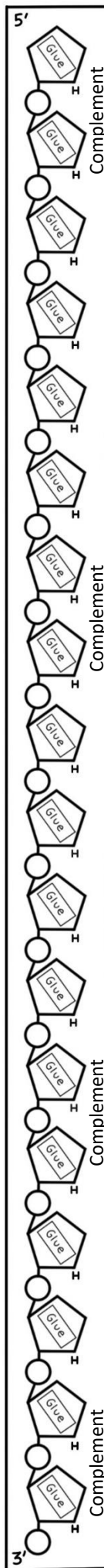
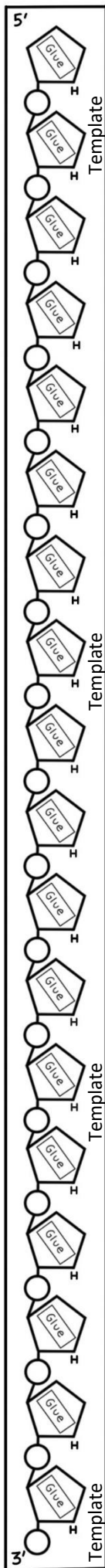
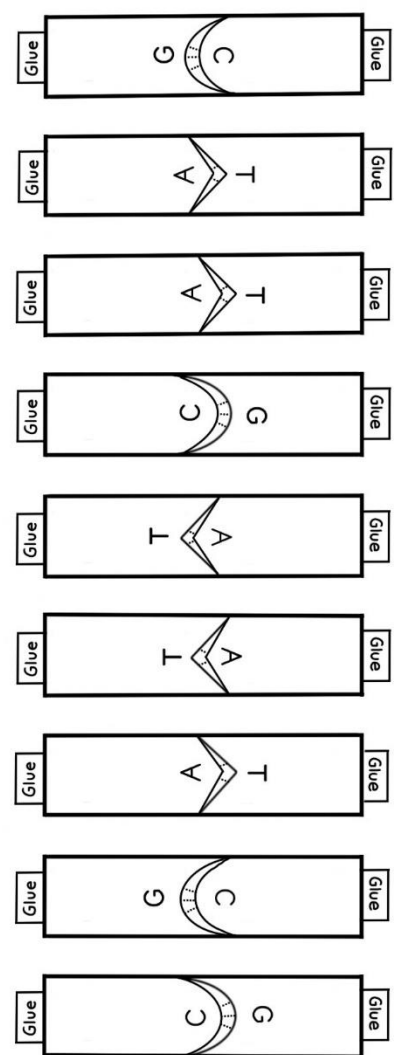
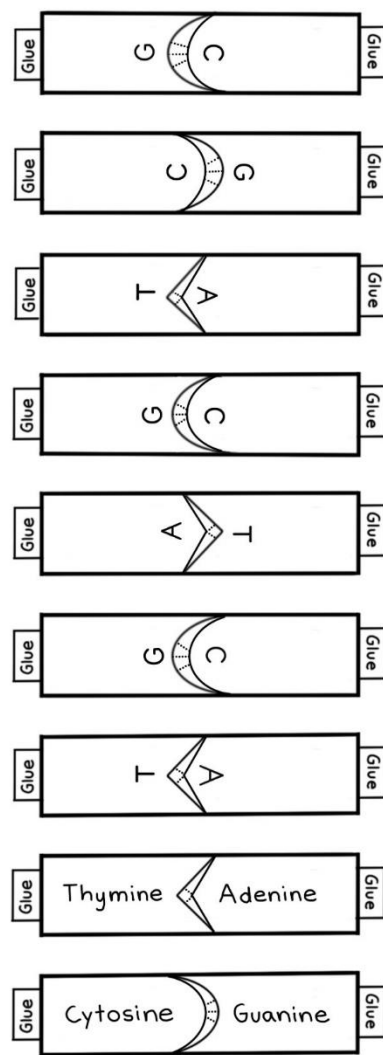


DNA Backbone: Deoxyribose sugar & Phosphate groups



DNA Nucleotide Pairs



3D Paper DNA Assembly

- 1. Color the DNA backbones and DNA nucleotide pairs. When coloring the nucleotides, keep the individual nucleotides the same color. For example, you can color all the adenines red, and all the thymines green. Choose different colors for the DNA backbones. Notice one is labeled "template," and the other is the complement.**
- 2. Cut out the DNA backbones and the nucleotide pairs. You will have 2 DNA backbones and 18 nucleotide pairs.**
- 3. Carefully fold the glue tabs on both ends of the nucleotide pairs into a 90 degree angle.**
- 4. Set up your DNA backbones. You should assemble your 3D DNA in the 3' to 5' direction. Lay your template on the table with 3' to the left and 5' to the right, now reverse the complimentary strand into the 5' to 3' direction. That is how DNA is organized in cells.**
- 5. Starting at the 3' end of the template, glue the nucleotides on to the template in this order: TAC GCG ACA TGA CAG ATC, (Use one side of the nucleotides for the order.) Make sure you match the angle of the glue spot on the backbone with your nucleotide so your final 3D DNA model will twist.**
- 6. Connect the complement DNA backbone to the opposite side of the nucleotide pairs in the 5' to 3' direction. You must match the angle of the glue guides so the model will twist, if not you will create a DNA ladder. Carefully hold the pieces in place until the glue sets.**

3D RNA Paper Assembly

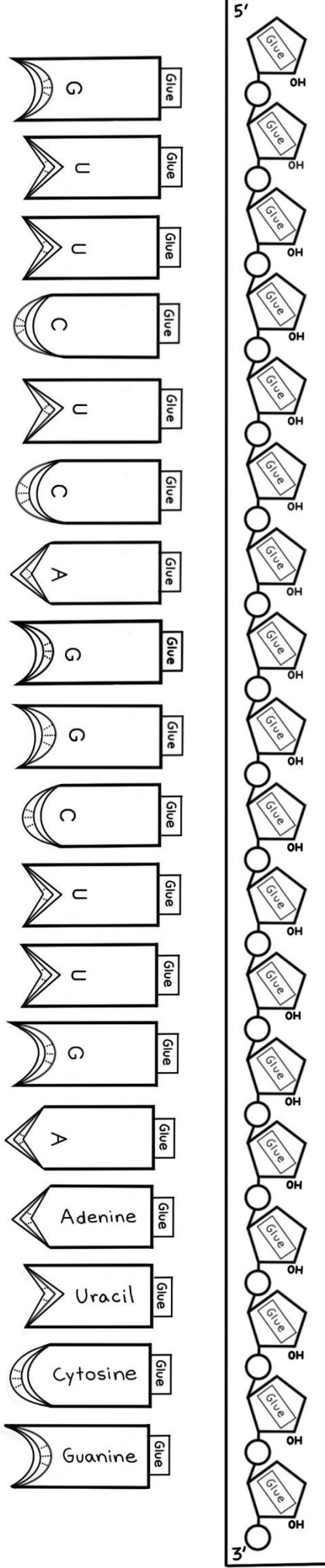
1. Color the RNA backbones and nucleotide pieces. When coloring the nucleotides, keep the individual nucleotides the same color. Choose different colors for the RNA backbone.
2. **Cut out the RNA backbone and the nucleotides. You will have 1 RNA backbone and 18 nucleotides in the space provided below:**
single nucleotides.

3. Carefully fold the glue tabs on the single nucleotide into a 90 degree angle.

4. **Set up your RNA backbones. You should assemble your 3D RNA in the 3' to 5' direction.**

DNA template: TAC GCG ACA TGA CAG ATC

RNA complement: _____



3D RNA Paper Assembly

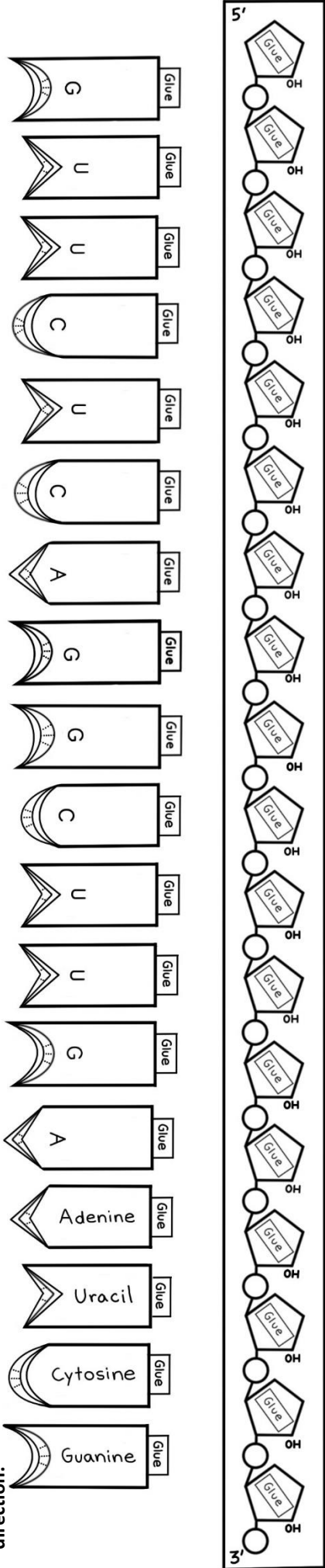
1. Color the RNA backbones and nucleotide pieces. When coloring the nucleotides, keep the individual nucleotides the same color. Choose different colors for the RNA backbone.
2. **Cut out the RNA backbone and the nucleotides. You will have 1 RNA backbone and 18 nucleotides in the space provided below:**
single nucleotides.

3. Carefully fold the glue tabs on the single nucleotide into a 90 degree angle.

4. **Set up your RNA backbones. You should assemble your 3D RNA in the 3' to 5' direction.**

DNA template: TAC GCG ACA TGA CAG ATC

RNA complement: _____



Dear Teacher,

Thank you for purchasing the 3D DNA & RNA paper model kit.

I have included instructions on the models' pattern.

I thought I would write a little note to you for some tips. First, try to create a 3D DNA model so you can experience the process and have an example for your classes.

Before beginning with your students, please emphasize this is an activity that requires students to use fine motor skills and patience. The more care they take in the cutting and assembling, the better their 3D DNA helix will look. If they do not take as much care, then students will still create a DNA ladder, but it will not twist. I noticed some of my students did not notice the angle they needed to glue the DNA nucleotides to on the DNA backbone. If they do not glue following the angle, the model will not twist. However, I emphasize that the most important thing is that they create the model regardless if it twists or not and are confident in their creation. I want the students to feel proud, so even when the models do not twist, I still tell them they did a great job. Because for many of them, it is still an accomplishment.

Please try and photocopy the pattern onto heavy weighted paper or cardstock. If the students also color the back of the pieces the finished product will look even better than if they only color one side. I made it optional for my students due to them already having a lot to accomplish.

Allow the students to choose the colors they will use, this creates "visual diversity" in their models.

Another tip is for students to set out a drop of glue on paper and use a paperclip or toothpick to transfer the glue onto the model so they have more control than using glue directly from a bottle. School glue is the best, glue sticks tend to dry out and cause the model to fall apart.

The DNA model has an H annotation on the sugars and the RNA models have an OH annotation. On the nucleotide pairs the dotted lines represent the hydrogen bonds between adenine and thymine, cytosine and guanine.

The RNA is complementary to the 3D DNA model. The codons can be transcribed into amino acid sequences. The amino acid sequence the DNA codons transcribe into is:

met arg cys thr val stop

Thank you so much for your support!

Mizzz Foster