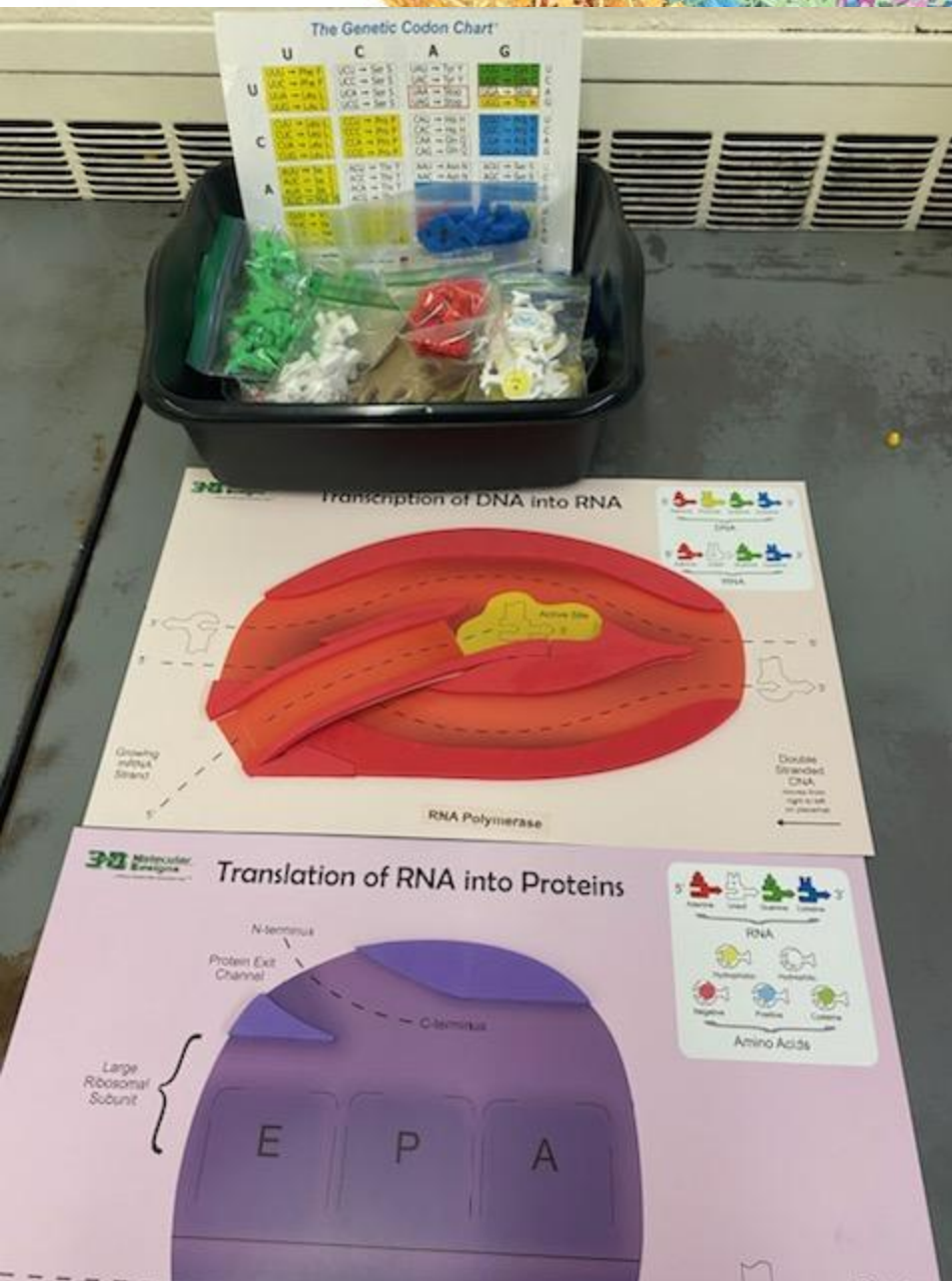
How can we use Dynamic DNA to show gel electrophoresis?



DNA Replication

Get Dynamic DNA kit out again before we do the Flow of Genetic Information kit and talk about how we can show DNA replication using it.





Flow of genetic information Transcription and Translation



Questions?
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Workshop NGSS Connections

SEPs	CCCs	DCIs
Asking questions and defining problems	Patterns	HS-LS1-1
Developing and Using Models	Structure and Function	HS-LS1-2
Constructing explanation and designing solutions	Scale, Proportion, and Quantity	HS-LS1-4
Engaging in argument from evidence	Cause and Effect	HS-LS3-1
Analyzing and Interpreting Data	Systems and System models	HS-LS3-2
		HS-LS3-3



Please scan the QR code