

FORM A

Name _____ Student Number _____

MULTIPLE CHOICE. Choose the one option that best completes the statement or answers the question. 27 questions worth 1 mark each, for a total of 27 marks.

- 1) Which of the following statements is TRUE?
 - A) An ECG measures the amplitude of action potentials within myocardial contractile cells.
 - B) Elevated levels of high density lipoproteins are associated with increased risk of cardiovascular disease.
 - C) Coronary by-pass refers to constriction of precapillary sphincters and shunting of blood to other vessels.
 - D) Velocity of blood flow at the capillaries is slowest due to greater total cross sectional area.

- 2) With regards to kidney regulation of blood pressure, which of the following statements is INCORRECT?
 - A) Aldosterone increases sodium absorption, therefore promoting water loss from plasma.
 - B) The production of angiotensin II involves proteins from the liver and lungs.
 - C) Angiotensin II increases vasoconstriction of arterioles.
 - D) Aldosterone increases blood pressure by increasing expression of Na/K pumps and increasing blood volume.

- 3) Antithrombin deficiency means a patient has _____.
 - A) an increased chance of blood clots due to activity of tissue thromboplastin
 - B) a decreased chance of blood clots due to activity of thrombin
 - C) an increased chance of blood clots due to activity of thrombin
 - D) a decreased chance of blood clots due to activity of tissue thromboplastin

- 4) Human papilloma virus (HPV) is the leading cause of cervical cancer in women. Ontario currently has a vaccination programme for girls in Grade 8 that will hopefully reduce the chances of them developing cervical cancer as they age. However, because HPV is a sexually transmitted disease, some parents are also demanding their sons be included in this programme. Which of the following statements is correct of these individuals 2 weeks after getting the HPV vaccine?
 - A) They will have developed a primary immune response to HPV.
 - B) IgE will have crossed their epithelial cells to create a physical barrier of protection.
 - C) Their T cells will have been trained for tolerance to HPV in the bone marrow.
 - D) They will have artificially acquired passive immunity.

- 5) Which of the following is INCORRECT?
 - A) A P of 25mmHg would induce greater flow than a P of 20mmHg.
 - B) Flow is inversely proportional to blood vessel radius.
 - C) An increase in vessel radius decreases velocity of flow.
 - D) An increase in vessel radius decreases resistance and increases flow.

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- 6) Which of the following statements is FALSE regarding factors that regulate GFR?
- A) Hormones can affect GFR by changing the resistance in the arterioles.
 - B) Activation of the sympathetic nervous system causes afferent arterioles to constrict.
 - C) GFR fluctuates across all blood pressures as it takes time for the kidney to feedback to alter homeostatic responses.
 - D) Myogenic autoregulation refers to the intrinsic ability of vascular smooth muscle to respond to pressure changes in the kidney.
- 7) Which of the following is INCORRECT?
- A) Blood pressure decreases from aorta to capillaries due to progressive increase in the number of vessels.
 - B) Blood pressure increases from aorta to capillaries due to progressive decrease in diameter of capillaries.
 - C) Blood pressure decreases from aorta to capillaries due to progressive increase in total cross-sectional area of vessels.
 - D) Blood pressure progressively decreases from the aorta to the vena cava.
- 8) Which of the following is a TRUE statement regarding the kidney?
- A) All plasma proteins and ions are free filtered from the plasma into the lumen of the kidney.
 - B) The kidneys receive incoming blood from the renal veins.
 - C) Transfer of fluid from blood into the kidney tubule primarily occurs by reabsorption.
 - D) The afferent arteriole brings blood into the glomerulus and the efferent arteriole allows for blood to leave the glomerulus.
- 9) How many of the following statements are FALSE?
- i) Hypertension is associated with chronic elevated blood pressure above 140/90 mmHg.
 - ii) Thrombolysis is a process where tissue plasminogen accumulates, creating a blood clot in coronary arteries.
 - iii) Macrophage infiltration and platelet formation contribute to plaque-associated occlusion of blood vessels.
 - iv) Inhibition of angiotensin converting enzyme increases blood pressure by increasing blood volume.
- A) 1 of these statements is false
 - B) 2 of these statements are false
 - C) 3 of these statements are false
 - D) All of these statements are false

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- 10) Which of the following measurements are NOT included in a Wiggers Diagram?
- A) Aortic pressure
 - B) Heart sounds
 - C) T wave
 - D) All of the above are included
- 11) With the passage of blood through the heart, starting from the vena cava and ending at systemic circulation, which of the following sequences is CORRECT?
- A) Vena cava, tricuspid valve, pulmonary artery, left ventricle, aorta
 - B) Vena cava, pulmonary vein, pulmonary semilunar valve, left atrium, aorta
 - C) Vena cava, bicuspid valve, pulmonary artery, left ventricle, aorta
 - D) Vena cava, right atrium, right ventricle, aorta, systemic circulation
- 12) How many of the following statements regarding electrocardiogram (ECG) are TRUE?
- i) During the QRS complex, both the mitral and aortic semilunar valves may be shut for a period of time.
 - ii) The initiation of the P wave is the result of calcium influx in myocardial autorhythmic cells of the SA node.
 - iii) Counting the number of R peaks per unit of time is an indication of stroke volume.
 - iv) An elevated ST segment is indicative of myocardial infarction.
- A) 1 of these statements is true
 - B) 2 of these statements are true
 - C) 3 of these statements are true
 - D) All of these statements are true
- 13) Regulatory T cells, or Treg cells, are recently discovered cells that suppress immune responses. These cells would be identified by the expression of which cell surface protein?
- A) MHCII
 - B) MHCI
 - C) CD8
 - D) CD43

FORM A

- 14) Which of the following sequence of events is INCORRECT?
- A) Increase blood pressure and baroreceptor firing, increased sympathetic norepinephrine release and vasodilation, decreased peripheral resistance.
 - B) Increase blood pressure and baroreceptor firing, decreased sympathetic norepinephrine release and myocardial force of contraction, decrease cardiac output.
 - C) Increase blood pressure and baroreceptor firing, increased parasympathetic ACh release, decreased heart rate and cardiac output.
 - D) A and C
- 15) If a patient has a systolic blood pressure of 130 mmHg and a diastolic pressure of 70 mmHg, their pulse pressure should be:
- A) 60 mmHg
 - B) 89.9 mmHg
 - C) 109.9 mmHg
 - D) 200 mmHg
- 16) Which of the following statements is TRUE regarding fluid distribution in the body?
- A) Fluid moves from high to low osmolarity.
 - B) Most of the body's water is stored in intracellular compartments.
 - C) Proteins in the plasma push water out of the blood capillaries.
 - D) Potassium is one of the major ions in the extracellular compartments.
- 17) Which of the following statements is TRUE?
- A) Permeability of albumin is inversely proportional to its molecular weight.
 - B) Fenestrated capillaries are more "leaky", therefore do not require vesicles for transcytosis.
 - C) Relaxation of precapillary sphincters allows for shunting of blood from the arterioles to venules.
 - D) Capillary density is inversely proportional to the metabolic activity of the tissue being perfused.
- 18) An inflammatory response is triggered when:
- A) Clotting factors are exposed to collagen
 - B) The injured area becomes red, swollen, and painful
 - C) Mast cells release histamine
 - D) Neutrophils are formed in the bone marrow
- 19) Activation of thrombin by the intrinsic pathway is initiated by _____.
- A) activation of tissue factor
 - B) subendothelial activation of factor XII
 - C) release of factor III from damaged tissue to directly activate factor X
 - D) activation of factor III

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- 20) Which of the following statements regarding the cardiac cycle is FALSE?
- A) The majority of ventricular filling occurs passively when ventricles are relaxed.
 - B) An increase in end systolic volume is associated with a decrease in stroke volume.
 - C) An increase in end diastolic volume enhances preload.
 - D) Increased heart rate is associated with increased stroke volume.
- 21) Identify the INCORRECT statement about the complement system:
- A) Complement proteins C3a and C5a cause inflammation.
 - B) Antigen binding to IgM can initiate the classical pathway.
 - C) The membrane attack complex is formed by C5/C6/C7/C8/C9.
 - D) C3 convertase of the alternative pathway requires the action of Factor D.
- 22) What is the path through the nephron in which filtrate flows?
- A) Glomerulus - Proximal tubule - collecting duct - distal tubule - Descending and Ascending limb of loop of Henle
 - B) Glomerulus - distal tubule - collecting duct - Proximal tubule - Descending and Ascending limb of loop of Henle
 - C) Glomerulus - Proximal tubule - Descending and Ascending limb of loop of Henle - distal tubule - collecting duct
 - D) Glomerulus - Descending and Ascending limb of loop of Henle - Proximal tubule - distal tubule - collecting duct
- 23) How many of the following statements accurately describe a step in excitation-contraction coupling of cardiac muscle?
- i) An action potential triggers the opening of ligand-gated Ca^{2+} channels.
 - ii) Calcium induces Ca^{2+} release from the sarcoplasmic reticulum via ryanodine receptor channels.
 - iii) The calcium spark triggers calcium binding to tropomyosin on the actin filament and ~~shortening~~ of the sarcomeres. ?
 - iv) Calcium passively diffuses back into the sarcoplasmic reticulum and across the cell membrane, allowing for relaxation to occur.
- A) 1 of these events is correct
 - B) 2 of these events is correct
 - C) 3 of these events is correct
 - D) All of these events are correct

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24) People suffering from haemophilia B _____.

- A) have clotting times that are shorter than normal
- B) do not have a functional common pathway
- C) do not have a functional intrinsic pathway
- D) do not have a functional extrinsic pathway

25) The following measurements are given:

Capillary hydrostatic pressure = 35 mmHg

Capillary colloid pressure = 20 mmHg

Interstitial fluid pressure = 5 mmHg

Interstitial fluid colloid pressure = 5 mmHg

Which of the following is CORRECT?

- A) Net pressure is 15 mmHg, promoting absorption
- B) Net pressure is -15 mmHg, promoting absorption
- C) Net pressure is 5 mmHg, promoting filtration
- D) Net pressure is 15 mmHg, promoting filtration

26) Identify the statement about ABO blood types that is CORRECT:

- A) Individuals with AB blood will have AB antibodies in their blood.
- B) Donors with blood type B can provide blood to individuals with B cell antigens.
- C) Blood from individuals with blood type A will agglutinate with plasma from individuals with blood type B.
- D) Individuals with blood type AB are universal recipients because their blood can be received by all blood types.

27) Macrophages are responsible for recycling aged or damaged red blood cells in the spleen. Iron from heme is removed from these red blood cells and can be stored in the liver as _____.

- A) Haemoglobin
- B) Ferritin
- C) Transferrin
- D) Bilirubin