

U: gummy bear

Activity: Building a Candy Model

Overview: We will be using candy to create a DNA model. Each person will get different starting materials, so we will all build different DNA. It is important that you read the directions carefully because after the DNA is built, we are going to transcribe and translate it!

1. First, line up your "nucleotides" in a row. Assign each color to a nucleotide:

A: orange T: pink C: yellow G: red

2. Line up your nucleotides in a row. Record the order of your nucleotides based on how you lined them up.

T, A, C, G, A, G, T, T, G, A, C

3. Use toothpicks to attach your nucleotides to the Twizzlers. What are the Twizzlers representing in this model?

sugar phosphate backbone

4. What are the toothpicks representing in this model?

weak hydrogen bond

5. Based on your nucleotides, acquire the corresponding nucleotides for the other side of your DNA strand based on the complementary base pairing rules and the colors you assigned in #1. Add these nucleotides to the other side of the toothpick, and use another Twizzler at the end of this side. Twist your model so it is in the appropriate DNA shape. What two words are used to refer to this structure?

double helix

6. Now we are going to transcribe this DNA and make mRNA from it. To do this, you are going to need more nucleotides. However we need to get rid of one nucleotide and add a different one. What is it? What color nucleotide will you use to represent it?

Uracil (green gummy bear)

"Unzip" your DNA strand by using scissors (or your fingers) to snap your toothpicks down the middle. Transcribe the original side of your DNA strand from #2. Attach the mRNA nucleotides to a new Twizzler using more toothpicks. Once you are finished, it will "leave" to go get translated, and your DNA can zip back up! Below record the nucleotide sequence in your mRNA strand.

A, U, G, G, A, A, C, U, G,

Now we are going to translate your mRNA into a protein below. Use the genetic code from your notes. Start at the beginning and go until you run out of nucleotides or you reach a "stop." Note: It most likely won't begin with "Met" and end with "stop" like we know it would in reality, but that's okay! Record below the amino acid sequence you got.

Met, Glu, Leu,

Practice: Transcribing and Translating

Transcribe and translate the following DNA molecules.

1. DNA: TACCGGATGCCAGATCAAATC

mRNA: AUG | GCC | UAC | GGU | CUA | GUU | UAG

amino acids: Met | Ala | Tyr | Gly | Leu | Val | •

2. DNA: TACCTGTTAAGCTACAAAATT

mRNA: AUG | GAC | AAU | UCG | AUG | UUU | UAA

amino acids: Met | Asp | Asn | Ser | Met | Phe | •

3. DNA: AATACGGGGGCGTAAACCACTA

mRNA: UUA | UGC | CCC | CGC | AUU | GGU | GAU

amino acids: Leu | Cys | Pro | Arg | Ile | Gly | Asp

4. DNA: GCTAGTACGTGCACATTAGAA

mRNA: CGA | UCA | UGC | ACG | UGU | AAU | CUU

amino acids: Arg | Ser | Cys | Thr | Cys | Asn | Leu

