

NM Public Education Department

SCIENCE: ANATOMY AND PHYSIOLOGY

END-OF-COURSE EXAM | GRADE 9-12 | YEAR 18-19

ASSESSMENT BLUEPRINT

Purpose Statement

Anatomy and Physiology

The Anatomy and Physiology End-of-Course (EOC) exam is intended to measure student proficiency of the New Mexico Science Standards. This course-level exam is provided to all students who have completed Anatomy and Physiology or related courses. This exam can be given for the following STARS course codes:

1550 - Medical Anatomy & Physiology

1713 - Anatomy and Physiology

Intended as a final exam for the course, this is a summative exam covering a range of content, skills, and applications. Scores are reported to the teacher, school, district, and state levels for the purposes of student grades, curriculum review, student graduation requirements, and NMTeach summative reports.

“The EOCs are exams written by New Mexico Teachers for New Mexico Students.”

During the 2016-17 school year, teachers were brought together in person or online as part of the blueprint and exam revision process. The NMPED extends our gratitude to all those who contributed to this improvement process. Although we were unable to implement every suggestion due to conflicting viewpoints at times, this blueprint reflects the best collaborative effort among dedicated peers.

The NMPED would like to especially recognize the following person(s) who led the revision for this blueprint:

- *Debbie Dean, Ph.D., Hobbs Municipal Schools, NBCT, Blueprint Lead*
- *Dinah McAlister, Portales Municipal Schools*

Explanation of Blueprint Layout & Test Specifications Table

Standard	Standards with Test Item Specifications:
<p><i>The standards identified in this portion of the blueprint are aligned to the 2005 Anatomy & Physiology Curricular Framework:</i></p> <p><u>http://www.arkansased.gov/public/userfiles/Learning_Services/Curriculum%20and%20Instruction/Frameworks/Science/anatomy_9_12_06.pdf</u></p> <p><i>New Mexico Teachers identified the standards to be measured on the EOC exam using the following criteria: 1) a great deal of instructional time is spent on the standard as identified in the curriculum and/or; 2) the standard is important to subsequent learning.</i></p> <p><i>It is important to note that the standards in the blueprint are only a subset of standards to be measured with the understanding that teachers cover more standards during the course of instruction than what has been selected to be measured.</i></p>	<p>Standards with Test Item Specifications:</p> <ul style="list-style-type: none"> ● <i>This portion of the blueprint identifies the specific skills and knowledge students will have to demonstrate during the exam.</i> ● <i>Although the standard may be broader, the item specifications may place constraint on portions of the standards in order to provide more transparency as to what specifically will be measured relative to the standard.</i> ● <i>Item specifications provide guidelines for the item writer so they know what topics to specifically focus on when authoring items.</i> ● <i>Topics and terms in bold will be emphasized on the exam.</i> <p>Item Types: <i>The item types for this EOC exam are limited to: MC = multiple choice with or without stimulus (e.g., picture, graph, table)</i></p> <p>Sample Question(s):</p> <p><i>Sample questions have been provided to assist teachers to correlate the questions with the performance standards and the test item specification, when applicable.</i></p> <ul style="list-style-type: none"> ● <i>An * denotes the correct answer</i> ● <i>DOK = Depth of Knowledge</i> ● <i>Some sample questions may be items released items from prior EOC exams</i>

Blueprint Table - Anatomy and Physiology

Standard/Learning Outcome	Standards with Test Item Specifications:
<p>OHB.1.AP.3 OHB.1.AP.4 OHB.1.AP.6 OHB.1.AP.7</p> <p>STRAND: Organization of the Human Body</p> <p>STANDARD 1: Students shall explore the organizational structures of the body from the molecular to the organism level.</p>	<p>3. Identify the major body systems. 4. Describe relative body position and structures, including regions, planes and cavities. 6. Investigate <i>homeostatic</i> control mechanisms and their importance to health and diseases. 7. Predict the effect of positive and negative feedback mechanisms on homeostasis.</p> <p>Specifications:</p> <ul style="list-style-type: none"> • Explain the anatomical position and the terms that describe relative positions, body planes, and body regions • Describe the body cavities, their membranes, and the organs within each cavity • Relate mechanisms to each body system’s health and cause of disease • Differentiate between positive and negative feedback mechanisms
	<p>Item Type: <i>MC = multiple choice with or without stimulus</i></p>
	<p>Sample Question:</p> <p>Which system’s organs include the nose, pharynx, larynx, bronchi, bronchioles, and lungs?</p> <p>A. nervous B. cardiovascular C. respiratory * D. skeletal</p>

	<p><i>Standard: OHB.1.AP.3</i> <i>DOK Level: 1</i></p>
<p>T.4.AP.1</p> <p>STRAND: Tissues</p> <p>STANDARD 4: Students shall understand the <i>histology</i> of the human body.</p>	<p>Standards with Test Item Specifications:</p> <p>1. Describe the structure, location, and function of each <i>tissue</i> category:</p> <ul style="list-style-type: none"> ● epithelial ● connective ● nervous ● muscle <p>Specifications:</p> <ul style="list-style-type: none"> ● None
	<p>Item Type: <i>MC = multiple choice with or without stimulus</i></p>
	<p>Sample Question:</p> <p>How can the shape of a squamous cell best be described?</p> <p>A. spherical B. cube C. columnar D. flat *</p> <p><i>Standard: T.4.AP.1</i> <i>DOK Level: 1</i> <i>This item was released from the NMPED 2016-17 operational form.</i></p>
<p>BS.6.AP.1 BS.6.AP.2 BS.6.AP.3</p>	<p>Standards with Test Item Specifications:</p> <p>1. Identify the components of the <i>skeletal system</i> (Structure and Function).</p>

<p>STRAND: Body Systems</p> <p>STANDARD 6: Students shall describe the <i>anatomy and physiology</i> of the <i>skeletal system</i>.</p>	<p>2. Discuss the physiological mechanisms of the <i>skeletal system</i> (ossification, remodeling and repair).</p> <p>3. Identify the macroscopic and microscopic structure of bone.</p> <p>Specifications:</p> <ul style="list-style-type: none"> • Distinguish between the bones of the axial skeleton and appendicular skeleton, including function • Distinguish bones according to shape and describe the major functions of bone. (e.g., flat, irregular, short and long) • Describe the structure of a typical long bone and indicate how each part functions in the physiology and growth of the bone. (e.g., epiphyseal plate, spongy bone and compact bone) • Identify the role of articular cartilage in relation to joint articulation • Understand the processes of ossification, remodeling and repair (intramembraneous and intrachondular ossification) • Describe the types of cells found in bone and their function in bone growth and control of bone mass (e.g., osteocytes, osteoclasts, osteoblasts) • Compare and contrast the microscopic organization of compact (cortical) bone and spongy (trabecular) bone
	<p>Item Type: <i>MC = multiple choice with or without stimulus</i></p>
	<p>Sample Question:</p> <p>Which of the following statements is true about a bone which is dense and compact?</p> <p>A. It is a cortical bone.* B. It forms the inner layer of bones. C. It is a trabecular bone. D. It is the portion of the bone which grows the quickest.</p>

	<p><i>Standard: BS.6.AP.3</i> <i>DOK Level: 1</i></p>
<p>BS.7.AP.1 BS.7.AP.2 BS.7.AP.3</p> <p>STRAND: Body Systems</p> <p>STANDARD 7: Students shall describe the <i>anatomy</i> and <i>physiology</i> of the <i>muscular system</i>.</p>	<p>Standards with Test Item Specifications:</p> <ol style="list-style-type: none"> 1. Identify the components of the <i>muscular system</i> (Structure and Function). 2. Discuss the physiological mechanisms of the <i>muscular system</i> (muscle contraction). 3. Identify the macroscopic, microscopic, and molecular structure of muscle. <p>Specifications:</p> <ul style="list-style-type: none"> • Identify the components of the muscular system, including major muscular groups and movement terms • Name the components of a skeletal muscle fiber and describe their functions • Describe how the thin and thick filaments are organized in the sarcomere • Explain the molecular processes and biochemical mechanisms that provide energy for muscle contraction and relaxation • Identify the steps involved in muscle contraction • Describe the neuromuscular junction and the neurotransmitter released at the neuromuscular junction • Know that the specialized structure, the mitochondria, inside cells plays a role in energy production • Compare and contrast the microscopic structure, organization, function, and molecular basis of contraction in skeletal, smooth, and cardiac muscle <p>Item Type: <i>MC = multiple choice with or without stimulus</i></p> <p>Sample Question:</p>

	<p>Upon stimulation of skeletal muscles, calcium is immediately made available for binding to troponin from which of the following?</p> <p>A. blood B. Sarcoplasmic reticulum * C. lump D. bone</p> <p><i>Standard: BS.7.AP.2</i> <i>DOK Level: 2</i></p>
<p>BS.8.AP.1 BS.8.AP.2 BS.8.AP.3</p> <p>STRAND: Body Systems</p> <p>STANDARD 8 Students shall describe the <i>anatomy and physiology</i> of the <i>nervous system</i>.</p>	<p>Standards with Test Item Specifications:</p> <ol style="list-style-type: none"> 1. Identify the components of the <i>nervous system</i> (Structure and Function). 2. Discuss the physiological mechanisms of the <i>nervous system</i> (how synapses function and the role of the neurotransmitter). 3. Identify the macroscopic, microscopic, and molecular structure of the <i>nervous system</i> (the divisions of the nervous system and their function, including parts and functions of the Central Nervous System—CNS). <p>Specifications:</p> <ul style="list-style-type: none"> • Recognize that the nervous system is divided into the peripheral nervous system and the central nervous system • Explain the role of excitatory and inhibitory neurotransmitters in a synapse • Identify neuron structure • Discuss the three basic types of activity in the nervous system: 1) sensory; 2) integration, interpretation, information storage, decision-making; 3) motor function • Describe the different types of neuroglial cells • Describe the function of oligodendrocytes and Schwann cells • Describe the structure and function of the myelin sheath

	<ul style="list-style-type: none"> Identify the divisions of the nervous system and their function, including the Central Nervous System (CNS) and Peripheral Nervous System Describe neurotransmitter function <p>Item Type: <i>MC = multiple choice with or without stimulus</i></p> <p>Sample Question:</p> <p>In the peripheral nervous system, where does a sensory neuron take impulses from the sensory receptors to?</p> <p>A. to motor neurons B. to interneurons C. to the autonomic nervous system D. to the central nervous system *</p> <p><i>Standard: BS.8.AP.3</i> <i>DOK Level: 2</i></p>
<p>BS.10.AP.1 BS.10.AP.2 BS.10.AP.3</p> <p>STRAND: Body Systems</p> <p>STANDARD 10: Students shall describe the <i>anatomy</i> and <i>physiology</i> of the <i>cardiovascular system</i>.</p>	<p>Standards with Test Item Specifications:</p> <ol style="list-style-type: none"> Identify the components of the <i>cardiovascular system</i> (structures and functions of the heart and circulation). Discuss the physiological mechanisms of the <i>cardiovascular system</i> (major components of blood and blood-typing). Identify the macroscopic, microscopic, and molecular structure of the <i>cardiovascular system</i> (blood clotting). <p>Specifications:</p> <ul style="list-style-type: none"> Describe the heart: include the pericardium, the layers in its wall, the four chambers, the valves, and the great vessels entering and leaving the heart

	<ul style="list-style-type: none"> • Describe the basic arrangement of the cardiovascular system and the blood flow through it (include the pulmonary and systemic circuits) • Describe the functions of the blood and distinguish whole blood from plasma and serum • Explain the ABO blood types • Explain physiology of heartbeats • Describe the basic processes in blood clotting • Classify and explain the functions of the formed elements found in blood and describe where they are produced
	<p>Item Type: <i>MC = multiple choice with or without stimulus</i></p>
	<p>Sample Question:</p> <p>Through which valve does blood leave the left ventricle?</p> <p>A. tricuspid B. bicuspid C. pulmonary semilunar valve D. aortic semilunar valve *</p> <p><i>Standard: BS.10.AP.3 DOK Level: 1 This item was released from the NMPED 2016-17 operational form.</i></p>
<p>BS.5.AP.1 BS.5.AP.2 BS.5.AP.3</p> <p>STRAND: Body Systems</p> <p>STANDARD 5: Students shall describe the</p>	<p>Standards with Test Item Specifications:</p> <ol style="list-style-type: none"> 1. Identify the components of the <i>integumentary system</i> (Structure and Function). 2. Discuss the physiological mechanisms of the skin (layers and appendages of skin). 3. Identify the macroscopic and microscopic structure of the integumentary system.

anatomy and physiology of the integumentary system.

Specifications:

- Describe the structure of the skin, including the hypodermis (subcutaneous), dermis, and the layers of the epidermis
- Identify the accessory structures of the skin; hair, nails and glands
- Regulation including: Vitamin D synthesis, thermoregulation, energy storage, etc.
- Sensory receptors
- Protection including: UV damage, immunity, chemical damage, etc.
- Identify microscopic characteristics of epithelial cells and tissue: simple squamous, cuboidal, pseudo-stratified
- Identify different structures of hair and nails
- Identify microscopic characteristics of connective tissue: Adipose, Areolar, Reticular
- Identify cell shapes: squamous, cuboidal, columnar
- Identify types of glands
- Explain steps in tissue repair
- Explain pigmentation and its role in the integumentary system

Item Type:

MC = multiple choice with or without stimulus

Sample Question:

What integumentary system appendage secretes oil?

- A. sweat gland
- B. sebaceous gland *
- C. hair follicle
- D. hair bulb

Standard: BS.5.AP.1

DOK Level: 1

	<p><i>This item was released from the NMPED 2016-17 operational form.</i></p>
<p>BS.12.AP.1 BS.12.AP.2 BS.12.AP.3</p> <p>STRAND: Body Systems</p> <p>STANDARD 12: Students shall describe the <i>anatomy and physiology</i> of the <i>respiratory system</i></p>	<p>Standards with Test Item Specifications:</p> <ol style="list-style-type: none"> 1. Identify the components of the <i>respiratory system</i> (structure and function of respiratory passages and organs). 2. Discuss the physiological mechanisms of the <i>respiratory system</i> (the mechanics of breathing and pulmonary ventilation). 3. Identify the macroscopic, microscopic, and molecular structure of the <i>respiratory system</i> (mechanical and chemical digestive processes). <p>Specifications:</p> <ul style="list-style-type: none"> • Identify the structure and function of the trachea, lungs, bronchioles, alveoli • Identify the mechanisms of breathing and pulmonary ventilation • Identify the pathway of respiratory gases • Compare and contrast inspiration and expiration O₂ and CO₂ exchange • Identify nasal passages, pharynx, larynx, trachea, bronchioles, alveoli • Identify the various lobes of the lung • Identify various accessory structures such as: diaphragm, intercostals, pleura <p>Item Type: <i>MC = multiple choice with or without stimulus</i></p> <p>Sample Question:</p> <p>In the lungs, when intrapulmonary pressure is greater than atmospheric pressure, what happens to the movement of air?</p> <p>A. aspiration B. constriction C. inhalation</p>

	<p>D. exhalation *</p> <p><i>Standard: BS.12.AP.2</i></p> <p><i>DOK Level: 2</i></p> <p><i>This item was released from the NMPED 2016-17 operational form.</i></p>
<p>BS.13.AP.1 BS.13.AP.2 BS.13.AP.3</p> <p>STRAND: Body Systems</p> <p>STANDARD 13: Students shall describe the <i>anatomy</i> and <i>physiology</i> of the <i>digestive system</i>.</p>	<p>Standards with Test Item Specifications:</p> <ol style="list-style-type: none"> 1. Identify the components of the <i>digestive system</i> (location and description of specific structures and digestive processes). 2. Discuss the physiological mechanisms of the <i>digestive system</i>. 3. Identify the macroscopic, microscopic, and molecular structure of the digestive system. <p>Specifications:</p> <ul style="list-style-type: none"> • Describe and identify the organs and organ relationships of the gastrointestinal tract, including accessory structures such as salivary glands, liver and pancreas • Describe the functions of the structural components and enzymes of the gastrointestinal tract and accessory organs in relation to the processing, digesting, and absorbing of the four major classes of macromolecules • Identify the microscopic tissue located in the digestive system and their function in absorption <p>Item Type: <i>MC = multiple choice with or without stimulus</i></p> <p>Sample Question:</p> <p>Why are Goblet cells important to the digestive system?</p> <ol style="list-style-type: none"> A. They kill most of the bacteria in food. B. They denaturize complex proteins. C. They produce mucus to protect the stomach.*

	<p>D. They create motion that churns food.</p> <p><i>Standard: BS.13.AP.3</i></p> <p><i>DOK Level: 1</i></p>
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Anatomy and Physiology EoC Reporting Category Alignment Framework					
Reporting Category	Standard	(Count by DOK)			Grand Total
		1	2	3	
Organization of the Human Body	OHB.1.AP.3	1			1
	OHB.1.AP.4	6			6
	OHB.1.AP.6		1		1
	OHB.1.AP.7		1		1
Histology	T.4.AP.1	2	2		4
Integumentary	BS.5.AP.1	2			2
	BS.5.AP.2		3		3
	BS.5.AP.3	1	1		2
Skeletal	BS.6.AP.1	1	2		3
	BS.6.AP.2		2		2
	BS.6.AP.3		1		1
Muscular	BS.7.AP.1		1		1
	BS.7.AP.2	2			2
	BS.7.AP.3	1	1		2
Nervous	BS.8.AP.1	2			2
	BS.8.AP.2		1		1
	BS.8.AP.3		1		1
Cardiovascular	BS.10.AP.1	2	2		4
	BS.10.AP.2		1		1
	BS.10.AP.3		1		1
Respiratory	BS.12.AP.1	1	1		2
	BS.12.AP.2	1			1
	BS.12.AP.3		1		1
Digestive	BS.13.AP.1		1		1
	BS.13.AP.2		1		1
	BS.13.AP.3		1		1
	Grand Total	22	26	0	48