CONCEPT: HELICAL FORMATIONS OF DNA

● *Supercoiling* is a _____ of helical DNA

□ **Supercoiled** DNA is DNA that has twisted upon itself

- Can alternate between supercoiled and relaxed states

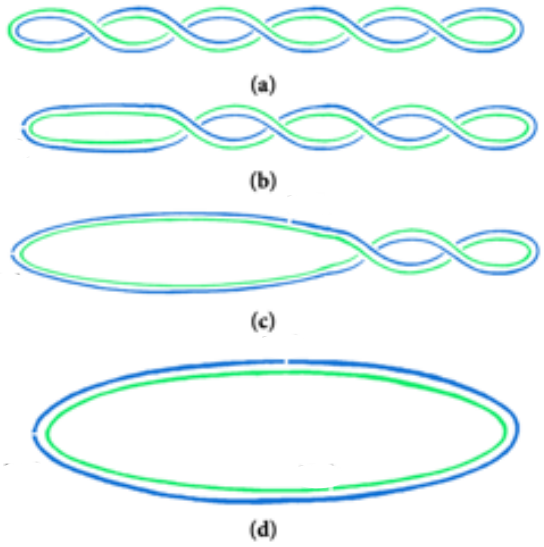
- Occurs in linear or circular DNA

□ **Topoisomerases** are enzymes that convert DNA between supercoiled and relaxed states

- *Type 1:* introduces single-strand breaks into DNA to release tension

- Type 2: introduces double-strand breaks into DNA to release tension

EXAMPLE: Example of a circular supercoiled DNA molecule



● **Denaturing** (separating) and **renaturing** (rejoining) strands of DNA happens in cells, and in laboratories

□ Denaturing of DNA strands occurs by _____ hydrogen bonds

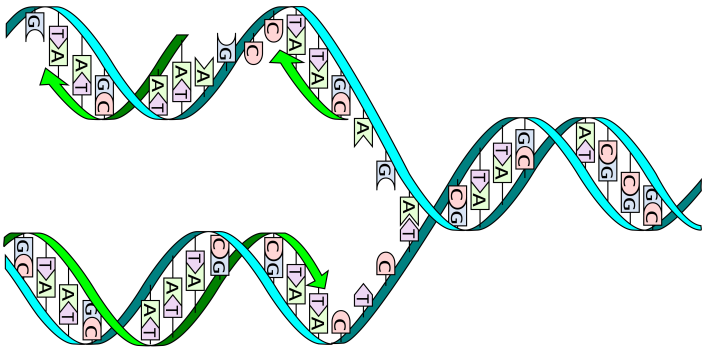
- Can occur through an increase in heat, change in pH, and exposure to UV light

□ The **DNA melting temperature** (**T_m**) is a specific temperature that separates DNA strands

- Depends on the number of hydrogen bonds

- G-C pairs have an extra bond, therefore raising the energy and temperature needed to break them

EXAMPLE: Denaturation of the DNA double helix



PRACTICE

1. Which of the following property is false regarding supercoiled DNA?
    a. Supercoiling is a helix that has twisted upon itself
    b. Supercoiling can be fixed by topoisomerases
    c. Supercoiling only happens in circular DNA
    d. Supercoiling can happen in both circular and linear DNA

2. Which enzyme is responsible for repairing supercoiling through double strand breaks?
    a. Topoisomerase Type 1
    b. Topoisomerase Type 2
    c. Topoisomerase Type 3

3. What is the name of the temperature that causes two complementary DNA strands to separate?
    a. Annealing Temperature
    b. Melting Temperature
    c. Dissolving Temperature
    d. Separation Temperature