Multiple-Choice Questions

1) Functions of the blood include
A) transport of nutrients and wastes.
B) regulation of pH and electrolyte concentration of interstitial fluids.
C) restricting fluid loss.
D) body defense.
E) all of the above
Answer: E
Diff: 1
Learning Outcome: 11.1
Skill Level: 1 Reviewing Facts and Terms

2) Blood is composed of
A) plasma.
B) formed elements.
C) blood cells.
D) cell fragments.
E) all of the above
Answer: E
Diff: 1
Learning Outcome: 11.1
Skill Level: 1 Reviewing Facts and Terms

3) The percentage of solids in a sample of human blood is normally about
A) 45 percent.
B) 10 percent.
C) 25 percent.
D) 70 percent.
E) 90 percent.
Answer: A
Diff: 1
Learning Outcome: 11.1
Skill Level: 1 Reviewing Facts and Terms
4) Plasma is the ________ fraction of blood.
   A) serum.
   B) lymphatic fluid.
   C) whole blood.
   D) extracellular fluid.
   E) packed blood.
   Answer: D
   Diff: 1
   Learning Outcome: 11.1
   Skill Level: 1 Reviewing Facts and Terms

5) Fresh whole blood is collected by
   A) arthroscopy.
   B) arterioscopy.
   C) venipuncture.
   D) sonography.
   E) venoscopy.
   Answer: C
   Diff: 1
   Learning Outcome: 11.1
   Skill Level: 1 Reviewing Facts and Terms

6) Which of the following is an agranulocyte?
   A) erythrocyte
   B) WBC
   C) monocyte
   D) eosinophil
   E) thrombocyte
   Answer: C
   Diff: 1
   Learning Outcome: 11.1
   Skill Level: 1 Reviewing Facts and Terms

7) A normal WBC count is about
   A) 1,000–2,000.
   B) 500–5,000.
   C) 5,000–10,000.
   D) 50,000–500,000.
   E) 5 million–6 million.
   Answer: C
   Diff: 1
   Learning Outcome: 11.1
   Skill Level: 1 Reviewing Facts and Terms
8) Platelets are  
A) giant, multinucleated cells.  
B) cytoplasmic fragments.  
C) immature leukocytes.  
D) both A and B  
E) all of the above  
Answer:  B  
Diff:  1  
Learning Outcome:  11.1  
Skill Level:  1 Reviewing Facts and Terms

9) The function of white blood cells is to  
A) remove carbon dioxide from active cells.  
B) remove nitrogenous wastes from active tissues.  
C) carry oxygen from the lungs to the body's cells.  
D) carry nutrients from the digestive system to the body's cells.  
E) defend the body against infectious organisms.  
Answer:  E  
Diff:  1  
Learning Outcome:  11.1  
Skill Level:  1 Reviewing Facts and Terms

10) The chief difference between plasma and serum involves the  
A) amount of water.  
B) quantity of electrolytes.  
C) quantity of organic wastes.  
D) coagulation proteins.  
E) concentration of glucose.  
Answer:  D  
Diff:  1  
Learning Outcome:  11.2  
Skill Level:  1 Reviewing Facts and Terms

11) The clotting proteins in blood plasma are  
A) globulins.  
B) transport proteins.  
C) albumins.  
D) collagen.  
E) fibrinogens.  
Answer:  C  
Diff:  1  
Learning Outcome:  11.2  
Skill Level:  1 Reviewing Facts and Terms
12) Plasma proteins that are necessary for blood to maintain osmotic pressure are
A) albumins.
B) fibrinogens.
C) globulins.
D) collagens.
E) elastins.
Answer: A
Diff: 1
Learning Outcome: 11.2
Skill Level: 1 Reviewing Facts and Terms

13) The condition of cyanosis is caused by increased levels of
A) carbaminohemoglobin.
B) deoxyhemoglobin.
C) oxyhemoglobin.
D) carbon dioxide.
E) carbon monoxide.
Answer: B
Diff: 1
Learning Outcome: 11.3
Skill Level: 1 Reviewing Facts and Terms

14) Biconcave cells without a nucleus are called
A) lymphocytes.
B) neutrophils.
C) eosinophils.
D) erythrocytes.
E) monocytes.
Answer: D
Diff: 1
Learning Outcome: 11.3
Skill Level: 1 Reviewing Facts and Terms

15) Red blood cells are stored in
A) the liver.
B) the thymus.
C) red bone marrow.
D) yellow bone marrow.
E) lymph nodes.
Answer: A
Diff: 1
Learning Outcome: 11.3
Skill Level: 1 Reviewing Facts and Terms
16) Stem cells responsible for the production of white blood cells originate in the
A) liver.
B) thymus.
C) spleen.
D) bone marrow.
E) lymphoid tissue.
Answer: D
Diff: 1
Learning Outcome: 11.3
Skill Level: 1 Reviewing Facts and Terms

17) Red blood cell production is regulated by a hormone from the
A) thymus.
B) lungs.
C) kidney.
D) suprarenal gland.
E) brain.
Answer: C
Diff: 1
Learning Outcome: 11.3
Skill Level: 1 Reviewing Facts and Terms

18) Before red blood cells enter the bloodstream, they
A) flatten.
B) multiply their mitochondria.
C) eject their nucleus.
D) soak up oxygen.
E) recycle hemoglobin.
Answer: C
Diff: 1
Learning Outcome: 11.3
Skill Level: 1 Reviewing Facts and Terms

19) The average life span of a red blood cell is
A) 1 week.
B) 1 month.
C) 4 months.
D) 6 months.
E) 1 year.
Answer: C
Diff: 1
Learning Outcome: 11.3
Skill Level: 1 Reviewing Facts and Terms
20) The function of hemoglobin is to
A) carry oxygen.
B) protect the body against infectious agents.
C) aid in the process of blood clotting.
D) carry nutrients from the intestine to the body's cells.
E) all of the above
Answer: A
Diff: 1
Learning Outcome: 11.3
Skill Level: 1 Reviewing Facts and Terms

21) ________ is a condition in which the oxygen-carrying capacity of the blood is reduced.
A) Erythropoiesis
B) Lymphopoiesis
C) Anemia
D) Leukopenia
E) Leukemia
Answer: C
Diff: 1
Learning Outcome: 11.3
Skill Level: 1 Reviewing Facts and Terms

22) A hemoglobin molecule contains
A) three protein chains, four heme groups, and two iron.
B) two protein chains, two heme groups, and four iron.
C) four protein chains, two heme groups, and two iron.
D) four protein chains, four heme groups, and four iron.
E) four protein chains, six heme groups, and two iron.
Answer: D
Diff: 1
Learning Outcome: 11.3
Skill Level: 1 Reviewing Facts and Terms

23) Each heme group in a molecule of hemoglobin contains ________ atom(s) of iron.
A) 1
B) 2
C) 3
D) 4
E) 1/2
Answer: A
Diff: 1
Learning Outcome: 11.3
Skill Level: 1 Reviewing Facts and Terms
24) In adults, erythropoiesis primarily takes place in
A) the liver.
B) yellow bone marrow.
C) the tibia.
D) the spleen.
E) the kidneys.
Answer: C
Diff: 1
Learning Outcome: 11.3
Skill Level: 1 Reviewing Facts and Terms

25) Red bone marrow is located in the
A) sternum.
B) ribs.
C) bodies of vertebrae.
D) ends of long bones.
E) all of the above
Answer: E
Diff: 1
Learning Outcome: 11.3
Skill Level: 1 Reviewing Facts and Terms

26) EPO is released when
A) oxygen levels in the blood increase.
B) oxygen levels in the blood decrease.
C) carbon dioxide levels in the blood increase.
D) carbon dioxide levels in the blood decrease.
E) protein levels in the blood increase.
Answer: B
Diff: 1
Learning Outcome: 11.3
Skill Level: 1 Reviewing Facts and Terms

27) Placement of an oxygen mask on a patient could result in
A) anemia.
B) increased numbers of lymphocytes.
C) increased erythropoiesis.
D) decreased erythropoiesis.
E) decreased elimination of vitamin K.
Answer: D
Diff: 1
Learning Outcome: 11.3
Skill Level: 1 Reviewing Facts and Terms
28) Having too many red blood cells is called
A) erythrocytosis.
B) erythropenia.
C) hemocytosis.
D) erythropoiesis.
E) hematopenia.
Answer: A
Diff: 1
Learning Outcome: 11.3
Skill Level: 1 Reviewing Facts and Terms

29) What effect would a drug that interferes with protein synthesis have on the development of red blood cells?
A) Fewer cells than normal would be formed.
B) The cells formed would not be able to carry as much oxygen as normal.
C) The cells formed would carry larger amounts of carbon dioxide.
D) The cells would be round like spheres.
E) all of the above
Answer: B
Diff: 1
Learning Outcome: 11.3
Skill Level: 2 Reviewing Concepts

30) A toxin that blocks the stomach’s ability to release intrinsic factor would cause
A) asphyxiation.
B) acidosis.
C) hemorrhage.
D) leukemia.
E) anemia.
Answer: E
Diff: 1
Learning Outcome: 11.3
Skill Level: 3 Critical Thinking & Clinical Applications

31) A person who lives in a city at sea level and vacations in the Rocky Mountains would experience an increase in
A) the number of platelets in the blood.
B) the number of lymphocytes in the blood.
C) red blood cell count.
D) white blood cell count.
E) the density of the bone marrow.
Answer: C
Diff: 1
Learning Outcome: 11.3
Skill Level: 3 Critical Thinking & Clinical Applications
32) This disease is characterized by an incorrect production of hemoglobin proteins.
A) sickle cell anemia
B) thalassemia
C) hematuria
D) jaundice
E) aplastic anemia
Answer: A
Diff: 1
Learning Outcome: 11.3
Skill Level: 3 Critical Thinking & Clinical Applications

33) This condition results from retaining hemoglobin breakdown products in the blood.
A) hematuria
B) aplastic anemia
C) microcytic anemia
D) jaundice
E) sickle cell anemia
Answer: D
Diff: 1
Learning Outcome: 11.3
Skill Level: 3 Critical Thinking & Clinical Applications

34) Another term for the condition known as erythroblastosis fetalis is
A) sensitization incompatibility.
B) cross reaction.
C) hemolytic disease of the newborn.
D) anemia.
E) none of the above
Answer: C
Diff: 1
Learning Outcome: 11.3
Skill Level: 3 Critical Thinking & Clinical Applications

35) Which of the following represents the correct sequence of appearance for mature red blood cells?
A) stem cell, erythroblast stage, proerythroblast, reticulocyte, RBC
B) hemocytoblast, myeloblast, reticulocyte, megakaryocyte, RBC
C) myeloid stem cell, proerythroblast, erythroblast, reticulocyte, RBC
D) monoblast, promonocyte, myelocyte, band cell, RBC
E) lymphoblast, proerythroblast, reticulocyte, band cell, RBC
Answer: C
Diff: 1
Learning Outcome: 11.3
Skill Level: 3 Critical Thinking & Clinical Applications
36) Which condition(s) may result in a decreased red blood cell count?
   A) acute infections
   B) leukemia
   C) menstruation
   D) hypochromic anemia
   E) all of the above
   Answer: C
   Diff: 1
   Learning Outcome: 11.3
   Skill Level: 3 Critical Thinking & Clinical Applications

37) Which grouping of conditions may result in an increased red blood cell count?
   A) severe dehydration, diarrhea, polycythemia
   B) anemia, dehydration, leukemia
   C) anemia, dehydration, severe hemorrhage
   D) leukemia, anemia, severe dehydration
   E) anemia, polycythemia, dehydration
   Answer: A
   Diff: 1
   Learning Outcome: 11.3
   Skill Level: 3 Critical Thinking & Clinical Applications

38) A person’s blood type is determined by the
   A) size of the red blood cells.
   B) shape of the red blood cells.
   C) chemical character of the hemoglobin.
   D) presence or absence of specific molecules on the plasma membrane.
   E) number of specific molecules on the plasma membrane.
   Answer: D
   Diff: 1
   Learning Outcome: 11.4
   Skill Level: 1 Reviewing Facts and Terms

39) Type AB blood contains
   A) A agglutinins on the red blood cells.
   B) agglutinogen A and B.
   C) B agglutinogens on the red blood cells.
   D) B agglutinins in the plasma.
   E) agglutinin A and B.
   Answer: B
   Diff: 1
   Learning Outcome: 11.4
   Skill Level: 1 Reviewing Facts and Terms
40) Agglutinogens of the various blood types are examples of
A) antibodies.
B) proteins.
C) white blood cells.
D) antigens.
E) none of the above
Answer: D
Diff: 1
Learning Outcome: 11.4
Skill Level: 1 Reviewing Facts and Terms

41) Bill wants to determine his blood type, so he takes a few drops of blood from a puncture wound in his finger and mixes it with various antisera. His blood cells agglutinate when mixed with the anti-A sera and anti-Rh sera, but not with the anti-B sera. This means
A) Bill could receive type B blood in a transfusion.
B) Bill could donate blood to an individual with type AB blood.
C) Bill is Rh-positive.
D) Bill's plasma contains anti-B antibodies.
E) Bill's plasma would cross-react with type 0 negative red blood cells.
Answer: D
Diff: 1
Learning Outcome: 11.4
Skill Level: 2 Reviewing Concepts

42) Pus contains
A) leukocytes.
B) bacteria.
C) damaged body cells.
D) platelets.
E) all of the above
Answer: E
Diff: 1
Learning Outcome: 11.5
Skill Level: 1 Reviewing Facts and Terms

43) During a viral infection, you would expect to see increased numbers of
A) neutrophils.
B) eosinophils.
C) basophils.
D) lymphocytes.
E) thrombocytes.
Answer: D
Diff: 1
Learning Outcome: 11.5
Skill Level: 1 Reviewing Facts and Terms
44) A sample of tissue from an injury shows a large number of eosinophils. This would indicate that the tissue was
A) abscessed.
B) inflamed.
C) being rejected.
D) infected by viruses.
E) infected by parasites.
Answer: E
Diff: 1
Learning Outcome: 11.5
Skill Level: 1 Reviewing Facts and Terms

45) Neutrophils
A) are granular leukocytes.
B) are phagocytic.
C) have lobed nuclei.
D) are active in fighting bacterial infection.
E) all of the above
Answer: E
Diff: 1
Learning Outcome: 11.5
Skill Level: 1 Reviewing Facts and Terms

46) The least numerous white blood cells in peripheral circulation are the
A) neutrophils.
B) eosinophils.
C) basophils.
D) lymphocytes.
E) monocytes.
Answer: C
Diff: 1
Learning Outcome: 11.5
Skill Level: 1 Reviewing Facts and Terms

47) Which of the following is the MOST active phagocytically?
A) neutrophils
B) eosinophils
C) basophils
D) lymphocytes
E) erythrocytes
Answer: A
Diff: 1
Learning Outcome: 11.5
Skill Level: 1 Reviewing Facts and Terms
48) ________ are large phagocytic WBCs that are "transformed" into phagocytic macrophages at the site of an injury.
A) Neutrophils
B) Eosinophils
C) Basophils
D) Lymphocytes
E) Monocytes
Answer: E
Diff: 1
Learning Outcome: 11.5
Skill Level: 1 Reviewing Facts and Terms

49) The white blood cells that are important in leaving the blood vessels and phagocytizing large materials are
A) neutrophils.
B) eosinophils.
C) basophils.
D) lymphocytes.
E) monocytes.
Answer: E
Diff: 1
Learning Outcome: 11.5
Skill Level: 1 Reviewing Facts and Terms

50) Platelets function in
A) transporting chemicals important for clotting.
B) forming temporary patches in injured areas.
C) contraction after clot formation.
D) initiating the clotting process.
E) all of the above
Answer: E
Diff: 1
Learning Outcome: 11.6
Skill Level: 1 Reviewing Facts and Terms

51) Platelets release ________, which causes local vasoconstriction.
A) serotonin
B) epinephrine
C) collagen
D) prostaglandin
E) fibrin
Answer: A
Diff: 1
Learning Outcome: 11.6
Skill Level: 1 Reviewing Facts and Terms
52) The basic event that causes a blood clot to form is the change of
A) prothrombin to thrombin.
B) Factor X to Factor Xa.
C) fibrinogen to fibrin.
D) vitamin K to prothrombin.
E) PDGF to platelet.
Answer: C
Diff: 1
Learning Outcome: 11.6
Skill Level: 1 Reviewing Facts and Terms

53) Platelets are
A) cells.
B) proteins.
C) cell fragments.
D) nuclei.
E) antibodies.
Answer: C
Diff: 1
Learning Outcome: 11.6
Skill Level: 1 Reviewing Facts and Terms

54) Thrombocytopenia is a deficiency of
A) antibodies.
B) erythrocytes.
C) platelets.
D) WBC.
E) all of the above
Answer: C
Diff: 1
Learning Outcome: 11.6
Skill Level: 3 Critical Thinking & Clinical Applications
55) The following is a list of the steps involved in the process of hemostasis and clot removal:
1. coagulation
2. fibrinolysis
3. vascular spasm
4. retraction
5. platelet phase
The correct sequence of these steps is
A) 5, 1, 4, 2, 3.
B) 3, 5, 1, 4, 2.
C) 2, 3, 5, 1, 4.
D) 3, 4, 5, 2, 1.
E) 4, 3, 5, 2, 1.
Answer: B
Diff: 1
Learning Outcome: 11.7
Skill Level: 1 Reviewing Facts and Terms

56) Which of the following is a necessary cofactor in the formation of a blood clot?
A) albumin
B) fibrinogen
C) calcium
D) prothrombin
E) vitamin K
Answer: C
Diff: 1
Learning Outcome: 11.7
Skill Level: 1 Reviewing Facts and Terms

57) The main event of the coagulation phase is
A) vascular spasm.
B) the activation of fibrinogen.
C) clot retraction.
D) the formation of a platelet plug.
E) the contraction of platelets.
Answer: B
Diff: 1
Learning Outcome: 11.7
Skill Level: 1 Reviewing Facts and Terms
58) The intrinsic pathway of coagulation is activated by
A) the sticking of platelets to damaged tissue.
B) the activation of a proenzyme exposed to collagen.
C) the release of tissue factor by damaged endothelium.
D) the release of heparin from the liver.
E) the conversion of prothrombin to thrombin.
Answer: B
Diff: 1
Learning Outcome: 11.7
Skill Level: 1 Reviewing Facts and Terms

59) The common pathway of coagulation ends with
A) the sticking of platelets to damaged tissue.
B) the activation of a proenzyme exposed to collagen.
C) the release of tissue factor by damaged endothelium.
D) the activation of a clotting factor that converts prothrombin to thrombin.
E) the activation of a clotting factor that converts fibrinogen to fibrin.
Answer: E
Diff: 1
Learning Outcome: 11.7
Skill Level: 1 Reviewing Facts and Terms

60) Which of the following vitamins is needed for the formation of clotting factors?
A) vitamin A
B) vitamin B
C) vitamin C
D) vitamin K
E) vitamin E
Answer: D
Diff: 1
Learning Outcome: 11.7
Skill Level: 1 Reviewing Facts and Terms

61) Calcium ions and _________ have an effect on nearly every aspect of the clotting process.
A) vitamin K
B) vitamin A
C) vitamin D
D) vitamin E
E) thiamin
Answer: A
Diff: 1
Learning Outcome: 11.7
Skill Level: 1 Reviewing Facts and Terms
62) A stationary blood clot is called a(n)
A) embolus.
B) thrombus.
C) plaque.
D) coagulant.
E) platelet plug.
Answer: B
Diff: 1
Learning Outcome: 11.7
Skill Level: 3 Critical Thinking & Clinical Applications

63) How would an increase in the concentration of calcium ion in the blood affect the process of hemostasis?
A) Platelet plugs would fail to form.
B) Coagulation would proceed more rapidly.
C) Coagulation would proceed more slowly.
D) Retraction would occur prematurely.
E) Fibrinolysis would occur more quickly.
Answer: B
Diff: 1
Learning Outcome: 11.7
Skill Level: 3 Critical Thinking & Clinical Applications

64) ________ occur(s) where endothelial and smooth muscle cells contain large quantities of lipids.
A) Clots
B) Emboli
C) Coagulation
D) Plaques
E) Stasis
Answer: D
Diff: 1
Learning Outcome: 11.7
Skill Level: 3 Critical Thinking & Clinical Applications

65) The inherited condition resulting from the inadequate production of clotting factors is termed
A) anemia.
B) thalassemia.
C) jaundice.
D) hemophilia.
E) none of the above
Answer: D
Diff: 1
Learning Outcome: 11.7
Skill Level: 3 Critical Thinking & Clinical Applications
Matching Questions

1) Match the formed element in the first column with its characteristic in the second.

_____ 1. RBC   A. anucleated and biconcave
_____ 2. WBC   B. anucleated and a cell fragment
_____ 3. platelet   C. nucleated and spheroid

Answer: 1-A, 2-C, 3-B
Diff: 1
Learning Outcome: 11.1
Skill Level: 1 Reviewing Facts and Terms

Fill in the Blank Questions

1) The percentage of whole blood occupied by cellular elements is termed the

Answer: hematocrit
Diff: 1
Learning Outcome: 11.1
Skill Level: 1 Reviewing Facts and Terms

2) Blood is approximately __________________ percent plasma by volume.

Answer: 55
Diff: 1
Learning Outcome: 11.1
Skill Level: 1 Reviewing Facts and Terms

3) When hemoglobin is broken down, a green pigment called __________________ is produced.

Answer: biliverdin
Diff: 1
Learning Outcome: 11.3
Skill Level: 1 Reviewing Facts and Terms

4) The most common type of WBC in a normal blood sample is the ____________________.

Answer: neutrophil
Diff: 1
Learning Outcome: 11.5
Skill Level: 1 Reviewing Facts and Terms

5) Neutrophils, eosinophils, and basophils are all specifically classified as ____________________.

Answer: granulocytes
Diff: 1
Learning Outcome: 11.5
Skill Level: 1 Reviewing Facts and Terms
6) The process of stopping bleeding is called _______________________.
Answer: hemostasis
Diff: 1
Learning Outcome: 11.7
Skill Level: 1 Reviewing Facts and Terms

Essay Questions

1) In the disease mononucleosis ("mono"), the spleen enlarges because of increased numbers of cells—both phagocytic as well as others. Common symptoms of this disease include pale complexion, a tired feeling, and a lack of energy, sometimes to the point of not being able to get out of bed. What might cause these symptoms?

Answer: A major function of the spleen is to destroy old, defective, and worn-out red blood cells. As the spleen increases in size, so does its capacity to eliminate red blood cells, and this produces anemia. The decreased number of red blood cells decreases the blood's ability to deliver oxygen to the tissues, and thus their metabolism is slowed down. This would account for the tired feeling and lack of energy. Because there are fewer red blood cells than normal, the blood circulating through the skin is not as red, and so the person has a pale or white skin coloration.

Diff: 2
Learning Outcome: 11.3
Skill Level: 3 Critical Thinking & Clinical Applications
Labeling Exercises

Using the figure above, identify the labeled part. Choose from the following list:

- Albumins (60%)
- Electrolytes
- Fibrinogen (4%)
- Globulins (35%)
- Organic nutrients
- Organic wastes
- Regulatory proteins (<1%)
1) Label A: ________
   Answer: Albumins (60%)
   Diff: 1
   Learning Outcome: 11.1
   Skill Level: 1 Reviewing Facts and Terms

2) Label B: ________
   Answer: Globulins (35%)
   Diff: 1
   Learning Outcome: 11.1
   Skill Level: 1 Reviewing Facts and Terms

3) Label C: ________
   Answer: Fibrinogen (4%)
   Diff: 1
   Learning Outcome: 11.1
   Skill Level: 1 Reviewing Facts and Terms

4) Label D: ________
   Answer: Regulatory proteins (<1%)
   Diff: 1
   Learning Outcome: 11.1
   Skill Level: 1 Reviewing Facts and Terms

5) Label E: ________
   Answer: Electrolytes
   Diff: 1
   Learning Outcome: 11.1
   Skill Level: 1 Reviewing Facts and Terms

6) Label F: ________
   Answer: Organic nutrients
   Diff: 1
   Learning Outcome: 11.1
   Skill Level: 1 Reviewing Facts and Terms

7) Label G: ________
   Answer: Organic wastes
   Diff: 1
   Learning Outcome: 11.1
   Skill Level: 1 Reviewing Facts and Terms