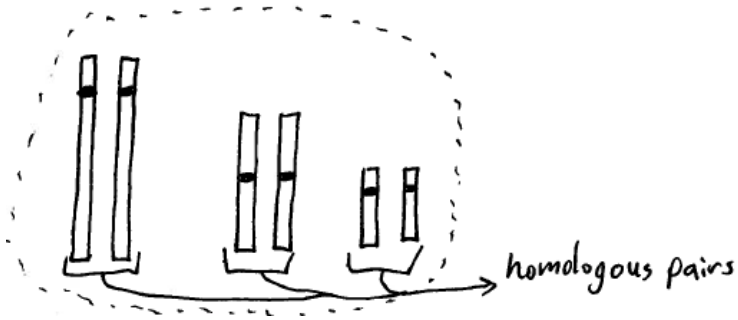
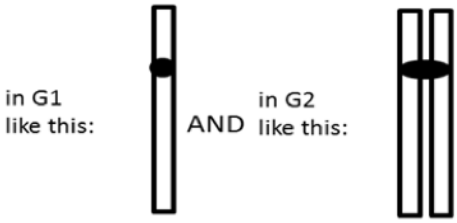
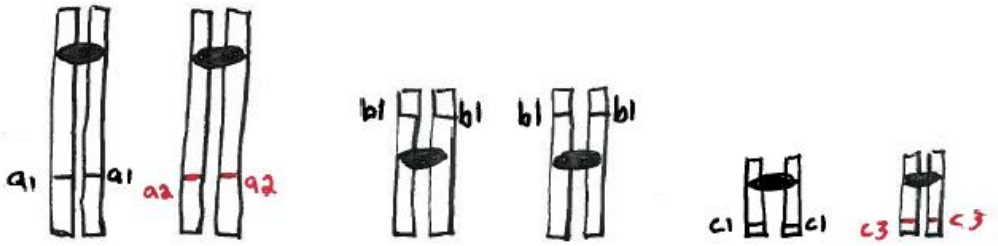
MITOSIS: GROUP ACTIVITY – Key

1. Draw the chromosomes in a cell (2*n* = 6) **before DNA replication** (i.e., in G1). (Remember that a chromatid is a molecule of double-stranded DNA.)

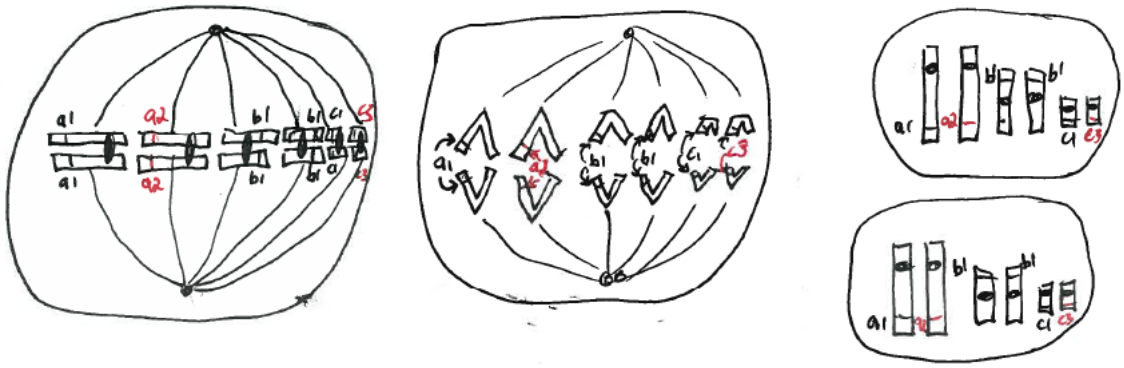




2. The 2*n* = 6 cell from above has the genotype *a1*/*a2*; *b1*/*b1*; *c1*/*c3*. The "*a*", "*b*", and "*c*" genes are on different chromosomes.
Draw the same cell **after replication** (in G2) and label the alleles on the chromosomes of your cell (show the specific locations with arrows or lines). Be sure to represent your chromosomes so that homologous pairs can be identified.



3. Draw the 2*n* = 6 cell at metaphase of mitosis, during anaphase, and the resulting daughter cells. Make sure the alleles are labeled in each drawing. List the alleles that are present (i.e., the genotype of the daughter cells).



4. Complete this table:

Cell 2*n* = 18	**Number of chromosomes**	**Amount of DNA per cell (picograms)**
Interphase G1	18	20
Mitotic prophase	**18**	**40**
Mitotic metaphase	**18**	**40**
Mitotic anaphase	**36**	**40**
Early mitotic telophase	**36**	**40**
Daughter cells	**18 (in each cell)**	**20 (in each cell)**

5. Human cells normally have 46 chromosomes. For one human cell in each of the stages listed below, state the total number of chromosomes and how many chromatids and DNA molecules (double helices) make up each individual chromosome.

Stage of mitosis	# Of chromosomes total	# Chromatids in each individual chromosome	# Of molecules in each individual chromosome
Metaphase in mitosis (chromosome are lined up to be pulled apart)	**46**	**2**	**2**
G1 (cells have just completed mitosis)	**46**	**1 (or 0)**	**1**
G2 (just prior to the start of mitosis)	**46**	**2**	**2**

★ Note that one DNA molecule is a double helix.