

- c. The further you go under water, the higher the water pressure. The higher water pressure prevents the lungs from inflating because the diaphragm is not strong enough to contract at such high pressures.
73. a. Tidal volume is about 500 mL and the vital capacity is 4500 mL.
b. 5 breaths per minute
c. The total lung capacity will be greater for the healthy individual than the smoker.
74. a. The intent is to expel the morsel of food.
b. The diaphragm is directly affected.
c. This procedure increases abdominal pressure and causes the diaphragm to elevate and forceful expiration to eject the piece of food out of the trachea and larynx.
d. The person should be given high levels of oxygen so that the cells in the body will continue to produce ATP needed for the heart to pump, the brain the function, etc.
75. a. Carbon monoxide would bind to the hemoglobin and therefore hemoglobin is unavailable to the oxygen. This causes the oxygen concentration to decrease even though the hemoglobin concentration and partial pressure of oxygen in the blood is normal.
b. The curve will shift to the left.
c. Carbon monoxide would bind to the hemoglobin and oxygen would not be transported to cells around the body. Without oxygen, the cells could not produce ATP and muscle cells like the heart would stop working.
76. At high partial pressures of oxygen, hemoglobin binds to oxygen to form oxyhemoglobin. When the blood is fully saturated, all the red blood cells are bound to oxygen molecules and are in the form of oxyhemoglobin. As oxygen level decreases, so does hemoglobin saturation. This occurs when red blood cells move to body tissues that have low level of oxygen. Oxyhemoglobin will release lots of oxygen molecules needed by active tissue cells and become haemoglobin.
77. You have a large reserve of oxygen. This means, your blood will have lots of hemoglobin to provide you when you become more active and require more oxygen.
78. a. in the tissues; b. in the lungs
79. a. The affinity of oxygen decreases and oxygen is released to the tissues.
b. The affinity of oxygen increases and oxygen is picked up by hemoglobin.
80. a. The curve will shift to the left.; b. The curve will shift to the right.; c. The curve will shift to the right.; d. The curve will shift to the left.; e. The curve will shift to the right.; f. The curve will shift to the left.; g. The curve will shift to the left.; h. The curve will shift to the right.; i. The curve will shift to the left.
81. a. The iron lung mimics the physiological action of breathing. When pressure decreases inside the lungs, this creates a partial vacuum. Air is forced into the lungs.
b. The iron lung would decrease the pressure inside the lungs, forcing air to flow into the lungs via the nose and mouth.
c. An air tight seal allows the chamber to be pressurized.

Chapter 12 Diagnostic Questions

- c. neuro
- a. cell
- b. nervous tissues.
- b sneezing
- c. They are involuntary actions.
- a. to get quick responses
- c. energy is required.
- a. a carrier protein.
- c. spinal cord.
- a. the skull.
- a. brakes.
- d. the vertebrae.
- d. all of the above
- c. the left side of the body.
- a. paralysis.
- b. amino acids.
- a. threshold
b. An impulse at one point on a neuron will cause an impulse at the next point along the neuron.
c. Each time the dominoes fall, they always move at the same speed and intensity.
- a. You would sneeze. b. You would blink. c. You would pull your hand back.

Chapter 12 Review Questions

- d. muscles or glands that respond to stimuli.
- b. a sensory neuron to a motor neuron.
- a. a gland releasing a hormone
- c. Myelin sheath – fatty protective layer covering the axon
- a. nerve impulses will slow down or stop
- d. stimulus → sensory neuron → interneuron → motor neuron → effector
- b. I and III only
- c. It allows quick response to environmental stimuli.
- c. detects changes in the environment.
- a. sodium gates open.
- c. sodium ions are transported out of the axon and potassium ions into the axon.
- a. the synaptic cleft.
- c. structure 3
- b. the dendrite of an interneuron
- b. the dendrite
- b. motor neuron
- c. C
- b. sodium-potassium pump
- b. the gates on the sodium and potassium channels are closed
- c. C

21. **d.** the action potential is in a brief reversal of polarity of the membrane potential.
22. **c.** potassium gates open and potassium ions flow out of the axon
23. **b.** start an action potential more often in a given time interval.
24. **c.** hyperpolarization.
25. **c.** the type of postsynaptic neurotransmitter receptors
26. **c.** depolarization
27. **c.** potassium ions.
28. **c.** active transport.
29. **b.** the refractory period.
30. **d.** presynaptic membrane to the postsynaptic membrane.
31. **b.** calcium ions
32. **d.** neurotransmitters
33. **a.** to break down acetylcholine
34. **d.** a neurotransmitter
35. **b.** hypothalamus
36. **a.** thalamus—smell
37. **d.** involuntary activity.
38. **d.** the motor neurons ending in the cardiac muscles
39. **a.** depolarization of an effector
40. **b.** involuntary.
41. **d.** increase intestinal activity.
42. **b.** inhibit urination.
43. **c.** hypothalamus
44. **d.** reticular activating system.
45. **a.** pons
46. **c.** Structure E
47. **b.** reasoning through a problem
48. **d.** hit a tennis ball with a smooth, coordinate swing.
49. **d.** Structure D
50. norepinephrine
51. A stimulus either produces an impulse or it won't produce an impulse. If a stimulus has adequate strength, it has reached a threshold and causes a neuron to transmit an impulse. If the stimulus is too weak, then the threshold will not produce an impulse.
52. A nerve impulse is generated in the sensory neuron and is carried to the spinal cord. The nerve impulse is passed on to the motor neuron which then causes the quadriceps femoris muscles in the leg to contract. This results in the knee jerk.
53. Advantages include: speed and less ATP is used due to fewer numbers of sodium-potassium pumps needed.
54. When a minimum threshold is reached, an action potential is triggered. Depolarization occurs causing sodium ion channels to open and sodium ions move into the axon. The membrane potential changes from negative to positive. Repolarization then occurs causing potassium ion channels to open and potassium ions move out of the axon. The membrane potential changes from positive to negative. During the refractory period, both potassium and sodium gates are closed and resting potential is restored.
55. A nerve impulse travels a lot faster along a myelinated axon than an unmyelinated axon.
56. **a.** 6; **b.** 6; **c.** 3; **d.** 2; **e.** 2; **f.** 6; **g.** 6; **h.** 4; **i.** 3; **j.** 6; **k.** 4; **l.** 4; **m.** 5
57. **a.** sympathetic nervous system; **b.** parasympathetic nervous system; **c.** sympathetic nervous system; **d.** sympathetic nervous system; **e.** sympathetic nervous system; **f.** parasympathetic nervous system; **g.** sympathetic nervous system; **h.** parasympathetic nervous system
58. The autonomic nervous system functions automatically and without conscious awareness. The ANS can either stimulate or inhibit effectors. The somatic nervous system controls conscious or voluntary regulation and stimulates skeletal muscles.
59. [CentreCIRCLE] Similarities between sympathetic and parasympathetic nervous systems: both are part of the peripheral nervous system and autonomic nervous system. Differences sympathetic and parasympathetic nervous systems: [LEFT CIRCLE: Sympathetic Nervous System] involved with stressful situations; "fight or flight" response; neurotransmitter = norepinephrine. [RIGHT CIRCLE: Parasympathetic Nervous System] involved with maintenance situations; "rest and digest" response; neurotransmitter = acetylcholine.]
60. hypothalamus
61. There is a conflict between the right side and left side of the brain. One side is wants you to read the word, while the other side identifies the word and wants you to say the colour your see, rather than the word that you see.
62. receptors for acetylcholine
63. **a.** acetylcholine
b. The levels of acetylcholine would increase as acetylcholine accumulates in the synapse.]
c. The build up of acetylcholine in the synapse would cause the muscles to continue contracting. Since there are no enzymes to break down acetylcholine, the nerve impulse would continue to fire.
d. If exposed to nerve gases, the diaphragm would continue to contract and exhalation could not occur.
64. hypothalamus
65. Norepinephrine is released by the sympathetic nervous system.
66. Students will form their hypothesis.

Chapter 13 Diagnostic Questions

- a.** kidneys, ureters, bladder and urethra
- a.** to store urine
- c.** active transport
- d.** medulla oblongata
- a.** the concentration of H^+
- c.** the renal artery carries blood to the kidneys and the renal vein carries blood away from the kidneys
- b.** increase the flow of urine.
- a.** osmolarity.
- b.** amino acid metabolism.
- a.** urea