RESPIRATION

1. The diaphragm and rectus abdominus are muscles of inspiration.

2. There is a positive pressure in the interpleural space which holds the lung against the rib cage on inspiration.

3. The collapse of the lung during expiration is primarily due to elastic tissue fibers in the lung.

4. As the alveolus expands during inspiration there is a increase in surfactant per unit area.

5. The most important component of the surfactant in the lung involved in the reduction of surface tension is a phospholipid (dipalmitoyldphosphaadhicholine).

6. The right lung has three lobes.

7. If the surfactant is not present, 7-10 times more energy is required to open an alveolus of the lung.

8. The energy used by the body for respiration (pulmonary ventilation) is about 3-5% of the total body energy.

9. Dead air space is the space found in your respiratory system where gas exchange does not occur and makes up about 150 ml of the total 500 ml of the tidal volume.

10. The function of the nose is to filter, warm and moisten air.

11. Articulation is produced by the vibrations of the vocal folds.

12. In the film shown in the laboratory on the larynx, the man is shown inserting the laryngoscope through the nose of a patient.

13. During a sneeze or cough, the particles may reach speeds greater than 75 miles per hour.

14. The four major organs involved in resonance of sound are the mouth, nose, nasal sinuses and pharynx.

15. The mucus and hairs can remove particles 4-6 microns in diameter.
16. A mechanism for a cough is the same as a sneeze except that the soft palate is elevated.

17 - 18
If your respiration rate is 14 per minute, your tidal volume is 500 ml, what would your minute respiratory volume be?

SHOW WORK

19. Dead air space is the space found in your respiratory system where gas exchange does not occur and is about 150 of the total 500 ml of the tidal volume.

20. Oxygen is the major gas in atmospheric air, about 78%.

21. When blood returns to the right atrium, hemoglobin is 60% saturated with oxygen.

22. Below a PO$_2$ of 40 mm Hg., each additional mm of Hg. decrease in pressure results in a tremendous decrease in oxygen on the hemoglobin molecule when compared to pressures above 40 mm Hg.

23. Hemoglobin is always 100% saturated when it leaves the lung alveolus.

24. The highest level of Oxygen in the body is in the vestibule of the nose.

25. If you raise the temperature of blood there would be a decrease in the amount of oxygen carried by the hemoglobin molecule, a shift to the right.

26. The highest concentration of Carbon dioxide is in the matrix of the mitochondria.

27. There is no transfer of oxygen or carbon dioxide in the systemic arteries or veins.

28. If you increase the ventilation rate, carbon dioxide will decrease in the blood if everything else remains constant.

29. If you increase the metabolic rate, carbon dioxide will increase in the blood.

30. Blood in the right pulmonary artery is has a partial pressure of 94mm Hg.

31. A shift to the right of the hemoglobin dissociation curve would result from a rise in pH (more alkaline).
32. Hemoglobin acts as a buffer for acid produced by carbon dioxide and water catalysed by carbonic anhydrase in the red blood cell.

33.- 36. How many liters of oxygen would be delivered to your tissues per minute if you were a long distance runner with a hematocrit of 42%. When running, your heart rate was 80 beats per minute. Your stroke volume was elevated however to 160 ml per stroke.

Assume that hemoglobin is 100% saturated with oxygen and can carry 1.34 (not the theoretical value of 1.39) ml of oxygen per 100 ml of cells. The respiration rate is 20 per minute and your blood pressure is 130/90 mm Hg.

SHOW WORK

37 - 42. Draw and label a chart and include the following:
   37. tidal volume
   38. vital capacity
   39. inspiratory reserve volume
   40. residual volume
   41. expiratory reserve volume
   42. lung capacity

43 - 47. GIVE THE APPROPRIATE VALUES FOR oxygen in the following diagram of a lung alveolus and the capillary.
   43. 40 mm
   44. 45 mm
   45. 48 mm
   46. 105 mm
   47. 96 mm

48-52 Draw and label the components of an alveolus and the corresponding capillary. Include in the diagram the location of the following:
   48. basement membrane of the capillary epithelium
   49. RBC
   50. acid hemoglobin
   51. surfactant
   52. alveolar epithelium
DIGESTION

53. Mucin is mainly composed of lipids, allowing it to have its slippage characteristics.

54. The man in the Netter slide shown in class was reading a book.

55. The parotid salivary glands secrete only mucin.

56. The submandibular glands are the largest of the three salivary glands.

57. When stimulated, the intestinal cells transport Chloride ions rather than sodium ions across the cell membrane. Positive sodium ions follow the chloride ions and they in turn create an osmotic gradient which draws water into the cell, a increasing the pressure in the cell.

58. The parietal cells of the stomach secrete HCL.

59. Monosaccharides enter the capillaries found in the villus rather than the lacteal.

60. Lactase, maltase and carboxypeptidase are all secreted by the intestinal mucosa.

61. Most of the sugar in the human diet is fructose (like that found in fruit).

62. Enteric lipase is the most important of the enzymes breaking down fat.

63. Secretin causes the release of buffers from the pancreas to neutralize the acid pH of the digestive juice coming from the stomach.

64. The end products of fat digestion are glycerol and water.

65. Lipase is mainly secreted by the liver and increases in concentration in the gall bladder.

66. The breakdown products from the action of pepsin on proteins are primarily amino acids.


68. Lipid is broken down to glycerol and amino acids by pancreatic lipase.

69. The term pyloric means “gateway”.

70. Cholecystokinin causes the release of digestive enzymes from the pancreas.

71. The gallbladder produces bile.
72. Pyloric and cardiac regions of the stomach have a large number of goblet cells which form mucus 1 mm thick on the surface of the stomach lining.

73. Mucus neck cells protect the lining of the stomach.

74. Gastric lipase breaks down butterfat in the stomach of infants.

75. Gastrin is produced by G cells in the small intestine when food enters through the pyloric sphincter into the duodenum. It enters the blood stream and acts on the cells of the stomach hence its name gastrin.

76. Mucin has amphoteric properties, thus buffering the acids and bases.

77. The pancreas secretes trypsinogen, chymotrypsinogen and carboxypeptidase.

78. The human esophagus is lined with stratified squamous epithelium. The mucin to lubricate the esophagus is produced in glands in the submucosa called submucosal glands.

79. The inner layer of the Tunica muscularis is circular.

80. The uvula is part of the hard palate.

81. Breakdown products of bile give the color both the feces and urine.

82. Glucose is found in galactose and sucrose.

83. The large intestinal cells produce Vitamin K.

84. The major function of the large intestine is to reabsorb water.

85. Cholecystokinin causes the release of bile from the gall bladder and carbonate ions from the pancreas.

86. The enterogastric reflex causes increased motility and secretion of bicarbonate ions when acids from the stomach and/or distention of the small intestine occurs.

87. Enzymes from the pancreas include dipetidase and maltase.

88. Prosecretin is activated by chyme from the stomach.

89. (NaHCO3) carbonate ions from the pancreas convert HCL to salt (NaCl) and carbonic acid (H2CO3).
90. Free amino acids are not found in the lumen of the small intestine because they are absorbed so rapidly into the bloodstream.

91. Trypsinogen is converted to trypsin when acid is present.

92. Glucose is transported before fructose in secondary active transport.

93. Free amino acids are found in the lumen of the small intestine.

94. Inside the intestinal cell, the glycerol and fatty acids are combined to form triglycerides which are then coated with protein and now are referred to as chylomicrons.

95. More electrolytes are reabsorbed by the upper part of the small intestine than the lower part.

96. Butterfat enters the lacteals of the villi because they have shorter chains than regular fats.

97. Most water is reabsorbed in the distal part of the large intestine.

98. Lipids are essential in the daily diet to absorb fat-soluble vitamins.

99. Fat-soluble vitamins are A, B, E, and K.

100. The inner portion of the stool is acidic, a result from bacterial metabolism.
RESPIRATION

1. The opening to the eustachian tube is located in the ________.
   a. nasopharynx
   b. laryngopharynx
   c. mouth
   d. nasal cavity
   e. oropharynx

2. The uvula is part of the ___________.
   a. tongue
   b. hard palate
   c. nasal cavity
   d. soft palate
   e. fauces

3. The movie in class on the larynx _______________
   a. illustrated a whistle produced by the vocal cords of the speaker
   b. showed the opening and closing of the glottis
   c. showed the false vocal folds
   d. all of the above responses are correct
   e. two of the above are correct

4. The nose is mainly associated with _____________.
   a. enunciation
   b. sound production
   c. pitch
   d. articulation
   e. resonance

5. The trachea in humans is
   a. O shaped
   b. C shaped
   c. U shaped

6. The thin lining on the ribs in the thoracic cavity is called _____________.
   a. visceral peritoneum
   b. parietal peritoneum
   c. visceral pleura
   d. parietal pleura
   e. the carina
7. The amount of surfactant per unit of surface area in the alveolus _________ on expiration and _________ on inspiration.
   a. decreases, increases
   b. increases, decreases
   c. remains constant

8. Surfactants ____________
   a. raise the surface tension of the water molecules.
   b. are composed of protein
   c. are composed of carbohydrate
   d. are required for lowering pressure to open alveolus
   e. are not required for normal breathing as the chest muscles can meet the necessary energy requirements

9. Contraction of the muscles of the expiration that forcefully expel air through the mouth is called a ________________
   a. sigh
   b. sob
   c. cough
   d. sneeze
   e. laugh

10 - 14 MATCH USE CHART PROVIDED
   10. total lung capacity
   11. inspiratory reserve volume
   12. vital capacity
   13. inspiratory volume
   14. tidal volume

15 - 19 Use the following responses refer to the hemoglobin dissociation curve
   a. shift to right
   b. shift to left
   c. no change

15. At the capillaries in the tissues there is a normal ________________

16. when you sleep at night and your body temperature drops would result in a ________________

17. An decrease in breathing would result in a ________________
    because there is more Carbon dioxide in the blood.

18. A decrease in the metabolic rate would cause the curve to ________________

19. Running would cause a ________________
20. Hemoglobin
   a. contains iron
   b. contains heme produced by the mitochondria
   c. carries carbon dioxide as carboxyhemoglobin
   d. contains a globulin fraction produced on ribosomes in the cell
   e. all of the above responses are correct

21-24. Use the following responses for questions 21 – 24
   a. 20 mm. Hg
   b. 40 mm. Hg
   c. 70 mm. Hg
   d. 97 mm. Hg
   e. 100 mm. Hg

What is the partial pressure of O₂ in each of the following vessels?
21. in the pulmonary artery __________

22. in the superior vena cava __________

23. in the capillary of the lung alveolus __________

24. in the brachial artery __________

25-29. How many liters of oxygen can be delivered to the tissues per minute if the hematocrit is 42% and the heart rate of the individual is 110 beats per minute and the stroke volume is 80 mls. There are 34 gms of Hb /100ml of cells.

Assume that hemoglobin is 100% saturated with oxygen and can carry 1.39 ml of oxygen per 100 ml of cells. The respiration rate is 20 per minute.

SHOW WORK

k

k

ANSWER __________
For questions 30 - 34 Use the following graph

30. location of the enzyme carbonic anhydrase

31. location of acid hemoglobin HHb

32. CO₂ - where is it produced.

33. location of HCO₃⁻ (carbonate ion) production

34. where carbonate ions are highest

35. The major control of respiration is located in the ________________
   a. medulla
   b. cerebellum
   c. pons
   d. pyramid
   e. olive

36. The function of the nose is to ________________
   a. filter air
   b. warm air
   c. moisten air
   d. all of above
   e. all but one of above

37. Receptors for a change in pH are found in the ________________
   a. medulla
   b. carotid body
   c. aortic body
   d. all of above
   e. all but one of above responses is correct
38. Carbon dioxide is carried mainly in the blood as ________
   a. carbon dioxide
   b. HCO₃
   c. H₂CO₃
   d. carboxyhemoglobin
   e. not carried in the plasma

39. Tuberculosis is caused by Mycobacterium tuberculosis. (T or F)

40. Smoking will kill you ultimately. (T or F)

41-46 **Match - where are they produced**

41. gastrin  a. mouth
42. amylase  b. stomach
43. cholecystokinin  c. pancreas
44. dipeptidase  d. small intestine
45. trypsin  e. two of above responses are correct
46. maltase

47. Vitamin K is produced in the ____________
   a. mouth
   b. stomach
   c. pancreas
   d. small intestine
   e. large intestine

48. Lipase breaks down lipids to ____________
   a. glycerol
   b. monoglycerides
   c. fatty acids
   d. diglycerides
   e. all of above responses are correct

49. Bile is **produced** in the ____________
   a. gallbladder
   b. stomach
   c. pancreas
   d. liver
   e. two of above responses are correct
50 - 56 Match

50. causes secretion of the pepsinogen  a. cholecystokinin
51. causes contraction of the gall bladder  b. GIP
52. causes section of buffers  c. gastrin
53. causes release of  d. bile
54. stops stomach secretions  e. secretin
55. emulsifies fats
56. releases trypsinogen

57. enter the lacteals in the small intestine.
   a. amino acids
   b. fatty acids
   c. glycerol
   d. glucose
   e. two of above

58. Proteins are held together by
   a. glycosidic bonds
   b. ester bonds
   c. peptide bonds
   d. hydrogen bonds
   e. none of above

59. The pancreas secretes all but
   a. carboxypeptidase
   b. dipeptidase
   c. trypsinogen
   d. chymotrypsinogen
   e. RNAase

60. Carbohydrates, fats and proteins are generally broken down by
   a. condensation
   b. hydrolysis
   c. decarboxylation

61. Lipids are important in the diet to
   a. absorb carbohydrate
   b. absorb proteins
   c. absorb minerals
   d. absorb vitamins
   e. absorb water

62. Maltase breaks down maltose to glucose and
   a. glucose
   b. fructose.
63. The plexus that controls local movement of the intestine and controls secretions is the __________ plexus.
   a. mucosal
   b. submucosal
   c. myenteric
   d. coeliac
   e. iliac

64. The outer portion of a stool is alkaline
   a. acid
   b. alkaline
   c. neutral because of mucin

65. The gut is derived from ____________.
   a. ectoderm
   b. mesoderm
   c. entoderm

67. The ___________ region of the stomach closest to the duodenum.
   a. pyloric
   b. fundic
   c. cardiac
   d. corpus
   e. two of above secrete large amounts of HCl

68. The term dental formula is ____________
   a. 2122
   b. 1223
   c. 3123
   d. 2122
   e. 2123

69. The myenteric plexus innervates the ____________
   a. Muscularis mucosa
   b. mucosa
   c. submucosal glands
   d. Tunica muscularis
   e. Tunica serosa
70. The cells responsible for phagocytosis in the liver are the _____________.
   a. hepatocytes
   b. simple squamous epithelial cells
   c. Kupffer cells
   d. endothelial cells
   e. neutrophils

71. Bitter is detected in taste buds in the ____________ of the tongue.
   a. back
   b. sides
   c. tip
   d. sides and tip
   e. back and tip

72. Stimulation of the vagus nerve would _____________ gastric secretions.
   a. increase
   b. decrease

73. The fat soluble vitamins include all but _____________.
   a. A
   b. B
   c. C
   d. K
   e. Two of the above

74. The inner layer of the Tunica muscularis is _________________.
   a. oblique,
   b. circular
   c. longitudinal

75. The duct from the parotid gland enters at the _____________.
   a. base of tongue
   b. base of the upper molar
   c. through little openings at the base of the tongue
   d. in the labial frenulum
   e. on each side of the frenulum