Mayfield High School Unit Plan

January 6 – January 21, 2016

Teacher: Nadine Goodman Brown

**Learning objectives**

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| **Content Area:** Biology | **Grade Level:** 10 | |
| **Unit: Cell Division** | | |
| **Learning Goals:**   1. The student will understand the structure of chromosomes and how they relate to cell division.   **1/6, 1/15**   1. The student will understand the stages in the cell cycle and explain possible outcomes when the cycle does not function properly.**1/8 and 1/11, 1/12-14** 2. The student will understand/explain the reasons why cells need to divide. **1/7-1/8** 3. The student will understand the process of meiosis and its importance in sexual reproduction. **1/6, 1/19-1/21** 4. The student will understand the similarities and differences of mitosis and meiosis. **1/21** 5. The student will understand the difference between sexual and asexual reproduction and give examples which explain the advantages of each type of reproduction**. 1/11 and 1/20** | | |
| **Score 4:** Student demonstrates in-depth inferences and applications of the learning goal(s) and can reconstruct and apply their knowledge from limited information:  A4: The student can explain how a homologous pair of chromosomes is alike and different.  B4/C4: Given scenarios the student will predict the length of the cell cycle.  D4/E4/F4: Explain how the process of meiosis accounts for diversity among siblings. | | |
| **Score 3:** Student demonstrates no major errors or omissions regarding the learning goal(s) that were explicitly taught:  A3: The student will describe chromosome & explain it relates to cell division.  B3: The student will define the stages in the cell cycle and explain the purpose of each stage.  C3: The student will explain 3 reasons why cells need to divide.  D3: The student will explain meiosis & its importance in sexual reproduction using the following  terms: somatic cells, gametes, dipoid(2n), haploid(n), variation, homologous chromosomes.  E3: The student will explain at least 3 similarities and 3 differences between mitosis and meiosis.  F3: The student will explain the advantages and disadvantages of sexual and asexual reproduction. | | |
| **Score 2:** The student demonstrates no major errors or omissions regarding the simpler details and processes that support the learning goal(s).  A2: The student can label and define the following structures: homologous chromosomes, sister chromatids, centromere, autosomes, sex chromosomes, karyotype.  B2: The student can list in sequence cell cycle stages & identify descriptions or pictures of each.  C2: The student can give at least 1 reason why cells need to divide.  D2: The student can identify the end products of meiosis.  E2: The student can identify at least 2 similarities and 2 differences between mitosis and meiosis.  F2: The student can describe, identify, and give examples of both sexual and asexual reproduction. | | |
| **Score 4 Example Assessment Items:**  Explain how siblings can have some traits like their mother and other traits like their father. | **Academic Vocabulary:**  Mitosis  Meiosis  Cytokinesis  Cell Cycle  G-1  S  G-2  Prophase  Metaphase  Anaphase  Telophase  Interphase  Random Segregation  Asexual Reproduction | Sexual Reproduction  Chromosome  Chromatid  Centriole  Centromere  Karyotype  Autosomes  Sex Chromosomes  Spindle Fibers  Haploid  Diploid  Homologous-Chromosomes  Crossing Over  Zygote |
| **Score 3 Example Assessment Items:**  List and describe the stages of the cell cycle: Interphase (G1, S, G2), Mitosis, and Cytokinesis.  Label the diagram:  [BioC102](https://www.google.com/url?sa=i&rct=j&q=&esrc=s&source=images&cd=&cad=rja&uact=8&ved=0ahUKEwiKmPnn95fKAhWCPD4KHazLB7kQjRwIBw&url=https://www.tes.com/lessons/AOmZJdttqLVX6A/cell-cycle-m-phase&psig=AFQjCNGWWnqMQHigdd15wdaM1naAKq-pDg&ust=1452264169203570) |
| **Score 2 Example Assessment Items**  A new cell produced by mitosis has:  A. double the number of chromosomes as its mother cell  B. same number of chromosomes as its mother cell  C. ½ the number of chromosomes as its mother cell  D. a different number of chromosomes which varies |
| **District Mission:**  Every student. Every day. | **District Vision:**  A promise of learning, dignity, and respect for all. | |

**Detailed Daily Plans (Assessments highlighted in yellow)**

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| Unit day  Likely date | L goals & ach st’ds | Lesson segments, including materials that will be used & assessments |
| One,  Wed, 1/6 | Overview | Purpose—reveal links between cell division & ideas of previous unit on DNA structure and expression AND introduce links to the next unit on Genetics.  Pairs of students will use the computer to complete a set of questions to accompany the website learn.genetics.utah.edu/tour of the basics including these segments:  What is DNA What is a chromosome  What is a gene What is a protein  What is a trait What is heredity  Homework—finish webquest as needed |
| Two,  Thurs  1/7 | A3  D3 | Discuss webquest, including a review of how DNA 🡪 genes🡪 chromosomes🡪genome🡪hereditary traits of organisms  At a shallow level, Compare/ Contrast Sexual and Asexual Cell division & emphasize generation of diversity w/in population as a result of sexual reproduction (use webquest slide to reshow this)   * Brainstorming - table comparing sexual and asexual cell division   Homework—Rad guide 10.1 (why cells divide) |
| Three,  Fri,  1/8 | C3  C2 | Analyze microscopic images to test the following alternate hypotheses: Larger organisms contain larger cells than smaller organisms OR Larger organisms contain more cells than smaller organisms.  grass leaves versus tree leaves,  adult grass frog vs adult human blood,  microscopically small protists versus sections of human tissues.    Discuss results to confirm/refute each hypothesis, then discuss:  why would organisms produce more cells, instead of larger cells, to grow?  Write two reasons from text on board, then perform two demos to engage & promote understanding:  Larger cells have less efficient passive transport than smaller cells because as a cell’s dimensions increase, the surface area/volume ratio decreases and results in lower and lower transport efficiency  1st—containers (like cell) having larger dimensions have a smaller surface area/vol ratio than those with smaller dimensions, resulting in lower speed and efficiency of transport via diffusion.  Basic (NaOH) agar cubes of varying dimensions (put surface area and volume ratios of each on board); soak in phenolphthalein solution for time in which next demo is completed: expectations?  Ball to every student with students spread widely across the room to represent a cell of high dimensions, time for one student to transfer every ball to a container “outside the cell” ; repeat with students clustered to represent smaller cells. Discuss results.  2nd—DNA overload—inefficiency of message transport from genome.  Have student carry a folded message to every student in a closely spaced “high SA/vol” cell, then compare the time—students stand until getting a message, then when all are seated carry out task like building a structure of legos-- required versus doing the same when the students are spread into a higher volume, like a low SA/vol cell. lts to explain the importance of information overload as a reason for cell division.  3rd –for asexual cell reproduction during growth/repair/development of a multicellular organism OR asexual organisms reproduction OR for sexual reproduction provided that special process of cell reproduction is required  Class closing writing—why do cells divide?  Homework: finish 10.1 RAD guide—section on stages of cell cycle, end 10.1 |
| Four,  Mon  1/11 | B  C  F | Opening question to review “two categories of cell division AND why cells divide asexually”  Lesson—cell cycle (start—analogy—asexual cell cycle stages compared to a person’s life cycle—fill in empty diagram of cell cycle; next—the actual stages of the cell cycle diagram filled in after a McGraw video clip, then notes taken in table—human life cycle analogy stages vs asexual cell cycle stages)  Homework—cell cycle and mitosis vocabulary definitions |
| Five,  Tues,  1/12 | B | Opening question—fill in empty cell cycle diagram with names of stages  Webquest—learning the appearance and events of the asexual mitotic cell cycle  Homework—complete cell cycle and mitosis vocabulary definitions, review webquest and rad guide 10.1 for formative assessment |
| Six,  Wed,  1/13 | B | Opening—class sharing of webquest results—recognizing stages and events of mitosis  Formative assessment for days 1—5 of unit—use Gradecam scan to analyze  Discuss formative assessment, self correct  Homework—RAD guide 10.2 (stages of mitosis) |
| Seven, Thurs,  1/14 | C | Check/self-correction of 10.2 rad guide  Lesson—why asexual cell division must be regulated at checkpoints: Cancer as a disease caused by defective cell cycle control.  FA intervention  Level 0-1: directed reading from text on topics, led by co-teacher  Level 2: work with teacher to have specific questions from FA answered, then to practice identifying pictures of cell cycle stages from photos of whitefish and onions  Level 3-4: reading on cancer and its relationship to the cell cycle  Homework: RAD guide 11.4 (introduction to sexual cell division, meiosis) |
| Eight,  Fri,  1/15 | A  D  E  F | Opening—sexual vs asexual cell division purpose  Lesson—recognizing different types of chromosomes and their importance for passing on DNA in sexual vs asexual cell division  Play—clips from webquest on learn.genetics.utah.edu/tour\_of\_basics: what is a gene, what is a trait, what is heredity.  Use simple diagram of a somatic cell having 2 pairs of homologous chromosomes with simple letter identified trait-coding genes.  Note-taking—draw and label diagrams of cells to show each vocab term  Apply notes to stages of meiosis and outcomes of meiosis  Homework—review and finish rad 11.4; test on Thursday |
| Nine,  Wed,  1/20 | A  D  E | Practice and rehearse—stages of meiosis and mitosis, comparison of mitosis and meiosis, formative assessment sexual cell division, meiosis  Homework—review for unit test on Friday |
| Ten,  Thurs,  1/21 | A-F | Self-correction of formative assessment, then divide students in to remediation groups to begin review for summative assessment (unit test) using:  Level 0-1 for formative assessment—work with co-teacher on vocabulary development, then on diagram labeling for stages mitosis, meiosis, and comparison; then these students can move to the coloring sheets used by level 2, and finally, to the activities used by level 3, 4  Level 2—biology coloring/labeling sheet on homologous chromosomes and stages meiosis, then comparing mitosis and meiosis—led by teacher; then, move to level 3,4 activities except for the level 4 question brainstorming  Level 3,4—self-directed review using matching cards (sexual,asexual OR mitosis/meiosis), keys to rad guides, keys to formative assessments, vocab flash or matching cards, online game type reviews; answer brainstorming for level 4 questions  A4: The student can explain how a homologous pair of chromosomes is alike and different.  B4/C4: Given scenarios the student will predict length of the cell cycle.  D4/E4/F4: Explain how meiosis accounts for diversity among siblings.  Homework—complete preparations for unit test tomorrow |
| Eleven,  Fri,  1/22 | A-F | Unit Test on sexual and asexual cell division via processes of binary fission, mitosis, and meiosis |