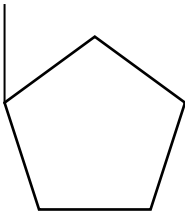


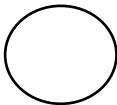
# The components of a nucleotide – instruction sheet

A nucleotide is the ‘building block’ of DNA and RNA

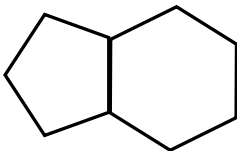
It has 3 components:



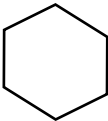
A pentose sugar



A phosphate group

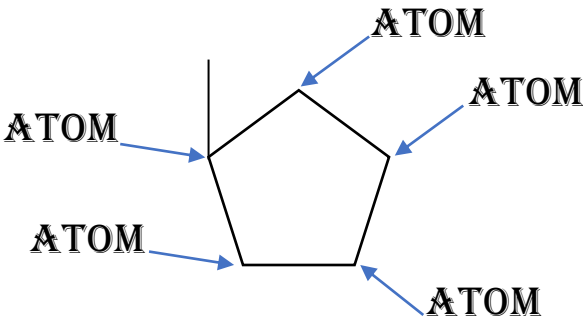


A nitrogenous base (there are two types)

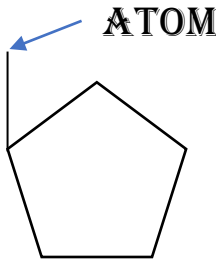


## The pentose sugar

Each of these points represents an atom.

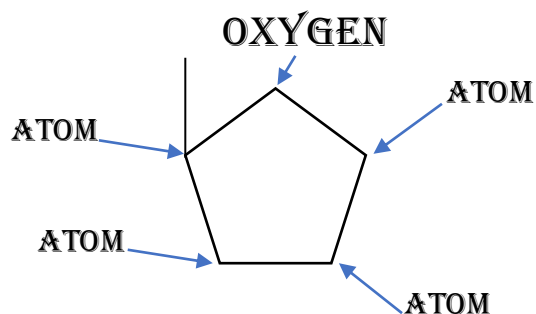


The tip of the little flag also represents an atom.



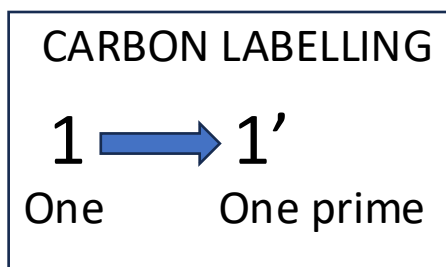
Label the pentose sugar on your answer sheet.

The atom next to the 'flag' is an oxygen.



**Label the oxygen with an 'O' on your answer sheet.**

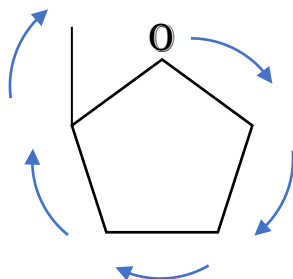
All of the other atoms are Carbon. Carbons are NOT labelled with a letter; they are labelled with a number. In sugars, that number gets a special designation called a 'prime'.



Carbons are numbered from the oxygen starting on the opposite side of the 'flag'.

**on your sheet label your carbons starting with 1'.**

Remember that the top of the 'flag' also has a carbon atom.



**Answer questions 1 & 2 on your answer sheet**

Nucleotide orientation is determined by the position of the 3' & 5' carbons in the pentose sugar.

### ANSWER QUESTIONS 3 & 4

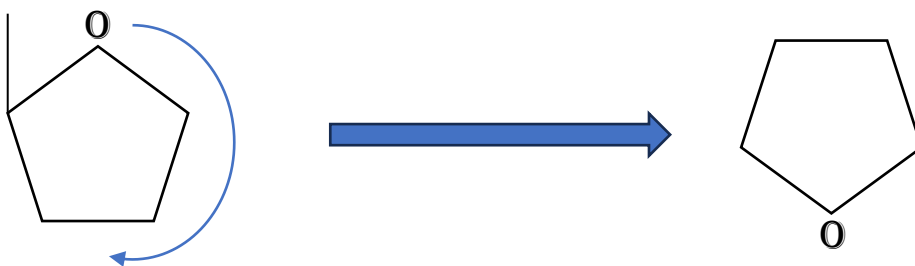
The orientation of the 'primes' (numbered carbons) gives us the orientation of the pentose sugar. In this case because the 5' carbon is at the top and the 3' carbon is at the bottom we would say the orientation is 5' to 3'.

### ANSWER QUESTION 5

CUT OUT a PENTOSE SUGAR FROM YOUR NUCLEOTIDE COMPONENTS PAPER (MAKE SURE TO LEAVE ENOUGH ROOM FOR LABELLING).

LABEL THIS PENTOSE SUGAR JUST AS YOU DID THE OTHER (GO BACK AND LOOK AT THE PREVIOUS PAGE IF YOU NEED TO)

ROTATE THE PENTOSE SUGAR SO THAT THE OXYGEN IS AT THE BOTTOM OF THE SUGAR.

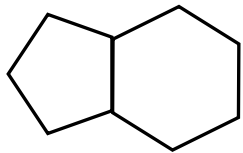


▶ PASTE THE ROTATED PENTOSE SUGAR TO YOUR SHEET WHERE INDICATED.

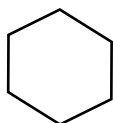
### ANSWER QUESTIONS 6 - 8

# The Nitrogenous Base

There are two types of nitrogenous bases.



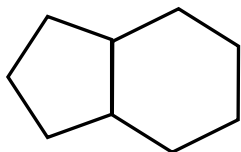
Purines



Pyrimidines

ANSWER QUESTIONS 9 & 10

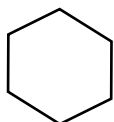
There are two types of purines in DNA and RNA.



Adenine (A) and Guanine (G)

COMPLETE QUESTION 11

There are three types of pyrimidines in DNA and RNA.



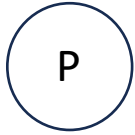
Cytosine (C), Thymine (T), and Uracil (U)  
DNA only                      RNA only

COMPLETE QUESTION 12 & 13

Purines only bind pyrimidines and pyrimidines only bind purines.

ANSWER QUESTIONS 14 - 17

# The Phosphate group



I'm important but more on me later!

## Constructing the Nucleotide

Each nucleotide is composed of 1 pentose sugar, 1 nitrogenous base, and 1 phosphate group.

CUT OUT AND LABEL A PENTOSE SUGAR

ORIENT THE SUGAR 5' TO 3'

The nitrogenous base always binds at the 1' Carbon

IDENTIFY THE 1' CARBON

CHOOSE WHICH BASE YOU WANT THIS NUCLEOTIDE TO HAVE.

ON YOUR 'NUCLEOTIDE COMPONENTS' PAPER COLOR AND LABEL THE BASE ACCORDING TO YOUR DESIGNATIONS ON PAGE 2 OF YOUR SHEET.

CUT THE BASE OUT AND PLACE IT AT THE 1' CARBON

The phosphate group always binds at the 5' Carbon

IDENTIFY THE 5' CARBON

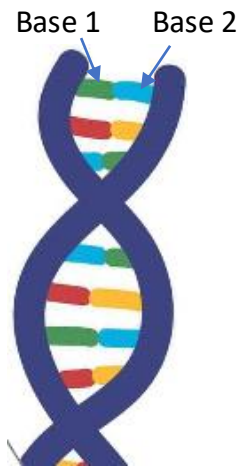
ON YOUR 'NUCLEOTIDE COMPONENTS' PAPER FIND A PHOSPHATE GROUP AND LABEL IT WITH A 'P'

CUT THE PHOSPHATE GROUP OUT AND PLACE IT AT THE 5' CARBON

WHEN YOU ARE SATISFIED WITH THE NUCLEOTIDE GLUE IT TO YOUR SHEET

CONSTRUCT A NUCLEOTIDE WITH THE CORRECT BASE TO BIND THE ONE YOU PASTED TO YOUR SHEET (DON'T GLUE/TAPE THE NUCLEOTIDE TO THE PAPER YET)

In DNA the bases must bind to each other to form the 'rungs' of the DNA 'ladder'.



ANSWER QUESTION 19

IF YOU HAVEN'T ALREADY, ROTATE YOUR NUCLEOTIDE SO THAT THE PENTOSE SUGAR'S ORIENTATION IS 3' TO 5'

PASTE THE 3' TO 5' NUCLEOTIDE TO YOUR SHEET SUCH THAT THE BASES BIND

ANSWER QUESTION 20

The opposite orientation of the sides of DNA is called being 'antiparallel.'

