Science GE DOK Alignment Chart **HUMAN BODY** **Grades 9-12** **GE 40**

DOK & NECAP Release Item Codes	GE Statement with Ceiling DOK	Science Concepts	Examples/Practice Items
Enduring Knowledge: The human body is unique in its heredity, body systems and development, and can be affected by the environment.			
DOK 3 **LS1(5-8) INQ + SAE-1** **LS2(5-8) SAE -6** **DOK 2** **LS2(5-8) SAE -7** **DOK 3** **LS1(5-8) SAE + FAF-2** **DOK 2**	**S9-12:40** **(DOK 3)** **Students demonstrate their understanding of Human Heredity by…** • Modeling and explaining how the structure of DNA is maintained and relates to genes and chromosomes, which code for specific protein molecules within a cell. **AND** • Modeling or diagramming new gene combinations that result from sexual reproduction (e.g., dominant/recessive traits). **AND** • Explaining how alteration of a DNA sequence may affect physical/chemical characteristics of the human body (e.g., sickle-cell anemia, cancer genetic engineering). **AND** • Comparing and contrasting the chromosome content of **somatic cells** and that of sex cells (**gametes**).	Science Concept: (Human Heredity) a. Instructions for specified characteristics of an organism are carried in DNA. (NSES) The information passed from parents to offspring is coded in DNA molecules. DNA molecules are long chains linking just four kinds of smaller molecules, whose sequence encodes genetic information. b. The human body is formed from cells that contain homologous parts two copies of each chromosome. c. New heritable characteristics can result from new combinations of existing genes or from mutations of genes in reproductive cells. d. All body cells have identical genetic information, but its expression may be very different from one cell to another due to the instructions given to different types of cells. – The sorting and recombination of genes in sexual reproduction results in a great variety of possible gene combinations (Include value of meiosis, but not phases). – Some new gene combinations make little difference, some can produce organisms with new and perhaps enhanced capabilities and some can be deleterious. – Gene **mutations** can be caused by radiation and chemicals (legal and illegal) and are passed on to offspring when they occur in sex cells. – Inserting, deleting or substituting DNA segments can alter genes. – Changes in DNA (**mutations**) occur spontaneously at low rates, but can affect the organism in many ways or may go unnoticed. e. Gene mutations in a cell can result in uncontrolled division called cancer. Exposure of cells to certain chemicals and radiation increases mutations and thus chances of cancer.	

Science GE DOK Alignment Chart **HUMAN BODY** **Grades 9-12** **GE 41**

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Enduring Knowledge: The human body is unique in its heredity, body systems and development and can be affected by the environment.			
DOK 3 **LS4(9-11)SAE + FAF-10** **DOK 3** **LS2(9-11)NOS-5** **DOK 3** **LS4(9-11)INQ + NOS-9**	**S9-12:41** **(DOK 3)** **Students demonstrate their understanding of Human Body Systems by…** • Diagramming a feedback loop that illustrates how several human body systems work together to restore **homeostasis** in response to an external stimulus (environmental/behavioral) (e.g., exercise, immune response, fight/flight, stress, drugs, normal cellular metabolism, any nervous system response). **AND** • Explaining examples of how the human body may be affected by the state of the internal or external environment and by heredity and by life experience (e.g., effects of malnutrition). **AND** • Using evidence to predict and explain how the effect of various environmental or hereditary factors influence the continuation of the human species (reproductive success) (e.g., anorexia and/or steroid use, radiation/toxic wastes/drug use, mutagenic agents and/or improper diet/obesity).	Science Concepts: a. All systems of the body are continually working together (communicating) to maintain balance (**homeostasis**) by responding to internal and external stimuli, e.g., cell-cell (B and T lymphocyte interaction, neurotransmitter secretion by nerve cells); organ-organ (hormones trigger target cells; motor impulses trigger muscles); system (respiratory/circulatory/excretory system interactions, endocrine/digestive/motor and biochemical responses to stress); external stimuli-organism (hypo/hyperthermia, chemical stimuli affect organs/systems/whole organism; sense reception, nerve response) b. Human behavior is determined by the state of our internal biochemical environment, our heredity and our life experiences (e.g., innate/learned behaviors). c. Reproduction is necessary for survival of a species. (e.g., *in vitro* fertilization, fetal alcohol syndrome, hormone imbalances, stress).	

Science GE DOK Alignment Chart **HUMAN BODY** **Grade s 9-12** **GE 42**

DOK & NECAP Release Item Codes	GE Statement with Ceiling DOK	Science Concepts	Examples/Practice Items
Enduring Knowledge: The human body is unique in its heredity, body systems and development and can be affected by the environment.			
DOK 2 DOK 3 LS4(9-11)SAE + FAF-10 DOK 2 DOK 2	**S9-12:42** **(DOK 3)** **Students demonstrate their understanding of the Patterns of Human Health/Disease by…** • Identifying a variety of nonspecific means of protection for the human body and explaining how these maintain human health (i.e., prevent disease). **AND** • Explain how the general process of the human **immune system** responds to foreign substances and organisms (e.g., phagocyte action and antibody production and maintenance). **AND** • Showing through models/diagrams/graphic organizers how specific biological abnormalities alter the normal functioning of human systems (e.g., feedback diagram). **AND** **(EXTENSION)** o Explaining the effect of unique viral diseases on the cells of the human **immune system** (e.g., retroviruses).	Science Concepts: a. The Human Body protects itself against infectious diseases (caused by microorganisms, viruses, animal parasites through physical protection and physiological (**immune**) responses. b. The Immune System is designed to protect against microscopic organisms (bacteria, fungi) and foreign substances that enter from outside the body and against some cancer cells that arise within. c. Some allergic responses are caused by the body's immune responses to usually harmless environmental substances. d. Humans have a variety of mechanisms—sensory, motor, emotional, social and technological—that can reduce and modify health hazards (e.g. blinking, fight or flight, coping mechanisms, medicine). e. The severity of human disease depends upon many factors, such as resistance to disease the virulence of the infecting organism. f. Biological abnormalities, such as injuries or chemical imbalance, cause or increase susceptibility to disease (e.g. hormonal imbalance, epilepsy, depression). (Atlas 91) g. (EXTENSION) Some viral diseases, such as AIDS, destroy critical cells of the immune system.	

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Enduring Knowledge: The human body is unique in its heredity, body systems and development and can be affected by the environment.			
DOK 2 DOK 2 DOK 1 DOK 3	**S9-12:43** **(DOK 3)** **Students demonstrate their understanding of the Patterns of Human Development by…** • Tracing the development of the human embryo from fertilization to gastrula stage, comparing its progress to that of other vertebrate organisms (e.g., amphibians and reptiles and birds and mammals). **AND** • Comparing the gestation of humans and the period of dependency after birth to that of other vertebrates. **AND** • Identifying the important events that occur in each stage (trimester) of human development (e.g., First trimester—embryonic organ systems established, Second trimester—fetal development/organ maturation, Third trimester—overall growth). **AND** • Justifying a position on the use of technology to influence human embryonic or fetal life.	Science Concepts: a. Human development begins with a single cell formed by fusion of egg cell and sperm cell and continues through nine months of further development and growth, similar to the development of other animals with backbones; and differences in an embryo's environment can influence the path of development. b. During human gestation and development a balance is necessary between brain size and birth size, therefore humans need more time after birth for full development of the brain and nervous system than other vertebrates. c. The long period of human development is associated with the prominent role of the brain. d. The use of technologies to maintain, prolong sustain or terminate life raise social, moral, ethical and legal issues.	