

## **Biology Support Resources**

## Biology Support Resources

The biology content can be broken in to three major categories as assessed on the Biology End of Course Exam (EOC). Those categories are **molecular and cell biology; classification, heredity, and evolution; and organisms, populations, and ecosystems**. The breakdown of the standards and the weight of each of these areas is represented below.

Table 1: Assessment Categories and Standards (<http://www.fldoe.org/core/fileparse.php/5662/urlt/0077547-biologyfl11sp.pdf>).

Content Breakdown by Benchmark					
Molecular and Cell Biology		Classification, Heredity, and Evolution		Organisms, Populations, and Ecosystems	
35% of EOC		25% of EOC		40% of EOC	
N.1.1	L.16.17	N.1.1	L.15.8	N.1.1	L.17.5
└─ N.1.4	└─ L.16.8	L.15.1	└─ N.1.3	L.14.7	└─ L.17.2
└─ N.1.6	└─ L.16.14	└─ L.15.10	└─ N.1.4	L.14.26	└─ L.17.4
└─ L.14.4	└─ L.16.16	└─ N.1.3	└─ N.2.1	L.14.36	└─ L.17.8
L.14.1	L.18.1	└─ N.1.4	L.15.13	L.14.52	└─ N.1.4
└─ N.1.3	└─ L.18.11	└─ N.1.6	└─ L.15.14	└─ L.14.6	L.17.9
└─ N.2.1	L.18.9	└─ N.2.1	└─ L.15.15	L.16.10	└─ E.7.1
└─ N.3.1	└─ L.18.7	└─ N.3.1	└─ N.1.3	L.16.13	L.17.20
└─ N.3.4	└─ L.18.8	└─ N.3.4	L.16.1		└─ L.17.11
L.14.3	└─ L.18.10	L.15.6	└─ L.16.2		└─ L.17.13
└─ L.14.2	L.18.12	└─ L.15.4			└─ N.1.3
L.16.3		└─ L.15.5			
└─ L.16.4		└─ N.1.3			
└─ L.16.5		└─ N.1.6			
└─ L.16.9					

The following resources are a collection of district recommended materials to be used to assist teachers and students in these content areas. These resources may be used as animations, interactive tutorials, lesson plan ideas, or video discussion links for classroom discussion.

To assist students with achieving the proper level of complexity in their content development, these resources may be used to provide opportunities for moderate and high levels of thinking. This is in alignment with the biology assessment as shown in Table 2. Complexity levels and percentage of questions in each of the complexity levels is provided in Table 2 below. As indicated, over 80 percent of all standards are assessed at the levels of moderate to high. Definitions of the cognitive levels may be viewed within the test item specifications (<http://www.fldoe.org/core/fileparse.php/5662/urlt/0077547-biologyfl11sp.pdf>).

Table 2: Complexity levels and estimated numbers of assessment items

Item Cognitive Complexity		
Low	Moderate	High
10-20%	60-80%	10-20%

*\*Some functionalities are supported by different browsers. An updated browser may be necessary to fully utilize all resources.*

## **Molecular and Cell Biology**

### **SC.912.L.14.1**

Describe the scientific theory of cells (cell theory) and relate the history of its discovery to the process of science.

- Animations - Searchable Database of Animations: <http://biology-animations.blogspot.com/search/label/cell%20biology>
- Animations - Searchable Database Hybrid Medical Animations: <http://www.hybridmedicalanimation.com/?s=cell>
- Video Discussion – Cell Theory: [http://mrescience.com/videos/life\\_chap\\_1\\_1/life\\_chap\\_1\\_1.htm](http://mrescience.com/videos/life_chap_1_1/life_chap_1_1.htm)

### **SC.912.L.14.3**

Compare and contrast the general structures of plant and animal cells. Compare and contrast the general structures of prokaryotic and eukaryotic cells. Also assesses SC.912.L.14.2.

- Animation - Tour of the Cell: <http://www.nsf.gov/news/overviews/biology/interactive.jsp>
- Animations - Searchable Database of Animations <http://biology-animations.blogspot.com/search/label/cell%20biology>
- Animations - Searchable Database Hybrid Medical Animations: <http://www.hybridmedicalanimation.com/?s=cell>
- Animations - Interactive Cell: <http://www.johnkyrk.com/meiosis.html>
- Animations - Virtual Cell Animations: <http://vcell.ndsu.nodak.edu/animations/>
- Interactive Tutorial - Animal & Plant Cell Interactive: [http://www.cellsalive.com/cells/cell\\_model.htm](http://www.cellsalive.com/cells/cell_model.htm)
- Interactive Tutorial - Cell Craft: <http://www.kongregate.com/games/cellcraft/cellcraft>
- Interactive Tutorial - Control of Cell Cycle: <http://www.nobelprize.org/educational/medicine/2001/cellcycle.html>

### **SC.912.L.16.3**

Describe the basic process of DNA replication and how it relates to the transmission and conservation of the genetic information. Also assesses SC.912.L.16.4, SC.912.L.16.5 and SC.912.L.16.9.

- Animations - Searchable Database of Animations: <http://biology-animations.blogspot.com/search/label/DNA>
- Animations - Searchable Database Hybrid Medical Animations: <http://www.hybridmedicalanimation.com/?s=dna>
- Interactive Tutorial – Double Helix: [http://www.nobelprize.org/educational/medicine/dna\\_double\\_helix/about.html](http://www.nobelprize.org/educational/medicine/dna_double_helix/about.html)

### **SC.912.L.16.17**

Compare and contrast mitosis and meiosis and relate to the processes of sexual and asexual reproduction and their consequences for genetic variation. Also assesses SC.912.L.16.8, SC.912.L.16.14 and SC.912.L.16.16.

- Animations - Searchable Database of Animations: <http://biology-animations.blogspot.com/search/label/cell%20division>

- Animations - Searchable Database Hybrid Medical Animations: <http://www.hybridmedicalanimation.com/?s=mitosis>
- Animations - Mitosis: <http://www.hybridmedicalanimation.com/work/animation/the-stages-of-mitosis/>
- Interactive Tutorial - Mitosis vs. Meiosis: <http://www.pbs.org/wgbh/nova/body/how-cells-divide.html>

#### SC.912.L.18.1

Describe the basic molecular structures and primary functions of the four major categories of biological macromolecules. Also assesses SC.912.L.18.11.

- Animations - Searchable Database of Animations: <http://biology-animations.blogspot.com/search/label/High%20cholesterol%20diagnosis>
- Animations - Searchable Database Hybrid Medical Animations: <http://www.hybridmedicalanimation.com/?s=lipids>
- Video Discussion – Biological Molecules: <http://www.bozemanscience.com/042-biological-molecules>

#### SC.912.L.18.9

Explain the interrelated nature of photosynthesis and cellular respiration. Also assesses SC.912.L.18.7, SC.912.L.18.8 and SC.912.L.18.10.

- Animations - Searchable Database of Animations: <http://biology-animations.blogspot.com/search/label/photosynthesis>
- Tutorial Animation - Cellular Respiration: <http://www.sumanasinc.com/webcontent/animations/content/cellularrespiration.html>

#### SC.912.L.18.12

Discuss the special properties of water that contribute to Earth's suitability as an environment for life: cohesive behavior, ability to moderate temperature, expansion upon freezing, and versatility as a solvent.

- Animations - Searchable Database of Animations: <http://biology-animations.blogspot.com/search/label/water%20transport>
- Video Discussion - Water and Life <http://www.bozemanscience.com/water-life>

### **Classification, Heredity and Evolution**

#### SC.912.L.15.1

Explain how the scientific theory of evolution is supported by the fossil record, comparative anatomy, comparative embryology, biogeography, molecular biology, and observed evolutionary change. Also assesses SC.912.L.15.10, SC.912.N.1.3, SC.912.N.1.4, SC.912.N.1.6, SC.912.N.2.1, SC.912.N.3.1 and SC.912.N.3.4.

- Animation – Pocket Mouse Evolution: [http://www.hhmi.org/biointeractive/evolution/pocket\\_mouse\\_evolution.html](http://www.hhmi.org/biointeractive/evolution/pocket_mouse_evolution.html)
- Animations - Searchable Database of Animations: <http://biology-animations.blogspot.com/search/label/embryo>
- Video Discussion – Marine Fossils in the Arctic Landscape: [http://education.nationalgeographic.com/education/media/sea-monster-island/?ar\\_a=1](http://education.nationalgeographic.com/education/media/sea-monster-island/?ar_a=1)

- Interactive Tutorial - A Brief History of Life: <http://www.pbs.org/wgbh/nova/evolution/brief-history-life.html>
- Interactive Tutorial - Adventures in the Rift Valley: <http://humanorigins.si.edu/research/east-african-research/adventures-rift-valley-interactive>
- Interactive Tutorial - Who's Who in Human Evolution:
- <http://www.pbs.org/wgbh/nova/evolution/whos-who-human-evolution.html>
- Video Discussion - Evolution of Y Chromosome: [http://www.hhmi.org/biointeractive/gender/Y\\_evolution.html](http://www.hhmi.org/biointeractive/gender/Y_evolution.html)

#### SC.912.L.15.6

Discuss distinguishing characteristics of the domains and kingdoms of living organisms. Also assesses SC.912.L.15.4, SC.912.L.15.5, SC.912.N.1.3 and SC.912.N.1.6.

- Animation – Cytoplasmic Streaming Narrated: [http://highereducation.com/sites/9834092339/student\\_view0/chapter31/animation\\_-\\_cytoplasmic\\_streaming.html](http://highereducation.com/sites/9834092339/student_view0/chapter31/animation_-_cytoplasmic_streaming.html)
- Animations - Searchable Database of Animations: <http://biology-animations.blogspot.com/search/label/Classification%20system%20of%20Life>
- Interactive Tutorial - Tree of Life: <http://www.wellcometreeoflife.org/interactive/>
- Video Discussion - Tree of Life (video): <http://www.wellcometreeoflife.org/video/>

#### SC.912.L.15.8

Describe the scientific explanations of the origin of life on Earth. Also assesses SC.912.N.1.3, SC.912.N.1.4 and SC.912.N.2.1.

- Interactive Tutorials - DNA From the Beginning: <http://www.dnafb.org/>

#### SC.912.L.15.13

Describe the conditions required for natural selection, including: overproduction of offspring, inherited variation, and the struggle to survive, which result in differential reproductive success. Also assesses SC.912.L.15.14, SC.912.L.15.15, and SC.912.N.1.3.

- Interactive Tutorials - Genetic Discrimination: <http://www.dnai.org/e/index.html>
- Video Discussion – Survival of the fittest: <http://education.nationalgeographic.com/education/media/battle-of-the-buzz/?ara=1>
- Video Discussion - Mantis Shrimp Eyes:
- <http://www.abc.net.au/catalyst/stories/3280489.htm>
- Video Discussion - Owl Eyes: <http://www.abc.net.au/catalyst/stories/3280474.htm>
- Video Discussion - Selective Breeding-African Livestock
- <http://www.abc.net.au/catalyst/stories/3269839.htm>
- Video Discussion - Selective Breeding-UG99 Fungus:
- <http://www.abc.net.au/catalyst/stories/3285577.htm>

#### SC.912.L.16.1

Use Mendel's laws of segregation and independent assortment to analyze patterns of inheritance. Also assesses SC.912.L.16.2.

- Animation – Narrated: Sickle Cell Anemia Video Clip:
- [http://www.hhmi.org/biointeractive/dna/DNAi\\_sicklec cell.html](http://www.hhmi.org/biointeractive/dna/DNAi_sicklec cell.html)

- Animation – Narrated: X-Inactivation (video): [http://www.hhmi.org/biointeractive/neuroscience/x\\_inactivation.html](http://www.hhmi.org/biointeractive/neuroscience/x_inactivation.html)
- Animation - Narrated Human Genome Sequencing: [http://www.hhmi.org/biointeractive/dna/DNAi\\_genetic\\_eng.html](http://www.hhmi.org/biointeractive/dna/DNAi_genetic_eng.html)
- Animations - Searchable Database of Animations: <http://biology-animations.blogspot.com/search/label/DNA%20Hybridization>
- Interactive Tutorial: <http://www.learner.org/interactives/dna/genetics.html>  
Interactive Tutorial - Human Genome Project: <http://www.dnai.org/c/index.html>
- Video Discussion - Genetically Modified Food (GMO): <http://www.abc.net.au/catalyst/stories/3329146.htm>
- Video Discussion - GMO: <http://www.abc.net.au/catalyst/stories/3329151.htm>
- Video Discussion - GMO: <http://www.abc.net.au/catalyst/stories/3329167.htm>

### **Organisms, Populations, and Ecosystems: Biodiversity**

SC.912.L.14.7

Relate the structure of each of the major plant organs and tissues to physiological processes.

- Animation - Nitrogen Cycle: <http://www.biology.ualberta.ca/facilities/multimedia/uploads/ecology/ncycle.html>
- Animation - Plant Cell Interactive: [http://www.cellsalive.com/cells/cell\\_model.htm](http://www.cellsalive.com/cells/cell_model.htm)
- Interactive Tutorial - Photosynthesis: <http://www.wonderville.ca/asset/photosynthesis>
- Interactive Tutorial - The Fungi Kingdom: <http://www.wisc-online.com/Objects/ViewObject.aspx?ID=BIO304>
- Video Discussion - Cyanide Seeds: <http://www.abc.net.au/catalyst/stories/3318890.htm>
- Video Discussion - Secret Life of Flowers: [http://www.exploratorium.edu/gardening/bloom/secret\\_life\\_of\\_flowers/index.html](http://www.exploratorium.edu/gardening/bloom/secret_life_of_flowers/index.html)

SC.912.L.14.26

Identify the major parts of the brain on diagrams or models.

- Animations - Searchable Database Hybrid Medical Animations: <http://www.hybridmedicalanimation.com/?s=brain>
- Animations - Searchable Database of Animations: <http://biology-animations.blogspot.com/search/label/brain>
- Animation – Narrated Reflex Arc: <http://www.sumanasinc.com/webcontent/animations/content/reflexarcs.html>
- Animation – Narrated Resting Membrane Potential: <http://www.sumanasinc.com/webcontent/animations/content/electricalsignaling.html>
- Interactive Tutorial - Electrocardiogram game: <http://www.nobelprize.org/educational/medicine/ecg/ecg.html>
- Interactive Tutorial - Nerve Signaling: [http://www.nobelprize.org/educational/medicine/nerve\\_signaling/game/nerve\\_signaling.html](http://www.nobelprize.org/educational/medicine/nerve_signaling/game/nerve_signaling.html)
- Interactive Tutorial - Poke-a-Muscle: <http://www.anatomyarcade.com/games/PAM/PAM.html>
- Interactive Tutorials - BBC Science: <http://www.bbc.co.uk/science/humanbody/>
- Video Discussion - Alzheimer's Disease video: <http://www.nia.nih.gov/alzheimers/alzheimers-disease-video>

- Video Discussion - Complex Pain: <http://www.abc.net.au/catalyst/stories/2621515.htm>
- Video Discussion - Neurotoxins: <http://www.abc.net.au/catalyst/stories/3280475.htm>

#### SC.912.L.14.36

Describe the factors affecting blood flow through the cardiovascular system.

- Animations - Searchable Database Hybrid Medical Animations: <http://www.hybridmedicalanimation.com/?s=heart>
- Animations - Searchable Database of Animations: <http://biology-animations.blogspot.com/search/label/Blocked%20Coronary%20Arteries>
- Animation – Narrated Synapse: <http://www.sumanasinc.com/webcontent/animations/content/synapse.html>
- Animation – Narrated Synaptic Transmission: <http://www.sumanasinc.com/webcontent/animations/content/synaptictransmission.html>
- Animation - 3-D Brain: <http://www.g2conline.org/2022>

#### SC.912.L.14.52

Explain the basic functions of the human immune system, including specific and nonspecific immune response, vaccines, and antibiotics. Also assesses SC.912.L.14.6

- Animations - Searchable Database Hybrid Medical Animations: <http://www.hybridmedicalanimation.com/?s=heart>
- Animations - Searchable Database of Animations: <http://biology-animations.blogspot.com/search/label/immunology>
- Interactive Tutorials - Multiple Links To Review the Human Body: <http://www.supplementcritique.com/a-review-of-parts-of-the-human-body>
- Animation – Narrated Cloning an Army of T-Cells for Immune Defense: <http://www.hhmi.org/biointeractive/immunology/tcell.html>

#### SC.912.L.16.10

Evaluate the impact of biotechnology on the individual, society and the environment, including medical and ethical issues.

- Animations - Searchable Database Hybrid Medical Animations: <http://www.hybridmedicalanimation.com/?s=biotechnology>
- Animations - Searchable Database of Animations: <http://biology-animations.blogspot.com/search/label/biotechnology>
- Animation - Pioneering New Frontiers in Tumor Angiogenesis: <http://angiogenesis.amgen.com/>
- Animations - BioVisions: <http://multimedia.mcb.harvard.edu/>
- Video Discussion - Staying Up Late: <http://www.abc.net.au/catalyst/stories/3275022.htm>
- Video Discussion - Stem Cells Repair: <http://www.abc.net.au/catalyst/stories/2608197.htm>



### SC.912.L.16.13

Describe the basic anatomy and physiology of the human reproductive system. Describe the process of human development from fertilization to birth and major changes that occur in each trimester of pregnancy.

- Animations - Searchable Database Hybrid Medical Animations: <http://www.hybridmedicalanimation.com/?s=reprod>
- Animations - Searchable Database of Animations: <http://biology-animations.blogspot.com/search/label/embryo>
- Video Discussion: Premenstrual Syndrome:
- <http://www.abc.net.au/catalyst/stories/3251902.htm>
- Animation – Narrated: In vitro fertilization: <http://www.sumanasinc.com/webcontent/animations/content/invitrofertilization.html>
- Interactive Tutorials - Multiple Links To Review the Human Body:
- <http://www.supplementcritique.com/a-review-of-parts-of-the-human-body>

### SC.912.L.17.5

Analyze how population size is determined by births, deaths, immigration, emigration, and limiting factors (biotic and abiotic) that determine carrying capacity. Also assesses SC.912.L.17.2, SC.912.L.17, SC.912.L.17.8 and SC.912.N.1.4.

- Lessons with support materials - TIEE (Teaching Issues and Experiments in Ecology) Searchable Database of Lessons: <http://tiee.esa.org/>
- Lessons, Animations, Video Clips: PBS Learning Media: [http://www.pbslearningmedia.org/search/?q=ecology&selected\\_facets=](http://www.pbslearningmedia.org/search/?q=ecology&selected_facets=)
- Lessons - Smithsonian Biodiversity Science: <http://nationalzoo.si.edu/education/classroomscience/>
- Video Discussion - Eel Migration: <http://www.abc.net.au/catalyst/stories/3291553.htm>

### SC.912.L.17.9

Use a food web to identify and distinguish producers, consumers, and decomposers. Explain the pathway of energy transfer through trophic levels and the reduction of available energy at successive trophic levels. Also assesses SC.912.E.7.1.

- Lessons with support materials - TIEE (Teaching Issues and Experiments in Ecology) Searchable Database of Lessons: <http://tiee.esa.org/>
- Lessons, Animations, Video Clips: PBS Learning Media: [http://www.pbslearningmedia.org/search/?q=ecology&selected\\_facets=](http://www.pbslearningmedia.org/search/?q=ecology&selected_facets=)

### SC.912.L.17.20

Predict the impact of individuals on environmental systems and examine how human lifestyles affect sustainability. Also assesses SC.912.L.17.11, SC.912.L.17.13 and SC.912.N.1.3.

- Lessons with support materials - TIEE (Teaching Issues and Experiments in Ecology) Searchable Database of Lessons: <http://tiee.esa.org/>
- Lessons, Animations, Video Clips: PBS Learning Media: [http://www.pbslearningmedia.org/search/?q=ecology&selected\\_facets=](http://www.pbslearningmedia.org/search/?q=ecology&selected_facets=)
- Lessons - Smithsonian Biodiversity Science: <http://nationalzoo.si.edu/education/classroomscience/>
- Video Discussion - Eel Migration: <http://www.abc.net.au/catalyst/stories/3291553.htm>