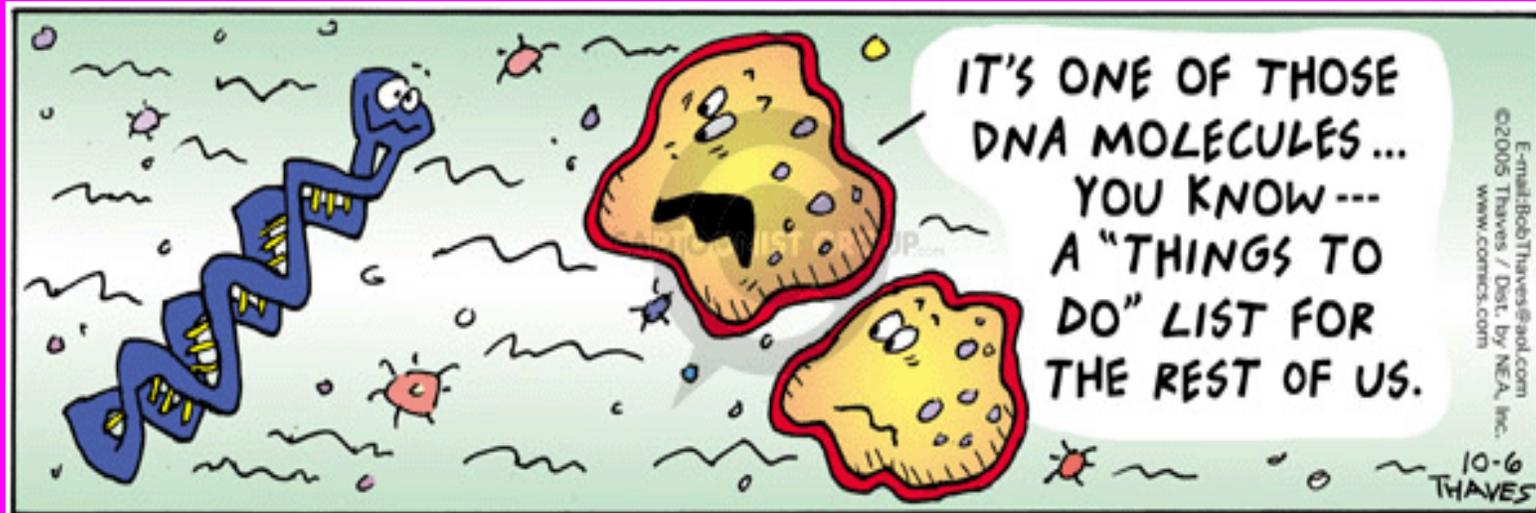


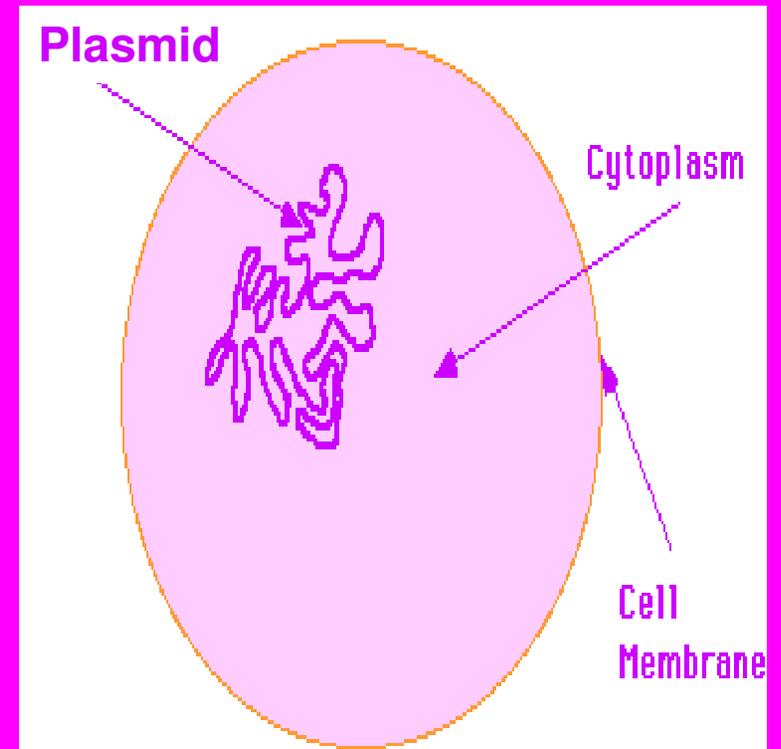
Chapter 12-2

DNA Replication and Chromosomes



I. Prokaryote DNA Replication

- A. Lack nuclei
- B. Single circular strand of DNA in cytoplasm of cell. Called a nucleoid or plasmid.
- C. DNA strand stretched out is approx 1.6mm in length.
- D. Replication begins at single point and goes in TWO \leftrightarrow directions until entire plasmid is replicated.

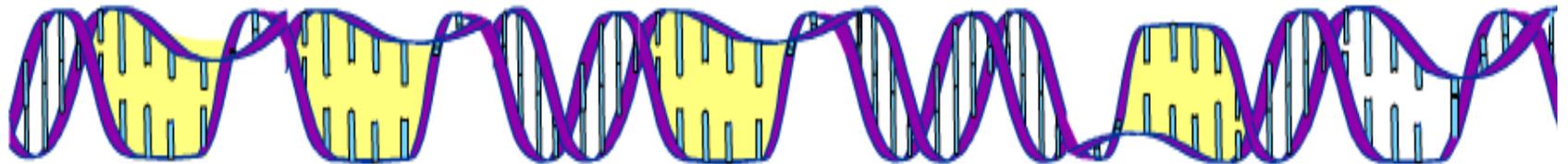


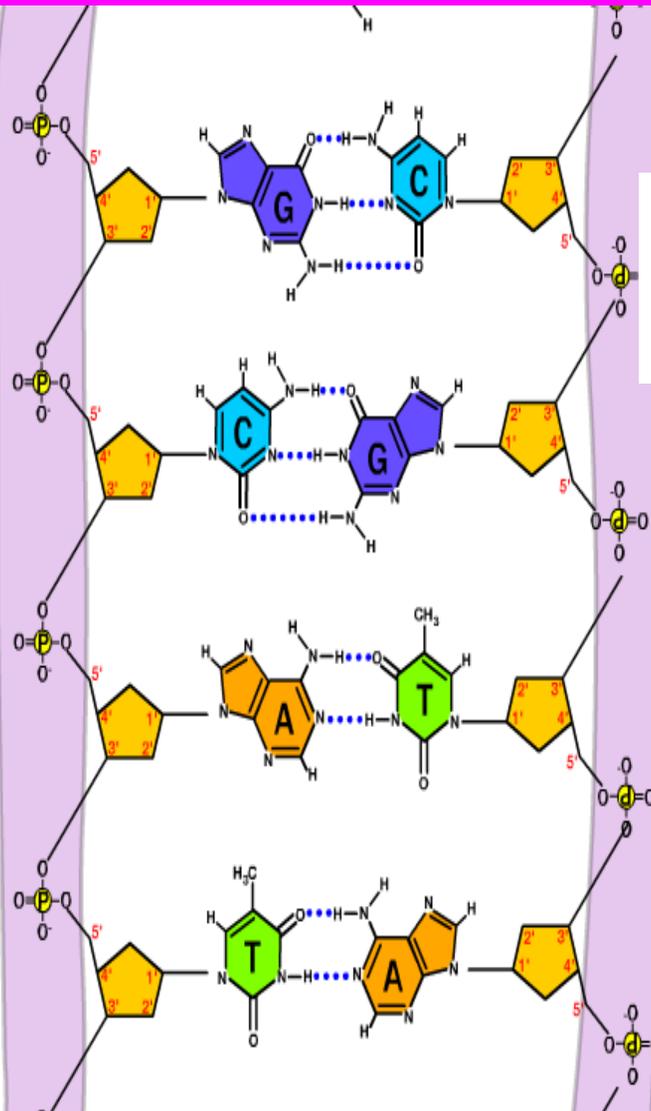
II. Eukaryote DNA Replication

- A. DNA contained in nucleus of every cell.
- B. More than 1 meter (up to 6 feet) of DNA in every human cell's nucleus!
- C. Begins at 100's of points and goes in TWO directions until chromosome is replicated.

E. Five Steps of DNA Replication

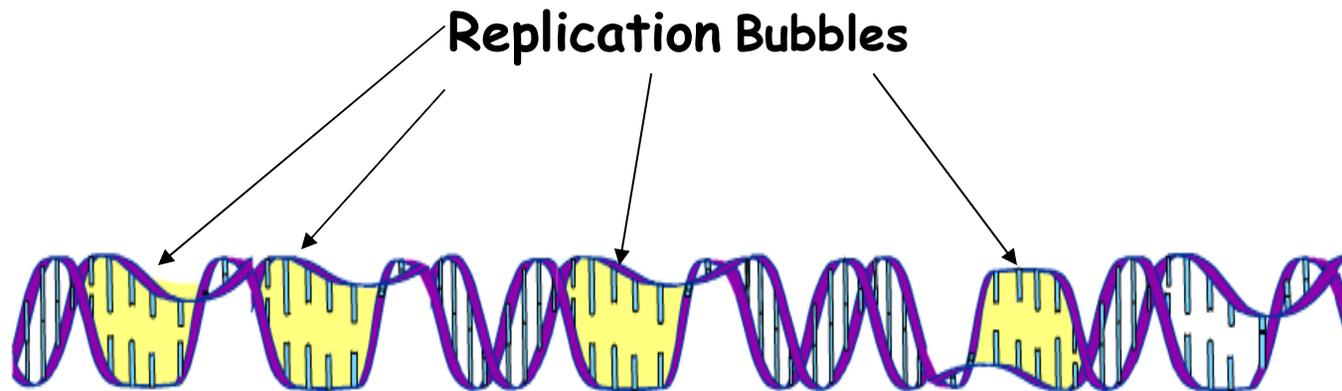
Step 1: UNCOILS
Ladder unwinds





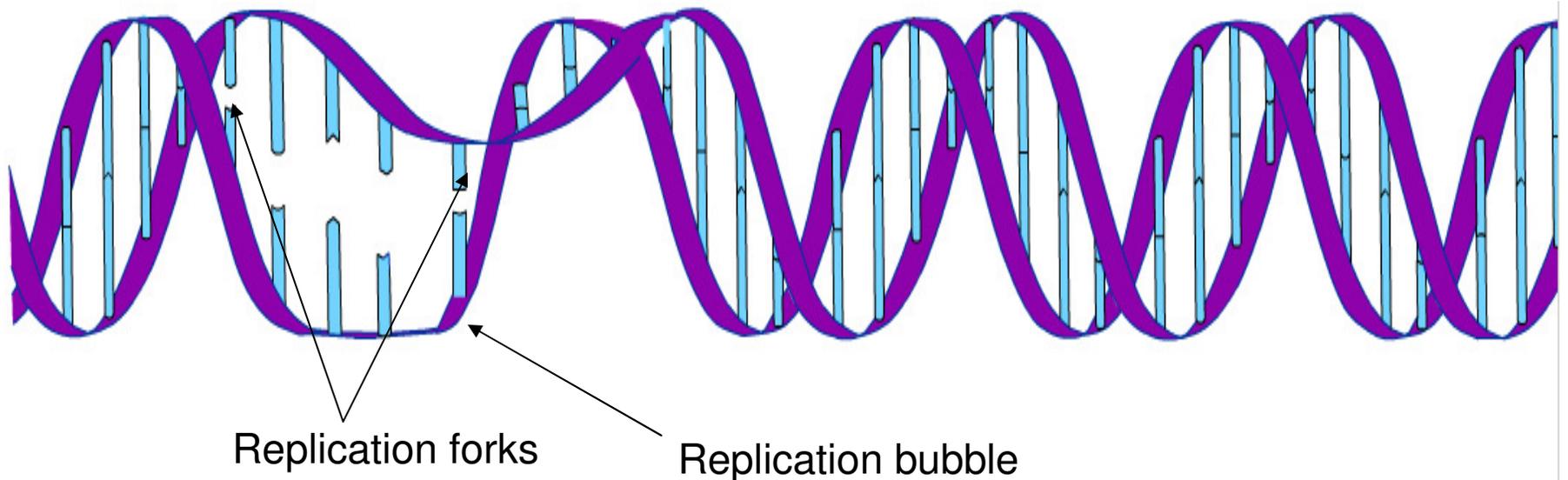
Lets zoom in and look at the Inside of a replication bubble.

- a. **Replication bubbles** form at multiple sites along the **DNA** molecule, greatly speeding up replication.

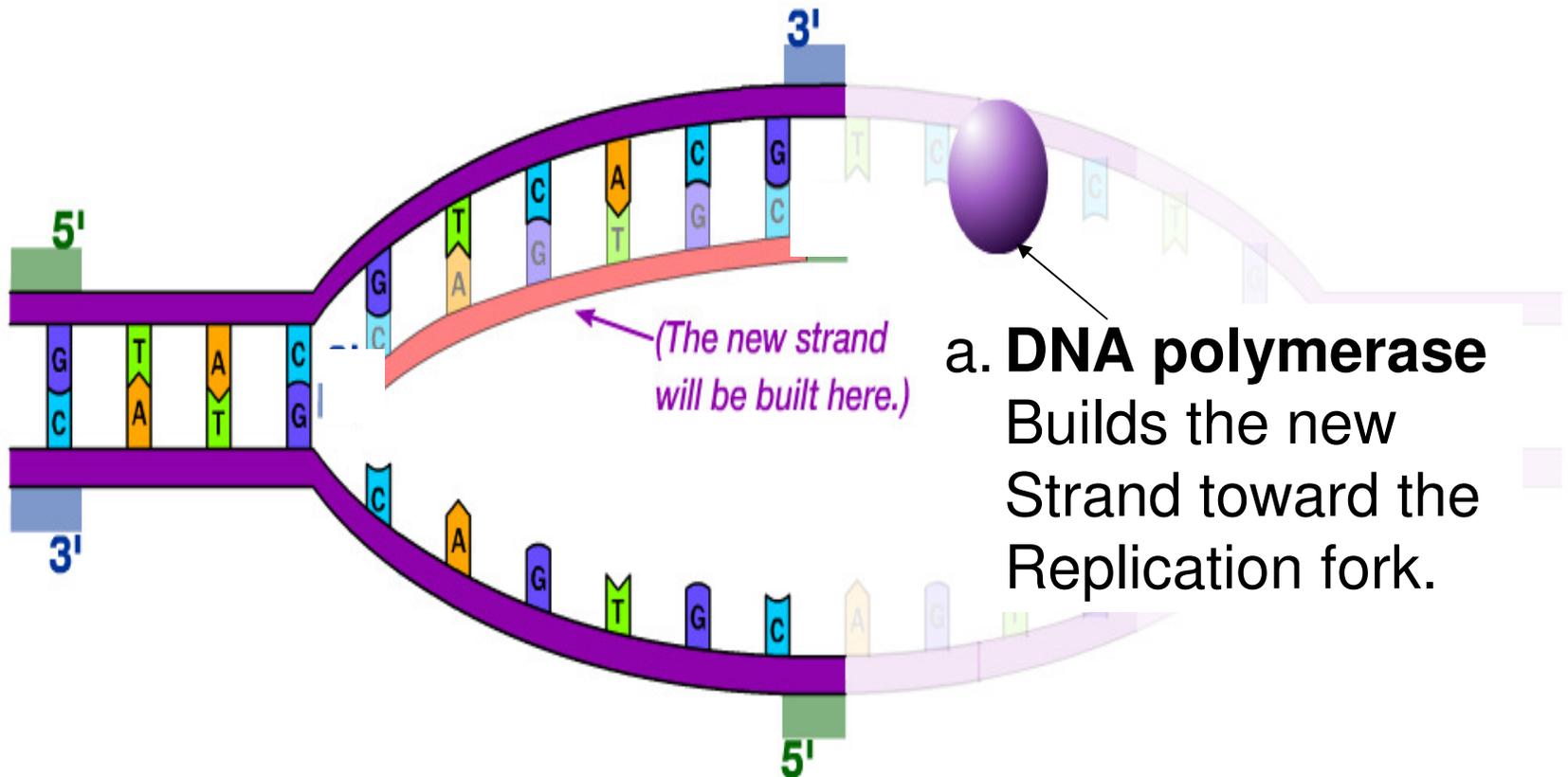


Step 2: (UNZIPS)

- a. Starts at each end of the bubble.
- b. the point where separation and replication begin is called a replication fork.
- c. The enzyme Helicase breaks the Hydrogen bonds between the base pairs inside the replication bubbles.

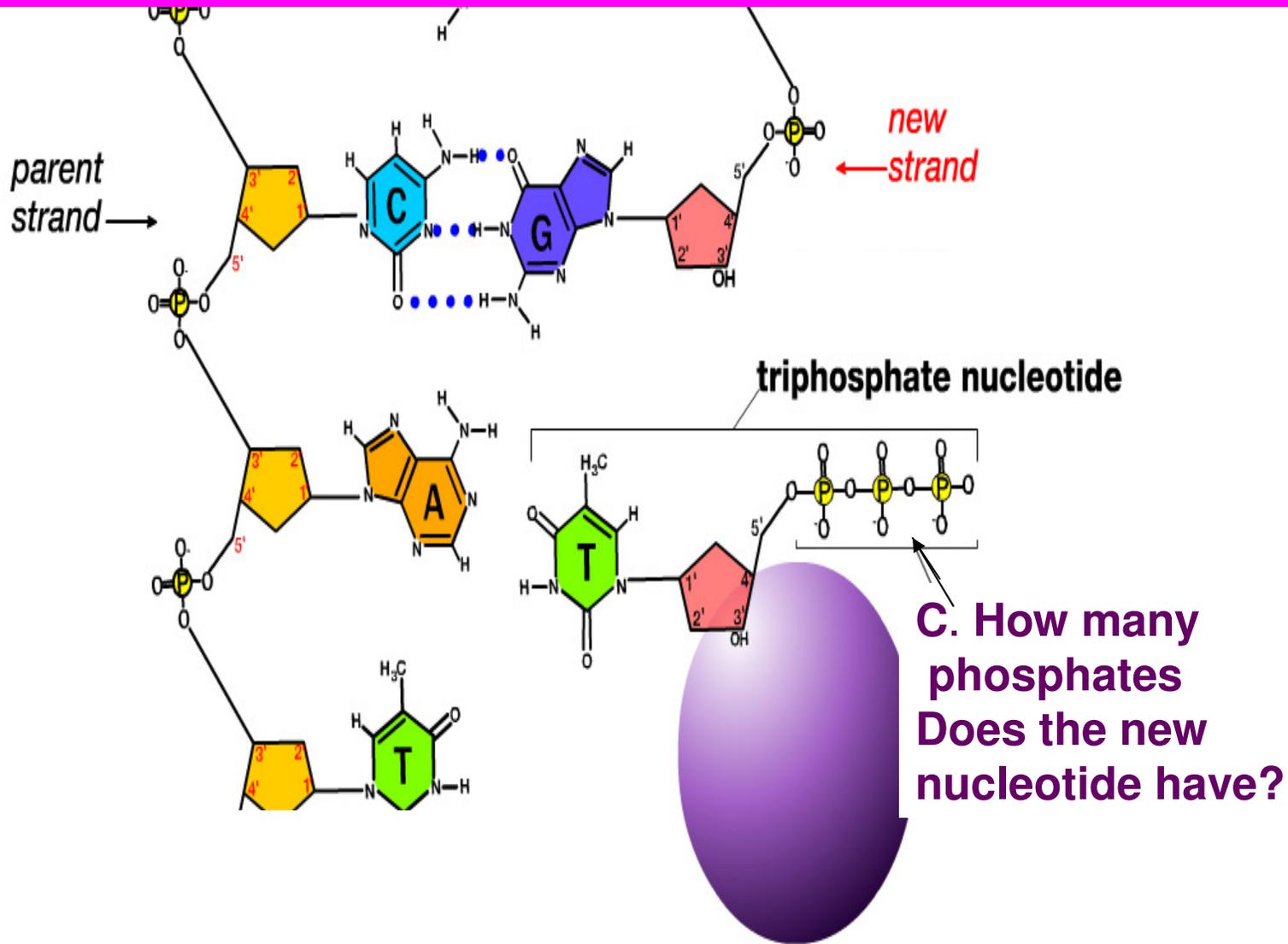


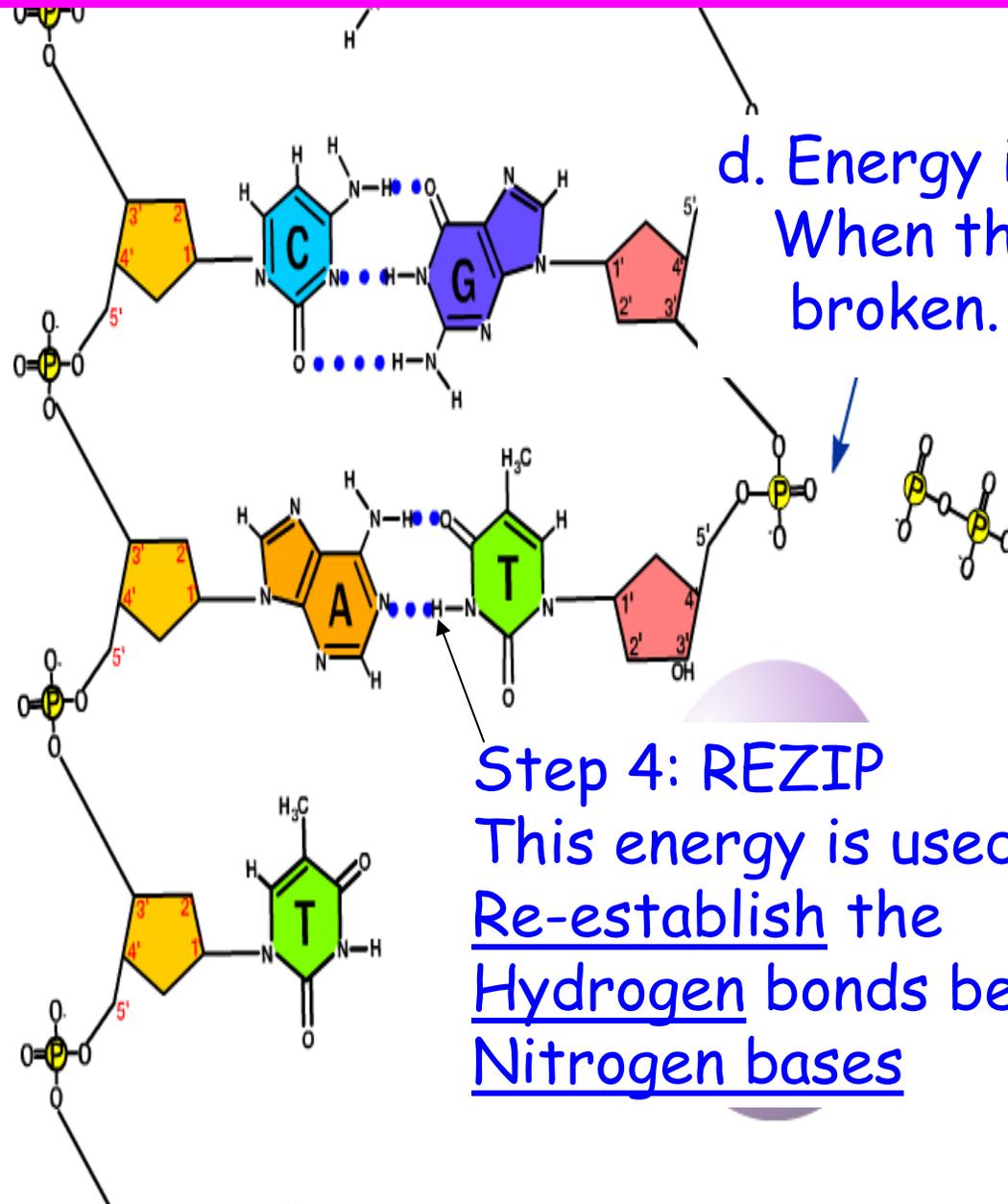
Step 3: BRING IN FREE NUCLEOTIDES. Now DNA polymerase can direct base pairing and begin to build a new Complementary strand according to the parent strand(template)



a. **DNA polymerase**
Builds the new
Strand toward the
Replication fork.

- Label the replication bubble.
- Label the replication fork.

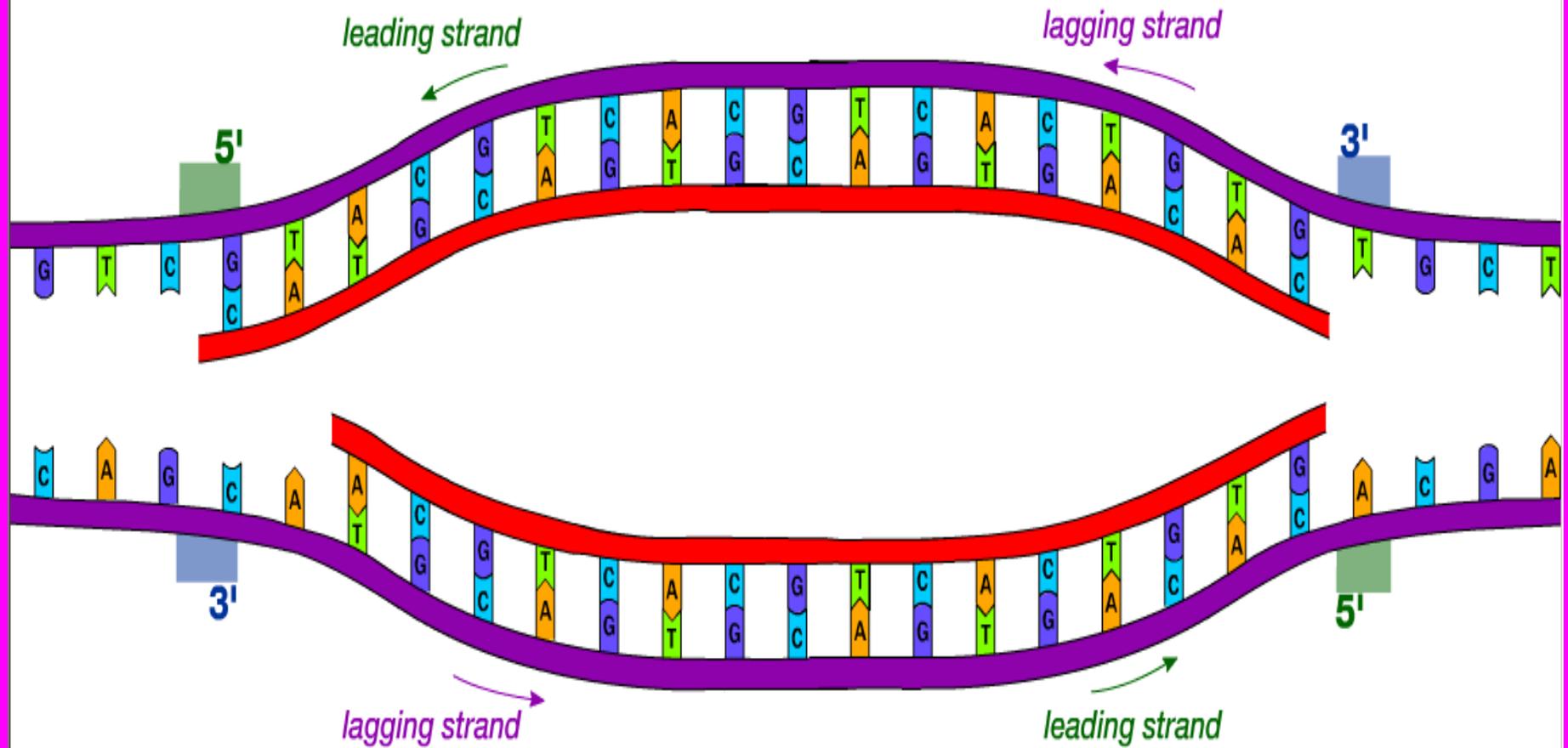




d. Energy is released
When this bond is broken.

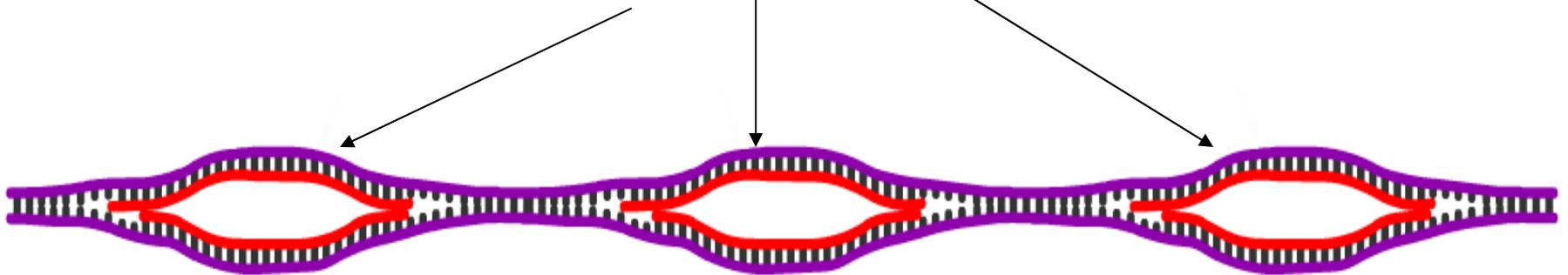
Step 4: REZIP
This energy is used to
Re-establish the
Hydrogen bonds between the
Nitrogen bases

a. This process continues in both directions, until the entire **DNA** molecule has been replicated.



b. Remember: There are multiple replication bubbles along the DNA molecule

Replication
bubble



c. They continue to grow until they join together.



d. Now there are two molecules of DNA.

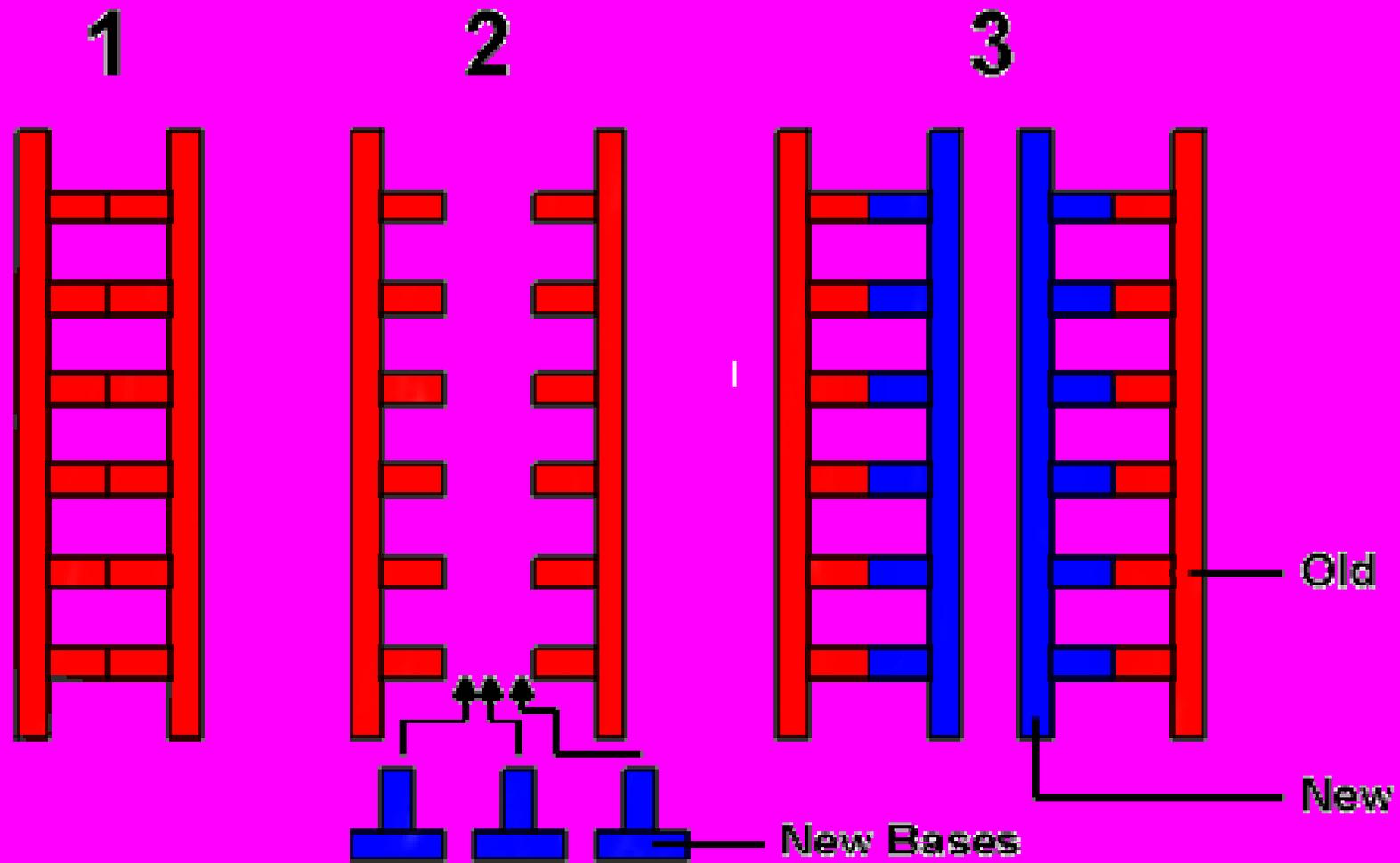
e. Each made of two strands composed of:

-one Original (parent) strand and

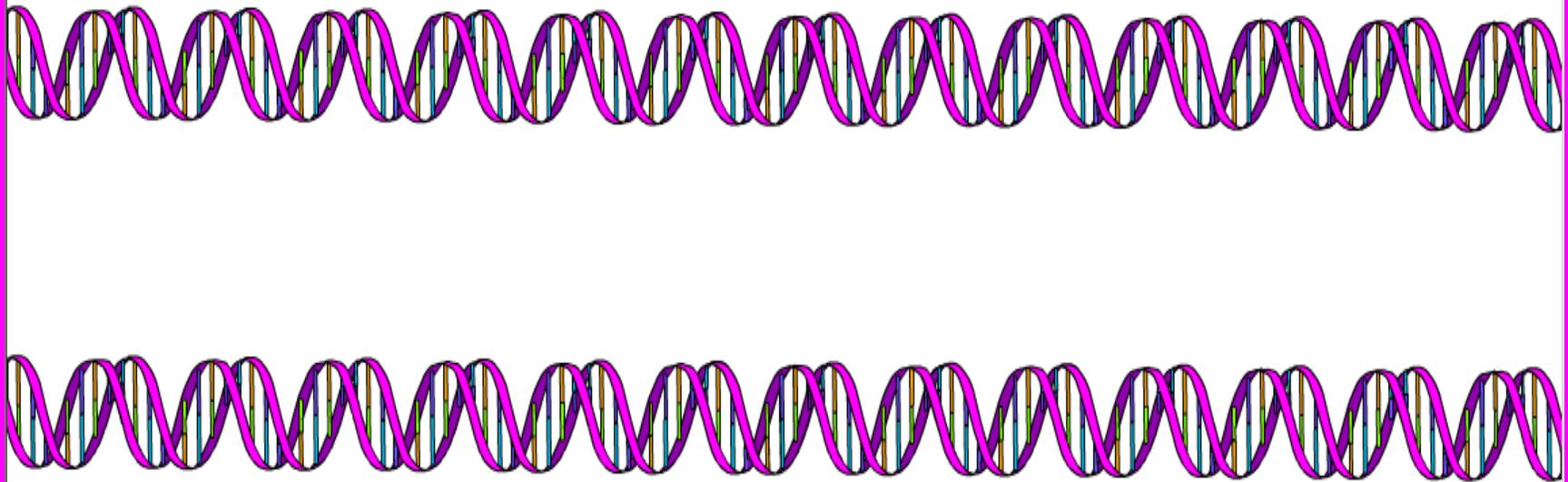
-one New (complementary) strand.



f. This is called semi-conservative replication

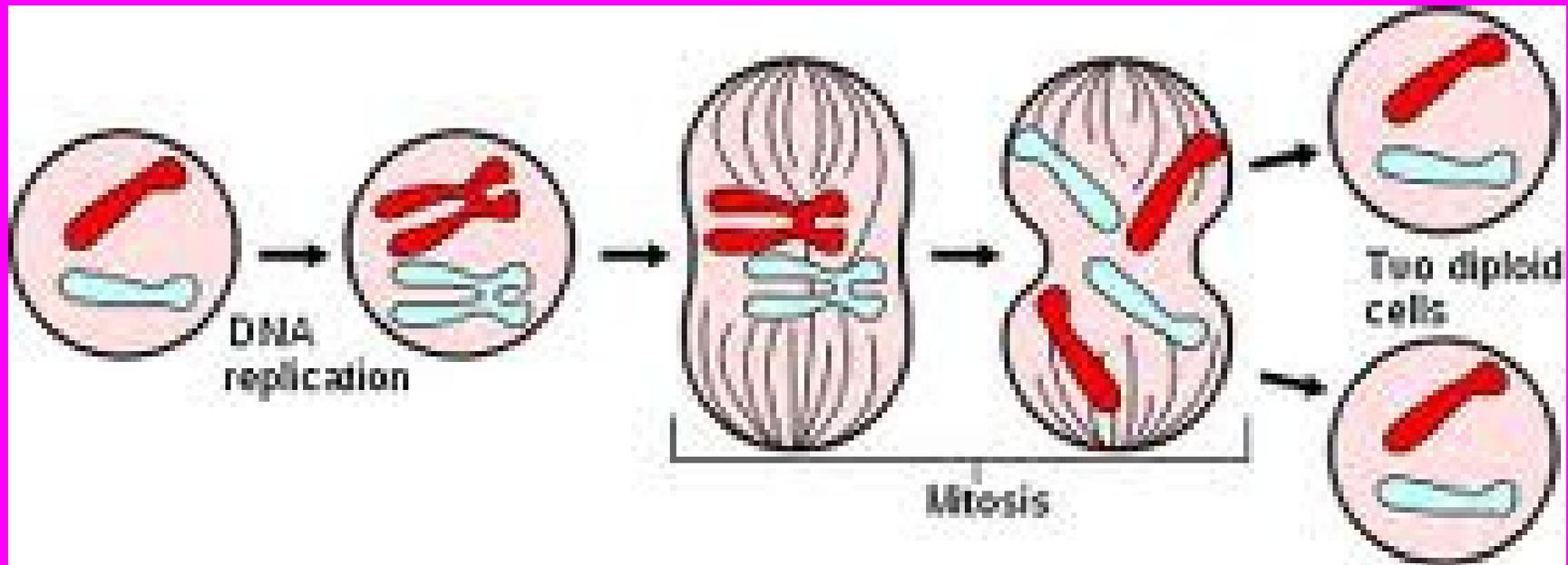


Step 5: (RECOIL) Now the 2 strands
can wind back up.

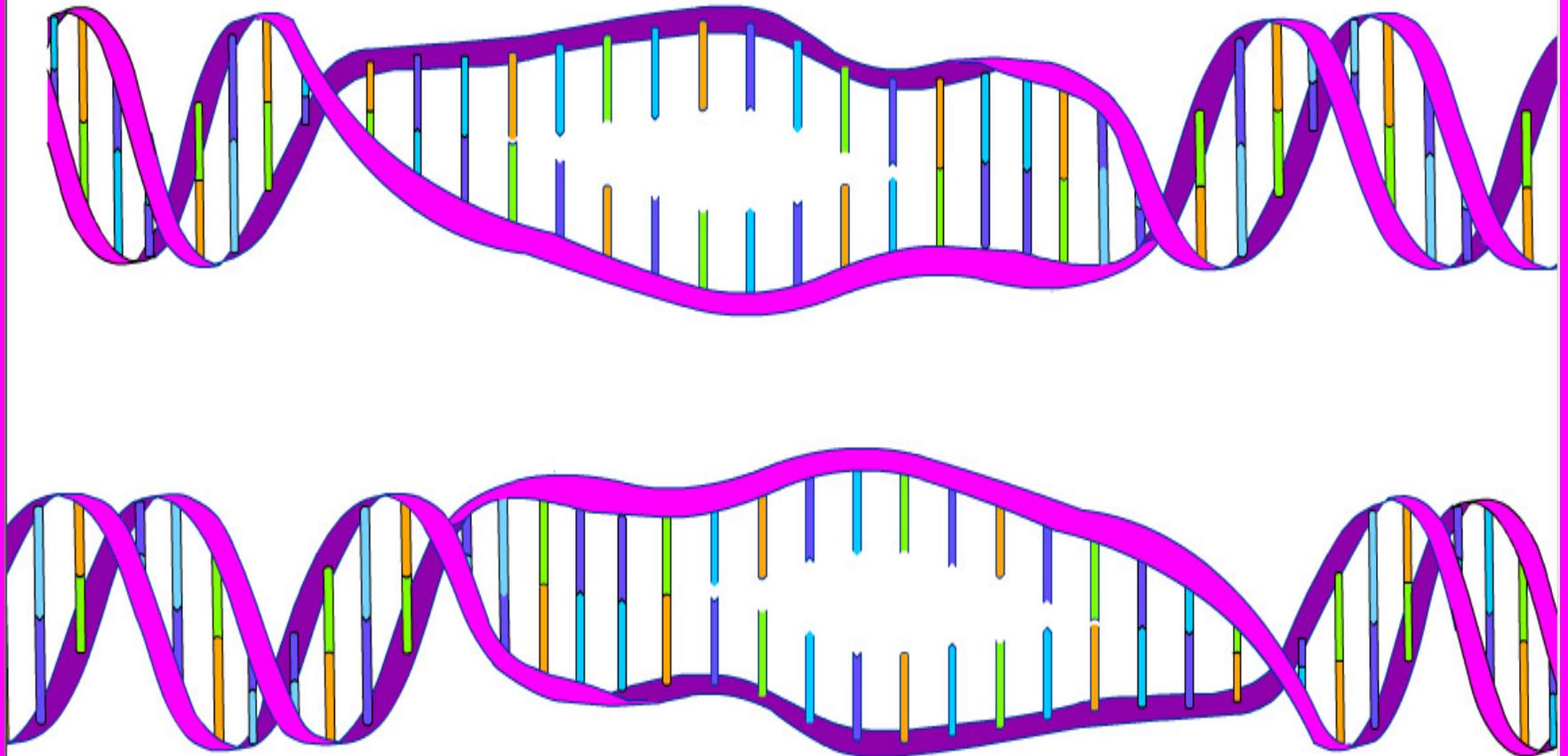


Each new **DNA molecule** is identical to the parent **DNA**.

a. Now the cell is ready for mitosis (cell division.)



b. Each new **DNA** molecule will be able to **replicate** and start the process all over again.



III. Chromosome/DNA Composition

A. DNA and Protein form the Chromatin (thread-like mass)

B. DNA wraps around histones (round proteins)

C. Histones cluster to form bead-like structures called nucleosomes.

D. Nucleosomes wind DNA strand into compact structure to fit inside the nucleus

<http://www.youtube.com/watch?v=gb5IBhfwQ4s&NR=1&feature=endscreen>

2 chromatids (a single copy of DNA) make up a chromosome (contains 2 copies of DNA)

