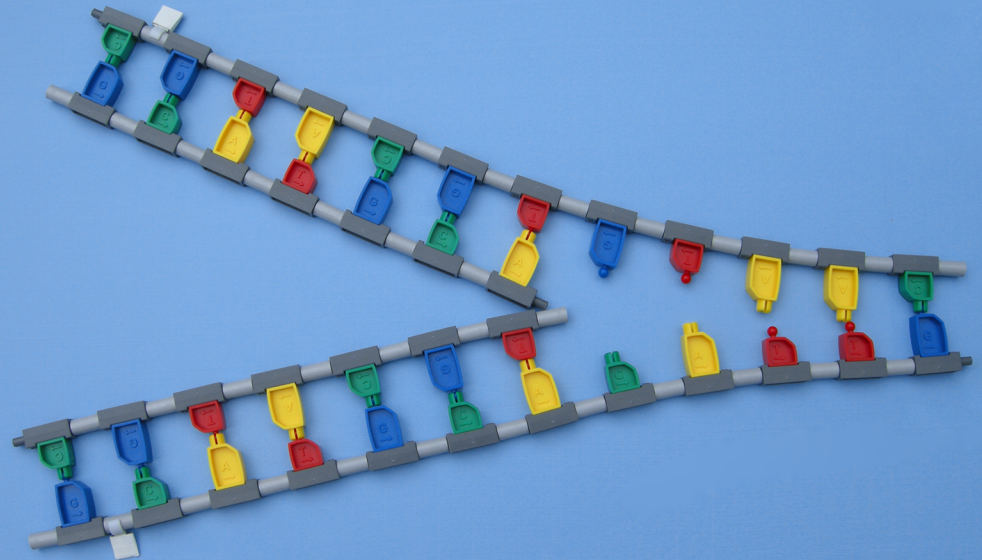


# DNA/RNA

## Booklet 1:

### Introduction to Structure and Function



Models and lessons created  
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# Using Your Booklet and Kit

**Q:** = Helpful Questions (answers on Page 29)

**Bold type** = required actions

Underlined = new vocabulary

## 1. Open the kit. Count the gray DNA pieces in the small compartments.

Each compartment should have 4 similar DNA pieces. Check that the colors are in the correct places. There are:

- 12 red (T)
- 12 yellow (A)
- 12 green (C)
- 12 blue (G)

## 2. Count the orange RNA pieces in the large compartment.



















Similar RNA pieces should be joined together in groups of six. There are:

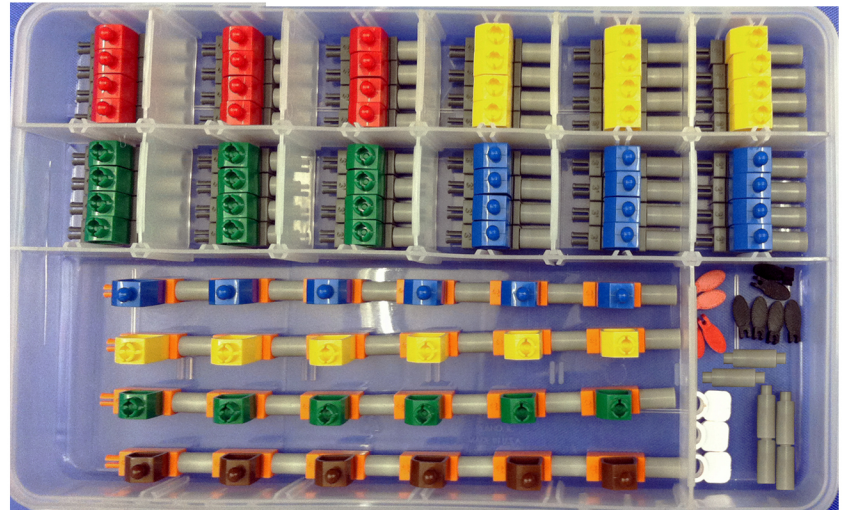
- 6 brown (U)
- 6 yellow (A)
- 6 green (C)
- 6 blue (G)

## 3. Identify and count the pieces in the last compartment.

There are:

- 6 gray cylinders (phosphates)
  - 4 with single pin*
  - 2 with double pin*
- 3 white markers
- 6 black clips (methyl)
- 4 red clips (oxygen)

DNA	 4T	 Thymine 4T	 4T	 4A	 Adenine 4A	 4A
	 4C	 Cytosine 4C	 4C	 4G	 Guanine 4G	 4G
RNA	 Uracil 6U		 Adenine 6A		 6A	
	 Cytosine 6C		 Guanine 6G		 6G	
						4 Phosphate 2 Phosphate 3 Marker 6 Methyl 4 Oxygen

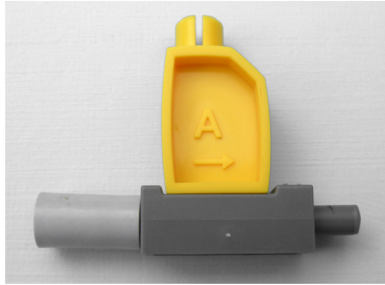


# PART I: STRUCTURE

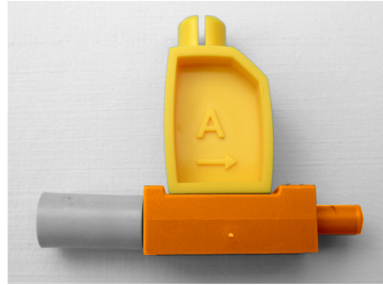
## Introducing the Nucleotides

DNA is the abbreviation for deoxyribonucleic acid. RNA is the abbreviation for ribonucleic acid. The pieces shown below are the building blocks of DNA and RNA. These small molecules are nucleotides.

Look at the photos and the figures. There are 2 kinds of nucleotides.



DNA Nucleotide



RNA Nucleotide



DNA



DNA nucleotide



RNA



RNA nucleotide

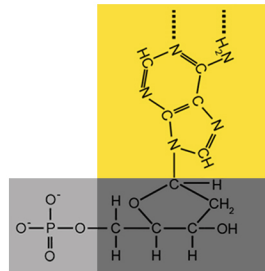
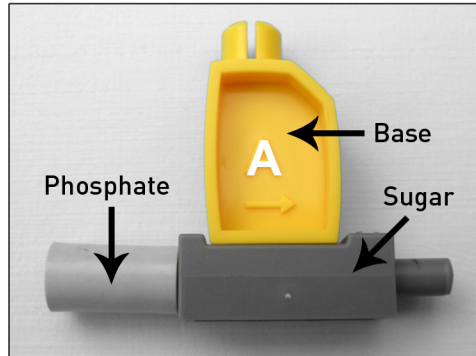
**Q:** Which nucleotides are orange? Which nucleotides are gray?



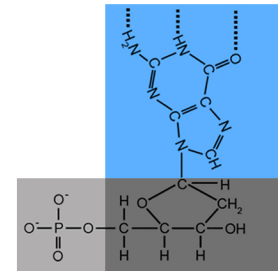
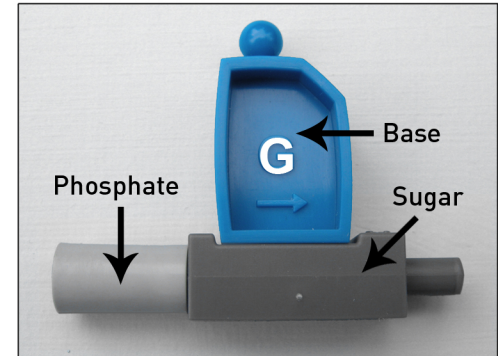
# Knowing Your Nucleotides

1. Take out 1 of each color DNA nucleotide. Hold a nucleotide in your hand and use the picture to identify the parts:

- phosphate (light gray cylinder)
- sugar (dark gray block)
- base (colorful shape with letter)



Adenine (A)



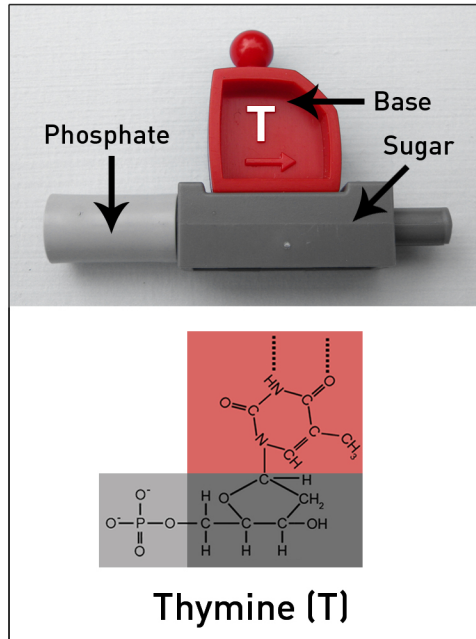
Guanine (G)

2. Look at the chemical diagrams below each model. The diagrams show the atoms in each nucleotide.

**Q:** Name the atoms you see in the chemical diagrams.

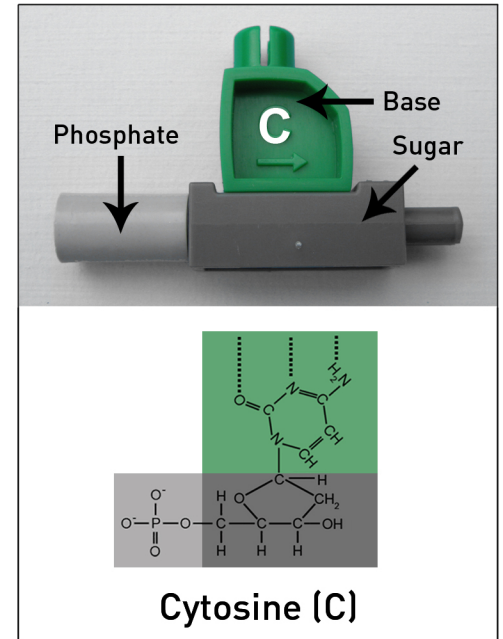
3. Find the letters on the models. They stand for the chemical names of the bases:

- Adenine (A)
- Guanine (G)
- Thymine (T)
- Cytosine (C)



4. Compare the sizes of all 4 bases.

**Q:** Which bases are bigger?



5. Find the arrows on each model nucleotide. Find the 3' end marked on the sugar. The arrow points toward the 3' end. Arrows are important when building DNA strands.

6. Build a small DNA molecule with just 4 nucleotides: A, T, G, and C. Your DNA should look like a ladder, with 2 nucleotides on each side of the ladder.

**7. Look at the top photo.** This is one way to build a DNA ladder from 4 nucleotides. However, this DNA structure is not correct. To make it correct, you must always pair a big nucleotide with a small nucleotide. This will keep the sides parallel.

**8. Look at the arrows on your DNA.** In nature, the sides of the DNA ladder run in opposite directions. The arrows on one side should point in one direction and the arrows on the other side should point in the opposite direction.

**9. Fix your DNA molecule so it looks like the bottom photo:**

- Pair big nucleotides with small nucleotides.
- The sides should be parallel.
- The arrows should point in opposite directions.

**Q:** Which bases always pair together in DNA?

You have just discovered the famous base-pairing rule!

