Section 1
Answer questions 1 – 40 on the scan sheet.

1. The nasal cavities function to:
   a. warm the air
   b. exchange respiratory gasses
   c. produce sound
   d. regulate the pH of the body fluids
   e. push air into the lungs

2. Which of the following best describes pulmonary ventilation?
   a. the exchange of gas between the lungs and the blood
   b. the transport of gas through the blood
   c. the exchange of gas between the blood and the lungs
   d. the movement of air into and out of the lungs
   e. the way cells use oxygen to make molecules of ATP

3. The _______ pleura is the membraneous covering that is in direct contact with the surface of the lungs.
   a. parietal
   b. mucosal
   c. submucosal
   d. visceral
   e. serosal

4. Of the following airways, which has the greatest diameter?
   a. trachea
   b. alveoli
   c. bronchioles
   d. primary bronchi
   e. all of the above have equal diameters

5. The mucosa of the trachea consists of what type of epithelium?
   a. simple squamous
   b. simple cuboidal
   c. simple columnar
   d. stratified cuboidal
   e. pseudostratified ciliated columnar

6. Which of the following aspects of the respiratory system has a wall that consists only of epithelial tissue?
   a. primary bronchi
   b. trachea
   c. bronchioles
   d. alveoli
   e. larynx
7. Gases are exchanged between the blood and the atmosphere through the walls of small sac-like structures in the lungs known as:
   a. bronchi
   b. alveoli
   c. bronchioles
   d. tracheoles
   e. capillaries

8. Which of the following is a result of the contraction of the smooth muscle within the walls of bronchioles?
   a. It will decrease the diameter of the bronchiole.
   b. It will cause bronchodilation.
   c. It will make breathing easier.
   d. It will eliminate the symptoms of an asthma attack.
   e. It will cause an increase in the amount of oxygen in the pulmonary capillaries.

9. Which of the following airways are supported by cartilage to prevent its collapse during inhalation?
   a. trachea
   b. alveolar sacs
   c. bronchioles
   d. mouth
   e. alveoli

10. Surface tension forces within the lung:
   a. are reduced by surfactant.
   b. are caused by a thin layer of water on the inside of the lungs (alveoli).
   c. cause the lungs to collapse.
   d. aid in the exhalation of air from the lungs.
   e. all of the above.

11. According to Boyle’s law, when the volume of the lung increases,
   a. The air pressure within the lung decreases.
   b. The air pressure within the lung does not change (remains constant).
   c. The air pressure within the lung increases.

12. Muscles found between the ribs which aid in pulmonary ventilation are called ______________.
   a. abdominal muscles
   b. intercostal muscles
   c. cardiac muscles
   d. intrapleural muscles
   e. bronchiolar smooth muscles

13. Inspiration occurs as a result of
   a. alveolar pressure increasing above atmospheric pressure.
   b. alveolar pressure decreasing below atmospheric pressure.
   c. alveolar pressure is remaining equal to atmospheric pressure.
   d. atmospheric pressure increasing above alveolar pressure.
   e. atmospheric pressure decreasing below alveolar pressure.
14. A **forced expiration** is accomplished by contracting which of the following muscle(s)?
   a. abdominals
   b. the external intercostal muscles
   c. the internal intercostal muscles
   d. a and b
   e. a and c

15. Which one of the following helps the lungs collapse during exhalation?
   a. elevated blood pressure
   b. the surface tension of the water on the luminal surface of the alveoli
   c. gravity
   d. hydrostatic pressure within the lumen of the alveoli
   e. the “mucociliary escalator”

16. Which of the following results from the contraction of the diaphragm?
   a. expiration
   b. alveolar pressure increases above atmospheric pressure
   c. air within the respiratory system moves from the bronchioles to the larynx
   d. the volume of the thoracic cavity increases
   e. the volume of the alveoli decrease

17. Inspiration ends when:
   a. alveolar pressure increases above atmospheric pressure.
   b. alveolar pressure decreases below atmospheric pressure.
   c. alveolar pressure is equal to atmospheric pressure.
   d. atmospheric pressure increases above alveolar pressure.
   e. atmospheric pressure decreases below alveolar pressure.

18. If a person has a vital capacity of 4100 ml, an expiratory reserve volume of 800 ml and an inspiratory reserve volume of 2700 ml, what is the tidal volume?
   a. 600 ml
   b. 3300 ml
   c. 1400 ml
   d. 3500 ml
   e. 1900 ml

19. An individual inhales as deep as she can. From this point she expires all of the air from her lungs that she is able to. The volume of air expired from her lungs during this expiration is equal to the:
   a. total lung capacity.
   b. vital capacity.
   c. residual volume.
   d. expiratory reserve volume.
   e. tidal volume.

20. The pneumotaxic center is located in the:
   a. spinal cord
   b. pons
   c. medulla oblongata
   d. thalamus
   e. cerebral cortex
21. With an increase in the amount of oxygen detected in the blood:
   a. the activity of the neurons in the dorsal respiratory group (DRG) will decrease.
   b. the ventilation rate will increase.
   c. the activity of the neurons in the ventral respiratory group (VRG) will increase.
   d. the saturation of hemoglobin with oxygen will rise above 100%.
   e. all of the above will occur.

22. The dorsal respiratory group (DRG) is located in:
   a. the cerebral cortex
   b. the medulla oblongata
   c. the pons
   d. the spinal cord
   e. the cerebellum

23. After holding your breath for one minute, you would expect blood:
   a. oxygen levels to be higher than normal.
   b. pH to decrease below 7.4.
   c. carbon dioxide levels to be lower than normal.
   d. temperature to decrease.
   e. color to become a brighter red.

24. Which of the following will cause an increase in the ventilation rate?
   a. A decrease in P_{CO2}
   b. An increase in P_{O2}
   c. An increase in the concentration of H^+ in the body
   d. Sleeping
   e. A decrease in metabolic rate

25. Voluntary hyperventilation will:
   a. cause respiratory alkalosis.
   b. result in an increase in the amount of oxygen unloaded at resiping tissues.
   c. increase the hemoglobin saturation of oxygen in the blood at the lungs.
   d. cause a right shift of the oxygen-hemoglobin dissociation curve.
   e. will decrease the amount of oxygen in the blood leaving the lungs.

26. As blood passes through the capillaries surrounding the alveoli:
   a. blood pCO_2 decreases.
   b. oxygen diffuses into the alveoli.
   c. carbon dioxide diffuses into red blood cells.
   d. the alveolar pO_2 decreases.
   e. blood pO_2 decreases.

27. Which of the following occurs during gas exchange between the blood and resiping tissues?
   a. CO_2 enters the resiping tissues
   b. O_2 exits (leaves) the resiping tissues
   c. The P_{CO2} in the blood increases
   d. The P_{O2} in the blood increases
   e. Hemoglobin becomes more saturated with oxygen
28. Hemoglobin is found in ______________.
   a. alveolar cells
   b. muscle cells
   c. red blood cells
   d. white blood cells
   e. platelets

29. What does O₂ bind to within a molecule of hemoglobin?
   a. the amino acid tyrosine
   b. an atom of nitrogen in heme
   c. Pb²⁺ (lead)
   d. Ca²⁺ (calcium)
   e. Fe²⁺ (iron)

30. A molecule of hemoglobin is 75% saturated when _____ O₂ molecule(s) is (are) bound to it.
   a. 0
   b. 1
   c. 2
   d. 3
   e. 4

31. A __________ shift of the oxy-hemoglobin dissociation curve results in more O₂ being unloaded off of hemoglobin.
   a. up
   b. down
   c. right
   d. left
   e. reverse

32. In the blood, CO₂ is least carried as ______________.
   a. dissolved CO₂ gas in the plasma
   b. bicarbonate ions in red blood cells
   c. carbaminohemoglobin
   d. bicarbonate ions in the plasma
   e. carbonic acid (H₂CO₃) in red blood cells

33. When carbon dioxide is chemically combined with water, it forms:
   a. carbon monoxide
   b. carbaminohemoglobin
   c. peroxide
   d. 2,3 DPG
   e. carbonic acid

34. Where does the conversion of CO₂ to bicarbonate (HCO₃⁻) occur before it is transported to the lungs?
   a. respiring tissues
   b. plasma
   c. alveoli
   d. white blood cells
   e. red blood cells
35. The fluid component of the blood is called:
   a. collagen
   b. plasma
   c. platelets
   d. lymph
   e. the buffy layer

36. Within blood, which of the following is considered to be a “formed element”?
   a. organic molecules
   b. antibodies
   c. platelets
   d. clotting factors
   e. blood gasses (oxygen and carbon dioxide)

37. When a sample of blood is centrifuged, it separates into _______ different layers based on density.
   a. 7
   b. 6
   c. 5
   d. 4
   e. 3

38. Which of the following is NOT a leukocyte?
   a. neutrophils
   b. lymphocytes
   c. eosinophils
   d. erythrocytes
   e. monocytes

39. Which of the following formed elements in blood assembles into a plug during hemostasis?
   a. leukocytes
   b. platelets
   c. erythrocytes
   d. collagen
   e. plasmin

40. Which is the most numerous white blood cell in whole blood?
   a. basophils
   b. neutrophils
   c. eosinophils
   d. lymphocytes
   e. monocytes
Section 2
Answer questions 41 – 55 on the scan sheet using A = increase, B = not change, or C = decrease. The cause is described before the blank and the effect is described after the blank in all questions.

41. A decrease in the volume of the thoracic cavity will ___________ the pressure in the alveoli.

42. The diffusion of carbon dioxide into an alveolus will ___________ the P_{CO2} in the alveolus.

43. An increase in the P_{CO2} within the body will ___________ the pH within body fluids.

44. Increasing blood P_{O2} by inhaling 100% oxygen, will ___________ the pH of your body.

45. Contraction of the diaphragm will ______ the air pressure in an alveolus.

46. A decrease in the secretion of surfactant into the lung will ______ the elastic recoil of the lungs.

47. An increase in the P_{CO2} will ______ the activity of the neurons in the dorsal respiratory group (DRG).

48. Contraction of the abdominal muscles will ______ the volume of the lungs.

49. A small decrease in alveolar P_{O2} from 100 mmHg to 95 mmHg will ______ the ventilation rate.

50. An increase in alveolar P_{O2} from 100 to 150 mmHg will ______ the hemoglobin saturation with O_2 in the blood leaving the lungs.

51. Respiratory alkalosis will ______ the rate and depth of ventilation.

52. A reduction in the availability of oxygen will _____________ the secretion of erythropoietin.

53. The secretion of antibodies will _______ the rate of hemostasis.

54. The secretion of erythropoietin will _______ the hematocrit.

55. Intravenous injection/infusion of an anticoagulant will ___________ the speed of clot formation.