



## Grades 9–12

### 3.1.9-12.D Life Science: Inheritance and Variation of Traits

**Students who demonstrate understanding can** use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms.

**Clarifying Statement:** N/A

**Assessment Boundary:** Assessment does not include specific gene control mechanisms or rote memorization of the steps of mitosis.

Science and Engineering Practices (SEP)	Disciplinary Core Ideas (DCI)	Crosscutting Concepts (CCC)
<b>Developing and Using Models</b> Modeling in 9–12 builds on K–8 experiences and progresses to using, synthesizing, and developing models to predict and show relationships among variables between systems and their components in the natural and designed world(s). <ul style="list-style-type: none"> <li>Develop and use a model based on evidence to illustrate the relationships between systems or between components of a system.</li> </ul>	<b>Growth and Development of Organisms</b> <ul style="list-style-type: none"> <li>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.</li> </ul>	<b>Systems and System Models</b> <ul style="list-style-type: none"> <li>Models (e.g., physical, mathematical, computer models) can be used to simulate systems and interactions—including energy, matter, and information flows—within and between systems at different scales.</li> </ul>

**Pennsylvania Context:** N/A

**PA Career Ready Skills:** Advocate for oneself in education, employment, and within the community.

### Connections to Other Standards Content and Practices

Standard Source	Possible Connections to Other Standard(s) or Practice(s)
<b>Agriculture (AFNR)</b>	CS.02.02.01.a: Identify and summarize the components within AFNR systems (e.g., Animal Systems: health, nutrition, genetics, etc.; Natural Resources Systems: soil, water, etc.).
<b>Science, Environmental Literacy and Sustainability (NAEE)</b>	9-12 Strand 1.F. Working with models and simulations: Learners create, use, test, and evaluate models to analyze environmental questions, problems, issues, or phenomena.



Standard Source	Possible Connections to Other Standard(s) or Practice(s)
PA Core Standards: ELA	CC.3.5.9-10.G: Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. CC.3.5.11-12.G: Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.
PA Core Standards and Practices: Math	MP.4: Model with mathematics. CC.2.2.HS.C.2: Graph and analyze functions and use their properties to make connections between the different representations.
PA Standards: Social Studies	N/A
Educational Technology (ISTE)	1.6. Creative Communicator: Students communicate clearly and express themselves creatively for a variety of purposes using the platforms, tools, styles, formats and digital media appropriate to their goals.
Technology and Engineering (ITEEA)	STEL-10: Assess how similarities and differences among scientific, mathematical, engineering, and technological knowledge and skills contributed to the design of a product or system.