

Appendix B

Answers to Chapter Review Questions

This appendix provides answers to the end-of-chapter Testing Your Recall and True/False questions. In the True or False sections, all statements are true except those listed and explained here. Answers to the figure legend questions are given at the end of each chapter; answers to Think About It and Testing Your Comprehension questions are in the Instructor's Manual; and answers to Testing Your Comprehension are also given at the Online Learning Center at www.mhhe.com/saladin3.

Chapter 1

- | | | |
|------|-------------------|-----------------------|
| 1. a | 8. c | 15. homeostasis |
| 2. e | 9. d | 16. set point |
| 3. d | 10. b | 17. negative feedback |
| 4. a | 11. dissection | 18. organ |
| 5. c | 12. Hooke | 19. stereoscopic |
| 6. c | 13. deduction | 20. prehensile, |
| 7. a | 14. psychosomatic | opposable |

True or False (explanation of the false statements only)

- Auscultation means listening to body sounds, not inspecting its appearance.
- Leeuwenhoek was a textile merchant who built microscopes to examine fabric.
- A scientific theory is founded on a large body of evidence, summarizing what is already known.
- Both the treatment and control groups consist of volunteer patients.
- Negative feedback is a self-corrective process with a beneficial effect on the body.

Atlas A

- | | | |
|------|-----------------|------------------------|
| 1. d | 8. d | 15. hand, foot |
| 2. c | 9. b | 16. meninges |
| 3. e | 10. d | 17. retroperitoneal |
| 4. d | 11. supine | 18. medial |
| 5. d | 12. parietal | 19. inferior |
| 6. a | 13. mediastinum | 20. cubital, popliteal |
| 7. a | 14. nuchal | |

True or False (explanation of the false statements only)

- The diaphragm is inferior to the lungs.
- The esophagus is in the ventral body cavity.
- The liver is in the hypochondriac region, superior to the lateral abdominal region.
- The peritoneum lines the outside of the stomach and intestines.
- The sigmoid colon is in the lower left quadrant.

Chapter 2

- | | | |
|------|-------------------|----------------------|
| 1. a | 8. c | 14. anabolism |
| 2. c | 9. b | 15. dehydration |
| 3. a | 10. d | synthesis |
| 4. c | 11. cation | 16. -ose, -ase |
| 5. a | 12. free radicals | 17. phospholipids |
| 6. e | 13. catalyst, | 18. cyclic adenosine |
| 7. b | enzymes | monophosphate |

- | | |
|---------------|---------------|
| 19. anaerobic | 20. substrate |
| fermentation | |

True or False (explanation of the false statements only)

- The monomers of a polysaccharide are monosaccharides (simple sugars).
- Such molecules are called isomers, not isotopes.
- A saturated fat is one to which no more hydrogen can be added.
- Above a certain temperature, enzymes denature and cease working.
- These solutes have different molecular weights, so 2% solutions would not contain the same amount of solute.

Chapter 3

- | | | |
|------|-----------------------|----------------------|
| 1. e | 9. d | 16. exocytosis |
| 2. b | 10. b | 17. nucleus, |
| 3. d | 11. micrometers | mitochondria |
| 4. b | 12. second messenger | 18. smooth ER, |
| 5. e | 13. voltage-regulated | peroxisomes |
| 6. e | 14. hydrostatic | 19. ligand-regulated |
| 7. a | pressure | gate |
| 8. c | 15. hypertonic | 20. cisterna |

True or False (explanation of the false statements only)

- Osmosis does not require ATP.
- Second messengers activate enzymes in the cell; they are not transport proteins.
- A channel could not move material from the outside of a cell to the inside unless it extended all the way across the membrane; it must be an integral protein.
- The plasma membrane consists primarily of phospholipid molecules.
- The brush border is composed of microvilli.

Chapter 4

- | | | |
|------|------------------|---------------------|
| 1. a | 8. d | 15. RNA polymerased |
| 2. e | 9. d | 16. chaperones |
| 3. c | 10. a | 17. 46, 92, 92 |
| 4. c | 11. cytokinesis | 18. ribosome |
| 5. e | 12. alleles | 19. growth factors |
| 6. b | 13. genetic code | 20. autosomes |
| 7. a | 14. polyribosome | |

True or False (explanation of the false statements only)

- There are no ribosomes on the Golgi complex; they are on the rough ER.
- There are no genes for steroids, carbohydrates, or phospholipids, but only for proteins.
- This law describes the pairing of bases between the two strands of DNA, not between mRNA and tRNA.
- Males have only one X chromosome, but have two sex chromosomes (the X and Y).
- Several RNA polymerase molecules at once can transcribe a gene.

Chapter 5

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|------|------|------|
| 1. a | 3. c | 5. c |
| 2. b | 4. e | 6. a |

Appendix B Answers to Chapter Review Questions **A-3**

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|-----------------|---------------------|-------------------|
| 7. b | 13. lacunae | 18. matrix |
| 8. e | 14. fibers | (extracellular |
| 9. b | 15. collagen | material) |
| 10. b | 16. skeletal muscle | 19. proteoglycans |
| 11. necrosis | 17. basement | 20. simple |
| 12. mesothelium | membrane | |

True or False (explanation of the false statements only)

- The esophageal epithelium is nonkeratinized.
- Adipose tissue is an exception; cells constitute most of its volume.
- Adipocytes are also found in areolar tissue, either singly or in small clusters.
- Tight junctions serve mainly to restrict the passage of material between cells.
- Perichondrium is lacking from fibrocartilage and from hyaline articular cartilage.

Chapter 6

- | | | |
|------|---------------------|------------------|
| 1. d | 9. a | 16. earwax |
| 2. c | 10. d | 17. sebaceous |
| 3. d | 11. insensible | glands |
| 4. b | perspiration | 18. anagen |
| 5. a | 12. piloerector | 19. dermal |
| 6. e | 13. debridement | papilla |
| 7. c | 14. cyanosis | 20. third-degree |
| 8. a | 15. dermal papillae | |

True or False (explanation of the false statements only)

- Keratin is the protein of the epidermis; the dermis is composed mainly of collagen.
- Vitamin D synthesis begins in the keratinocytes.
- The hypodermis is not considered to be a layer of the skin.
- Different races have about the same density of melanocytes but different amounts of melanin.
- A genetic lack of melanin causes albinism, not pallor. Pallor is a temporary, nonhereditary paleness of the skin.

Chapter 7

- | | | |
|------|------------------------|------------------|
| 1. e | 8. e | 15. hypocalcemia |
| 2. a | 9. b | 16. osteoblasts |
| 3. d | 10. d | 17. calcitriol |
| 4. c | 11. hydroxyapatite | 18. osteoporosis |
| 5. d | 12. canaliculi | 19. metaphysis |
| 6. a | 13. appositional | 20. osteomalacia |
| 7. d | 14. solubility product | |

True or False (explanation of the false statements only)

- The most common bone disease is osteoporosis, not fractures.
- Bones elongate at the epiphyseal plate, not the articular cartilage.
- Osteoclasts develop from stem cells in the bone marrow, not from osteoblasts.
- Hydroxyapatite is the major mineral of bone; the major protein is collagen.
- The major effect of vitamin D is bone resorption, though it also promotes deposition.

Chapter 8

- | | | |
|------|----------------------|---------------|
| 1. b | 9. e | 17. auricular |
| 2. e | 10. b | 18. styloid |
| 3. a | 11. fontanels | 19. pollex, |
| 4. d | 12. temporal | hallux |
| 5. a | 13. sutures | 20. medial |
| 6. e | 14. sphenoid | longitudinal |
| 7. c | 15. annulus fibrosus | |
| 8. b | 16. dens | |

True or False (explanation of the false statements only)

- Each hand and foot has 14 phalanges.
- The female pelvis is wider and shallower than the male's.

- The lumbar vertebrae have transverse processes but no transverse costal facets.
- The most frequently broken bone is the clavicle.
- Arm* refers to the region containing only the humerus; *leg* refers to the region containing the tibia and fibula.

Chapter 9

- | | | |
|------|--------------------|---------------------|
| 1. c | 8. d | 15. gomphosis |
| 2. b | 9. b | 16. serrate |
| 3. a | 10. d | 17. extension |
| 4. e | 11. synovial fluid | 18. range of motion |
| 5. c | 12. bursa | 19. labrum |
| 6. c | 13. pivot | 20. menisci |
| 7. a | 14. kinesiology | |

True or False (explanation of the false statements only)

- Osteoarthritis occurs in almost everyone after a certain age; rheumatoid arthritis is less common.
- A kinesiologist studies joint movements; a rheumatologist treats arthritis.
- Synovial joints are diarthroses and amphiarthroses but never synarthroses.
- The round ligament is somewhat slack and probably does not secure the femoral head.
- Synovial fluid is secreted by the synovial membrane of the joint capsule and fills the bursae.

Chapter 10

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|------|-----------------|-------------------------|
| 1. b | 8. a | 14. hamstring |
| 2. e | 9. d | 15. flexor retinacula |
| 3. a | 10. c | 16. urogenital triangle |
| 4. c | 11. origin | 17. linea alba |
| 5. e | 12. fascicle | 18. synergist |
| 6. e | 13. prime mover | 19. bipennate |
| 7. b | (agonist) | 20. sphincter |

True or False (explanation of the false statements only)

- The mastoid process is its insertion.
- The trapezius is superficial to the scalenes.
- Normal exhalation does not employ these muscles.
- They result from rapid extension of the knee, not flexion.
- They are on opposite sides of the tibia and act as antagonists.

Atlas B

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|-------|-------|-------|
| 1. f | 11. y | 21. k |
| 2. b | 12. m | 22. d |
| 3. k | 13. n | 23. f |
| 4. p | 14. e | 24. b |
| 5. h | 15. g | 25. a |
| 6. z | 16. v | 26. u |
| 7. o | 17. f | 27. j |
| 8. x | 18. c | 28. i |
| 9. c | 19. y | 29. g |
| 10. a | 20. x | 30. q |

Chapter 11

- | | | |
|------|------------------------|-------------------|
| 1. a | 8. c | 15. acetylcholine |
| 2. d | 9. e | 16. myoglobin |
| 3. b | 10. b | 17. Z discs |
| 4. d | 11. threshold | 18. varicosities |
| 5. a | 12. complete tetanus | 19. muscle tone |
| 6. c | 13. terminal cisternae | 20. lactic acid |
| 7. e | 14. myosin | |

True or False (explanation of the false statements only)

- A motor neuron may supply 1,000 or more muscle fibers; a motor unit consists of one motor neuron and all the muscle fibers it innervates.
- Calcium binds to troponin, not to myosin.

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- Thick and thin filaments are present but not arranged in a way that produces striations.
- Under natural conditions, a muscle seldom or never attains complete tetanus.
- A muscle produces most of its ATP during this time by anaerobic fermentation, which generates lactic acid; it does not consume lactic acid.

Chapter 12

- | | | |
|------|-------------------|----------------------|
| 1. e | 9. d | 15. oligodendrocytes |
| 2. c | 10. b | 16. nodes of Ranvier |
| 3. d | 11. afferent | 17. axon hillock, |
| 4. a | 12. conductivity | initial segment |
| 5. c | 13. absolute | 18. norepinephrine |
| 6. e | refractory period | 19. facilitated zone |
| 7. d | 14. dendrites | 20. neuromodulators |
| 8. a | | |

True or False (explanation of the false statements only)

- The Na⁺ outflow depolarizes the neuron and the K⁺ inflow repolarizes it.
- The threshold stays the same but an EPSP brings the membrane potential closer to the threshold.
- The effect of a neurotransmitter varies from place to place depending on the type of receptor present.
- The signals travel rapidly through the internodes and slow down at each node of Ranvier.
- Synaptic contacts are remodeled, added, and removed throughout life.

Chapter 13

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|------|----------------------|-----------------------|
| 1. e | 8. a | 15. intrafusal fibers |
| 2. c | 9. e | 16. phrenic |
| 3. d | 10. b | 17. decussation |
| 4. d | 11. ganglia | 18. proprioception |
| 5. e | 12. ramus | 19. dorsal root |
| 6. c | 13. spinocerebellar | 20. tibial, common |
| 7. c | 14. crossed extensor | fibular |

True or False (explanation of the false statements only)

- The gracile fasciculus is an ascending (sensory) tract.
- All spinal nerves are mixed nerves; none are purely sensory or motor.
- The dura is separated from the bone by a fat-filled epidural space.
- Dermatomes overlap each other by as much as 50%.
- Some somatic reflexes are mediated primarily through the brainstem and cerebellum.

Chapter 14

- | | | |
|------|---------------------|-----------------------|
| 1. c | 8. d | 14. hydrocephalus |
| 2. a | 9. e | 15. choroid plexus |
| 3. e | 10. e | 16. precentral |
| 4. a | 11. corpus callosum | 17. frontal |
| 5. b | 12. ventricles, | 18. association areas |
| 6. c | cerebrospinal | 19. categorical |
| 7. a | 13. arbor vitae | 20. Broca's area |

True or False (explanation of the false statements only)

- This fissure separates the cerebral hemispheres, not the cerebellar hemispheres.
- The cerebral hemispheres do not develop from neural crest tissue.
- The choroid plexuses produce only 30% of the CSF.
- Hearing is a temporal lobe function; vision resides in the occipital lobe.
- Eye movements are controlled by the oculomotor, trochlear, and abducens nerves; the optic nerve serves only to carry visual information.

Chapter 15

- | | | |
|------|----------------------|--------------------|
| 1. b | 8. d | 15. enteric |
| 2. c | 9. a | 16. norepinephrine |
| 3. e | 10. c | 17. sympathetic |
| 4. e | 11. adrenergic | 18. preganglionic, |
| 5. a | 12. dual innervation | postganglionic |
| 6. e | 13. autonomic tone | 19. cAMP |
| 7. d | 14. vagus | 20. vasomotor tone |

True or False (explanation of the false statements only)

- Both systems are always simultaneously active.
- In biofeedback and other circumstances, limited voluntary control of the ANS is possible.
- The sympathetic division inhibits digestion.
- Waste elimination can occur by autonomic spinal reflexes without necessarily involving the brain.
- All parasympathetic fibers are cholinergic.

Chapter 16

- | | | |
|------|---------------------|------------------------|
| 1. a | 8. c | 15. hair cells |
| 2. c | 9. c | 16. stapes |
| 3. b | 10. b | 17. inferior colliculi |
| 4. a | 11. fovea centralis | 18. taste hairs |
| 5. e | 12. ganglion | 19. olfactory bulb |
| 6. e | 13. Na ⁺ | 20. referred pain |
| 7. d | 14. otoliths | |

True or False (explanation of the false statements only)

- These fibers end in the medulla oblongata.
- Because of hemidecussation, the right hemisphere receives signals from both eyes.
- The posterior chamber, the space between iris and lens, is filled with aqueous humor.
- Descending analgesic fibers block signals that have reached the dorsal horn of the spinal cord.
- The trochlear and abducens nerves control the superior oblique and lateral rectus, respectively.

Chapter 17

- | | | |
|------|---------------------|-------------------|
| 1. b | 10. e | 17. negative |
| 2. d | 11. adenohipophysis | feedback |
| 3. a | 12. tyrosine | inhibition |
| 4. c | 13. acromegaly | 18. hypophyseal |
| 5. c | 14. cortisol | portal system |
| 6. c | 15. glucocorticoids | 19. permissive |
| 7. d | 16. granulosa, | 20. up-regulation |
| 8. c | interstitial | |
| 9. e | | |

True or False (explanation of the false statements only)

- Hormones are also secreted by the heart, liver, kidneys, and other organs not generally regarded as glands.
- The pineal gland and thymus undergo involution with age.
- Without iodine, there is no thyroid hormone (TH); without TH, there can be no negative feedback inhibition.
- The tissue at the center is the adrenal medulla.
- There are also two testes, two ovaries, and four parathyroid glands.

Chapter 18

- | | | |
|------|-------|--------------------|
| 1. b | 6. d | 11. hemopoiesis |
| 2. c | 7. d | 12. hematocrit, or |
| 3. c | 8. c | packed cell volume |
| 4. a | 9. d | 13. thromboplastin |
| 5. b | 10. c | 14. agglutinogens |

15. hemophilia 18. polycythemia 20. erythropoietin
16. hemostasis 19. vitamin B₁₂
17. sickle-cell disease

True or False (explanation of the false statements only)

3. Oxygen deficiency is the result of anemia, not its cause.
4. Clotting is one mechanism of hemostasis, but hemostasis includes others. Agglutination is unrelated to either of these.
6. The most abundant WBCs are neutrophils.
9. The heme is excreted; the globin is broken down into amino acids that can be reused.
10. In leukemia, there is an excess of WBCs. A WBC deficiency is leukopenia.

Chapter 19

1. d 8. e 14. Na⁺
2. b 9. a 15. gap junctions
3. d 10. e 16. T wave
4. a 11. systole, diastole 17. semilunar
5. e 12. systemic 18. auscultation
6. c 13. atrioventricular 19. preload
7. d (coronary) sulcus 20. cardiac output

True or False (explanation of the false statements only)

1. The coronary circulation is part of the systemic circuit; the other division is the pulmonary circuit.
3. The first two-thirds of ventricular filling occurs before the atria contract. The atria add only about 31% of the blood that fills the ventricles.
6. The first heart sound occurs at the time of the QRS complex.
7. The heart has its own internal pacemaker and would continue beating; the nerves only alter the heart rate.
10. The ECG is a composite record of the electrical activity of the entire myocardium, not a record from a single myocyte. It looks much different from an action potential.

Chapter 20

1. c 8. a 14. thoracic pump
2. b 9. e 15. oncotic pressure
3. a 10. d 16. transcytosis
4. e 11. systolic, diastolic 17. sympathetic
5. b 12. continuous 18. baroreceptors
6. c capillaries 19. the arterial circle
7. e 13. anaphylactic 20. basilic, cephalic

True or False (explanation of the false statements only)

4. Some veins have valves, but arteries do not.
5. By the formula $F \propto r^4$, the flow increases 16-fold.
8. The capillaries normally reabsorb about 85% of the fluid they filter; the rest is absorbed by the lymphatic system.
9. An aneurysm is a weak, bulging vessel which may rupture.
10. Anaphylactic shock is a form of venous pooling shock.

Chapter 21

1. b 9. a 15. opsonization
2. c 10. c 16. pyrogen
3. a 11. pathogen 17. interleukins
4. a 12. lysozyme 18. antigen-binding site, epitope
5. d 13. lymphadenitis 19. clonal deletion
6. b 14. diapedesis 20. autoimmune
7. e (emigration)
8. d

True or False (explanation of the false statements only)

1. Lysozyme is a bacteria-killing enzyme.
3. Interferons promote inflammation.

4. Helper T cells are also necessary to humoral immunity.
9. Anergy is a loss of lymphocyte activity, whereas autoimmune diseases result from misdirected activity.
10. Interferons inhibit viral replication; perforins lyse bacteria.

Chapter 22

1. c 10. a 17. compliance, elasticity
2. c 11. glottis
3. a 12. bronchial tree 18. inspiratory center
4. e 13. pulmonary surfactant
5. e 14. intrapleural, 19. ventilation-perfusion coupling
6. c atmospheric
7. b 15. obstructive
8. a 16. anatomic dead 20. alkalosis, hypocapnia
9. d space

True or False (explanation of the false statements only)

1. The glottis is the superior opening into the larynx, not its inferior exit.
4. When volume increases, pressure decreases.
5. Atelectasis can have other causes such as airway obstruction.
8. In an average 500 mL tidal volume, 350 mL reaches the alveoli.
10. Most CO₂ is transported as bicarbonate ion.

Chapter 23

1. a 9. c 16. transport maximum
2. d 10. a 17. antidiuretic hormone
3. b 11. micturition
4. c 12. renal autoregulation
5. b 13. trigone 18. internal urethral
6. b 14. macula densa 19. protein
7. d 15. podocytes 20. arcuate
8. e

True or False (explanation of the false statements only)

1. Parathyroid hormone regulates calcium absorption by the PCT.
2. Urine contains more urea and chloride than sodium.
4. A substantial amount of tubular fluid is reabsorbed by the paracellular route, passing through leaky tight junctions.
5. Glycosuria does not occur in diabetes insipidus.
8. Urine can be as dilute as 50 mOsm/L.

Chapter 24

1. c 9. d 16. hyperkalemia
2. a 10. b 17. hyponatremia
3. a 11. Na⁺ 18. respiratory acidosis
4. a 12. K⁺ 19. limiting pH
5. d 13. metabolic water 20. osmolarity
6. c 14. cutaneous
7. e transpiration
8. b 15. fluid sequestration

True or False (explanation of the false statements only)

2. Aldosterone has only a small influence on blood pressure.
5. PTH promotes calcium absorption but phosphate excretion.
6. Protein buffers more acid than bicarbonate or phosphates do.
9. More water than salt is lost, so the body fluids become hypotonic.
10. Aquaporins are found in the distal tubule and collecting duct.

Chapter 25

1. b 4. e 7. a
2. d 5. a 8. a
3. c 6. c 9. a

A-6 Appendix B Answers to Chapter Review Questions

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|---------------------|---------------|----------------------|
| 10. a | 14. enteric | 18. maltase, maltose |
| 11. occlusal | 15. vagus | 19. chylomicrons |
| 12. amylase, lipase | 16. gastrin | 20. iron |
| 13. parotid | 17. sinusoids | |

True or False (explanation of the false statements only)

- Fat digestion begins in the stomach.
- Most of the tooth is dentin.
- Hepatocytes secrete bile into the bile canaliculi.
- Intrinsic factor is involved in the absorption of vitamin B₁₂.
- Water, glucose, and other nutrients pass between cells, through the tight junctions.

Chapter 26

- | | | |
|------|---------------------|-----------------------|
| 1. a | 8. a | 15. liver |
| 2. c | 9. d | 16. insulin |
| 3. b | 10. d | 17. core temperature |
| 4. e | 11. incomplete | 18. hypothalamus |
| 5. b | 12. glycogenolysis | 19. cytochromes |
| 6. e | 13. gluconeogenesis | 20. ATP synthase, ATP |
| 7. c | 14. urea | |

True or False (explanation of the false statements only)

- Leptin suppresses the appetite.
- Most of the cholesterol is endogenous, not dietary.
- Excessive protein intake can cause renal damage.
- Gluconeogenesis is a postabsorptive phenomenon.
- Brown fat does not generate ATP.

Chapter 27

- | | | |
|------|-----------------------------|----------------------------|
| 1. a | 9. d | 15. tunica albuginea |
| 2. a | 10. d | 16. seminal vesicles |
| 3. a | 11. mesonephric | 17. sustentacular |
| 4. c | 12. fructose | 18. secondary spermatocyte |
| 5. a | 13. pampiniform plexus | 19. deep |
| 6. d | | 20. acrosome |
| 7. e | 14. secondary spermatocytes | |
| 8. c | | |

True or False (explanation of the false statements only)

- Only the testes are primary sex organs.
- Female development results from a low testosterone level, not from estrogen.

- The pampiniform plexus prevents the testes from overheating.
- Sperm are stored in the epididymis.
- There is no such phenomenon as male menopause.

Chapter 28

- | | | |
|------|-------------------|----------------------------|
| 1. a | 8. b | 15. corona radiata |
| 2. d | 9. c | 16. antrum |
| 3. c | 10. c | 17. climacteric |
| 4. a | 11. follicle | 18. conceptus |
| 5. e | 12. endometrium | 19. infundibulum, fimbriae |
| 6. b | 13. menarche | 20. lochia |
| 7. b | 14. corpus luteum | |

True or False (explanation of the false statements only)

- Only the ovum and corona radiata enter the uterine tube, not the whole follicle.
- HCG is secreted by the placenta.
- Many eggs and follicles undergo atresia during childhood, so their number is reduced by the age of puberty.
- Prolactin is secreted during pregnancy but does not induce lactation then.
- Only the superficial layer (functionalis) is shed.

Chapter 29

- | | | |
|------|---------------------|--------------------------------|
| 1. b | 8. a | 15. chorionic villi |
| 2. b | 9. d | 16. acrosome |
| 3. c | 10. d | 17. collagen |
| 4. c | 11. teratogens | 18. Down syndrome (trisomy-21) |
| 5. a | 12. nondisjunction | 19. foramen ovale |
| 6. e | 13. life span | 20. embryo |
| 7. c | 14. life expectancy | |

True or False (explanation of the false statements only)

- Sperm require about 10 hours to become capacitated and able to fertilize an egg.
- Fertilization occurs in the uterine tube.
- Several early-arriving sperm clear a path for the one that fertilizes the egg.
- Blood bypasses the lungs via the foramen ovale.
- Exercise improves the quality of life in old age, but has not been shown to increase life expectancy significantly.