

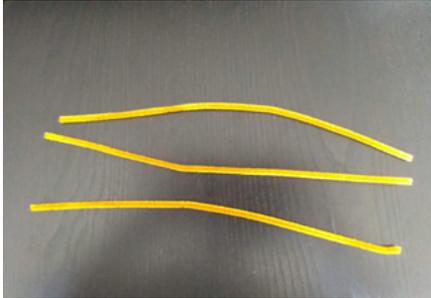
## DNA Origami Scaffold and Staple Strands

DNA can be made to form into almost any shape imaginable!

For this activity, we're going to be using pipe cleaners/chenille stems to demonstrate how DNA staple strands can be designed to hold a scaffold strand in desired shapes.

**Materials Needed:** 5 or 6 pipe cleaners, 3 should be of the same color. 1 pen or pencil. scissors.

1. Gather the 3 pipe cleaners that are of the same color.



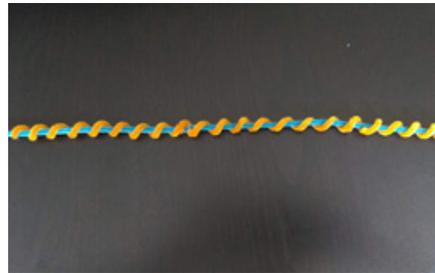
2. Combine the 3 pipe cleaners by twisting the ends together.



3. Wrap the combined pieces around a pencil. This will create your helix shape and serve as your DNA scaffold strand. Once wrapped, pull your DNA scaffold strand off of the pencil.

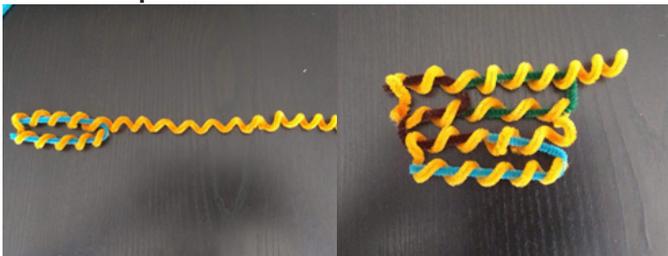


4. At this point, test to see if you can fit another pipe cleaner through the center of your scaffold strand. This is how staple strands will fit together!

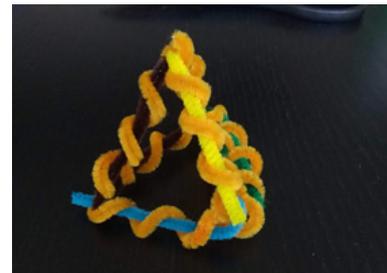


5. Try folding your scaffold into 2d and 3d shapes. Notice how it falls apart pretty easily! Now cut and fold staple strands to fill the entire scaffold and see how it stays together better. If it still isn't holding its shape, think about how you could rearrange your staples to make it more stable.

**2D Example:**



**3D Example:**



**Carnegie Mellon University**  
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*Activity Courtesy of Charlotte Andreasen, MechE/EPP, '21.*

For More Information about DNA Origami Research at CMU:  
<https://www.cmu.edu/gelfand/researchatcmu/lgcstemcareers/taylor-mech-eng.html>  
<https://www.andrew.cmu.edu/user/bex/>