



NATIONAL BOARD OF PODIATRIC MEDICAL EXAMINERS

PART I Basic Science Examination

PRACTICE TEST 1

The Part I Practice Tests are representative of the content covered in the Part I Examination. They include question formats found in the actual examination. They also include questions of varying difficulty. A candidate's performance on a Practice Test does not guarantee similar performance on the actual examination.

BASIC SCIENCE EXAMINATION
PRACTICE TEST 1

60 questions

Directions: Each of the questions or incomplete statements below is followed by four suggested answers or completions. Select the one that is best in each case.

- Which of the following muscles aids in unlocking the knee joint in the initial phase of flexion?
(A) Biceps femoris
(B) Popliteus
(C) Semimembranosus
(D) Gastrocnemius
- Depolarization of a muscle membrane is caused by an
(A) influx of potassium ions
(B) efflux of potassium ions
(C) influx of sodium ions
(D) efflux of sodium ions
- Which of the following metabolic pathways would be enhanced in a person with untreated type 1 diabetes?
(A) Fatty acid biosynthesis
(B) Ketone body formation
(C) Glycogen formation
(D) Triglyceride biosynthesis
- Aspirin inhibits the action of which of the following?
(A) Prostacyclin
(B) Cyclooxygenase
(C) Thrombin
(D) Factor VIII
- The first metatarsal usually receives fibers of insertion from the tibialis anterior muscle and the
(A) tibialis posterior
(B) flexor digitorum longus
(C) extensor hallucis brevis
(D) fibularis (peroneus) longus
- Which part of the skeletal muscle cell is responsible for maintaining the low resting, myoplasmic Ca^{++} concentration?
(A) Transverse tubules
(B) Sarcoplasmic reticulum
(C) Thick filaments
(D) Thin filaments
- Which of the following parts of the fibula is subcutaneous?
(A) Medial surface of the shaft
(B) Medial surface of the head
(C) Medial surface of the lateral malleolus
(D) Lateral surface of the lateral malleolus
- The deep plantar artery is a branch of the
(A) dorsalis pedis artery
(B) anterior tibial artery
(C) fibular (peroneal) artery
(D) lateral tarsal artery
- All of the following are potential complications of loop diuretics EXCEPT
(A) hyperuricemia
(B) hyperkalemia
(C) hyponatremia
(D) hypovolemia
- Which of the following ligaments is under the greatest tension when the foot is plantarflexed and inverted?
(A) Tibionavicular
(B) Calcaneotibial
(C) Calcaneofibular
(D) Anterior talofibular

11. Which of the following is a pneumoconiosis associated with carcinoma of the lung and malignant mesothelioma?
- (A) Chronic berylliosis
 - (B) Asbestosis
 - (C) Silicosis
 - (D) Coal-worker's pneumoconiosis
12. Which of the following agents is effective against systemic mycoses when administered parenterally?
- (A) Amphotericin B
 - (B) Griseofulvin
 - (C) Nystatin
 - (D) Miconazole
13. In human IgG, the variable region domain is responsible for
- (A) activation of complement
 - (B) stimulation of B cells
 - (C) transplacental crossing
 - (D) specific antigen binding
14. The difference between the systolic and diastolic pressures is known as
- (A) cardiac resistance
 - (B) pulse pressure
 - (C) capacitance
 - (D) stroke volume
15. Overproduction of purines associated with Lesch-Nyhan syndrome can lead to
- (A) excess urea production
 - (B) excess uric acid production and gout
 - (C) xanthine oxidase poisoning
 - (D) xanthine underproduction and crystal deposition in the kidneys
16. Gram-positive bacteria lack which of the following?
- (A) Peptidoglycan
 - (B) Lipopolysaccharide
 - (C) Cell membrane
 - (D) Cell wall
17. When probenecid is taken as a preventive for gout, it may cause which of the following?
- (A) Interference with theophylline therapy
 - (B) Intensified renal toxicity from aminoglycosides
 - (C) Intensified renal toxicity from tetracyclines
 - (D) An elevated plasma level of penicillin G or penicillin V
18. Which bony structure is easily palpated near the most superior point of the medial longitudinal arch?
- (A) Sustentaculum tali
 - (B) Navicular tuberosity
 - (C) First metatarsal head
 - (D) Fifth metatarsal tuberosity
19. Which of the following is the best antiseptic?
- (A) 100% ethanol
 - (B) 88% phenol
 - (C) 50% methanol
 - (D) Povidone-iodine
20. Ingestion of milk inhibits the absorption of which of the following?
- (A) Ciprofloxacin
 - (B) Erythromycin
 - (C) Tetracycline
 - (D) Griseofulvin
21. Which of the following substances exhibits the lowest renal-clearance value?
- (A) Urea
 - (B) Glucose
 - (C) Uric acid
 - (D) Creatinine
22. Morphine is a more efficacious analgesic than aspirin, ibuprofen, or acetaminophen because morphine
- (A) is metabolized to an active metabolite
 - (B) is taken in smaller doses
 - (C) has a longer half-life
 - (D) has a higher maximal effect

23. To demonstrate a superficial fungal infection, a skin scraping is taken and covered with a drop of 20 percent NaOH or KOH for the purpose of
- (A) dissolving tissue cells
 - (B) releasing spores
 - (C) counterstaining
 - (D) neutralizing the acid content
24. The nutrient artery of the tibia is a branch of which of the following arteries?
- (A) Anterior tibial
 - (B) Posterior tibial
 - (C) Fibular (peroneal)
 - (D) Popliteal
25. Which of the following features of the hip bone develops from a secondary center of ossification?
- (A) Pubic tubercle
 - (B) Iliopubic eminence
 - (C) Ischial spine
 - (D) Ischial tuberosity
26. Damage to the basal ganglia could result in
- (A) a loss of pain and temperature sensation
 - (B) a loss of fine touch
 - (C) a resting tremor of the hands
 - (D) increased tremor during movement
27. The increase in blood glucose level observed after an injection of epinephrine is best explained by stimulation of
- (A) gluconeogenesis
 - (B) liver glycogenesis
 - (C) liver glycogenolysis
 - (D) glucose absorption
28. All of the following abnormalities of cell growth may be reversible on removal of the underlying stimulus EXCEPT
- (A) anaplasia
 - (B) atrophy
 - (C) hyperplasia
 - (D) hypertrophy
29. Most systemic fungal infections enter the body by
- (A) puncture wounds of the skin
 - (B) ingestion of fungal spores
 - (C) contact with fungal-contaminated fomites
 - (D) inhalation of fungal spores
30. Which of the following will occur if a drug is displaced from plasma protein binding sites?
- (A) The half-life of the drug will be prolonged.
 - (B) The drug will tend to achieve higher tissue concentrations.
 - (C) Renal excretion will tend to decrease.
 - (D) The distribution of the drug will be decreased.
31. One main product of the beta oxidation of fatty acids is
- (A) acetyl-CoA
 - (B) palmitic acid
 - (C) glycerol
 - (D) glycerol-3-phosphate
32. On injection, which of the following hormones produces the greatest protein catabolic effect?
- (A) Estradiol
 - (B) Somatotropin
 - (C) Testosterone
 - (D) Cortisone
33. Which of the following is true of all third layer plantar muscles?
- (A) They are toe extensors.
 - (B) They insert on proximal phalanges.
 - (C) They originate on the rearfoot.
 - (D) They are innervated by the lateral plantar nerve.
34. The primary spinal level that innervates the skin of the small toe is
- (A) L4
 - (B) L5
 - (C) S1
 - (D) S2

35. All of the following can lead to Cushing's syndrome EXCEPT
- (A) pituitary adenoma
 - (B) adrenal cortical adenoma
 - (C) abrupt cessation of steroid therapy after long-term use
 - (D) long-term prednisone therapy
36. Nissl substance is an aggregation of
- (A) rough endoplasmic reticulum
 - (B) nucleoli
 - (C) neurofilaments
 - (D) neurotubules
37. The alpha-helix configuration of a protein is due to the formation of
- (A) hydrogen bonds
 - (B) ionic bonds
 - (C) disulfide bonds
 - (D) hydrophobic interactions
38. Which of the following is a true statement about Down syndrome?
- (A) There is an increased risk of developing acute leukemia.
 - (B) Life expectancy is approximately 10 years.
 - (C) Deaths in infancy and early childhood are usually due to infection.
 - (D) Advanced paternal age is frequently associated with this syndrome.
39. The jugular notch is part of the
- (A) body of the sternum
 - (B) manubrium
 - (C) clavicle
 - (D) occipital bone
40. Which of the following nerves is located anterior to the ear and passes through the parotid gland?
- (A) Facial
 - (B) Glossopharyngeal
 - (C) Hypoglossal
 - (D) Auriculotemporal
41. Which of the following is a paralytic disorder that involves the anterior horn cells of the spinal cord?
- (A) Multiple sclerosis
 - (B) Poliomyelitis
 - (C) Guillain-Barré syndrome
 - (D) Muscular dystrophy
42. Postoperative urinary retention is best treated with which of the following?
- (A) Neostigmine
 - (B) Carbachol
 - (C) Atropine
 - (D) Bethanechol
43. Elevated serum alkaline phosphatase with normal serum calcium and phosphorus in an elderly patient is most suggestive of
- (A) osteosarcoma
 - (B) osteoporosis
 - (C) hyperparathyroidism
 - (D) Paget's disease
44. Of the following, which two cell types play the most significant role in delayed hypersensitivity?
- (A) Neutrophils and mast cells
 - (B) Macrophages and B lymphocytes
 - (C) Macrophages and T lymphocytes
 - (D) B lymphocytes and T lymphocytes
45. Methotrexate toxicity may be increased by which of the following groups of drugs?
- (A) Nonsteroidal anti-inflammatory drugs (NSAIDs)
 - (B) H₁-antihistamines
 - (C) Opioids
 - (D) Anticoagulants
46. Which of the following fatty acids is essential in the diet?
- (A) Stearic
 - (B) Palmitoleic
 - (C) Linolenic
 - (D) Oleic

47. Which of the following is the strongest ligament of the sacroiliac joint?
- (A) Sacrospinous
 - (B) Ventral sacroiliac
 - (C) Dorsal sacroiliac
 - (D) Interosseous sacroiliac
48. The right coronary artery originates from the
- (A) ascending aorta
 - (B) thoracic aorta
 - (C) aortic arch
 - (D) brachiocephalic trunk
49. Irregular, atypical, proliferative changes occurring in epithelial cells in response to chronic irritation or inflammation are referred to as
- (A) hypertrophy
 - (B) dysplasia
 - (C) atrophy
 - (D) hyperplasia
50. Which of the following is a disease that occurs in young men and is characterized by thrombosis with inflammation of the arteries of the lower extremities?
- (A) Arteriosclerosis obliterans
 - (B) Monckeberg's disease
 - (C) Buerger's disease
 - (D) Thrombophlebitis
51. Aldosterone is secreted by cells in the zona
- (A) glomerulosa
 - (B) fasciculata
 - (C) reticularis
 - (D) incerta
52. Which of the following antihypertensive agents is LEAST likely to interfere with blood glucose regulation in a patient with type 1 diabetes?
- (A) Propranolol
 - (B) Captopril
 - (C) Chlorothiazide
 - (D) Furosemide
53. Which of the following conditions would increase insulin sensitivity?
- (A) Stress
 - (B) Pregnancy
 - (C) Exercise
 - (D) Taking steroids
54. Bacteria that are classified as gram-negative have which of the following properties?
- (A) They lose the primary stain and are colored violet.
 - (B) They lose the primary stain and are colored red.
 - (C) They retain the primary stain and are colored violet.
 - (D) They retain the primary stain throughout the gram-stain procedure.
55. A patient presents with a rapidly invasive, necrotizing fasciitis; and exotoxin A is readily detectable by indirect fluorescent immunoassay of the tissue. Which of the following organisms is most likely involved?
- (A) *Bacillus anthracis*
 - (B) *Staphylococcus aureus*
 - (C) *Staphylococcus epidermidis*
 - (D) *Streptococcus pyogenes*
56. Which of the following muscles abducts the thigh?
- (A) Obturator externus
 - (B) Iliopsoas
 - (C) Gracilis
 - (D) Gluteus medius
57. All of the following statements about the human papillomavirus are true EXCEPT:
- (A) It is inhibited by the antiviral agent amantadine.
 - (B) It is the cause of both benign and malignant tumors.
 - (C) It is integrated into the chromosome of the host cell.
 - (D) It is a double-stranded DNA virus without an envelope.

58. The aortic valve does which of the following?
- (A) Prevents the backflow of blood into the aorta during ventricular diastole.
 - (B) Prevents the backflow of blood into the left ventricle during ventricular diastole.
 - (C) Prevents the backflow of blood into the right ventricle during ventricular diastole.
 - (D) Closes when the first heart sound is heard.
59. Vital capacity is defined as the
- (A) minimum volume of air the lungs can hold
 - (B) maximum volume of air the lungs can hold
 - (C) maximum volume of air that can be expired after a maximal inspiration
 - (D) volume of air normally entering or leaving the lungs during a single breath
60. Inability to dorsiflex the foot would most likely indicate injury to which of the following nerves?
- (A) Sural
 - (B) Femoral
 - (C) Tibial
 - (D) Common fibular (peroneal)

END OF PRACTICE TEST 1



NATIONAL BOARD OF PODIATRIC MEDICAL EXAMINERS

PART I Basic Science Examination

PRACTICE TEST 2

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BASIC SCIENCE EXAMINATION
PRACTICE TEST 2

60 questions

Directions: Each of the questions or incomplete statements below is followed by four suggested answers or completions. Select the one that is best in each case.

- The biosynthesis of glucose from noncarbohydrate sources is called
 - gluconeogenesis
 - glycogenesis
 - glycogenolysis
 - glycolysis
- Which of the following muscles is innervated by the femoral nerve?
 - Gastrocnemius
 - Sartorius
 - Obturator internus
 - Gluteus medius
- The characteristic histopathologic lesion associated with Parkinson's disease is found in the
 - medulla
 - thalamus
 - cortex
 - substantia nigra
- The linea aspera is found on the
 - tibia
 - ilium
 - ischium
 - femur
- Which of the following muscles can both plantarflex and evert the foot?
 - Tibialis anterior
 - Tibialis posterior
 - Fibularis (peroneus) longus
 - Flexor digitorum longus
- Evaluation of a patient with peripheral neuropathy reveals elevated liver enzymes. A complete blood count (CBC) and fasting serum glucose are both within the reference range. Which of the following is the most likely cause of the neuropathy?
 - Vitamin B₁₂ deficiency
 - Alcoholism
 - Iron deficiency
 - Diabetes mellitus
- Transitional epithelium is found only in
 - special sense organs
 - the gastrointestinal tract
 - the respiratory system
 - the urinary system
- Which of the following arteries is the largest major branch of the posterior tibial artery?
 - Circumflex fibular
 - Popliteal
 - Fibular (peroneal)
 - Lateral calcaneal
- Which of the following hormones affects closure of the epiphyseal plate?
 - Androgen
 - Epinephrine
 - Insulin
 - Follicle-stimulating hormone (FSH)
- The tendon of which of the following muscles is associated with the medial side of the second metatarsophalangeal joint?
 - First lumbrical
 - First plantar interosseous
 - Second dorsal interosseous
 - Third dorsal interosseous

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11. Beta-blocking agents are indicated for all of the following conditions EXCEPT
- (A) bradycardia
 - (B) angina pectoris
 - (C) essential tremor
 - (D) essential hypertension
12. Which of the following is the principal nerve that innervates the medial compartment of the thigh?
- (A) Tibial
 - (B) Sciatic
 - (C) Femoral
 - (D) Obturator
13. The ability to form endospores is characteristic of the genus
- (A) *Clostridium*
 - (B) *Listeria*
 - (C) *Streptococcus*
 - (D) *Corynebacterium*
14. Which of the following muscles inserts into the iliotibial tract?
- (A) Gluteus maximus
 - (B) Superior gemellus
 - (C) Piriformis
 - (D) Sartorius
15. Ototoxicity, nephrotoxicity, neuromuscular blockade, and allergic skin reactions are attributable to the
- (A) tetracyclines
 - (B) penicillins
 - (C) cephalosporins
 - (D) aminoglycosides
16. In untreated diabetes mellitus, osmotic diuresis originates in the proximal convoluted tubules for which of the following reasons?
- (A) A reduced amount of glucose is present in the filtrate.
 - (B) The transport maximum for large molecular weight substances is lowered.
 - (C) The luminal cell membranes of these tubules become less permeable to water.
 - (D) Subtotal glucose reabsorption by these tubules leads to excess water being retained in their lumina.
17. Which of the following is a test of platelet function?
- (A) Complete blood count
 - (B) Prothrombin time
 - (C) Partial thromboplastin time
 - (D) Bleeding time
18. Which of the following is a true statement about the medial surface of the shaft of the tibia?
- (A) It is palpable.
 - (B) It includes part of the malleolar sulcus.
 - (C) It gives attachment to the interosseous membrane of the leg.
 - (D) It gives origin to one of the extensor muscles.
19. The coronary sinus drains blood into the
- (A) right atrium
 - (B) left atrium
 - (C) right ventricle
 - (D) left ventricle
20. A detailed travel and residential history is of greatest importance as a diagnostic aid in suspected cases of
- (A) candidiasis
 - (B) zygomycosis
 - (C) coccidioidomycosis
 - (D) cryptococcosis
21. Kyphosis is an abnormal increase in which of the following curvatures of the vertebral column?
- (A) Thoracic
 - (B) Lumbar
 - (C) Cervical
 - (D) Sacral
22. In which of the following areas would ossification be seen first?
- (A) Shaft of the tibia
 - (B) Proximal end of the tibia
 - (C) Distal end of the tibia
 - (D) Distal end of the fibula

23. A positive tuberculin skin test indicates that an individual most likely
- (A) has been infected with tubercle bacilli
 - (B) has a normal humoral response to antigens
 - (C) is immune to *Mycobacterium tuberculosis*
 - (D) has an impairment in T-cell-mediated immunity
24. An important feature for protein structure and function is the formation of disulfide bonds involving which of the following amino acids?
- (A) Lysine
 - (B) Cysteine
 - (C) Glutamine
 - (D) Methionine
25. During the activation of skeletal muscle contraction, calcium binds to
- (A) actin
 - (B) myosin
 - (C) troponin
 - (D) tropomyosin
26. Which muscle is an antagonist to the second dorsal interosseous muscle?
- (A) First dorsal interosseous
 - (B) First plantar interosseous
 - (C) Second plantar interosseous
 - (D) Third dorsal interosseous
27. Which of the following agents is orally active against *Trichophyton rubrum*?
- (A) Haloprogin
 - (B) Itraconazole
 - (C) Amphotericin B
 - (D) Econazole
28. Which of the following occurs when the diaphragm contracts?
- (A) The expiratory muscles contract.
 - (B) Lung volume increases.
 - (C) The intra-alveolar pressure increases.
 - (D) The size of the thoracic cavity decreases.
29. On which of the following bones do the tibialis anterior, tibialis posterior, and fibularis (peroneus) longus all insert, at least in part?
- (A) Navicular
 - (B) First metatarsal
 - (C) Medial cuneiform
 - (D) Intermediate cuneiform
30. The intrinsic muscles of the tongue derive motor innervation from which of the following cranial nerves?
- (A) Facial
 - (B) Glossopharyngeal
 - (C) Hypoglossal
 - (D) Trigeminal
31. Which of the following cell types should one expect to see in transplanted organ rejection?
- (A) B lymphocytes
 - (B) T lymphocytes
 - (C) Neutrophils
 - (D) Eosinophils
32. Scleroderma is associated with all of the following EXCEPT
- (A) dermal fibrosis
 - (B) claw-like hands
 - (C) thymic hypoplasia
 - (D) renal failure
33. Which of the following agents causes the development of epithelioid cells and caseous necrosis?
- (A) Bleomycin
 - (B) Pneumococcus pneumoniae
 - (C) Tubercle bacillus
 - (D) Ozone
34. Succinylcholine does which of the following?
- (A) Blocks the release of acetylcholine
 - (B) Produces depolarization at the neuromuscular junctions
 - (C) Irreversibly inhibits acetylcholinesterase
 - (D) Competitively antagonizes muscarinic receptors

35. In comparison to white muscle fibers, red skeletal muscle fibers
- (A) contract more rapidly
 - (B) become fatigued more rapidly
 - (C) have more mitochondria
 - (D) have a larger diameter
36. A competitive antagonist will do which of the following?
- (A) Decrease the ED_{50} of the agonist.
 - (B) Decrease the LD_{50} of the agonist.
 - (C) Shift the dose-response curve of the agonist to the right.
 - (D) Increase the amount of drug available for the receptor by producing a covalent bond.
37. Which of the following are the same in both hemoglobin and myoglobin?
- (A) Their oxygen-binding curves
 - (B) Their oxygen-binding capacity per molecule
 - (C) The oxidation state of iron in their heme moieties
 - (D) The number of subunits they contain
38. A minor traumatic injury that leads to a chronic, granulomatous ulcerated lesion with the development of multiple subcutaneous nodules along the lymphatics of the extremities is characteristic of infection with
- (A) *Pseudallescheria boydii*
 - (B) *Paracoccidioides brasiliensis*
 - (C) *Cryptococcus neoformans*
 - (D) *Sporothrix schenckii*
39. First-order fibers for discriminative touch and conscious proprioception that enter the spinal cord in the lumbar region ascend through the spinal cord in the
- (A) fasciculus cuneatus
 - (B) fasciculus dorsolateralis
 - (C) fasciculus gracilis
 - (D) fasciculi proprii
40. Which of the following findings in cerebrospinal fluid would indicate bacterial meningitis rather than viral meningitis?
- (A) Increased pressure
 - (B) Increased protein content
 - (C) Reduced sugar content
 - (D) Pleocytosis of lymphocytes
41. Parasympathetic nerve activity causes
- (A) decreased contraction of muscles of the intestine
 - (B) decreased secretion of sweat glands
 - (C) contraction of the urinary bladder
 - (D) relaxation of the ciliary muscle of the eye
42. Reactivation tuberculosis is a recognized risk of anti-inflammatory therapy with which of the following drugs?
- (A) Aspirin
 - (B) Indomethacin
 - (C) Piroxicam
 - (D) Hydrocortisone
43. A decrease in albumin concentration in the blood would be expected to
- (A) increase the rate of filtration from capillaries
 - (B) increase the plasma oncotic pressure
 - (C) decrease the likelihood of edema
 - (D) decrease the hydrostatic pressure of interstitial fluid
44. Acetylsalicylic acid inhibits the synthesis of all of the following EXCEPT
- (A) prostaglandin E_2
 - (B) prostacyclin
 - (C) leukotriene C_4
 - (D) thromboxane A_2
45. Which of the following arteries supplies the greatest portion of the thigh region?
- (A) Obturator
 - (B) Popliteal
 - (C) Femoral
 - (D) Deep femoral (profunda femoris)

46. Large red blood cells (macrocytes) and hypersegmented granulocytes in the peripheral blood are characteristic of which of the following anemias?
- (A) Aplastic
 - (B) Iron deficiency
 - (C) Sickle cell
 - (D) Folic acid deficiency
47. Which of the following agents possesses both antidysrhythmic and antianginal activity?
- (A) Nitroglycerin
 - (B) Verapamil
 - (C) Isosorbide dinitrate
 - (D) Lidocaine
48. At birth, a neonate presents with hearing loss, cardiovascular pathology, and pearly cataracts. An enveloped, ribonucleic acid-containing, hemagglutinating virus is isolated from the placenta. The most likely diagnosis of this infection is
- (A) adenovirus keratitis
 - (B) herpesvirus keratoconjunctivitis
 - (C) congenital rubella
 - (D) neonatal coxsackievirus
49. Peripheral neuropathy is characteristic of the toxicity displayed by which of the following?
- (A) 6-Mercaptopurine
 - (B) Daunorubicin
 - (C) Vincristine
 - (D) Mechlorethamine
50. The splenic pathology that occurs in adults with sickle cell anemia is best described as splenic
- (A) atrophy
 - (B) neoplasia
 - (C) infarction
 - (D) hyperplasia
51. The most efficacious diuretic action is achieved by agents that act at which of the following nephron sites?
- (A) Distal tubule
 - (B) Proximal tubule
 - (C) Collecting ducts
 - (D) Ascending limb of Henle's loop
52. During a primary immune response, which of the following types of cells are responsible for secreting most circulating antibodies?
- (A) B cells
 - (B) T cells
 - (C) Plasma cells
 - (D) Monocytes
53. The superficial (subcutaneous) infrapatellar bursa is separated from the deep infrapatellar bursa by the
- (A) patella
 - (B) patellar ligament
 - (C) patellar retinacula
 - (D) fibular notch
54. The speed of onset for inhalation anesthesia can correctly be described as
- (A) directly proportional to the solubility of the anesthetic in blood
 - (B) inversely proportional to the solubility of the anesthetic in blood
 - (C) directly proportional to the partial pressure of the anesthetic in alveoli
 - (D) inversely proportional to the partial pressure of the anesthetic in alveoli
55. Intrinsic factor is necessary for the absorption of
- (A) thiamine
 - (B) folic acid
 - (C) pyridoxine
 - (D) vitamin B₁₂

56. Which of the following is a saprophytic, acid-fast bacillus that is found in soil and water and commonly causes overt pulmonary disease in patients with AIDS?
- (A) *Nocardia asteroides*
 - (B) *Pneumocystis carinii*
 - (C) *Mycoplasma pneumoniae*
 - (D) *Mycobacterium avium-intracellulare*
57. The work performed by the left ventricle of the heart is greater than that performed by the right ventricle because the left ventricle
- (A) has more adrenergic innervation
 - (B) produces a greater cardiac output
 - (C) has a slower contraction time
 - (D) contracts against a greater resistance
58. Which of the following is NOT associated with an autoimmune disease?
- (A) Pannus formation
 - (B) Butterfly rash
 - (C) Heberden's nodes
 - (D) Acute vasculitis
59. The cancer chemotherapeutic agent 5-fluorouracil inhibits
- (A) the synthesis of thymidylate
 - (B) the synthesis of uridylate
 - (C) the regeneration of tetrahydrofolate
 - (D) conversion to deoxyribonucleotides
60. Bacterial endospores are killed most effectively by
- (A) alcohols
 - (B) iodophors
 - (C) autoclaving
 - (D) microwaving

END OF PRACTICE TEST 2



NATIONAL BOARD OF PODIATRIC MEDICAL EXAMINERS

PART I Basic Science Examination

PRACTICE TEST 3

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BASIC SCIENCE EXAMINATION
PRACTICE TEST 3

60 questions

Directions: Each of the questions or incomplete statements below is followed by four suggested answers or completions. Select the one that is best in each case.

- Which of the following muscles acts on one joint only?
(A) Sartorius
(B) Adductor longus
(C) Rectus femoris
(D) Long head of biceps femoris
- Which of the following types of hepatitis has the best prognosis?
(A) Hepatitis A
(B) Hepatitis B
(C) Alcoholic hepatitis
(D) Chronic active hepatitis
- The cytoskeleton of a cell includes which of the following?
(A) Peroxisomes
(B) Ribosomes
(C) Microtubules
(D) Microvilli
- The precentral gyrus and corticospinal tract are essential for
(A) vision
(B) kinesthesia
(C) voluntary movement
(D) auditory identification
- In the distal portion of the leg, the small saphenous vein courses along with which of the following nerves?
(A) Saphenous
(B) Sural
(C) Tibial
(D) Superficial fibular (peroneal)
- Which of the following amino acids is a precursor of dopamine?
(A) Threonine
(B) Tryptophan
(C) Glutamine
(D) Tyrosine
- The spinal accessory nerve innervates which muscle?
(A) Latissimus dorsi
(B) Trapezius
(C) Deltoid
(D) Biceps
- A patient presents with painless lymph node enlargement, splenomegaly, and intermittent fever. A lymph node biopsy shows Reed-Sternberg cells. Which of the following is the likely diagnosis?
(A) Burkitt's lymphoma
(B) Acute lymphocytic leukemia
(C) Hodgkin's disease
(D) Multiple myeloma
- Which of the following is an example of humoral immunity?
(A) T cells killing tumor cells
(B) T cells killing virus-infected T cells
(C) Mucus trapping inhaled bacteria
(D) Classical complement binding to bacteria

10. Acute inflammation is most frequently characterized by
- (A) long duration, lymphocyte and macrophage migration, and blood vessel proliferation
 - (B) short duration, low intensity, and massive systemic response
 - (C) short duration, exudation of fluid with serum proteins, and neutrophil migration
 - (D) initial transient vasodilatation followed by vasoconstriction and edema
11. Monoclonal gammopathy and multiple lytic bone lesions are common abnormalities of which of the following?
- (A) Multiple myeloma
 - (B) Chronic lymphocytic leukemia
 - (C) Acute myelocytic leukemia
 - (D) Myeloid metaplasia
12. Diminished two-point discrimination in the right leg and decreased pain and temperature sensation in the left leg indicate a
- (A) motor cortex lesion
 - (B) cerebellar lesion
 - (C) spinal cord hemisection
 - (D) unilateral brain stem section
13. Which of the following is a useful drug in the treatment of acute gout?
- (A) Indomethacin
 - (B) Probenecid
 - (C) Allopurinol
 - (D) Penicillamine
14. Diagnosis of erythrasma is based on
- (A) a coral fluorescence under Wood's light
 - (B) a rising antibody titer
 - (C) cultural identification of the etiologic agent
 - (D) fluorescent antibody tests
15. The first plantar interosseous muscle arises from which of the following metatarsals?
- (A) First
 - (B) Second
 - (C) Third
 - (D) Fourth
16. The binding of immunoglobulin molecules to the surface of the basophil is an important component of
- (A) acute phase reactions
 - (B) immediate hypersensitivity
 - (C) hemolytic disease
 - (D) mucosal immunity
17. Which of the following statements about electron transport is normally true?
- (A) It is stimulated by high levels of ATP.
 - (B) It requires NAD^+ as its terminal electron acceptor.
 - (C) It is most active under anaerobic conditions.
 - (D) It occurs simultaneously with oxidative phosphorylation.
18. All of the following diseases are transmitted by arthropod vectors EXCEPT
- (A) relapsing fever
 - (B) Rocky Mountain spotted fever
 - (C) campylobacteriosis
 - (D) Lyme disease
19. During an examination of the upper limb, it is noted that the patient has a "wrist-drop" sign. This finding indicates damage to the
- (A) extensor muscles of the arm
 - (B) flexor muscles of the arm
 - (C) radial nerve distal to the triceps muscle
 - (D) ulnar nerve distal to the medial epicondyle
20. Which of the following is a true statement about the K_m of an enzyme?
- (A) It is equal to the substrate concentration at one-half the V_{max} .
 - (B) It decreases in the presence of a competitive inhibitor.
 - (C) It decreases in the presence of a noncompetitive inhibitor.
 - (D) It increases as the affinity for a substrate increases.

21. The dorsal digital artery to the medial side of the second toe is a branch of which artery?
- (A) Deep plantar
 - (B) Dorsalis pedis
 - (C) First dorsal metatarsal
 - (D) Second dorsal metatarsal
22. For which of the following does hemoglobin iron have the strongest affinity?
- (A) O₂
 - (B) CN⁻
 - (C) CO
 - (D) CO₂
23. Which of the following is most likely to produce a systemic lupus erythematosus-like syndrome?
- (A) Nifedipine
 - (B) Clonidine
 - (C) Digoxin
 - (D) Procainamide
24. The lateral and medial femoral circumflex arteries are most commonly branches of the
- (A) femoral artery
 - (B) deep femoral artery
 - (C) first perforating artery
 - (D) inferior gluteal artery
25. Swelling of the hands and feet at birth, a “webbed” neck, and coarctation of the aorta are frequent and important features of
- (A) Turner's syndrome
 - (B) Down syndrome
 - (C) Albright's syndrome
 - (D) Marfan syndrome
26. Which of the following hormones has the greatest effect on sodium reabsorption by the collecting duct?
- (A) Corticosterone
 - (B) Antidiuretic hormone (ADH)
 - (C) Cortisone
 - (D) Aldosterone
27. Which of the following nerves courses between the oblique head of the adductor hallucis and the interosseous muscles?
- (A) First common digital branch of the medial plantar
 - (B) Proper digital branch of the medial plantar
 - (C) Deep branch of the lateral plantar
 - (D) Superficial branch of the lateral plantar
28. Tinea pedis is best treated by topical application of which of the following?
- (A) Nystatin
 - (B) Griseofulvin
 - (C) Miconazole
 - (D) Flucytosine
29. Which of the following best describes *Mycobacterium tuberculosis* isolates?
- (A) Aerobic acid-fast cocci
 - (B) Aerobic acid-fast rods
 - (C) Anaerobic acid-fast cocci
 - (D) Anaerobic acid-fast rods
30. The P-R interval in an electrocardiogram trace represents
- (A) ventricular repolarization
 - (B) ventricular depolarization
 - (C) atrial repolarization
 - (D) atrioventricular (AV) nodal delay
31. All of the following antibiotics inhibit bacterial cell wall synthesis EXCEPT
- (A) cephalothin
 - (B) vancomycin
 - (C) erythromycin
 - (D) imipenem
32. A patient presents with a cutaneous ulcer that began as a vesicular lesion and became pustular before ulceration. A scraping of the ulcer reveals intranuclear inclusion bodies. The most likely diagnosis is
- (A) herpes
 - (B) molluscum contagiosum
 - (C) papillomavirus
 - (D) rubeola

33. The prototype disorder of type IV cell-mediated hypersensitivity is
- (A) Goodpasture's syndrome
 - (B) Arthus reaction
 - (C) tuberculosis
 - (D) penicillin sensitivity
34. Which of the following represents the sum of the tidal volume and inspiratory reserve volume?
- (A) Inspiratory capacity
 - (B) Functional residual capacity
 - (C) Vital capacity
 - (D) Expiratory reserve volume
35. A common adverse effect of prolonged therapy with hydrochlorothiazide is
- (A) hypernatremia
 - (B) hyperuricemia
 - (C) hyperkalemia
 - (D) hypoglycemia
36. Which of the following insulin preparations has the longest duration of action?
- (A) Regular insulin
 - (B) Isophane insulin suspension
 - (C) Protamine zinc insulin suspension
 - (D) Insulin zinc suspension
37. Which of the following hormones is secreted by the pars nervosa?
- (A) ACTH
 - (B) ADH
 - (C) FSH
 - (D) TSH
38. Compared to an isometric skeletal muscle twitch, an isotonic skeletal muscle twitch involves
- (A) greater tension
 - (B) greater myofilament sliding
 - (C) less energy expenditure
 - (D) less ATP utilization
39. All of the postganglionic sympathetic cell bodies for the head are found in the
- (A) spinal nucleus of the trigeminal nerve
 - (B) pterygopalatine ganglion
 - (C) trigeminal ganglion
 - (D) superior cervical ganglion
40. A 78-year-old woman complains of stiffness and decreased joint mobility, especially in the morning. She also has developed an osteophytic nodule at the base of the terminal phalanges. Based on this information, which of the following is the most likely diagnosis?
- (A) Gouty arthritis
 - (B) Osteoarthritis
 - (C) Rheumatoid arthritis
 - (D) Systemic lupus erythematosus
41. Insulin deficiency normally increases
- (A) glycolysis
 - (B) fatty acid synthesis
 - (C) protein synthesis
 - (D) triglyceride degradation
42. Activation of the vagus nerve to the heart leads to which of the following?
- (A) An increased P-R interval
 - (B) An increased firing rate at the SA node
 - (C) Increased transmission through the ventricular muscle mass
 - (D) Faster conduction through the AV node
43. Enzyme induction most likely has occurred in an individual who has been taking a drug when
- (A) protein synthesis decreases in the body
 - (B) the biological half-life of the drug decreases
 - (C) the rate of metabolism of the drug decreases
 - (D) a smaller concentration of the drug can produce the same effect as it did before induction
44. Which of the following is an essential nutrient in the human diet?
- (A) Thymidine
 - (B) Cholesterol
 - (C) Ascorbic acid
 - (D) Oleic acid

45. All of the following statements about prenatal development are true EXCEPT:
- (A) Chondrification of the foot begins prior to joint cavitation.
 - (B) The upper and lower limb buds appear at the same time.
 - (C) Vascular development within a limb bud precedes lumbosacral plexus development.
 - (D) At the end of the embryonic period the foot is plantarflexed.
46. Which of the following is a premalignant skin disorder commonly associated with subsequent malignant change?
- (A) Acne vulgaris
 - (B) Keloid
 - (C) Seborrheic keratosis
 - (D) Actinic keratosis
47. Which of the following muscles can help flex the knee joint?
- (A) Gracilis
 - (B) Pectineus
 - (C) Rectus femoris
 - (D) Adductor magnus
48. Which of the following joints allows flexion, extension, abduction, and adduction?
- (A) Distal tibiofibular
 - (B) Tarsometatarsal
 - (C) Interphalangeal
 - (D) Metatarsophalangeal
49. Which of the following symptoms can result from an overdose of atropine?
- (A) Miosis
 - (B) Blurred vision
 - (C) Profuse sweating
 - (D) Diarrhea
50. The major stimulus for the synthesis of glucocorticoids by the adrenal cortex is
- (A) stress
 - (B) hyperglycemia
 - (C) hyponatremia
 - (D) dietary proteins
51. The Kirby-Bauer method of antimicrobial susceptibility testing has been standardized for
- (A) slow-growing fastidious organisms
 - (B) slow-growing aerobic organisms
 - (C) fast-growing aerobic organisms
 - (D) fast-growing, CO₂-requiring organisms
52. Antiperistaltic, antidiarrheal agents such as diphenoxylate and paregoric may do all of the following EXCEPT
- (A) potentiate electrolyte loss
 - (B) decrease stool frequency
 - (C) relieve intestinal cramps
 - (D) worsen the effects of an invasive bacterial infection
53. Tardive dyskinesia is most likely to be associated with the use of
- (A) haloperidol
 - (B) phenelzine
 - (C) amitriptyline
 - (D) diazepam
54. The os tibiale externum is an accessory bone found in relation to the
- (A) cuboid
 - (B) talus
 - (C) medial cuneiform
 - (D) navicular
55. Which of the following muscles functions to dorsiflex the ankle and evert the foot?
- (A) Extensor digitorum longus
 - (B) Fibularis (peroneus) brevis
 - (C) Fibularis (peroneus) longus
 - (D) Tibialis anterior
56. Subperiosteal hematomas and bleeding into joint spaces are most likely to be caused by a deficiency of which of the following?
- (A) Vitamin A
 - (B) Vitamin B₁₂
 - (C) Vitamin C
 - (D) Folic acid

57. A patient presents with draining lesions on the foot that demonstrate granules or grains in the exudate. The most likely diagnosis is
- (A) blastomycosis
 - (B) mycetoma
 - (C) chromomycosis
 - (D) sporotrichosis
58. Which of the following muscles attaches to the lateral surface of the shaft of the fibula?
- (A) Soleus
 - (B) Fibularis (peroneus) brevis
 - (C) Fibularis (peroneus) tertius
 - (D) Flexor hallucis longus
59. A patient has a primary respiratory infection that manifests itself as chronic osteomyelitis. Biopsied specimens reveal large spherules filled with endospores. The etiologic agent is
- (A) *Cryptococcus neoformans*
 - (B) *Blastomyces dermatitidis*
 - (C) *Coccidioides immitis*
 - (D) *Histoplasma capsulatum*
60. All of the following are located on the proximal extremity of the femur EXCEPT the
- (A) linea aspera
 - (B) intertrochanteric line
 - (C) trochanteric fossa
 - (D) lesser trochanter

END OF PRACTICE TEST 3

**PRACTICE TEST 1
ANSWER KEYS AND RATIONALES**

Item: Key
1 B

The popliteus muscle has a proximal attachment on the lateral surface of the lateral condyle of the femur and the lateral meniscus. Its distal attachment is on the posterior surface of the tibia. When the foot (and thus the tibia) is fixed to the ground, the popliteus muscle will laterally rotate the femur on the tibia, unlocking the knee joint and assisting in flexion of the knee.

Item: Key
2 C

Increased inward g_{Na^+} results in a depolarization which approaches the positive (depolarizing) potential for Na^+ as predicted by the Nernst equation.

Item: Key
3 B

In the absence of insulin, metabolism is retained in a mode that favors gluconeogenesis, glycogenolysis, and lipolysis. This leads to increased ketone body synthesis by the liver and an accumulation of ketoacids in the blood, which can cause ketoacidosis.

Item: Key
4 B

Aspirin inhibits the synthesis of prostaglandins by inhibiting cyclooxygenase activity.

Item: Key
5 D

Two muscles insert on the first metatarsal, both on the base: fibularis (peroneus) longus on the lateral side and tibialis anterior on the medial side.

Item: Key
6 B

The membranes of the cisternae of the sarcoplasmic reticulum contain inwardly directed active transport systems which pump (or resequester) Ca^{++} from the cytosol back into the cisternae.

Item: Key
7 D

All the structures on the medial side of the fibula are deep. On the lateral aspect, only the head and the lateral malleolus are subcutaneous; the rest of the bone is covered mainly by muscle.

Item: Key
8 A

The deep plantar, or first proximal perforating, artery is one of the terminal branches of the dorsalis pedis artery.

Item: Key
9 B

In an attempt to counteract the significant loss of sodium caused by loop diuretic therapy, an increase in the Na^+-K^+ (and Na^+-H^+) exchange by the kidneys will occur, resulting in the development of hypokalemia.

Item: Key
10 D

The anterior talofibular ligament is oriented such that its attachments are distracted when the ankle joint is under inversion stress. Additional tension is applied in plantarflexion.

Item: Key
11 B

Asbestosis has been documented as a causative factor in carcinoma of the lung and malignant mesothelioma.

Item: Key
12 A

Amphotericin B, administered parenterally, is the most important of the drugs available for the treatment of systemic mycoses. It is often used for initial induction regimens prior to follow-up treatment. The fungicidal action of amphotericin B is due to its effects on the permeability and transport properties of fungal membranes.

Item: Key
13 D

The variable domain of each antibody contains different amino acids. These changes allow the antibody to bind specifically to only one antigen or to a limited number of very similar antigens that share common motifs.

Item: Key
14 B

Systolic pressure is the maximal pressure that can be recorded in a peripheral artery. Diastolic pressure is the minimal pressure that can be recorded in the same vessel during one cardiac cycle. The difference between systolic and diastolic pressure is termed the pulse pressure.

Item: Key
15 B

This syndrome is caused by a severe deficiency in the enzyme hypoxanthine guanine phosphoribosyltransferase (HGPRT) which salvages purine ring structures from the free bases, guanine and hypoxanthine, to produce nucleotides. If this salvage pathway is not operative, the purine bases are converted to uric acid, which leads to hyperuricemia and gout.

Item: Key
16 B

The outer leaflet of the outer membrane of gram-negative bacteria is composed of lipopolysaccharide. Only gram-negative bacteria contain an outer membrane.

Item: Key
17 D

Probenecid, a uricosuric agent, is a weak acid that competes with uric acid for reabsorption by the weak acid transport mechanism in the S2 segment of the proximal renal tubule. Probenecid can inhibit the secretion of a number of other weak acids, such as the penicillins, in addition to inhibiting the reabsorption of uric acid.

Item: Key
18 B

Of the three structures located on bones of the medial longitudinal arch (the sustentaculum tali, navicular tuberosity, and first metatarsal head), the navicular tuberosity is the most superior. It is also easily palpated through the skin.

Item: Key
19 D

Povidone-iodine is the best antiseptic of the choices provided. Although ethanol is considered an excellent antiseptic, it is not effective at 100% and is used at concentrations of 70%-95%.

Item: Key
20 C

Absorption of tetracycline is impaired by multivalent cations of calcium, magnesium, and aluminum, for example. Consequently, its absorption is impaired by dairy products and antacids, which contain multivalent cations.

Item: Key
21 B

Normally, the tubular load for glucose is only about 125 mg/min. The threshold for glucose to appear in the urine, i.e., to be cleared from the blood by the kidneys, is a tubular load of about 320 mg/min. Therefore, although glucose is a substance that is freely filtered, it is normally completely reabsorbed by the nephron, resulting in a clearance of zero.

Item: Key
22 D

Morphine is a more efficacious analgesic than aspirin, ibuprofen, or acetaminophen because morphine has a higher maximal effect. Efficacy is the maximal effect (Emax) that an agonist can produce if a dose is taken to very high levels. It is determined mainly by the nature of the receptor and its associated effector system and can be measured with a graded dose-response curve.

Item: Key
23 A

Sodium hydroxide (NaOH) and potassium hydroxide (KOH) are used to dissolve the tissue present in the skin scraping so that the fungi are easier to distinguish.

Item: Key
24 B

The nutrient artery of the tibia, a branch of the posterior tibial artery, usually enters the bone at the nutrient foramen.

Item: Key
25 D

The ischial tuberosity is one of the four fairly constant secondary centers of ossification in the hip bone.

Item: Key
26 C

The basal ganglia play a part in the upper motor neuron control of muscles. Damage to the basal ganglia could result in resting tremors of the hands.

Item: Key
27 C

Epinephrine binds to a class of G-protein receptors on liver cell plasma membranes and initiates an intracellular signaling cascade that begins with the stimulation of adenylyl cyclase and the production of intracellular cAMP. A cAMP-dependent protein kinase then initiates a phosphorylation cascade that results in the activation of glycogen phosphorylase and the breakdown of liver glycogen (glycogenolysis) and the subsequent release of free glucose into the blood.

Item: Key
28 A

An anaplastic change is a permanent modified malignant change.

Item: Key
29 D

Systemic fungal infections cause lung infections and pneumonia and are introduced into the pulmonary system by inhalation.

Item: Key
30 B

If a drug is displaced from its plasma protein binding site, it is free and will, therefore, achieve a higher tissue concentration. Only an unbound (free) drug can reach its site of action.

Item: Key
31 A

Beta oxidation begins with free fatty acids and, in most cases, results in the production of two carbon fragments in the form of acetyl-CoA.

Item: Key
32 D

Iatrogenic cortisone accelerates protein catabolism and inhibits reuptake of amino acids from protein catabolism.

Item: Key
33 B

In the third layer of plantar muscles, flexor hallucis brevis and adductor hallucis insert onto the base of the proximal hallucal phalanx, and flexor digiti minimi brevis inserts onto the base of the proximal phalanx of the fifth toe.

Item: Key
34 C

The skin of the lateral side of the foot and lower leg is part of the S1 dermatome.

Item: Key
35 C

Abrupt cessation of steroid therapy after long-term use results in a sharp decrease in cortisol, which would not lead to Cushing's syndrome.

Item: Key
36 A

Nissl substance is an aggregation of rough endoplasmic reticulum in neurons. Rough endoplasmic reticulum synthesizes a lot of proteins and, therefore, contains many ribosomes.

Item: Key
37 A

The alpha helix, a common form of secondary structure found in most proteins, is stabilized by hydrogen bonds.

Item: Key
38 A

The risk of developing acute leukemia is 10 to 20 times greater in individuals with Down syndrome.

Item: Key
39 B

The jugular notch is part of the manubrium of the sternum. The manubrium is anatomically significant in that it is used to locate other structures of the thoracic cage, such as the jugular veins and the articulation of the clavicles.

Item: Key
40 A

The facial nerve, which is located anterior to the ear and passes through the parotid gland, provides motor innervation to the muscles of facial expression. Injury to the area of the parotid gland can cause paralysis of the facial muscles.

Item: Key
41 B

In poliomyelitis a virus specifically attacks the anterior horn cells of the spinal cord, which causes paralysis.

Item: Key
42 D

Bethanechol, a choline ester with good resistance to cholinesterase, is clinically very effective for postoperative and neurogenic ileus and urinary retention.

Item: Key
43 D

Elevated serum alkaline phosphatase and normal levels of serum calcium in an elderly patient are typical of Paget's disease.

Item: Key
44 C

Delayed-type hypersensitivity occurs when sensitized T_H1 cells release cytokines. These cytokines lead to macrophage and T_C activation and direct cellular damage.

Item: Key
45 A

Approximately 50% of methotrexate is bound to plasma proteins and may be displaced from plasma albumin by a number of drugs, including salicylates. Renal excretion of methotrexate occurs through a combination of glomerular filtration and tubular secretion. Therefore, the concurrent use of drugs that reduce renal blood flow, such as nonsteroidal anti-inflammatory drugs (NSAIDs), can delay drug excretion and lead to severe myelosuppression.

Item: Key
46 C

Linolenic acid is required in the diet because human metabolism is not capable of producing the pattern of unsaturation (double bonds) found in this structure.

Item: Key
47 D

The cross-sectional area of the interosseous sacroiliac ligament is much greater than that of the sacrospinous, ventral sacroiliac, and dorsal sacroiliac ligaments.

Item: Key
48 A

The right coronary artery, which originates from the ascending aorta, is one of two coronary arteries that are the source of oxygenated blood to the heart.

Item: Key
49 B

The size and shape of cells and their nuclei are variable in dysplasia, which may occur in response to chronic irritation or inflammation.

Item: Key
50 C

Buerger's disease is an unusual inflammatory and thrombotic disease of the extremities, typically occurring in young men.

Item: Key
51 A

The zona glomerulosa of the adrenal gland produces aldosterone, which regulates renal function and maintains electrolyte balance in the blood (normal tension).

Item: Key
52 B

In patients with type 1 diabetes and diabetic nephropathy, captopril prevents or delays the progression of renal disease.

Item: Key
53 C

Exercise increases insulin sensitivity, which decreases the needed dose of insulin.

Item: Key
54 B

Gram-negative bacteria have a much thinner layer of peptidoglycan than gram-positive cells. Ethanol, used for the wash step, removes the water from peptidoglycan and causes it to collapse in both gram-positive and gram-negative cells. The ethanol also solubilizes the outer membrane. The collapsed peptidoglycan layer of gram-negative cells is too thin to retain the dye and the cells become colorless. They appear red after staining with the secondary stain.

Item: Key
55 D

In addition to causing mild diseases such as strep throat, *Streptococcus pyogenes* can cause necrotizing fasciitis. Although exotoxin A is not always associated with necrotizing fasciitis, exotoxin A is produced by *Streptococcus pyogenes* and can be present in necrotic tissues.

Item: Key
56 D

The gluteus medius muscle originates from the dorsum of the ilium between the anterior and posterior gluteal line, inferior to the iliac crest. It is the only muscle listed that is in a position to abduct the thigh.

Item: Key
57 A

Amantadine is an antiviral agent specific for influenza A. It prevents viral uncoating and penetration.

Item: Key
58 B

The margins of the aortic valve tightly approximate at the start of ventricular diastole, preventing backflow from the aorta into the left ventricle.

Item: Key
59 C

Vital capacity represents the sum of the inspiratory reserve volume, the tidal volume, and the expiratory reserve volume; in short, it represents the maximal volume of air that the respiratory tract can ventilate.

Item: Key
60 D

The common fibular (peroneal) nerve supplies motor innervation to the muscles in the leg that dorsiflex the foot. Due to its superficial position around the fibular neck, it is the major nerve of the lower extremity that is injured most often.

PRACTICE TEST 2
ANSWER KEYS AND RATIONALES

Item: Key
1 A

Gluconeogenesis is the process by which the metabolism of noncarbohydrate sources results in the production of either pyruvate (or its equivalent) or oxaloacetate, which can be used to produce glucose via phosphoenolpyruvate.

Item: Key
2 B

The sartorius muscle, which runs obliquely from proximal lateral to distal medial as it crosses the anterior thigh, is the only muscle listed to receive its innervation from the femoral nerve.

Item: Key
3 D

Parkinson's disease is associated with lesions in the dopaminergic cells of the substantia nigra.

Item: Key
4 D

The linea aspera is a rough ridge on the posterior aspect of the femoral shaft, marking the closely related attachments of a number of muscles and the intermuscular septa of the thigh.

Item: Key
5 C

The fibularis (peroneus) longus muscle has its origin on the head and upper part of the lateral surface of the shaft of the fibula. Its tendon passes posterior to the lateral malleolus, along the lateral side of the calcaneus, and through the fibular (peroneal) groove on the plantar surface of the cuboid to insert on the plantar posterolateral aspect of the medial cuneiform and the lateral side of the base of the first metatarsal. With the tendon running posterior to the ankle axis and lateral to the subtalar joint and midtarsal joint axes, it is the only muscle of those listed that can both plantarflex and evert the foot.

Item: Key
6 B

In alcoholism, there is peripheral neuropathy caused by demyelination. Elevated liver enzymes are also seen with chronic alcohol consumption.

Item: Key
7 D

Transitional epithelium is found only in the urinary system. It withstands distension stress due to pressure in the bladder from a transition state (empty or full).

Item: Key
8 C

The fibular (peroneal) artery, arising from the posterior tibial artery at the level of the inferior border of the popliteus muscle, is its largest major branch.

Item: Key
9 A

Androgen alters bone metabolism such that epiphyseal plate closure is accelerated.

Item: Key
10 A

The first lumbrical muscle arises from the medial side of the flexor digitorum tendon slip to the second toe and inserts into the medial side of the extensor hood of that same toe.

Item: Key
11 A

Cardiovascular adverse effects, including bradycardia, are extensions of the beta blockade induced by beta-blocking agents.

Item: Key
12 D

Most of the muscles in the medial compartment of the thigh are innervated by the obturator nerve; only the pectineus muscle does not usually receive motor innervation from this nerve.

Item: Key
13 A

Endospores are bacterial spores. The spores are highly resistant to extremes in heat (including boiling water) and pH. *Clostridium* is one of the relatively few species that produce endospores.

Item: Key
14 A

The fibers of the gluteus maximus muscle pass inferolaterally from the posterior aspect of the gluteal surface of the ilium to the fascia lata at the iliotibial band, which it helps to create. The other muscles listed have no attachment to the iliotibial band or the fascia lata.

Item: Key
15 D

Toxicities associated with aminoglycosides include auditory or vestibular damage; nephrotoxicity in the form of acute tubular necrosis; neuromuscular blockage, which may occur at high doses; and allergic skin reactions.

Item: Key
16 D

Unreabsorbed glucose in the proximal tubules increases the tubular fluid oncotic pressure. This increase, if significant, results in osmotic diuresis and consequent polyuria.

Item: Key
17 D

Bleeding time is a test of platelet function. It measures the time it takes to actually stop bleeding from a cut.

Item: Key
18 A

Except for a small area at the proximal end where the pes anserinus tendons insert, the entire medial surface of the shaft of the tibia is subcutaneous.

Item: Key
19 A

The coronary sinus, which drains deoxygenated blood into the right atrium, provides for the most important venous drainage of the heart.

Item: Key
20 C

Coccidioidomycosis caused by *Coccidioides immitis* is usually geographically restricted. It is endemic only in certain hot, dry regions with mild winters.

Item: Key
21 A

Kyphosis is a type of abnormality of the skeletal system associated with the thorax.

Item: Key
22 A

Ossification of the tibia, like other long bones, begins in the shaft. The primary ossification center appears at about 7 weeks of gestation, while secondary centers appear around the time of birth or later.

Item: Key
23 A

The tuberculin skin test is a delayed-type hypersensitivity test. PPD (a mix of tuberculin proteins) is injected intradermally. A patient who has been infected with *Mycobacterium tuberculosis* will have T_H1 cells specific for PPD. Activation of the T_H1 cells by PPD will cause a localized delayed-type hypersensitivity.

Item: Key
24 B

The disulfide bond provides important cross-links, which may stabilize proteins. The chemical nature of the disulfide bond is an -S-S- linkage between the sulfur atoms in the side chains of cysteine residues.

Item: Key
25 C

When Ca⁺⁺ binds to troponin C, the result is a steric alteration of the troponin I molecule which, in turn, sterically shifts the tropomyosin molecule away from the bond sites on actin. Uncovering the bond sites activates myosin ATPase, which initiates contraction.

Item: Key
26 A

The first and second dorsal interosseous muscles are abductors of the second toe, the first in a medial direction and the second in a lateral direction.

Item: Key
27 B

Trichophyton rubrum causes cutaneous mycoses; species of *Trichophyton* attack the skin, nails, and hair. Itraconazole, a triazole, is orally active against *Trichophyton rubrum*.

Item: Key
28 B

The dome of the unstimulated diaphragm projects into the thoracic cavity. Phrenic nerve stimulation flattens the diaphragm, increasing the volume of the thoracic cavity. This, in turn, increases lung volume.

Item: Key
29 C

Tibialis anterior inserts on the medial and plantar surfaces of the medial cuneiform, tibialis posterior inserts on the tuberosity of the bone, and fibularis (peroneus) longus inserts on its lateral surface.

Item: Key
30 C

Injury to the hypoglossal nerve can lead to an inability to protrude the tongue.

Item: Key
31 B

Organ rejection is mediated by CD4⁺ and CD8⁺ T cells (lymphocytes).

Item: Key
32 C

Scleroderma is a disease marked by increased collagen deposition and effects that do not include thymic hypoplasia.

Item: Key
33 C

The tubercle bacillus, which causes tuberculosis, causes the development of epithelioid cells and caseous necrosis.

Item: Key
34 B

Succinylcholine, a depolarizing neuromuscular blocker, depolarizes the neuromuscular end-plate.

Item: Key
35 C

Compared to white muscle fibers, red muscle fibers require more energy for contraction for short periods of time. Mitochondria produce the energy required through the Krebs (tricarboxylic acid) cycle.

Item: Key
36 C

In the presence of a competitive antagonist, the log dose-response curve is shifted to higher doses, that is, horizontally to the right on the dose axis.

Item: Key
37 C

Hemoglobin and myoglobin share a unique ability to maintain the oxidation state of the iron in their heme moieties in the +2 state (ferrous) while reversibly binding oxygen.

Item: Key
38 D

Sporothrix schenckii lesions begin as painless papules that eventually ulcerate and become chronic. The lesions will often begin at one location and spread up the lymphatics leaving satellite lesions behind.

Item: Key
39 C

Injury to the spinal cord in the dorsal columns can result in the loss of discriminatory touch and conscious proprioception of the joints of the extremities distal to the point of injury.

Item: Key
40 C

In bacterial meningitis, the sugars are taken up by the bacteria and the neutrophils in the cerebrospinal fluid.

Item: Key
41 C

Parasympathetic cholinergic stimulation of single-unit, smooth muscle M receptors increases IP₃ synthesis, which increases intracellular Ca⁺⁺. Ca⁺⁺ then forms the calcium-calmodulin complex, which activates myosin light chain kinase, thereby triggering contraction.

Item: Key
42 D

Compared to aspirin, indomethacin, and piroxicam, hydrocortisone has the greatest anti-inflammatory potency and would profoundly alter the immune response of lymphocytes. The immunosuppressive and anti-inflammatory actions of hydrocortisone are inextricably linked, because they both involve inhibition of leukocyte functions.

Item: Key
43 A

Decreased plasma protein concentrations decrease the magnitude of the osmotic gradient for fluid flow back into the capillary, thereby increasing the tendency for fluid to flow out of the capillary.

Item: Key
44 C

Leukotrienes, including leukotriene C₄, are produced from arachidonic acid by lipoxygenase.

Item: Key
45 D

The deep femoral (profunda femoris) artery is the largest branch of the femoral artery and the chief artery of the thigh.

Item: Key
46 D

In folic acid deficiency, there is megaloblastic anemia due to decreased or absent levels of folic acid during DNA synthesis, which leads to large red blood cells (macrocytes) and hypersegmented granulocytes.

Item: Key
47 B

By decreasing calcium influx during an action potential, verapamil reduces intracellular calcium concentration and muscle contractility. Calcium blockers relax blood vessels and reduce cardiac rate and contractility. Verapamil blocks calcium-dependent conduction in the AV node and may be used to treat AV nodal arrhythmias.

Item: Key
48 C

Due to the nonspecific nature of congenital rubella, a diagnosis cannot be made based on symptoms alone. Rubella virus is an enveloped single-stranded, positive-sense RNA virus that can hemagglutinate some types of red blood cells.

Item: Key
49 C

Vincristine has neurotoxic actions and may cause areflexia, peripheral neuropathy, and paralytic ileus.

Item: Key
50 C

Sickle cell anemia causes splenic infarction, which occurs when the sinusoids of the spleen are blocked by the sickling of erythrocytes in the small vessels.

Item: Key
51 D

In the ascending limb of Henle's loop, Na and Cl are actively reabsorbed without the accompaniment of water. Diuretics that work primarily at the ascending limb of Henle's loop interfere with the reabsorption of 20% to 30% of the filtered load of the kidney and manifest the most effective diuretic action.

Item: Key
52 C

Plasma cells (effector B cells) are the subset of B cells that secrete most of the antibodies during a primary immune response.

Item: Key
53 B

The two infrapatellar bursae are named according to their position relative to the patellar ligament.

Item: Key
54 B

The more rapidly a drug equilibrates with the blood, the more quickly the drug passes into the brain to produce anesthetic effects. Drugs with a low blood-gas partition coefficient equilibrate more rapidly than do drugs with a higher blood solubility.

Item: Key
55 D

Vitamin B₁₂ is found in the diet generally bound to protein. In order for it to be absorbed, it must first be liberated from dietary protein by the digestion process in which it is bound to a glycoprotein called intrinsic factor.

Item: Key
56 D

Acid-fast staining is a characteristic of *Mycobacterium* species. *Mycobacterium avium-intracellulare* causes cavitary pulmonary disease. Once considered rare, it is a common systemic infection in patients with AIDS.

Item: Key
57 D

The left ventricle must overcome the resistance present in the total peripheral circulation, which is about seven times greater than that which the right ventricle must overcome with the pulmonary circulation.

Item: Key
58 C

Heberden's nodes are not associated with an autoimmune disease.

Item: Key
59 A

5-Fluorouracil, an antimetabolite, is converted in the body to the corresponding deoxyribonucleotide, which is an analog of thymidylate and a potent inhibitor of thymidylate synthetase and, therefore, an inhibitor of thymidylate synthesis.

Item: Key
60 C

Autoclaving at 121°C, 15 lb/in² steam pressure is the only method of the choices provided that will kill all bacterial endospores; therefore, it is the most effective method.

**PRACTICE TEST 3
ANSWER KEYS AND RATIONALES**

Item: Key
1 B

Adductor longus crosses only the hip joint.

Item: Key
2 A

Compared to hepatitis B, alcoholic hepatitis, and chronic active hepatitis, hepatitis A has the best prognosis because it is acute and self-limiting. The causative virus induces a significant immunologic response which leads to its control.

Item: Key
3 C

The cytoskeleton is the cell's architecture. It is comprised of microtubules which define the structure and shape of cells.

Item: Key
4 C

The motor cortex of the precentral gyrus contributes a significant percentage of efferent fibers to the corticospinal tract. Lesions involving the precentral gyrus and/or the corticospinal tract result in the inability to perform fine, voluntary movements.

Item: Key
5 B

The small saphenous vein leaves the dorsum of the foot by passing posterior to the lateral malleolus, coursing posteriorly, to enter the lower leg, where it travels with the sural nerve.

Item: Key
6 D

The amino acid tyrosine is the precursor of all catecholamines, including dopamine.

Item: Key
7 B

The spinal accessory nerve, a primary nerve of the brachial plexus, innervates the trapezius muscle.

Item: Key
8 C

Reed-Sternberg cells are typically found in lymph nodes and the spleen. They are distinctive macrophages seen only in Hodgkin's disease.

Item: Key
9 D

The complement system is part of the humoral immune response. There are two mechanisms for activating the complement system: the classical and the alternate pathways. The classical pathway involves the binding of antibodies to the target (e.g., the bacterial cell).

Item: Key
10 C

Acute inflammation is a response to injury that causes the release of many factors from both injured cells and inflammatory cells. Some of the factors affect blood vessels. Blood flow increases and more leaking occurs, which causes proteinaceous edema. Neutrophils migrate out of vessels into the interstitial space to clean up the injured cell debris or infectious agent.

Item: Key
11 A

Multiple myeloma is a unique myeloproliferative disorder that originates in the hematopoietic stem cells, which primarily affect the differentiated nature of B lymphocytes and plasma cells. In one particular form, the defect leads to the production of significant amounts of a monoclonal antibody. It also presents with lytic bone lesions due to the proliferation of the B lymphocyte clones in the bone marrow.

Item: Key
12 C

Axonal pain and temperature fibers cross at the level of the spinal cord. Axonal fibers carrying proprioception information do not cross at the level of the spinal cord.

Item: Key
13 A

Indomethacin, a potent nonsteroidal anti-inflammatory drug (NSAID), is effective in inhibiting the inflammation of acute gout.

Item: Key
14 A

Erythrasma is a chronic superficial infection of the skin caused by *Corynebacterium minutissimum*. These bacteria produce porphyrin, which appears as a coral red fluorescence under Wood's light.

Item: Key
15 C

Since the resting position of the second toe is the reference for digital abduction and adduction, it can only abduct to one side or the other. The hallux has its own adductor. Therefore, the third toe is the most medial toe that can be adducted by a plantar interosseous muscle.

Item: Key
16 B

Type I hypersensitivity (immediate hypersensitivity) is induced when antigen cross-links IgE that is bound to mast cells and basophils. This causes the release of vasoactive mediators.

Item: Key
17 D

The synthesis of ATP in the mitochondrion via oxidative phosphorylation is dependent on the generation of a proton gradient between the matrix of the mitochondrion and the inter-membrane space. This gradient is produced by electron transport and thus electron transport is required for ATP synthesis (oxidative phosphorylation).

Item: Key
18 C

Campylobacter jejuni, the causative agent of campylobacteriosis, is transmitted to humans through the ingestion of contaminated food or by direct contact with infected pets. It is not transmitted by arthropod vectors.

Item: Key
19 C

The radial nerve innervates the extensor muscles of the forearm. Injury to the radial nerve causes paralysis of the extensors. The extensors are then unopposed by the action of the flexor muscles, which results in the bending of the wrist joint toward the flexor side.

Item: Key
20 A

Based on the Michaelis-Menten equation, $v_0 = V_{max} [S]/K_m + [S]$, K_m is numerically equal to the substrate concentration when $v_0 = V_{max}/2$. This can be illustrated by solving the Michaelis-Menten equation for $[S]$ and substituting $V_{max}/2$ for the initial velocity, v_0 . Thus, the common definition of K_m is often stated as the substrate concentration for a given enzyme and substrate that will produce one-half of the V_{max} .

Item: Key
21 C

The first dorsal metatarsal artery usually branches directly from the dorsalis pedis artery. At the first webspace, between the hallux and the second toe, it divides into two branches. The more lateral branch then divides as it passes distally into a medial and lateral branch. The lateral branch, the third dorsal digital artery, supplies the medial side of the second toe.

Item: Key
22 C

The binding of carbon monoxide to hemoglobin is very tight and exceeds the binding of other ligands to the heme iron.

Item: Key
23 D

Procainamide causes hypotension, especially when used parenterally, and a reversible syndrome similar to systemic lupus erythematosus.

Item: Key
24 B

The lateral and medial femoral circumflex arteries are usually branches of the deep femoral artery.

Item: Key
25 A

Swelling of the hands and feet at birth, a "webbed" neck, and coarctation of the aorta are features typically seen in Turner's syndrome.

Item: Key
26 D

Aldosterone increases Na⁺ reabsorption primarily in the collecting duct by increasing insertion of Na⁺ channel proteins into the membrane of principal cells, increasing principal cell synthesis of Na⁺ channels and increasing the activity of the Na⁺-K⁺ exchangers.

Item: Key
27 C

The lateral plantar nerve divides into a superficial and a deep branch at the level of the base of the fifth metatarsal bone. The deep branch travels deep to the oblique head of the adductor hallucis muscle and superficial to the plantar interossei muscles.

Item: Key
28 C

Miconazole is an effective treatment for tinea pedis. It readily penetrates the stratum corneum of the skin and persists there for more than 4 days after application. Irritation, burning, and maceration are rare after cutaneous application.

Item: Key
29 B

Mycobacterium tuberculosis bacteria are aerobic and grow best under microaerophilic (5%-10% CO₂) conditions. The bacteria are acid-fast because arylmethane dyes are retained after washing with weak acid. The stained bacteria appear as rods.

Item: Key
30 D

The P-R interval includes not only the time necessary for atrial depolarization but also the time necessary for completion of conduction through the atrioventricular (AV) node.

Item: Key
31 C

Erythromycin is a bacteriostatic agent that inhibits protein synthesis by binding reversibly to 50S ribosomal subunits of sensitive microorganisms.

Item: Key
32 A

Infection with herpes simplex virus causes grouped or singular vesicular lesions that become pustular and may coalesce to form larger ulcers. Intracellular inclusion bodies or multinucleated bodies can be seen in a direct smear prepared from the base of a suspected lesion.

Item: Key
33 C

Tuberculosis involves a cellular response typical of type IV hypersensitivity.

Item: Key
34 A

Tidal volume and inspiratory reserve volume represent the inspiratory capacity or the maximum volume of air that can be inhaled following a eupneic tidal exhalation.

Item: Key
35 B

Thiazides are excreted by both glomerular filtration and tubular secretion. Tubular secretion is the same mechanism that handles uric acid secretion. The thiazides compete with uric acid and displace it from its binding site, resulting in the development of hyperuricemia.

Item: Key
36 C

Protamine zinc insulin suspension has a duration of action of 24 to 36 hours, which is longer than the duration of action of regular insulin, isophane insulin suspension, and insulin zinc suspension.

Item: Key
37 B

Cells in the pars nervosa secrete ADH to regulate electrolyte balance in the blood (normal tension).

Item: Key
38 B

An isotonic twitch allows the muscle to shorten; an isometric twitch does not.

Item: Key
39 D

The superior cervical ganglion is the only source of postganglionic sympathetic innervation to the head.

Item: Key
40 B

In a 78-year-old patient, the presence of stiffness, decreased joint mobility, and osteophytic nodules suggests a diagnosis of osteoarthritis.

Item: Key
41 D

In the absence of insulin, metabolism is retained in a mode that favors gluconeogenesis, glycogenolysis, and lipolysis. This leads to increased levels of blood glucose and mobilization of fatty acids from adipose tissue via triglyceride breakdown.

Item: Key
42 A

Vagal nerve activation stimulates the cholinergic efferents of the SA node and the AV node. The nodal tissue becomes hyperpolarized, which decreases the slope of depolarization. This results in an increase in the duration of nodal delay and, consequently, a longer P-R interval.

Item: Key
43 B

Enzyme induction usually results from increased synthesis of cytochrome-P450-dependent drug-oxidizing enzymes in the liver. Several days are usually required to reach maximum induction; a similar amount of time is required to regress after withdrawal of the inducer.

Item: Key
44 C

Ascorbic acid or vitamin C is required in the human diet. While some animals are capable of the synthesis of ascorbic acid from glucuronic acid, humans are not. This vitamin is a required cofactor for several critical oxidation reactions.

Item: Key
45 B

Upper limb bud development precedes lower limb bud development by a few days.

Item: Key
46 D

Actinic keratosis is considered a dysplastic, premalignant lesion.

Item: Key
47 A

The tendon of the gracilis muscle inserts on the medial surface of the shaft of the tibia. It passes posterior to the knee joint axis, inserting distal to the joint itself, making it the only muscle of those listed that can flex the knee joint.

Item: Key
48 D

The metatarsophalangeal joints are ellipsoidal joints and are, therefore, biaxial.

Item: Key
49 B

The duration of action of a normal dose of atropine is 4 to 8 hours, except in the eye, where the effect is much longer. Atropine may be used to dilate the pupil and to paralyze accommodation, but the duration of action is greater than 72 hours. Blurred vision is a common adverse effect of atropine.

Item: Key
50 A

Stress stimulates the synthesis and release of glucocorticoids by the adrenal cortex.

Item: Key
51 C

The sensitivity of a bacterium to an antibiotic is determined by measuring the zone of clearance around an antibiotic disc in a lawn of bacteria. The antibiotic slowly diffuses away from the disc forming a concentration gradient. An organism is considered resistant if it is resistant to a clinically relevant concentration of antibiotic. Therefore, the size of the zone of inhibition is essential in determining sensitivity. The rate of bacterial growth can affect the size of the zone, so that the standard zone sizes apply only to fast-growing aerobic organisms.

Item: Key
52 A

Electrolyte loss and dehydration during a bout of diarrhea can be fatal. Diphenoxylate and paregoric, by effectively decreasing peristalsis, can decrease electrolyte loss and dehydration, which allows for more effective reabsorption of both fluid and valuable electrolytes and prevents severe dehydration.

Item: Key
53 A

Haloperidol, an antipsychotic butyrophenone, blocks brain dopamine D2 receptors and is primarily associated with the development of tardive dyskinesia.

Item: Key
54 D

The os tibiale externum is a relatively common accessory bone found at the medial aspect of the navicular. It is formed from a secondary center of ossification of the navicular tuberosity that fails to fuse with the body of the navicular.

Item: Key
55 A

The proximal attachments of the extensor digitorum longus muscle include the lateral condyle of the tibia, the upper portion of the medial surface of the shaft of the fibula, and the upper part of the interosseus membrane between the tibia and the fibula. As the muscle passes distally, it passes anterior to the ankle joint and divides into four slips to insert in both the middle and distal phalanges of digits two through five as part of the extensor expansion complex. Because its tendons pass lateral to the subtalar joint and midtarsal joint axes, it is the only muscle of those listed that can both dorsiflex and evert the foot.

Item: Key
56 C

A deficiency of vitamin C leads to defects in collagen synthesis, particularly in vascular walls, which leads to an increased risk of hemorrhage.

Item: Key
57 B

Mycetoma is an infection associated with trauma to the foot. Hyphae in the tissue tend to form granules that are visible in the exudate.

Item: Key
58 B

The lateral surface of the shaft of the fibula gives origin to the muscles of the lateral osteofascial compartment of the leg, which are the fibularis (peroneus) longus and fibularis (peroneus) brevis muscles.

Item: Key
59 C

Coccidioides immitis causes primary respiratory infection including fever, chest pain, and cough. If the disease becomes disseminated, it can affect the bones, joints, and meninges. The presence of spherules is diagnostic.

Item: Key
60 A

The linea aspera is located along the length of the shaft of the femur.