Phoenixville Area School District Understanding by Design (UbD) Science Unit Plan

Grade Level &/or HS Subject: BIOLOGY **Unit Name: CELLULAR REPRODUCTION**

Stage 1 Desired Results

Overarching NGSS & PA Standards:

HS-LS1-4

HS-LS3-2

Which branch(es) of science apply:

BIOLOGY

Transfer

Students will be able to independently use their learning to…

- Develop and use models
- Obtain, evaluate, and communicate information (supported by evidence)
- Construct explanations and design solutions

Meaning-Making

Students will understand that…

- Cellular division (mitosis) and differentiation produces and maintains complex organisms.
- Inheritable genetic variations may result from (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors.

ESSENTIAL QUESTIONS

Students will keep considering...

- How do organisms grow and develop?
- How are the characteristics of one generation related to the previous generation?
- How/why do individuals of the same species vary in how the look, function and behave?

Knowledge and Skills Acquisition

UNDERSTANDINGS

Students will know…

- In multicellular organisms individual cells grow and then divide via a process called mitosis, thereby allowing the organism to grow. The organism begins as a single cell (fertilized egg) that divides successively to produce many cells, with each parent cell passing identical genetic material (two variants of each chromosome pair) to both daughter cells. Cellular division and differentiation produce and maintain a complex organism, composed of systems of tissues and organs that work together to meet the needs of the whole organism.
- In sexual reproduction, chromosomes can sometimes swap sections during the process of meiosis (cell division), thereby creating new genetic combinations and thus more genetic variation. Although DNA replication is tightly regulated and remarkably accurate, errors do occur

Students will be skilled at…

- Use a model based on evidence to illustrate the relationships between systems or between components of a system.
- Make and defend a claim based on evidence about the natural world that reflects scientific knowledge, and student-generated evidence.

	and result in mutations, which are also a source of genetic variation. Environmental factors can also cause mutations in genes, and viable mutations are inherited. • Environmental factors also affect expression of traits, and hence affect the probability of occurrences of traits in a population. Thus, the variation and distribution of traits observed depends on both genetic and environmental factors. • Describe the events that occur during the cell cycle: interphase, nuclear division (i.e., mitosis or meiosis), cytokinesis.* • Compare and contrast the processes and outcomes of mitotic and meiotic nuclear divisions.* • Describe processes that can alter composition or number of chromosomes (i.e., crossing-over, nondisjunction, duplication, translocation, deletion, insertion, and inversion).*	
	KEY VOCABULARY Allele, Asexual Reproduction, Cell Cycle, Chromosome, Crossing over, Cytokinesis, Deletion, Diploid, Duplication, Gamete, Haploid, Homologous Chromosomes, Interphase, Inversion, Mitosis, M-Phase, Nondisjunction, Sexual Reproduction, Sister Chromatids, Somatic Cell, Tetrad, Translocation, Zygote	

Stage 2 – Evidence		
Evaluative Criteria	***Assessment Evidence***	
What criteria will be used in each assessment to evaluate attainment of the desired results?	PERFORMANCE TASK(S): • Mitosis Modeling Lab • Mitosis Inquiry Lab • Meiosis Modeling Lab • Chromosomal Mutations/Cancer Research Project	Differentiation Considerations: • Grouping of students • Split Screen Activities • Scaffolding of Information
What criteria will be used in each assessment to evaluate attainment of the desired results?	OTHER EVIDENCE: • Quizzes and Unit Exams • Mitosis vs. Meiosis Modeling – OPTIONAL • Sketch Notes – OPTIONAL	Differentiation Considerations: • Grouping of students • Split Screen Activities • Scaffolding of Information