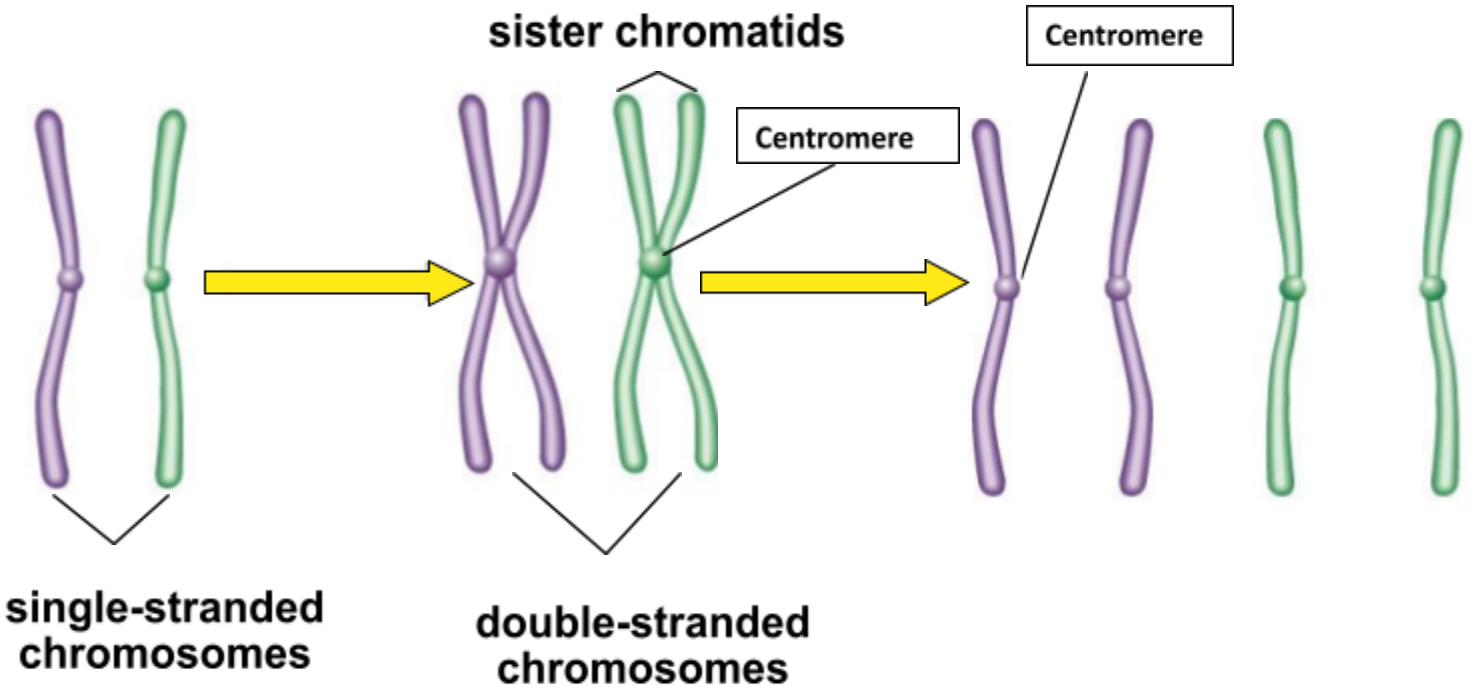
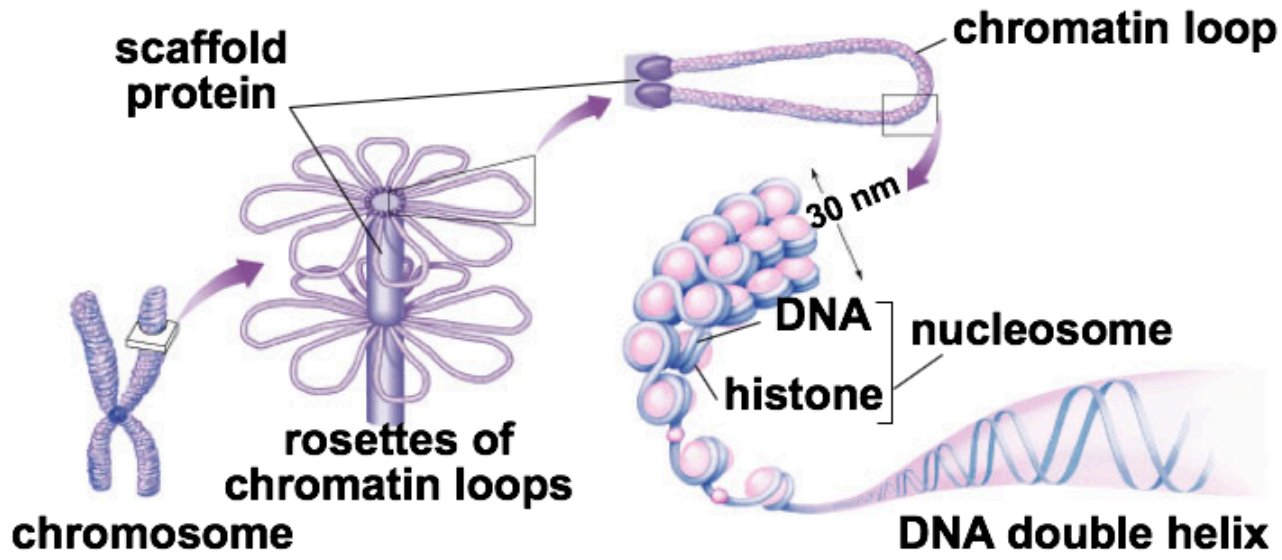
Karyotype Lab Instructions- DO NOT TURN THIS IN

Today you will assemble a karyotype (a complete set of chromosomes) which would be found in prophase of mitosis. You will be given a set of chromosomes from each parent. The 23 chromosomes on the paper represent those from MOM. The 23 chromosomes from the paper circle represent chromosomes from DAD. Humans have 23 pairs of chromosomes which total 46. During interphase, the DNA replicates or copies itself. This replication causes a total of 92 chromosomes to be found in the cell.



DNA wrapped around proteins called histones makes chromatin. Chromatin is super coiled together and condenses into chromosomes. A chromosome has 1 centromere which holds it together in the center. Double-stranded chromosomes have 1 centromere holding them together. This is considered 1 chromosome even though it is double stranded. When those sister chromatids are separated, each chromatid is considered a separate chromosome, as each has its own centromere.



Humans have 46 chromosomes or 23 pairs. In a karyotype, chromosome pairs are numbered 1-23. Each member of the pair looks identical. The only exception to this is the male chromosome, which, of course is not identical to the female X chromosome. The Y chromosome is very small. Chromosome 23 is known as the sex chromosome as it determines the biological sex of the offspring. Normal males are XY and normal females are XX. In this lab, you will cut out the chromosomes and match it to its partner chromosomes (homologous chromosomes). After the lab, you will be able to tell if the chromosomes belong to a male or female, and if that person has a genetic chromosomal disorder. There are several disorders which can be found in this lab. See the table below:

Turners Syndrome	**Meta-Females**	**Klinefelter's Syndrome**	**Edwards Syndrome**	**Down Syndrome**
(1) X Chromosome for number 23	XXX for chromosome 23	XXY for Chromosome 23	Trisomy 18	Trisomy 21
Reduced Height, Reduced sexual development, Sterile, Slight mental retardation, born with webbed skin on their necks	Taller and typically less intelligent than average females, able to reproduce	Males are sterile. They tend to be taller than average males and overweight and have language and short-term memory problems	Typically die before the age of 1 year. Typically have heart defects and other organ malformations	Typically, have flattened faces, heart problems, shorter than average individuals, mental retardation and are typically happy. Individuals are sterile.

Answer the following questions after completing the activity.

1. How many total chromosomes are present in your karyotype? _____

2. Somatic cells are body cells (liver, skin, heart, nerve etc). Each somatic cell in the body of this person will have how many chromosomes _____? (hint: see answer for #1)

3. Chromosomes 1-22 in the karyotype are called autosomes. They do not determine the sex of the individual. What chromosome pair number determines the sex of the individual?_____

4. Do the chromosomes provided by females have any influence on determining the sex of the offspring?
_____

5. Identify the following:

Sister chromatids: _____
Chromosome: _____
Centromere:_____
DNA: _____
Chromatin: _____

