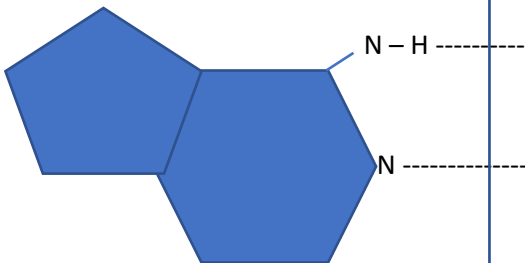


# Candy DNA Worksheet

Starting DNA strand: **CAACTGTGAAGA**

## Adenine

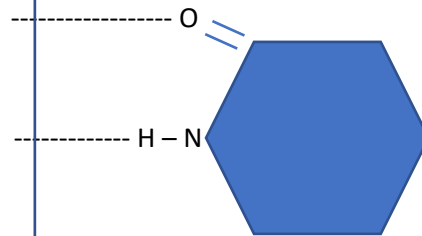
7 Pink marshmallows or circle wine gums



binds only with

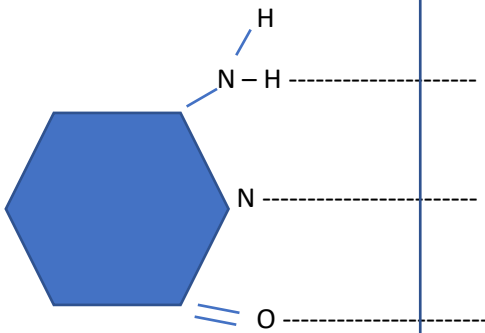
## Thymine

7 Yellow marshmallows or long wine gums



## Cytosine

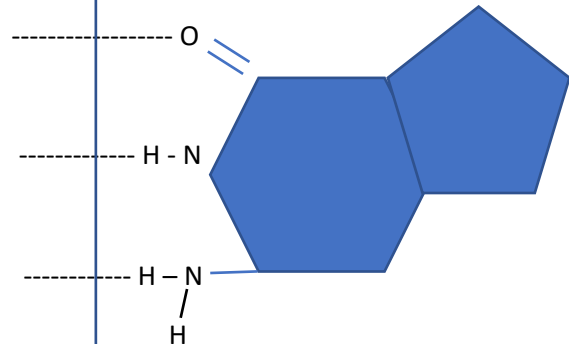
5 Green marshmallows or crown wine gums



binds only with

## Guanine

5 Orange marshmallows or diamond wine gums



## Methods:

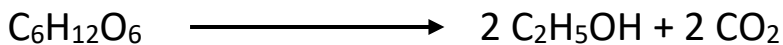
1. Sort your shaped wine gums or coloured marshmallows on the Worksheet. Adenine is pink mini marshmallows or circle wine gums; Thymine is yellow mini marshmallows or long wine gums; Cytosine is green mini marshmallows or crown shaped wine gums; and Guanine is orange mini marshmallows or diamond shaped wine gums.
2. Start with the first base at the left on the DNA strand shown on the Worksheet. "C" equals Cytosine which is the green or crown shape candy base, stick the coloured or shaped candy base into one of the toothpick ends and a bit through.
3. Push the candy base onto the toothpick end leaving room to stick the same toothpick end into one long strand of licorice backbone.
4. Continue adding candy base to the single strand of licorice backbone by sticking the candy onto the toothpick and the toothpick into the long licorice, with the bases listed on the Worksheet. A for Adenine, A for Adenine, C for Cytosine, T for Thymine, G for Guanine, T for Thymine, G for Guanine, A for Adenine, A for Adenine, G for Guanine, and finally A for Adenine.
5. With half of the DNA strand complete, you can start matching to create the base pairs.
6. Find the matching candy base and push the candy into the open end of the toothpick to be beside the existing candy base to make the base pair. Remember that adenine always and only binds with thymine and cytosine always and only binds with guanine.
7. Once the base pairs are on the toothpicks, you can add the second strand of long licorice to the open ends of the toothpicks to add the second sugar-phosphate backbone.
8. Give the DNA ladder a twist counter-clockwise from the top to create the double helix.

Finished DNA strand double strand:

	CAA	CTG	TGA	AGA	
	GTT	GAC	ACT	TCT	transcribed from DNA to mRNA
Amino Acids:	Val	Asp	Thr	Ser	translated from mRNA to AAs

A small portion of the DNA sequence coding for yeast ADHII (yeast alcohol dehydrogenase 2). The DNA coding the protein (enzyme) is 1046 base pairs in length.

The yeast alcohol dehydrogenase 2 enzyme is used in anaerobic (no oxygen) fermentation of glucose (sugar) to the products of ethanol and carbon dioxide.



Alcohol dehydrogenase

This process is used in baking bread (CO<sub>2</sub> gas causes the bread to rise, ethanol is cooked off) and making wine and beer (CO<sub>2</sub> gas is released from the container, ethanol is left to make the beverage).

Can you think of other products we use or eat that are made from alcoholic fermentation?

The candy that you have used to make the DNA, where does that come from?

I look forward to talking with you about your Candy DNA experience during the live sessions.

## References:

Madigan, M.T., Bender, K.S., Buckley, D.H., Sattley, W.M., and Stahl, D.A. (2021). Brock Biology of Microorganisms. 16<sup>th</sup> Edition. Hoboken, NJ: Pearson Education. pp. 166 – 192.

Moore, D., Robson, G.D., and Trinci, A.P.J. (2011) 21<sup>st</sup> Century Guidebook to Fungi. Cambridge, UK: Cambridge University Press. pp. 475 – 477.

Russell, D. W., Smith, M., Williamson, V.M., and Young, E. T. (1983) Nucleotide sequence of the Yeast Alcohol Dehydrogenase II Gene. The Journal of Biological Chemistry. Vol 258, No. 4, pp. 2674 – 2682.