Medical Assisting: Anatomy and Physiology

Exam Information

Exam number
714

Items
80

Points
75

Prerequisites
None

Recommended course length
One semester

National Career Cluster
Health Science

Performance standards
No

Certificate available
Yes

Description

The Medical Assistant: Anatomy and Physiology industry certification exam assesses learners' understanding of support for physicians by providing assistance during patient examinations, administering and monitoring treatments, keeping patient and related health record information, and performing clinical, administrative, and laboratory duties.

Exam Blueprint

Standard	Percentage of exam
1. Body cavities & quadrants	3%
2. Structures & functions of cells & tissues	4%
3. Integumentary system	9%
4. Skeletal system	14%
5. Muscular system	5%
6. Cardiovascular system	13%
7. Lymphatic/immune system	5%
8. Respiratory system	10%
9. Digestive system	8%
10. Nervous system	10%
11. Endocrine system	10%
12. Urinary system	4%
13. Reproductive system	8%

Standard 1

Students will identify the body cavities and quadrants and the organs they contain.

Objective 1 Locate the body cavities and their organs.

1. Cranial: Brain
2. Spinal/Vertebral: Spinal cord
3. Thoracic: Heart and lungs
4. Abdominal: Liver, most of the intestines, stomach, gallbladder, spleen, kidneys
5. Pelvic: Urinary bladder, internal reproductive organs

Objective 2 Identify the four major abdominal quadrants and the organs in each quadrant.

1. Right upper quadrant (RUQ): Liver, gallbladder, right kidney
2. Left upper quadrant (LUQ): Stomach, spleen, pancreas, left kidney
3. Right lower quadrant (RLQ): Appendix, right ovary
4. Left lower quadrant (LLQ): Left ovary

Standard 2

Students will identify the structures and functions of the cell and tissues.

Objective 1 Identify the six levels of body organization.

1. Describe the chemical level.
2. Describe the cellular level.
3. Describe the tissues.
4. Describe the organs.
5. Describe the organ systems.
6. Describe the organism.

Objective 2 Identify the principal parts of a generalized animal cell and their functions.

1. Nucleus
2. Cytoplasm
3. Organelles
    a. Ribosome
    b. Endoplasmic Reticulum (smooth, rough)
    c. Golgi Complex
    d. Lysosome
    e. Mitochondria
4. Cell membrane

Objective 3 Differentiate between cellular transport mechanisms.

1. Describe diffusion.
2. Describe osmosis.
3. Describe filtration.

Objective 4 Distinguish between the four basic tissue types.

1. Contrast the functions of the four tissue types.
    a. Epithelial-covering and lining
    b. Connective-support and structure
    c. Muscular-movement
    d. Nervous-interpretation and nerve impulse conduction
2. Identify the locations of the four tissue types.
    a. Epithelial-skin and mucous membranes
    b. Connective-bones, blood, adipose, cartilage
    c. Muscular-muscles
    d. Nervous-nerves, brain, spinal cord

Standard 3

Students will describe the anatomy and physiology of the Integumentary System.

Objective 1 Identify the layers of the skin.

1. Epidermis
2. Dermis
3. Subcutaneous

Objective 2 Identify the structures of the dermis.

1. Nails
2. Sweat (sudoriferous) glands
3. Oil (sebaceous) glands
4. Hair

Objective 3 Describe the functions of the integumentary system.

1. Protection against water loss
2. Protection against infection
3. Vitamin D production
4. Sensory organ
5. Absorption of medications
6. Excretion of water, salts, and waste
7. Temperature regulation
8. Protection against UV light

Objective 4 Identify the disorders of the integumentary system.

1. Burns
    a. 1st degree - superficial
    b. 2nd degree - partial thickness
    c. 3rd degree - full thickness
2. Athlete's foot
3. Hives/urticaria
4. Herpes
5. Melanoma
6. Decubitus ulcers

7. Warts/verrucae vulgaris
8. Pediculosis/lice
9. Dermatitis
10. Eczema
11. Psoriasis
12. Ringworm
13. Lesion

Objective 5 Describe the signs and symptoms of infection and inflammation.

1. Recognize redness, swelling, heat, and pain.
2. Identify how the inflammation process is initiated.
3. Describe the effects of histamine in inflammation.

Standard 4

Students will describe the anatomy and physiology of the Skeletal System.

Objective 1 Identify the functions of the skeletal system.

1. Hematopoiesis (blood cell production)
2. Structure
3. Support
4. Muscle attachment and movement
5. Mineral storage

Objective 2 Identify the basic bones of the skeleton.

1. Cranium (frontal, parietal, occipital, temporal, maxillae, mandible)
2. Vertebrae (cervical, thoracic, lumbar, sacral, coccyx)
3. Rib cage (ribs, sternum, xiphoid process)
4. Arm (humerus, radius, ulna, carpals, metacarpals, phalanges)
5. Pelvis (ilium, ischium, pubis)
6. Leg (femur, tibia, fibula, tarsals, metatarsals, phalanges)

Objective 3 Distinguish between the following fractures:

1. Simple (closed)
2. Compound (open)
3. Greenstick
4. Impacted (compression)
5. Comminuted
6. Spiral

Objective 4 Identify the signs and symptoms of disorders of the skeletal system.

1. Arthritis (osteoarthritis, rheumatoid arthritis, gouty arthritis)

2. Osteoporosis
3. Scoliosis, Lordosis, Kyphosis
4. Herniated disc
5. Carpal tunnel syndrome
6. Bursitis
7. Sprains

Standard 5

Students will describe the anatomy and physiology of the Muscular System.

Objective 1 Identify the functions of the muscular system.

1. Heat production
2. Movement
3. Structure
4. Protection

Objective 2 Differentiate between the three types of muscle tissue.

1. Locate cardiac muscle and describe the characteristics (striated, involuntary, found in the heart.)
2. Locate smooth muscles and describe characteristics (non-striated, involuntary, found in hollow organs like the stomach.)
3. Locate skeletal muscles and describe the characteristics (striated, voluntary, found attached to bones.)

Objective 3 Contrast the differences between tendons and ligaments.

1. Tendons-connect muscles to bones
2. Ligaments-connect bone to bone

Objective 4 Identify the basic muscles of the human body.

1. Sternocleidomastoid
2. Latissimus dorsi
3. Biceps brachii
4. Triceps brachii
5. Deltoid
6. Gluteus (maximus, medius)
7. Rectus femoris
8. Vastus lateralis
9. Gastrocnemius
10. Diaphragm

Objective 5 Identify the signs and symptoms of disorders of the muscular system.

1. Strains

2. Atrophy
3. Tendonitis
4. Fibromyalgia
5. Muscular Dystrophy

Standard 6

Students will describe the anatomy and physiology of the Cardiovascular System.

Objective 1 Identify the components of the cardiovascular system.

1. Blood
2. Heart
3. Blood vessels
    a. Arteries
    b. Veins
    c. Capillaries

Objective 2 Identify the functions of the cardiovascular system.

1. Transportation of nutrients and wastes
2. Transportation of heat
3. Transportation of oxygen and carbon dioxide
4. Transportation of hormones, antibodies, and enzymes

Objective 3 Identify the structures of the heart.

1. Aorta
2. Coronary arteries
3. Septum
4. Myocardium
5. Inferior and superior vena cava
6. Right and left atria
7. Tricuspid valve, Bicuspid valve (mitral valve)
8. Right and left ventricles
9. Pulmonary semilunar valve, aortic semilunar valve
10. Pulmonary arteries, pulmonary veins

Objective 4 Locate the major arteries and veins of the cardiovascular system.

1. Identify appropriate arteries for taking an accurate blood pressure and pulse.
    a. Apical
    b. Carotid
    c. Radial
    d. Brachial
    e. Femoral
2. Identify appropriate veins for venipunctures.
    a. Median cubital

b. Basilic
c. Cephalic

Objective 5 Describe the layers of and functions of blood vessels.

1. Arteries
   a. Take blood away from the heart.
   b. Thicker to withstand the pressure from the heart.
2. Veins
   a. Take blood toward the heart.
   b. Modified with valves to prevent backflow of blood.
3. Capillaries
   a. Gas and nutrient exchange between the blood and body cells.
   b. Single layer of cells.

Objective 6 Identify the signs and symptoms of disorders of the cardiovascular system.

1. Myocardial infarction
2. Cerebrovascular accident (CVA-stroke)
3. Hypertension
4. Embolus/Thrombus
5. Arteriosclerosis, Atherosclerosis
6. Cardiac arrest
7. Phlebitis
8. Arrhythmia
9. Congestive heart failure
10. Aneurysm

Standard 7

Students will describe the anatomy and physiology of the Lymphatic/Immune System.

Objective 1 List the functions of the lymphatic system.

1. Transport excess tissue fluid to the blood vessels.
2. Immunity

Objective 2 Describe the functions of the major structures of the immune system.

1. Spleen
   a. Filters blood
2. Tonsils
   a. Lymphatic tissue in the pharynx.
   b. Helps to remove pathogens from food and air.
3. Lymph nodes
   a. Masses of lymphatic tissue.
   b. Filters pathogens from lymph.

Objective 3 Describe the human body's lines of defense against infection.

1. Discuss the physical and chemical barriers.
    a. Mucous membranes (trap pathogens)
    b. Cilia (propel pathogens out of respiratory tract)
    c. Coughing and sneezing
    d. Hydrochloric acid (stomach)
    e. Tears in the eyes (contain bactericidal chemicals)
2. Discuss non-specific immunity.
    a. Fever
    b. Inflammation (WBC's destroy pathogens)
3. Discuss specific immunity.
    a. Immune response
    b. Production of antibodies
4. Differentiate between active and passive immunity.
    a. Vaccination
    b. Delivery of antibodies
        i. Through mother
        ii. Through injection (gamma globulin)

Objective 4 Identify the signs and symptoms of disorders of the lymphatic/immune systems.

1. Influenza
2. Coronavirus Disease (COVID-19)
3. Human Immunodeficiency Virus (HIV)/Acquired Immunodeficiency Syndrome (AIDS)
4. Mononucleosis
5. Autoimmune disorders (Lupus)
6. Streptococcus Aureus
7. Methicillin Resistant Staphylococcus Aureus (MRSA)

Standard 8

Students will describe the anatomy and physiology of the Respiratory System.

Objective 1 Identify the structures of the respiratory system.

1. Nose and nasal cavity
2. Pharynx
3. Larynx
    a. Epiglottis
4. Trachea
5. Lungs
6. Bronchi
7. Bronchioles
8. Alveoli

Objective 2 Describe the functions of the respiratory system.

1. Warm, moisten, and filter air
2. Sound production
3. Carbon dioxide-oxygen gas exchange

Objective 3 Identify the signs and symptoms of disorders of the respiratory system.

1. Asthma
2. Tuberculosis (TB)
3. Upper respiratory infection (URI)
4. Pneumonia
5. Respiratory Syncytial Virus (RSV)
6. Chronic obstructive pulmonary disease (COPD)
7. Bronchitis
8. Epistaxis (bloody nose)
9. Sleep apnea

Objective 4 Identify the signs and symptoms of respiratory distress.

1. Dyspnea (pursed lip breathing)
2. Tachypnea
3. Wheezing

Standard 9

Students will describe the anatomy and physiology of the Digestive System.

Objective 1 Describe the functions of the digestive system.

1. Ingestion
2. Digestion
3. Absorption
4. Excretion

Objective 2 Identify the structures of the alimentary canal organs and their basic functions.

1. Mouth-chemical and mechanical digestion
2. Pharynx-passageway
3. Esophagus –passageway to stomach
4. Stomach-chemical and mechanical digestion
5. Small intestine-nutrient absorption
6. Large intestine-absorption of water, collects food residue for excretion

Objective 3 Identify the structures of the accessory organs and their basic functions.

1. Salivary Glands – produce saliva to breakdown food
2. Pancreas – releases digestive enzymes into the small intestine

3. Liver – produces bile to breakdown fats
4. Gallbladder – storage of bile

Objective 4 Identify the signs and symptoms of disorders of the digestive system.

1. Irritable bowel syndrome (IBS)
2. Diverticulitis
3. Hemorrhoids
4. Celiac disease
5. Appendicitis
6. Hepatitis A & B
7. Ulcers
8. Hernia
9. Colon cancer

Standard 10

Students will describe the anatomy and physiology of the Nervous System/Special Senses.

Objective 1 Describe the general functions of the nervous system.

1. Detects and interprets sensory information
2. Voluntary and involuntary integration of the stimulus
3. Response to stimulus (movement or secretion)

Objective 2 Differentiate between the central nervous system (CNS) and the peripheral nervous system (PNS).

1. CNS
    a. Brain
    b. Spinal cord
2. PNS
    a. Peripheral nerves
    b. Sympathetic division
    c. Parasympathetic division

Objective 3 Identify the structures of the nervous system and their major functions.

1. Brain
    a. Cerebrum
        i. Frontal lobe-personality, reason, speech
        ii. Parietal lobe-taste, skin sensations
        iii. Occipital lobe-sight
        iv. Temporal lobe-hearing, memory
    b. Cerebellum-balance and coordination
    c. Midbrain-relay station for impulses
    d. Brainstem-heart rate and respirations
        i. Medulla oblongata

        ii. Pons
    e. Hypothalamus-control of endocrine functions, blood pressure, and temperature regulation
    f. Pituitary gland-secretes many hormones
2. Spinal cord-reflex center, conduction of nerve impulses
3. Cerebrospinal fluid (CSF)-shock absorption and provide nutrients to CNS
4. Meninges (dura mater, arachnoid mater, pia mater)-protection of CNS
5. Neurons (sensory, motor, and interneuron)-nerves

Objective 4 Identify the signs and symptoms of disorders of the nervous system.

1. Alzheimer's disease
2. Meningitis
3. Headache
4. Epilepsy
5. Paralysis (Hemiplegia, Paraplegia, Quadriplegia)
6. Herpes zoster/shingles
7. Multiple sclerosis (MS)
8. Sciatica

Objective 5 Identify the principle anatomical structures of the eye.

1. Conjunctiva
2. Sclera
3. Cornea
4. Iris
5. Pupil
6. Lens
7. Retina

Objective 6 Identify the principle anatomical structures of the ear.

1. Outer Ear
    a. Auricle
    b. Auditory Canal
2. Middle Ear
    a. Tympanic cavity
    b. Tympanic membrane
    c. Auditory (Eustachian) tube
    d. Auditory ossicles
    e. Malleus
    f. Incus
    g. Stapes
3. Inner Ear
    a. Semicircular canals
        i. Vestibule
        ii. Cochlea and Organ of Corti

Objective 7 Explain the following diseases and disorders associated with the eyes and ears.

1. Ametropia-abnormal refracted light
2. Myopia
3. Hyperopia
4. Presbyopia
5. Cataracts
6. Conjunctivitis
7. Strabismus
8. Glaucoma
9. Macular degeneration
10. Vertigo
11. Tinnitus
12. Middle ear infection (Otitis Media)
13. Deafness
    a. Conductive
    b. Sensorineural

Standard 11

Students will describe the anatomy and physiology of the Endocrine System.

Objective 1 Describe the general functions of the endocrine system.

1. Regulates growth, development, and maturation.
2. Regulates chemical balance by the production of hormones.

Objective 2 Describe what a hormone is and how it works.

1. Chemicals secreted into the blood to have an effect on a target tissue
2. Produced by endocrine glands

Objective 3 Describe the major locations, secretions (hormones), and functions of the following glands:

1. Pituitary-growth hormone (GH), Adrenocorticotropic (ACTH), Thyroid Stimulating Hormone (TSH), oxytocin
2. Thyroid-thyroxine
3. Pancreas-insulin
4. Adrenal-cortisol, adrenaline
5. Ovaries-estrogen, progesterone
6. Testes-testosterone

Objective 4 Identify the signs and symptoms of disorders of the endocrine system.

1. Diabetes mellitus (Types 1 and 2)
2. Hypothyroidism/Hyperthyroidism
3. Dwarfism/Gigantism

Standard 12

Students will describe the anatomy and physiology of the Urinary System.

Objective 1 Describe the functions of the urinary system.

1. Excrete waste and water from the body
2. Regulate fluid balance and blood composition

Objective 2 Identify the structures of the urinary system and their major functions.

1. Kidneys-filter the blood and form urine
2. Ureters-passageway for urine from the kidneys to the bladder
3. Bladder-temporary storage of urine
4. Urethra-passageway of urine to the outside of the body

Objective 3 Identify the gross anatomy of the kidneys.

1. Renal cortex
2. Renal medulla
3. Renal pyramids
4. Renal pelvis
5. Renal capsule
6. Calyces

Objective 4 Identify the microscopic structures of the nephron.

1. Renal corpuscle
    a. Glomerulus
    b. Glomerular (Bowman's) capsule
2. Afferent arteriole
3. Efferent arteriole
4. Renal tubule
    a. Proximal convoluted tubule
    b. Descending limb
    c. Nephron loop
    d. Ascending limb
    e. Distal convoluted tubule
    f. Collecting duct
    g. Peritubular capillaries

Objective 5 Identify the signs and symptoms of disorders of the urinary system.

1. Kidney Stones
2. Cystitis/UTI
3. Pyelonephritis
4. Incontinence

5. Renal failure

Standard 13

Students will describe the anatomy and physiology of the Reproductive System.

Objective 1 Describe the functions of the reproductive system.

1. Production of gametes (egg and sperm) by the gonads
2. Produces hormones to help in the maturation process

Objective 2 Identify the structures of the female reproductive system and their major functions.

1. Breasts-lactation
2. Ovaries-production of eggs, estrogen, and progesterone
3. Uterine tubes-site of fertilization, passage between ovaries and uterus
4. Uterus-nourishment and protection of the fetus
    a. Cervix
    b. Endometrium
5. Vagina-birth canal, exit for menstrual flow

Objective 3 Identify the structures of the male reproductive system and their major functions.

1. Penis-protects the urethra
2. Testes-production of testosterone and sperm
3. Scrotum-muscular sac containing the testicles
4. Epididymis-storage and maturation of sperm
5. Vas deferens-passageway of semen from the testicles meeting connection with the urethra
6. Prostate gland-secretes fluids for sperm motility
7. Urethra-passageway for urine and semen

Objective 4 Identify the signs and symptoms of disorders of the reproductive system.

1. Female
    a. Ovarian cyst
    b. Premenstrual syndrome (PMS)
    c. Menopause
    d. Cancer
        i. Cervical cancer
        ii. Ovarian cancer
        iii. Breast cancer
    e. Endometriosis
    f. Human Papillomavirus (HPV)
    g. Pelvic Inflammatory Disease (PID)
2. Male

a. Cancer
    i. Prostate cancer
    ii. Testicular cancer
b. Epididymitis
c. Prostatitis
d. Benign Prostatic Hypertrophy (BPH)

Objective 5 Review the following self-examinations:

1. Breast self-exam (BSE)
2. Testicular self-exam (TSE)