

School:	Booker T. Washington	Subject:	Research	Teacher:		Lesson Plan Date:	
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PRE-PLANNING	OBJECTIVE What will your students be able to learn?	BENCHMARK:
	Students will be able to visually distinguish between the different phases of mitosis as well as be able to physically construct them from memory based on the key characteristics of each phase	(no Research pacing guide)
	ASSESSMENT <i>"Begin with the End in Mind"</i> How will you know whether your students have made progress toward the objective? How and when will you assess mastery?	
	Students will have made progress when they are seen identifying the phases of mitosis without referencing their notes to confirm their answers; each phase has a very particular identifying traits and these should soon become second nature to recognize	
	ESSENTIAL QUESTION A higher order question that is directly derived from the benchmark, introduced at the beginning of the lesson, discussed throughout the lesson, and answered by students at the end of the lesson to show understanding of the concepts taught.	
	What are the steps occurring in mitosis and how does each step allow the cell to progress towards its goal of replication?	
	HIGHER ORDER QUESTIONS (3-5) What questions will be answered to provoke higher order thinking and include Moderate to High FCAT Complexity Levels? What would the ideal student response be for each question?	
<ul style="list-style-type: none"> Why must we have checkpoints in the cell cycle? (to prevent uncontrolled cell growth, which is what is seen in cancers and tumor growth; to make sure that the previous step has been performed correctly, and if the cell does not meet proper standards, it will be lysed) What types of cells does mitosis occur in? (somatic cells aka body cells, occurs in all living things) What is the main triggering factor of mitosis? (a cell growing too large to be able to upkeep its internal processes, therefore it must divide so it has the power of two cells to maintain that amount of mass) 		
LESSON CYLCE	BELLRINGER Follow the Focus Calendar to provide reinforcement of previously taught skills.	TIME Approximate
	The following questions will be projected on the board to be copied in the students' notebooks and answered. <ul style="list-style-type: none"> What is mitosis? What triggers mitosis? Describe the phases of mitosis, detailing what is happening with the chromosomes, spindle fibers, and nucleus during each phase. Why is mitosis a form of asexual reproduction? 	10 min
	INTRODUCTION Brief part of the lesson when students learn the objective/essential question and how mastering the objective leads to achieving the bigger goal of the course. <ul style="list-style-type: none"> Provide a hook to motivate students and link to prior knowledge in order to introduce a new concept. Explain the relevance of lesson and the importance of learning the concept. Introduce important vocabulary using the word wall as an interactive learning tool. 	25-30 min
	<ul style="list-style-type: none"> After giving the students 10 minutes to review the bellringer questions and discuss them with their neighbors, we will discuss them as a class Students will already have their notes written out on mitosis (flipped classroom) therefore should have a grasp on the concepts already We will move from the bellringer into the brief review PowerPoint (provided by Ms. Williams) to allow the students to ensure their information in their notes is accurate 	

<p>MODELING “I DO” Component of the lesson when teacher explicitly models to students exactly what they are expected to do during guided practice and eventually during independent work.</p> <ul style="list-style-type: none"> • Conduct a think aloud while modeling the steps to completing an activity or solving a problem. • Model the use of a graphic organizer. • Use questioning techniques such as re-directing, wait-time and prompting. 	
<p>With the descriptive slide on the board and the activity sheets passed out, I will go over the activity for the day, describing how the students will be manipulating the Oreos to mimic each stage (as described in handout)</p>	
<p>GUIDED PRACTICE “WE DO” Guide students to independent practice by providing an opportunity to work in small groups and practice what was taught during the modeled portion of the lesson.</p> <ul style="list-style-type: none"> • Incorporate the use of a collaborative strategy in small groups. • Encourage student accountable talk during group discussion. • Perform checks for understanding. 	
<p>Mitosis’s Favorite Cookie activity - working in groups of 2 (see attached worksheet)</p>	
<p>COLLABORATIVE PRACTICE “THEY DO” Guide students to independent practice by providing an opportunity to work in small groups and practice what was taught during the shared portion of the lesson.</p> <ul style="list-style-type: none"> • Incorporate the use of a collaborative strategy in small groups. • Circulate throughout the room and provide guidance to each group as needed. 	
<p>Students will correct any errors seen in their cookie displays as well as will get a chance to view the work of their peers to see how they interpreted the assignment. By collaborating with other groups they will be able to identify the most effective ways to portray each stage via this activity as well as memorize the defining features of each stage.</p>	
<p>INDEPENDENT PRACTICE “YOU DO” Differentiate your instruction to reach the diversity of learners in your classroom.</p> <ul style="list-style-type: none"> • Assign students independent work that is directly aligned with the “I Do” and “We Do” portions of the lesson. • Conduct Center Rotations • Circulate around the room to provide individual support. • Pull small groups or individuals for more intensive support. 	
<p>Students will now move on to the follow up questions of the worksheet which will serve as a review of the concepts of mitosis and the cycle.</p>	
<p>CLOSURE Wrap up the lesson and help students organize the information learned into a meaningful context.</p> <ul style="list-style-type: none"> • Have students reflect on or answer the Essential Question. <p>Help students connect today’s learning to their bigger goal in the course.</p>	<p>5 min</p>
<p>Collectively run through each phase of mitosis one last time, solidifying that the class knows the order of the stages as well as what key events are occurring at each. We will then discuss what methods worked the best in the cookie activity and why (why the students found certain methods, such as color coding, most efficient in describing the stages of mitosis)</p>	
<p>HOME-LEARNING How will students practice what they learned? How will opportunities be provided for students to maintain mastery of previously mastered skills/concepts?</p>	
<p>Students can review their notes on today’s discussion of mitosis as well as relate them back to previous discussions involving DNA, making connections between each lesson they are given to see the whole picture</p>	

Mitosis's Favorite Cookie!

Using your notes on the cell cycle, you and your group will be creating an Oreo cookie replica of each of the phases of mitosis using Oreos, toothpicks, and sprinkles.



- 1) Remove the top cookie so that all of the cream is left on one side; repeat for all 6 cookies.
- 2) The cream of the cookie represents the cytoplasm. Mold the "cytoplasm" using a toothpick to imitate what it should look like in each stage.
- 3) Using the sprinkles, you can then represent the chromosomes, spindle fibers, nuclear membrane, and any other structures crucial to that stage (color coding will help get your point across!)
- 4) Once fully constructed, lay each cookie down on paper in the order they come in the cell cycle and label each cookie with their phase.
- 5) After having your models approved, fill in the chart below with summaries of what is occurring in each stage of the cell cycle.

Stage	Summary of Important Events
Interphase	
Prophase	
Metaphase	
Anaphase	
Telophase	
Cytokinesis	

Follow-Up Questions:

1. When are the chromosomes copied? _____
2. During which phase of mitosis does the nuclear membrane reappear around the newly formed sets of chromosomes? _____
3. From what structures do the spindle fibers originate? _____
4. During which phase of mitosis do the sister chromatids split apart and move towards the poles of the cell? _____
5. In what phase does the cytoplasm divide? _____
6. What are the stages of the cell cycle and what occurs during each?
