

# Build a “Marshmallow” DNA Model—DAY 1

Name \_\_\_\_\_

You will need:

**12 LARGE** white marshmallows—representing **deoxyribose**—the **5-carbon sugar**

**12 small** white marshmallows—representing the phosphate groups

A handful of *colored* marshmallows—representing the *nitrogen bases*

Pink— Cytosine

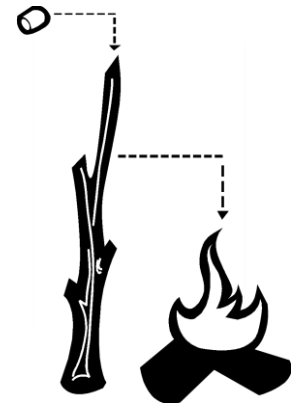
Green— Guanine

Orange— Adenine

Yellow— Thymine

Several **whole, unbroken toothpicks**—representing the **covalent bonds**

Several broken toothpicks—representing the hydrogen bonds



You will be making a short piece of DNA (i.e., **Gene**) where the genetic code reads:

**C A T T A G**

**Step 1:** Begin by making a single nucleotide. Your nucleotide should include a deoxyribose, a phosphate group and the nitrogen base, Cytosine. All three of these components should be separated by covalent bonds.

**Step 2:** Continue making nucleotides until you have made one nucleotide for each of the letters in your parent strand.

**Step 3:** Get your parent strand approved by your teacher.

**Step 4:** Fill in the complementary strand of DNA by matching complementary nucleotides for each nitrogen base in the parent strand according to the base-pairing rules.

**Step 5:** Double check that you have placed the correct number of hydrogen bonds between your nitrogen bases and that your DNA strand is antiparallel.

**Step 6: Review** for your **DNA Model exit quiz** with your teacher by making sure each member of your group can identify the following DNA structural features: outline 1 nucleotide, covalent and hydrogen bonds, 5-Carbon sugar, phosphate group, nitrogen base, deoxyribose, backbone, antiparallel, base-pairing rules

**Step 7:** Draw a diagram of your DNA model below (like we did in class) and be sure to label the following DNA features:

- Several hydrogen and *covalent* bonds
- CIRCLE → the DNA backbones
- OUTLINE → One nucleotide

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DNA Diagram Here:

## Replicate a DNA gene using a “Marshmallow” DNA Model —DAY II

You will need:

**12 LARGE** white marshmallows—representing **deoxyribose**—the **5-carbon sugar**

**12 small** white marshmallows—representing the phosphate groups

A handful of *colored* marshmallows—representing the *nitrogen bases*

Pink— Cytosine

Green— Guanine

Orange— Adenine

Yellow— Thymine

Several **whole, unbroken toothpicks**—representing the **covalent bonds**

Several broken toothpicks—representing the hydrogen bonds



You will be performing **REPLICATION** of the DNA gene using the directions below.

**Step 1:** Take your original DNA gene and separate the two parent strands.

**Step 2:** Make complementary nucleotides for each nitrogen base in the separated parent strands.

**Step 3:** Be sure that you have the correct number of hydrogen bonds between your nitrogen bases. Also, be sure both of your DNA strands are antiparallel.

**Step 4:** You should have two DNA strands that are identical to each other—each consisting of one old DNA strand and one new DNA strand. After checking your work, have your teacher check both of your DNA strands.

**Step 5:** Answer the questions below. Be sure to clean up your area when complete.

1. What does it mean to say that DNA is antiparallel?
2. Why is DNA referred to as a double helix?
3. What nucleotide parts make up the DNA backbones?
4. What does it mean if the 2 DNA strands are complementary?
5. Why would DNA ever need to be replicated?
6. What role does DNA polymerase play in DNA replication?