**`1Stop-Motion Meiosis Animation Project**

Stop-motion (aka stop-action) is an animation technique to make a physically manipulated object appear to move on its own. The object is moved in small increments between individually photographed frames, creating the illusion of movement when the series of frames is played as a continuous sequence.

**Objective**: Study the behavior of chromosomes during meiosis (gamete formation).

**Materials:** Various items to represent the cell parts such as-buttons, pipe cleaners, straws, noodles, yarn, clay/Play-Doh, paper clips, felt, etc.

**Procedure:** Using your chosen materials, construct a model of a cell for each stage of meiosis. Take a minimum of 60 pictures of the different stages of the cycle. Make very small changes to transition from phase to phase (5-6 pictures between each phase change). Label the stages and important parts of the cell as you are taking your pictures. Upload the pictures to a software program to create your Stop-motion video.

**Technology Part:** You will upload your pictures into a program that will help you create your animation. JellyCam is a free download that will upload your pictures and create the animation for you. iMovie or Windows Movie Maker can also be used and also https://www.kapwing.com/montage

**Grading:** You will receive several grades for this assignment.

* 1 Classwork/homework grade for the Planning Sheet.
* 1 Assessment grade for the Procedure & Analysis Questions
* 1 Stop-motion Animation production quality grade.

**\*\* Please see rubric for specific grading of the project. \*\***

**Label Requirements:** The following phases and labels will be required on your pictures and will need to stay up throughout the stage (as appropriate):

Interphase

Prophase 1 & 2

Metaphase 1 & 2

Anaphase 1 & 2

Telophase 1 & 2

Cytokinesis

Centromere

Sister Chromatids Gametogenesis

Nuclear membrane

Cell membrane Tetrad Homologous Pairs Gamete Sperm / Egg Nucleus Synapsis Oogenesis

Spermatogenesis

Chromosomes

Centrioles

Spindle fibers

Cleavage furrow

Crossing over

Group Members:

Due Dates:

Directions: Answer the following questions in **complete sentences**. Please organize questions in groups by the phase name. All answers should be typed and printed. Each member should agree on the answer and have their own copy.

YOU WILL ONLY BE SUBMITING ONE COPY TO ME FOR GRADING.

\*Remember…you are responsible for this information!! Be sure you understand what happens in each phase of mitosis.

**Procedure Questions:**

Interphase:

* How many cells are present at the beginning of this stage?
* What are the three portions of interphase? Describe each.
* How many chromosomes are present after the completion of interphase?
  + How many chromatids would that include?
* Why does interphase only occur once during the process of Meiosis?

**Meiosis I**

Prophase I:

* What are centrioles?
* What does the genetic information in the cell look like during this stage?
* What is the purpose of spindle fibers during cellular division?
* Why is this stage particularly important to genetic variation?
* What is synapsis?
* Are cell(s) haploid or diploid?

Metaphase I:

* At this point, the spindle fibers growing out of the poles resemble a star-shaped structure. What is this structure called?
* Where have the spindle fibers attached to the tetrads?
* What does the genetic information in the cell look like during this stage?
* What can you use to remember what happens during this phase of mitosis?
* Are cell(s) haploid or diploid?

Anaphase I:

* What does the genetic information in the cell look like during this stage?
* Are there currently tetrads or chromosomes?
* Define the term ‘non-disjunction’ and explain how it applies to this stage of cellular division.
* Are cell(s) haploid or diploid?

Telophase I:

* Why are the homologous chromosomes separated and pulled to opposite poles of the cell?
* What does the genetic information in the cell look like during this stage?
* How many cells are present at the end of this stage...How many nuclei are starting to form?
* Are cell(s) haploid or diploid?

-----------*Cytokinesis I*

* Define the root ‘cyto’. Define the root ‘kinesis’. What does ‘cytokinesis’ mean?
* How many cells are present at the end of this stage?
* Are cell(s) haploid or diploid?

**Meiosis II**

Prophase II:

* How many cells are present at the beginning of this stage?
* What does the genetic information in the cell look like during this stage?
* How does this stage compare to a stage in mitosis?
* Are there tetrad, chromosomes or chromatids during this stage?
* Are cell(s) haploid or diploid?

Metaphase II:

* What does the genetic information in the cell look like during this stage?
* Are there tetrad, chromosomes or chromatids during this stage?
* How does this stage compare to a stage in mitosis?
* Are cell(s) haploid or diploid?

Anaphase II:

* What does the genetic information in the cell look like during this stage?
* Are there tetrad, chromosomes or chromatids during this stage?
* Define the term ‘non-disjunction’ and explain how it applies to this stage of cellular division.
* How does this stage compare to a stage in mitosis?
* Are cell(s) haploid or diploid?

Telophase II:

* How many cell are present at the end of this stage…how many forming nuclei?
* Are there tetrad, chromosomes or chromatids during this stage?
* What does the genetic information in the cell look like during this stage?
* How does this stage compare to a stage in mitosis?
* Are cell(s) haploid or diploid?

---------*Cytokinesis II*

* How many cells are present at the end of this portion of gametogenesis?
* What kinds of cells would be a product of Oogenesis? Spermatogenesis?
* Are cell(s) haploid or diploid?

**Analysis Questions:**

Answer these questions after the Procedure Questions.

1. How many chromosomes were in each of the original parent cells?
2. How many chromosomes are now in each one of the final reproductive cells?
   1. If question 1 referred to humans, what would this number be?
   2. If question 2 referred to humans, what would this number be?
3. What do these many different numbers tell you about reproduction by meiosis?
4. What is one important function of meiosis, as related to chromosomes number?
5. Explain why Meiosis 1 is responsible for variation.
6. Explain why Meiosis 2 is responsible for reduction division.
7. What are the differences between mitosis and meiosis?
8. What role does meiosis play in sexual reproduction?
9. Describe crossing over and when does it occur?
10. What is ‘non-disjunction’ and why could it happen? What could be the result?
11. Define fertilization, zygote, and embryo.

Group Members Names: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Group Planning Sheet

You will need to plan what materials you will need to represent the cell parts and get your labels created so that when you are ready to take pictures, you can focus on just taking pictures rather than getting things together.

**Interphase:**

Important steps to highlight: What materials and labels do I need?

**Prophase I: (REMEMBER- this is the most important step)**

Important steps to highlight: What materials and labels do I need?

**Metaphase I:**

Important steps to highlight: What materials and labels do I need?

**Anaphase I:**

Important steps to highlight: What materials and labels do I need?

**Telophase I:**

Important steps to highlight: What materials and labels do I need?

**CYTOKINESIS I:**

Important steps to highlight: What materials and labels do I need?

**Prophase II:**

Important steps to highlight: What materials and labels do I need?

**Metaphase II:**

Important steps to highlight: What materials and labels do I need?

**Anaphase II:**

Important steps to highlight: What materials and labels do I need?

**Telophase II:**

Important steps to highlight: What materials and labels do I need?

**CYTOKINESIS II:**

Important steps to highlight: What materials and labels do I need?