Shelby County Schools Science Vision

Shelby County Schools' vision of science education is to ensure that from early childhood to the end of the 12th grade, all students have heightened curiosity and an increased wonder of science; possess sufficient knowledge of science and engineering to engage in discussions; are able to learn and apply scientific and technological information in their everyday lives; and have the skills such as critical thinking, problem solving, and communication to enter careers of their choice, while having access to connections to science, engineering, and technology.

To achieve this, Shelby County Schools has employed The Tennessee Academic Standards for Science to craft meaningful curricula that is innovative and provide a myriad of learning opportunities that extend beyond mastery of basic scientific principles.

Introduction

In 2014, the Shelby County Schools Board of Education adopted a set of ambitious, yet attainable goals for school and student performance. The District is committed to these goals, as further described in our strategic plan, Destination 2025. In order to achieve these ambitious goals, we must collectively work to provide our students with high quality standards aligned instruction. The Tennessee Academic Standards for Science provide a common set of expectations for what students will know and be able to do at the end of each grade, can be located in the Tennessee Science Standards Reference. Tennessee Academic Standards for Science are rooted in the knowledge and skills that students need to succeed in post-secondary study or careers. While the academic standards establish desired learning outcomes, the curricula provide instructional planning designed to help students reach these outcomes. The curriculum maps contain components to ensure that instruction focuses students toward college and career readiness. Educators will use this guide and the standards as a roadmap for curriculum and instruction. The sequence of learning is strategically positioned so that necessary foundational skills are spiraled in order to facilitate student mastery of the standards.

Our collective goal is to ensure our students graduate ready for college and career. Being College and Career Ready entails, many aspects of teaching and learning. We want our students to apply their scientific learning in the classroom and beyond. These valuable experiences include students being facilitators of their own learning through problem solving and thinking critically. The Science and Engineering Practices are valuable tools used by students to engage in understanding how scientific knowledge develops. These practices rest on important "processes and proficiencies" with longstanding importance in science education. The science maps contain components to ensure that instruction focuses students toward understanding how science and engineering can contribute to meeting many of the major challenges that confront society today. The maps are centered around five basic components: the Tennessee Academic Standards for Science, Science and Engineering Practices, Disciplinary Core Ideas, Crosscutting Concepts, and Phenomena.

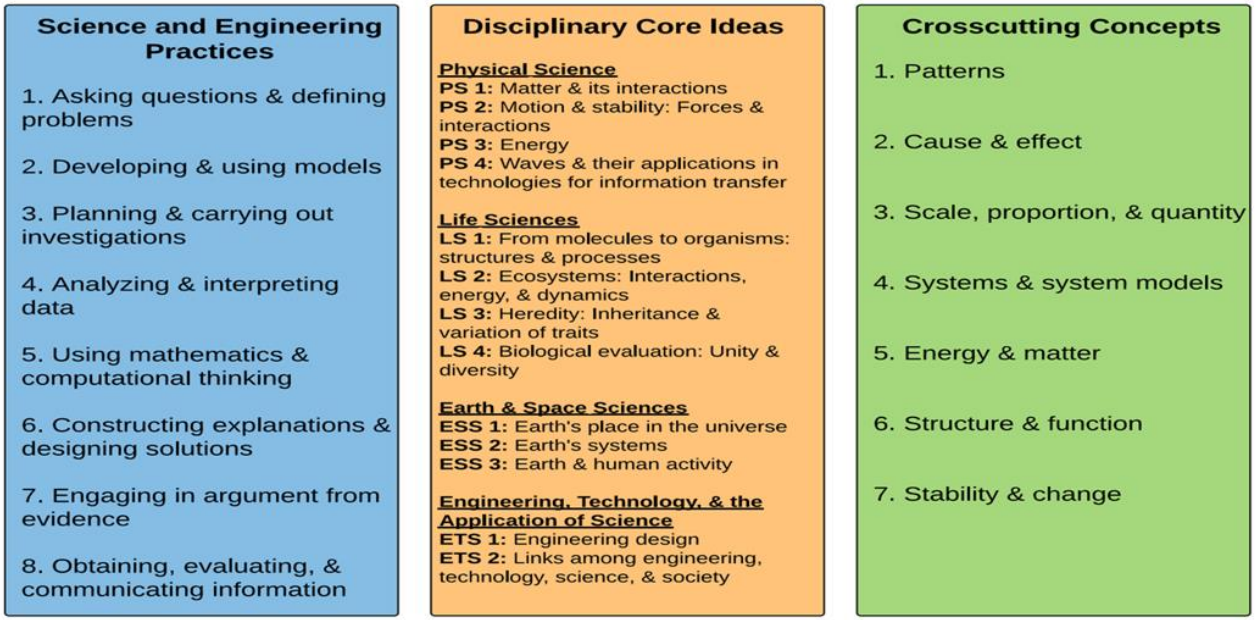
The Tennessee Academic Standards for Science were developed using the National Research Council's 2012 publication, A Framework for K-12 Science Education as their foundation. The framework presents a new model for science instruction that is a stark contrast to what has come to be the norm in science classrooms. Thinking about science had become memorizing concepts and solving mathematical formulae. Practicing science had become prescribed lab situations with predetermined outcomes. The framework proposes a three-dimensional approach to science education that capitalizes on a child's natural curiosity. The Science Framework for K-12 Science Education provides the blueprint for developing the effective science practices. The *Framework* expresses a vision in science education that requires students to operate at the nexus of three dimensions of learning: Science and Engineering Practices, Crosscutting Concepts, and Disciplinary Core Ideas. The *Framework* identified a small number of disciplinary core ideas that all students should learn with increasing depth and sophistication, from Kindergarten through grade twelve. Key to the vision expressed in the *Framework* is for students to learn these disciplinary core ideas in the

context of science and engineering practices. The importance of combining Science and Engineering Practices, Crosscutting Concepts and Disciplinary Core Ideas is stated in the *Framework* as follows:

Standards and performance expectations that are aligned to the framework must take into account that students cannot fully understand scientific and engineering ideas without engaging in the practices of inquiry and the discourses by which such ideas are developed and refined. At the same time, they cannot learn or show competence in practices except in the context of specific content. (NRC Framework, 2012, p. 218)

To develop the skills and dispositions to use scientific and engineering practices needed to further their learning and to solve problems, students need to experience instruction in which they use multiple practices in developing a particular core idea and apply each practice in the context of multiple core ideas. We use the term "practices" instead of a term such as "skills" to emphasize that engaging in scientific investigation requires not only skill but also knowledge that is specific to each practice. Students in grades K-12 should engage in all eight practices over each grade band**.** Crosscutting concepts have application across all domains of science. As such, they are a way of linking the different domains of science. Crosscutting concepts have value because they provide students with connections and intellectual tools that are related across the differing areas of disciplinary content and can enrich their application of practices and their understanding of core ideas. There are seven crosscutting concepts that bridge disciplinary boundaries, uniting core ideas throughout the fields of science and engineering. Their purpose is to help students deepen their understanding of the disciplinary core ideas and develop a coherent and scientifically based view of the world.

The map is meant to support effective planning and instruction to rigorous standards. It is *not* meant to replace teacher planning, prescribe pacing or instructional practice. In fact, our goal is not to merely "cover the curriculum," but rather to "uncover" it by developing students' deep understanding of the content and mastery of the standards. Teachers who are knowledgeable about and intentionally align the learning target (standards and objectives), topic, text(s), task, and needs (and assessment) of the learners are best-positioned to make decisions about how to support student learning toward such mastery. Teachers are therefore expected--with the support of their colleagues, coaches, leaders, and other support providers--to exercise their professional judgment aligned to our shared vision of effective instruction, the Teacher Effectiveness Measure (TEM) and related best practices. However, while the framework allows for flexibility and encourages each teacher/teacher team to make it their own, our expectations for student learning are non-negotiable. We must ensure all of our children have access to rigor—high-quality teaching and learning to grade level specific standards, including purposeful support of literacy and language learning across the content areas.



Learning Progression

At the end of the elementary science experience, students can observe and measure phenomena using appropriate tools. They are able to organize objects and ideas into broad concepts first by single properties and later by multiple properties. They can create and interpret graphs and models that explain phenomena. Students can keep notebooks to record sequential observations and identify simple patterns. They are able to design and conduct investigations, analyze results, and communicate the results to others. Students will carry their curiosity, interest and enjoyment of the scientific world view, scientific inquiry, and the scientific enterprise into middle school.

At the end of the middle school science experience, students can discover relationships by making observations and by the systematic gathering of data. They can identify relevant evidence and valid arguments. Their focus has shifted from the general to the specific and from the simple to the complex. They use scientific information to make wise decision related to conservation of the natural world. They recognize that there are both negative and positive implications to new technologies.

As an SCS graduate, former students should be literate in science, understand key science ideas, aware that science and technology are interdependent human enterprises with strengths and limitations, familiar with the natural world and recognizes both its diversity and unity, and able to apply scientific knowledge and ways of thinking for individual and social purposes.

Structure of the Standards

- Grade Level/Course Overview: An overview that describes that specific content and themes for each grade level or high school course.
- Disciplinary Core Idea: Scientific and foundational ideas that permeate all grades and connect common themes that bridge scientific disciplines.
- Standard: Statements of what students can do to demonstrate knowledge of the conceptual understanding. Each performance indicator includes a specific science and engineering practice paired with the content knowledge and skills that students should demonstrate to meet the grade level or high school course standards.

Purpose of Science Curriculum Maps

This map is a guide to help teachers and their support providers (e.g., coaches, leaders) on their path to effective, college and career ready (CCR) aligned instruction and our pursuit of Destination 2025. It is a resource for organizing instruction around the Tennessee Academic Standards for Science, which define what to teach and what students need to learn at each grade level. The map is designed to reinforce the grade/course-specific standards and content (scope) and provides *suggested* sequencing, pacing, time frames, and aligned resources. Our hope is that by curating and organizing a variety of standards-aligned resources, teachers will be able to spend less time wondering what to teach and searching for quality materials (though they may both select from and/or supplement those included here) and have more time to plan, teach, assess, and reflect with colleagues to continuously improve practice and best meet the needs of their students.

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Human Anatomy & Physiology
Quarter 4 Curriculum Map
Curriculum Map Feedback Survey

Quarter 1		Quarter 2		Quarter 3		**Quarter 4**	
Unit 1 Anatomical Orientation	Unit 2 Protection, Support, and Movement	Unit 3 Nervous System	Unit 4 Endocrine System	Unit 5 Transport of Nutrients and Gases	Unit 6 Lymphatic System	**Unit 7 Absorption and Excretion**	Unit 8 Reproduction, Growth, and Development
3 Weeks	6 Weeks	6 Weeks	3 Weeks	6 Weeks	3 Weeks	5 Weeks	4 Weeks

UNIT 7: Absorption and Excretion [5 Weeks]

The Overarching Question(s)

How do organisms obtain and use the matter and energy they need to live and grow?

Unit, Lesson	Lesson Length	Essential Question	Vocabulary
Unit 7 Absorption and Excretion	**2.5 Weeks**	• How do the structures and functions of living things allow them to meet their needs? • How does energy change from one form to another as it moves through a system? • How does the variation among individuals affect their survival? • What are the functions of the digestive system and what organs are involved?	Accessory digestive organs, digestive tract, esophagus, feces, flatulence, ingestion, oral cavity, palate, salivary glands, soft palate, uvula, wisdom teeth, reflux, stomach, small intestine, anus, appendicitis, appendix, ascending colon, cecum, colon, descending colon, large intestine, rectum, sigmoid colon, transverse colon, bile, common bile duct, pancreatic duct, gallbladder, gallstone, acid reflux, acute diarrhea, amoebic dysentery, celiac disease, chronic diarrhea, cirrhosis, colon cancer, colon polyp, diarrhea, dysphagia, food intolerance, gastric reflux, gastroesophageal reflux disease (GERD), hepatitis, hernia, hiatal hernia, inflammatory bowel disease (IBD), pancreatitis, salmonella, ulcer, diverticulosis

Standards and Related Background Information	Instructional Focus	Instructional Materials
DCI LS1. From Molecules to Organisms: Structures and Processes	**Learning Outcomes** • Identify the various parts of the digestive system.	**Curricular Resources** **Engage** 1. CK-12: The Digestive System

HAP.ETS2: Links Among Engineering, Technology, Science, and Society

Standards

HAP.LS1.24 Model the sequential organization of the alimentary canal and its accessory organs in order to describe the physiological role of each. *this standard sets the flow of learning for this unit; setting the expectation that the standards that follow should be bundled in a manner that provides students with a holistic and sequential understanding of the anatomy and physiology of the alimentary canal.

HAP.LS1. 23 Diagram the progression of lipid transport from the digestive system, through the lymphatic system, and into the cardiovascular circulation.

HAP.LS1.25 Analyze gastrointestinal wall histology and explain the anatomical architecture that supports efficient absorption and transport of molecules into cardiovascular or lymphatic circulation.

HAP.LS1.26 Investigate the actions of major digestive enzymes and hormones and identify their sources.

HAP.LS1.27 Describe the role of the hepatic portal system in coupling the digestive and cardiovascular systems.

Explanation

The Human digestive system is the system used in the human body for the process of digestion. The human digestive system consists primarily of the digestive tract, or the series of structures and organs through which food and liquids pass during their processing into forms

- Explain the functions of each of the parts of the digestive system.
- Explain the importance of healthy eating choices to the digestive system.
- Describe the digestive process.
- Explain waste production.
- Understand the aging and pathology of the digestive system.

Phenomenon

Liver regeneration after the loss of hepatic tissue is a fundamental parameter of liver response to injury. Recognized as a phenomenon from mythological times, it is now defined as an orchestrated response induced by specific external stimuli and involving sequential changes in gene expression, growth factor production, and morphologic structure. The process is associated with signaling cascades involving growth factors, cytokines, matrix remodeling, and several feedbacks of stimulation and inhibition of growth related signals. Liver manages to restore any lost mass and adjust its size to that of the organism, while at the same time providing full support for body homeostasis during the entire regenerative process.

2. The Teaching Channel: Demonstrating Biology: It Takes Guts
3. Khan Academy: The Digestive System
4. TED-Ed: How Your Digestive System Works
5. The Digestive System Interactive
6. Gizmos: The Digestive System
7. Designing a Digestive System
8. Crash Course: Digestive System, Part 1
9. Crash Course: Digestive System, Part 2
10. Crash Course: Digestive System, Part 3

Explore

EMC AA&P Workbook & Laboratory Manual:

Ch. 13 The Digestive System, pgs. 241-265

- Laboratory Activity 1: Microscopic Identification of Normal Digestive Organs; pgs.259-260
- Laboratory Activity 2: Effects of Antacids on Protein Digestion, pgs. 260-262

Investigations:

- Case Study Investigation #13, pgs. 461, 463, 466, 476, 480, 487
- A Case Study: Is Exercise Bad for the Digestive System, pgs. 493-495

What Happens When You Eat?

Explain

Digestive System

Elaborate

Short Readings

- Artificial Digestive System, pg. 464
- Fun Facts: The Digestive System, pg. 578
- Lactose Intolerance: A Closer Look, pg. 483
- Can Kissing Cause Ulcers, pg. 485

absorbable into the bloodstream. The system also consists of the structures through which wastes pass in the process of elimination and other organs that contribute juices necessary for the digestive process. If the body did not have a digestive tract, you could not enjoy your favorite pizza, hamburger, or other food. The human body must obtain its energy by eating food. Therefore, the main purpose of the digestive system is to provide the body with amino acids, carbohydrates, fats, and vitamins to keep our cells functioning. The digestive system provides these essential materials to the 75 trillion cells that live in our bodies. **Misconceptions** • **Spicy food and stress cause stomach ulcers.** Most stomach ulcers are caused by *Helicobacter pylori (H. pylori)*, a type of bacterial, or the use of nonsteroidal anti-inflammatory drugs (NSAIDs) such as naproxen, ibuprofen, or aspirin. Spicy foods and stress can worsen ulcer symptoms. Cancer can cause stomach ulcers too. • **Celiac Disease is a rare childhood disease.** Celiac disease is a disease that affects children and adults. It affects 1 in 133 otherwise healthy people in the U.S. Celiac symptoms are often apparent in children who experience failure to thrive, diarrhea, and retarded growth, but symptoms can manifest for the first time in adults as well. People who have celiac disease must adhere to a strict, life-long gluten-free diet. • **Bowel regularity means a bowel movement every day.** Bowel function and the frequency of bowl movements are highly variable. It's normal	Liver regeneration may be simpler than previously thought Liver transplant from HIV+ living donor to negative recipient: the unanswered questions	**Evaluate** • Ch. 13 The Digestive System-Concept Check, pgs.463, 466, 470, 472, 474, 476, 478, 480, 484 • Ch. 13 The Digestive System-Study Guide, pgs. 491-492 **Textbook:** *Applied Anatomy & Physiology 2nd Ed.: A Case Study Approach; Brian R, Shmaefsky* Ch. 13 The Digestive System; pgs. 460-495

to have as many as three bowel movements a day, to three per week. Even more or fewer bowel movements are normal for some healthy people. • **Cirrhosis is only caused by alcoholism.** Cirrhosis is scarring of the liver that may be caused by alcoholism and other conditions. Alcoholism is the second most common cause of cirrhosis in the U.S. It is responsible for less than 50% of all cases of cirrhosis. • **Digestion happens in the stomach.** Some digestion happens in the stomach, but food passes through a series of stations on its way through our bodies beginning with the mouth. • **Lactose intolerance and milk allergy are the same.** Lactose intolerance refers to gastrointestinal symptoms following consumption of lactose greater than the body's amount of lactase, the intestinal enzyme needed to digest and absorb lactose. Milk allergy, is a reaction to one or more milk proteins triggered by the immune system. **Science and Engineering Practice** **Planning and Carrying out Investigations** *Students plan and perform investigations to aid in the development of a predictive model for interacting variables, consider the quantity of data with respect to experimental uncertainty, and select methods for collection and analysis of data.* **Cross Cutting Concept** **System and System Models** *Students make predictions from models, taking into account assumptions and approximations.*		

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3 Weeks	6 Weeks	6 Weeks	3 Weeks	6 Weeks	3 Weeks	**5 Weeks**	4 Weeks

UNIT 7: Absorption and Excretion [5 Weeks]

The Overarching Question(s)

How do organisms obtain and use the matter and energy they need to live and grow?

Unit, Lesson	Lesson Length	Essential Question(s)	Vocabulary
Unit 7 Absorption and Excretion	**2.5 Weeks**	• What is the structure and function of the urinary system? • What are some disorders of the urinary system? • How are disorders of the urinary system treated? • How do you relate the body's hormone control to the urinary system?	Kidneys, umbilical cord, renal artery, renal vein, ureters, urinary bladder, urethra, incontinence, nephrons, Bowman's capsule, collecting tubule, distal convoluted tubule, glomerulus, loop of Henle, proximal convoluted tubule, acute renal failure, bladder cancer, chronic renal failure, cystitis, diuretics, polycystic kidney disease, urinary tract infection (UTI)

Standards and Background Information	Instructional Focus	Instructional Materials
DCI LS1. From Molecules to Organisms: Structures and Processes HAP.ETS2: Links Among Engineering, Technology, Science, and Society **Standards** **HAP.LS1.28** Model the sequential organization of the male and female urinary tracts in order to describe the	**Learning Outcomes** • Describe all the organs of the urinary system. • Explain how the nephron is the functional unit of the kidney. • Describe the vascular and tubular components of the nephron. • Analyze the glomerular filtration rate and its regulation. • Compare the substances that are regulated and not regulated by the kidneys.	**Curricular Resources** **Engage** • The Urinary System (video) |Bozeman Science| • The Urinary System, part I (video) |Crash Course A&P| • The Urinary System – An Introduction (video) |FuseSchool| • Meet the Kidneys (video) |Khan Academy|

physiological role of blood filtration and waste excretion from the body.

HAP.LS1.29 Identify the parts of a nephron and describe how they assist in homeostatic mechanisms through urine formation.

Explanation

The urinary system, also known as the renal system, produces, stores and eliminates urine, the fluid waste excreted by the kidneys. The kidneys make urine by filtering wastes and extra water from blood. Urine travels from the kidneys through two thin tubes called ureters and fills the bladder. When the bladder is full, a person urinates through the urethra to eliminate the waste. The urinary system is susceptible to a variety of infections and other problems, including blockages and injuries. These can be treated by a urologist or another health care professional who specializes in the renal system. The urinary system works with the lungs, skin and intestines to maintain the balance of chemicals and water in the body. Adults eliminate about 27 to 68 fluid ounces (800 to 2,000 milliliters) per day based on typical daily fluid intake of 68 ounces (2 liters), National Institutes of Health (NIH). Other factors in urinary system function include fluid lost through perspiring and breathing. In addition, certain types of medications, such as diuretics that are sometimes used to treat high blood pressure, can also affect the amount of urine a person produces and eliminates. Some beverages, such as coffee and alcohol, can also cause increased urination in some people.

Misconceptions

- Common folklore states that sweat glands in the skin get rid of wastes from the body. Sweat, however, is involved in evaporative cooling, not in waste removal. The belief may have come from

- Discuss the relationship between body hydration and urine excretion.
- Describe how kidney function contributes to homeostasis.
- Understand the biological basis of the pathology and aging of the urinary system.

Phenomenon

"Football player dies from drinking too much water/Gatorade"
USAToday, August 2014

If water is necessary for survival, how can such an essential substance kill us?

"Overhydrating presents health hazards for young football players"

- Urination (video) |Khan Academy|
- Urinary System (simulation) |EduMedia|
- Waste Not, Want Not (activity) |CPALMS|

Explore

Investigations:

- Case Study Investigation #14, pgs. 497, 503, 504, 512, 521
- A Case Study: Using Diuretics to Treat Hypertension, pgs. 528-529

EMC AA&P Workbook & Laboratory Manual:

Ch. 14 The Urinary System, pgs. 266-286

- Laboratory Activity 1: Urine Chemical Analysis, pgs. 280-281

Explain

- A Brief History of Urinalysis, pg. 508
- Testing for Illegal Substances Using Urinalysis, pg. 509
- Is Drinking Urine Healthy? pg. 511
- Hemodialysis, pg. 515
- Robotic Removal, pg. 516
- Science and Social Ethics, pg. 517

Elaborate

- The Dangers of Overhydration, pg. 520

- Laboratory Activity 2: Microscopic Examination of Urine Sediment, pgs. 282-283 (Lab Manual)

observations on fever patients. People noticed that when the fever "broke," the patient sweated. They believed that the patient was sweating out whatever toxic material had caused the fever, when in fact the body was simply cooling itself down because the underlying infection had been conquered by the immune system. Many early treatments consisted of ways of making patients sweat, in the belief that the patient would "sweat out" the fever. • Even today, some people believe that sweating or special products will remove "toxins" from the skin, though such claims are usually vague about what those "toxins" are supposed to be. • Students often learn that "kidneys filter the blood." Filtration occurs at the glomerulus where the primary filtrate (plasma) moves into the nephron, but osmosis and active transport are used to "clean" the blood of nitrogenous wastes and other waste material, and to recover salts and nutrients.		**Evaluate** • Ch. 14 The Urinary System-Concept Check; pgs. 498, 503, 504, 506, 512, 514, 521 • Ch. 14 The Urinary System-Study Guide; pgs. 525-527 **Textbook:** *Applied Anatomy & Physiology 2nd Ed.: A Case Study Approach; Brian R, Shmaefsky* Ch. 14 The Urinary System; pgs. 496-529

Human Anatomy & Physiology
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3 Weeks	6 Weeks	6 Weeks	3 Weeks	6 Weeks	3 Weeks	5 Weeks	4 Weeks

UNIT 8: Reproduction, Growth, and Development [4 Weeks]

The Overarching Question(s)

- How do the organs and structures of the reproductive system function to produce successive generations of offspring?

- How does the reproductive system contribute to the homeostatic relationship with other body systems?

Unit, Lesson	Lesson Length	Essential Question(s)	Vocabulary
Unit 8 **Reproduction, Growth, and Development**	4 Weeks	• What are the functions of the testicles and ovaries? • What is the function of the epididymis? • How does the sperm and ova travel through the vas deferens and fallopian tubes? • What is the purpose of the cowper's gland, seminal vesicle and the prostate gland? • How does the urethra function in the male and female? • How does fertilization occur? • How is a vasectomy and a tubal ligation similar? • What types of preventative medicine can we practice preventing diseases of the reproductive system?	Puberty, secondary sex characteristics, sexual dimorphism, external genitalia, mammary gland, reproductive tract, androgen, cervix, endometrium, erectile tissue, fallopian tubes, hymen, labia majora, labia minora, menstrual cycle, ovum, ovarian follicle, ovulation, uterus, vagina, vulva, womb, areola, lactation, nipple, scrotum, seminiferous tubules, undescended testis, cowper's glands, prostate gland, semen, seminal vesicles, vas deferens, circumcision, erection, foreskin, penis, ovarian cycle, postovulation (luteal) phase, preovulation (follicular) phase, uterine cycle, ejaculation, erectile dysfunction, fertilization, orgasm, sexual intercourse, amniotic fluid, amniotic sac, blastocyst, blastula, colostrum, conception, conjoined twins, fetus, fraternal twins, human chorionic gonadotropin (hCG), identical twins, implantation, labor, placenta, pregnancy, breast cancer, cervical cancer, cesarean section, ectopic pregnancy, fibroids, genital warts, hypospadias, Pelvic inflammatory disease (PID), placenta previa, prostate cancer, sexually transmitted diseases (STDs), testicular cancer, andropause, impotence, menopause, prolapse (organ),

Standards and Background Information	Instructional Focus	Curriculum Materials
DCI(s) LS1. From Molecules to Organisms: Structures and Processes	**Learning Outcomes** • Illustrate the parts of the reproductive systems.	**Curricular Resources** **Engage** **Videos:**

HAP.ETS2: Links Among Engineering, Technology, Science, and Society

Standard(s)

HAP.LS1.39 Identify and describe the organs of the human male and female reproductive systems that provide the physiological functions of gametogenesis, fertilization, and embryogenesis.

HAP.LS1.40 Examine the microscopic structures of the human egg and sperm and explain how their structures relate to their functions.

HAP.LS1.41 Based on the secretion of hormones, identify the endocrine tissues of the reproductive system and describe their roles in regulation of secondary sex characteristics, the female menstrual cycle, pregnancy, fetal development, and parturition. **with focus on the bolded portion of this standard.*

HAP.LS1.41 Based on the secretion of hormones, identify the endocrine tissues of the reproductive system and describe their roles in regulation of secondary sex characteristics, the female menstrual cycle, **pregnancy, fetal development, and parturition**. **with focus on the bolded portion of this standard.*

in conjunction with

HAP.LS1.42 Trace the major events of human development with fertilization to birth, with a focus on the development of organs and functional organ systems.

Explanation

- Summarize the functions of the male and female reproductive systems.
- Demonstrate the differences between the male and female reproductive systems.
- Differentiate the primary and secondary sexual characteristics of both the male and female.
- Describe preventative health checks that will allow for detection of reproductive illnesses.

Phenomenon

Controlling Breast Cancer with Pregnancy

Although pregnancy can place stress on the human body, recent studies show that it also has some physiological benefits. A protein called alpha-fetoprotein (AFP) that is produced during pregnancy may inhibit the development of breast cancer. This finding came about after researchers discovered that the incidence of breast cancer is less in women who have had at least one full-term pregnancy. Women normally have a 13% chance of developing breast cancer; however, the chance is reduced to 7% in women who have biological children. Scientists surmised that AFP may play a role in reducing the incidence of breast cancer. A team of researchers developed an artificial form of AFP called AFPep. (The term AFPep is used to distinguish the artificial form of the protein from the naturally occurring AFP.) Using mice in their studies, they compared AFPep with a drug therapy called tamoxifen, which is currently used to treat breast cancer. The results showed AFPep to be equally effective at reducing the incidence of breast cancer as tamoxifen. In addition, the cancer cells did not lose sensitivity to AFPep; cancer cells ultimately become resistant to tamoxifen after prolonged treatments. Another benefit of

1. The Reproductive System |Khan Academy|
2. Crash Course: Reproductive System-Female, Part 1
3. Crash Course: Reproductive System-Male, Part 2
4. Crash Course: Reproductive System-Sex & Fertilization, Part 3
5. Crash Course: Pregnancy & Development, Part 4

Explore

Investigation:

- Case Study Investigation #15, pgs. 530, 533, 541, 544, 554, 560
- A Case Study: Mandatory Methods for Controlling Sexually Transmitted Diseases, pgs. 567-569

EMC AA&P Workbook & Laboratory Manual:

Ch. 15 The Reproductive System and Human Development, pgs. 287-305

- Laboratory Activity 1: Predicting Birth Defects; pgs. 299-301
- Laboratory Activity 2: Modeling the Test for Human Chorionic Gonadotropin; pgs. 301-302

Explain

Elaborate

Short Readings

- Gestation Facts, pg. 537
- The Return of Wet Nurses? pg. 540
- Child Mother, pg. 546
- Hostile Cervical Mucus, pg. 548

The reproductive system is the last system studied in high school human anatomy and physiology. It is a collection of internal and external organs, in both males and females, that work together for the purpose of procreating. Due to its vital role in the survival of the species, many scientists argue that the reproductive system is among the most important system in the entire body. Around 49.5 percent of the world's population is female, so there are slightly more men on the planet than women. A person's sex is determined by what reproductive system the person has, but it isn't always so simple. **Misconceptions** • **Fertilization occurs in the fallopian tube (oviduct) of the female reproductive system.** Once fertilized, the egg attaches to the lining of the uterus. It becomes a ball of cells over time, then develops in the uterus of the female to become a baby. • **Only females are born with reproductive sex cells.** Females are born with immature eggs already in their ovaries. When puberty occurs, the eggs mature and are released by the ovaries. Males only produce sperm after reaching puberty. • **Females do not urinate through the vagina.** In men, both semen and urine pass through the urethra, a passageway that terminates at the end of the penis. Females urinate through a urethra as well, but it is not connected to their vaginal opening.	AFPep is that it is not nearly as toxic as other chemotherapy treatments. Research indicates that during pregnancy, AFP plays a role in estrogen regulation. Most breast cancers are initiated by high levels of estrogen. Resource: *Applied Anatomy & Physiology 2nd Ed.: A Case Study Approach; Brian R, Shmaefsky*, pg. 557	**Related Research** • Controlling Breast Cancer with Pregnancy, pg. 557 **Evaluate** • Ch. 15 The Reproductive System and Human Development-Concept Check, pgs. 533,534, 541, 544, 554, 558, 560 • Ch. 15 The Reproductive System and Human Development-Study Guide pgs. 565-566 **Additional Resources:** 6. Encyclopedia Britannica: Human Reproductive System 7. National Cancer Institute: SEER Training Modules: Introduction to the Reproductive System 8. Encyclopedia Britannica: Human Development 9. Development of the Male and Female Reproductive Systems Modules |Lumen Learning| **Textbook:** *Applied Anatomy & Physiology 2nd Ed.: A Case Study Approach; Brian R, Shmaefsky* Ch. 15 The Reproductive System and Human Development; pgs. 530-569

Curriculum and Instruction- Science			
RESOURCE TOOLKIT			
Human Anatomy and Physiology Quarter 4			
Textbook Resources *Applied Anatomy & Physiology 2nd Ed.: A Case Study Approach; Brian R, Shmaefsky* Ch. 13 The Digestive System; pgs. 460-495 Ch. 14 The Urinary System; pgs. 496-529 Ch. 15 The Reproductive System and Human Development; pgs. 530-569	**DCIs and Standards** **DCI** LS1. From Molecules to Organisms: Structures and Processes HAP.ETS2: Links Among Engineering, Technology, Science, and Society **Standard** HAP.LS1.24 HAP.LS1.23 HAP.LS1.25 HAP.LS1.26 HAP.LS1.27 HAP.LS1.39 HAP.LS1.40 HAP.LS1.41 HAP.LS1.42	**Websites/Videos** EMC Bookshelf Glossary CSI Worksheets Crossword Puzzles Human Anatomy Online Biology Corner Explore Health Careers Visible Body	**Additional Resources** **ACT & SAT** TN ACT Information & Resources SAT Connections SAT Practice from Khan Academy Khan Academy Illuminations (NCTM) Discovery Education The Futures Channel The Teaching Channel Teachertube.com