МИНИСТЕРСТВО НАУКИ, ВЫСШЕГО ОБРАЗОВАНИЯ И ИННОВАЦИЙ КЫРГЫЗСКОЙ РЕСПУБЛИКИ
ОШСКИЙ МЕЖДУНАРОДНЫЙ МЕДИЦИНСКИЙ УНИВЕРСИТЕТ

Кафедра «Естественно-гуманитарных дисциплин»

РАССМОТРЕНО
на заседании кафедры протокол № 2
от «25» 09 **2025 года**

Зав. кафедрой, **Р.О.Юсупова**

УТВЕРЖДАЮ

Председатель УМС ОММУ,
к.б.н., доцент **Орунбаева Б.М.**
"28" 08 **2025 г.**

ФОНД ТЕСТОВЫХ ЗАДАНИЙ

для итогового контроля по дисциплине «Normal physiology»
на 2025-2026 учебный год
Направление: 560001 – Лечебное дело (GM)
курс – II, семестр – III

Наименование дисциплины	Всего	Кредит	Аудиторные занятия (60 ч)		СРС
			Лекции	Практические	
Нормальная физиология	**120 ч**	**4 кр**	**24 ч**	**36 ч**	**60 ч**
Количество тестовых вопросов	**540**				

Составитель: Батырова К.М.
Составитель: Чаурасия Житендра

Эксперт-тестолог: Токтоназарова Н.Т.

г. Ош – 2025 г.

ЭКСПЕРТНОЕ ЗАКЛЮЧЕНИЕ БАНКА ТЕСТОВЫХ ЗАДАНИЙ

кафедры «Естественно-гуманитарных дисциплин»

от «___» _____20__г.

на разработанные тестовые задания по дисциплине

“Нормальная физиология”

наименование дисциплины

Батырова К.М., Чапрасия Интендра

/указать должность, ученую степень, Ф.И.О. автора (авторов)/

Тестовые задания проверены членом экспертной группы тестологов

Токтоназарова Н.Т.

/указать должность, ученую степень, Ф.И.О./

Направления проведения оценки структуры и содержания тестового задания

№	Направление экспертизы	Оценка экспертов	
1.	Соответствие задания программам и стандартам обучения	Соответствует ✓	Не соответствует
2.	Включение в тесты только наиболее важных, базовых знаний	Соответствует ✓	Не соответствует
3.	Ясность смысла тестовой ситуации и представления ТЗ	Ясно ✓	Не ясно
4.	Правильность ответа на вопрос ТЗ	Соответствует ✓	Не соответствует
5.	Значимость содежания тестового задания (0-сомнительный, 1-допустимый, 2-важный, 3-существенный)	2 балл(ов)	
6.	Соответствие необходимое число заданий по каждому разделу дисциплины исходя из его важности и числа часов, отведенных на его изучение в программе.	Соответствует ✓	Не соответствует

Членом экспертной группы выявлены следующие недостатки в тестовом задании 14 тестовых вопросов несоответствует по терминологии

Членом экспертной группы внесены следующие исправления (корректировки) в тестовое задание после обсуждения заменены 14 тестовых вопросов

На основании представления тестовых заданий автором (авторами) и проведенной проверки сделала следующее заключение:

1) Содержание тестовых заданий **соответствует (не соответствует)** содержанию УМКД (*нужное подчеркнуть*)

2) Представленные тестовые задания в следующем объеме 540 вопросов:

соответствуют (не соответствуют) требованиям, предъявляемым к количеству, уровням сложности и формам заданий для составления тестов. (*нужное подчеркнуть*)

Тестолог: Токтоназарова Н.Т. _____

Ознакомлен зав. кафедрой Жунова Р.О. _____

Option 1

1. What is the primary stimulus for the release of erythropoietin?
   A. High blood pressure
   B. Hyperoxia
   C. Tissue hypoxia
   D. Elevated platelet count
   E. Alkalosis

2. During the cardiac cycle, the point at which the ventricles contain the maximum volume of blood is known as:
   A. End-systolic volume
   B. Stroke volume
   C. End-diastolic volume
   D. Ejection fraction
   E. Cardiac reserve

3. The primary function of the pulmonary surfactant is to:
   A. Facilitate oxygen diffusion
   B. Kill inhaled bacteria
   C. Increase alveolar surface tension
   D. Decrease alveolar surface tension
   E. Promote carbon dioxide binding

4. The QRS complex in a standard ECG corresponds to:
   A. Atrial depolarization
   B. Atrial repolarization
   C. Ventricular depolarization
   D. Ventricular repolarization
   E. AV nodal delay

5. Which of the following is the correct sequence of the cardiac conduction system?
   A. AV node > SA node > Bundle of His > Purkinje fibers
   B. SA node > AV node > Bundle of His > Purkinje fibers
   C. Purkinje fibers > AV node > SA node > Bundle of His
   D. Bundle of His > SA node > AV node > Purkinje fibers
   E. SA node > Bundle of His > AV node > Purkinje fibers

6. Hemoglobin has the highest affinity for which of the following gases?
   A. O_2
   B. CO_2
   C. CO
   D. NO
   E. H_2S

7. The majority of oxygen in the blood is transported:
   A. Dissolved in plasma
   B. As carbaminohemoglobin
   C. As bicarbonate ions
   D. Bound to hemoglobin
   E. Bound to plasma proteins

8. The most important factor determining peripheral resistance is:
   A. Blood viscosity
   B. Total blood volume

C. Length of the blood vessel
D. Vessel radius
E. Heart rate

9. The physiological "dead space" includes all of the following EXCEPT:
A. Trachea
B. Bronchi
C. Bronchioles
D. Alveoli
E. Terminal bronchioles

10. Platelet adhesion at the site of vessel injury is initially mediated by their binding to:
A. Fibrinogen
B. Thrombin
C. Collagen
D. Von Willebrand factor
E. Prothrombin

11. The term "hematocrit" refers to:
A. The percentage of leukocytes in blood
B. The percentage of erythrocytes in blood
C. The total blood volume
D. The hemoglobin concentration
E. The clotting ability of blood

12. The ion primarily responsible for the plateau phase of the ventricular action potential is:
A. Sodium influx
B. Potassium efflux
C. Chloride influx
D. Calcium influx
E. Magnesium efflux

13. Which blood type is considered the universal recipient?
A. A
B. B
C. AB
D. O
E. Rh-negative

14. After a normal exhalation, the amount of air that remains in the lungs is called the...?
A. Tidal Volume
B. Expiratory Reserve Volume
C. Inspiratory Reserve Volume
D. Functional Residual Capacity
E. Residual Volume

15. The Frank-Starling mechanism of the heart states that:
A. Heart rate increases with sympathetic stimulation
B. Ejection fraction decreases with increased afterload
C. Stroke volume increases with increased end-diastolic volume
D. Cardiac output is the product of heart rate and stroke volume
E. Coronary blood flow is proportional to metabolic demand

16. The conversion of fibrinogen to fibrin is catalyzed by:
A. Thromboplastin
B. Prothrombin
C. Thrombin

D. Plasmin
E. Factor X

17. A decrease in which of the following would result in an increase in pulmonary ventilation?
A. Arterial PCO2
B. Arterial PO2
C. Arterial pH
D. Blood hemoglobin
E. Plasma bicarbonate

18. According to the "All-or-None" law in cardiac physiology, which of the following statements is true?
A. The entire ventricular myocardium contracts as a single unit every time.
B. An action potential in a cardiac muscle cell will only occur if the stimulus reaches a precise threshold.
C. The force of ventricular contraction is proportional to the strength of the stimulus.
D. The heart rate will either double or remain the same in response to sympathetic stimulation.
E. The ventricles will either eject all their blood or none of it during systole.

19. Which leukocyte is primarily responsible for the phagocytosis of bacteria?
A. Lymphocyte
B. Eosinophil
C. Basophil
D. Neutrophil
E. Monocyte

20. The velocity of blood flow is slowest in the:
A. Aorta
B. Arteries
C. Arterioles
D. Capillaries
E. Venae cavae

21. The primary respiratory control center, which generates the basic rhythm of breathing, is located in the:
A. Cerebrum
B. Cerebellum
C. Pons
D. Medulla oblongata
E. Hypothalamus

22. The T wave of the ECG represents:
A. Atrial depolarization
B. Ventricular depolarization
C. Atrial repolarization
D. Ventricular repolarization
E. SA node depolarization

23. In the coagulation cascade, the intrinsic and extrinsic pathways converge at the activation of:
A. Factor X
B. Factor XIII
C. Prothrombin
D. Fibrinogen
E. Factor VII

24. Which of the following situations makes hemoglobin release MORE oxygen to the tissues?
A. An increase in blood pH
B. A decrease in body temperature

C. A decrease in carbon dioxide (CO_2) concentration
D. An increase in carbon dioxide (CO_2) concentration
E. The formation of carboxyhemoglobin

25. The volume of air that remains in the lungs after a maximal expiration is the:
A. Tidal volume
B. Expiratory reserve volume
C. Inspiratory reserve volume
D. Residual volume
E. Functional residual capacity

26. Which of the following is the primary force that directly pushes blood from the veins back toward the heart?
A. The pumping force of the left ventricle
B. The contraction of the veins themselves
C. The pressure gradient from veins to the right atrium
D. The osmotic pressure in the vena cava
E. The suction created by the lungs

27. Which of the following is NOT a characteristic of cardiac muscle cells?
A. Striated
B. Multinucleated
C. Involuntary control
D. Intercalated discs
E. Branching fibers

28. The process of red blood cell production is called:
A. Thrombopoiesis
B. Erythropoiesis
C. Leukopoiesis
D. Hematopoiesis
E. Agranulopoiesis

29. The primary driver for the exchange of gases in the alveoli is:
A. Active transport
B. Osmosis
C. Simple diffusion
D. Facilitated diffusion
E. Filtration

30. Venous return to the heart is enhanced by all of the following EXCEPT:
A. Skeletal muscle pump
B. Respiratory pump
C. Sympathetic venoconstriction
D. Increased blood volume
E. Standing up quickly

Option 2

1. In the lungs, hemoglobin _____ oxygen. In the tissues, hemoglobin _____ oxygen**.**
   A. produces / consumes
   B. releases / binds
   C. binds / releases
   D. transports / destroys
   E. stores / releases

2. Isovolumetric contraction occurs during the cardiac cycle when:
   A. The AV valves are open and semilunar valves are closed.
   B. Both AV and semilunar valves are open.
   C. Both AV and semilunar valves are closed.
   D. The AV valves are closed and semilunar valves are open.
   E. Blood is rapidly ejecting into the aorta.

3. The most abundant plasma protein, crucial for maintaining colloidal osmotic pressure, is:
   A. Fibrinogen
   B. Gamma globulin
   C. Albumin
   D. Prothrombin
   E. Transferrin

4. The primary pacemaker of the heart is the:
   A. Atrioventricular (AV) node
   B. Sinoatrial (SA) node
   C. Bundle of His
   D. Purkinje fibers
   E. Bundle branches

5. The law that states the diffusion rate of a gas is proportional to the surface area and partial pressure gradient, and inversely proportional to the thickness of the membrane, is:
   A. Boyle's Law
   B. Henry's Law
   C. Fick's Law
   D. Dalton's Law
   E. Laplace's Law

6. Which vessel type is the primary site of total peripheral resistance and regulation of blood flow?
   A. Elastic arteries
   B. Muscular arteries
   C. Arterioles
   D. Capillaries
   E. Venules

7. The lifespan of a typical human red blood cell is approximately:
   A. 30 days
   B. 60 days
   C. 90 days
   D. 120 days
   E. 1 year

8. The P wave on an ECG is generated by:
   A. Depolarization of the atria
   B. Depolarization of the ventricles
   C. Repolarization of the atria
   D. Repolarization of the ventricles

E. Delay at the AV node

9. The process by which white blood cells leave the circulation by squeezing between endothelial cells is called:
A. Chemotaxis
B. Phagocytosis
C. Diapedesis
D. Opsonization
E. Margination

10. The volume of air inspired or expired during normal, quiet breathing is the:
A. Inspiratory reserve volume
B. Expiratory reserve volume
C. Tidal volume
D. Residual volume
E. Vital capacity

11. The ion essential for the conversion of prothrombin to thrombin in the coagulation cascade is:
A. Sodium
B. Potassium
C. Calcium
D. Magnesium
E. Chloride

12. A person with blood type O has in their plasma:
A. Both A and B antigens
B. No antibodies
C. Anti-A antibodies
D. Anti-B antibodies
E. Both Anti-A and Anti-B antibodies

13. The central chemoreceptors in the medulla are most sensitive to changes in:
A. Arterial PO_2
B. Arterial PCO_2
C. Arterial pH
D. Plasma bicarbonate levels
E. Cerebrospinal fluid pH

14. Cardiac output can be calculated using the Fick principle, which is based on the measurement of:
A. Blood pressure and heart rate
B. Oxygen consumption and arteriovenous oxygen difference
C. Stroke volume and ejection fraction
D. Venous return and central venous pressure
E. Systemic and pulmonary vascular resistance

15. The second heart sound ("dub") is primarily caused by the:
A. Closure of the AV valves
B. Opening of the AV valves
C. Closure of the semilunar valves
D. Opening of the semilunar valves
E. Rapid ventricular filling

16. Which of the following is a function of platelets?
A. Oxygen transport
B. Antibody production
C. Phagocytosis of parasites
D. Formation of a temporary plug in vessel walls

E. Release of erythropoietin

17. The pressure in the pleural cavity is normally:
A. Equal to atmospheric pressure
B. Greater than atmospheric pressure
C. Less than atmospheric pressure
D. Variable, but always positive
E. Zero

18. The PR interval on an ECG represents the time from the beginning of atrial depolarization to the beginning of ventricular depolarization, which primarily reflects:
A. SA node firing
B. Atrial repolarization
C. Conduction through the AV node
D. Ventricular contraction
E. Purkinje fiber activation

19. The majority of carbon dioxide in the blood is transported as:
A. Dissolved CO_2 in plasma
B. Carbaminohemoglobin
C. Bicarbonate ions
D. Carbonic acid
E. Bound to albumin

20. Vasoconstriction of arterioles in a specific tissue bed would lead to:
A. Increased blood flow to that tissue
B. Decreased resistance in that tissue
C. Increased capillary hydrostatic pressure in that tissue
D. Decreased blood flow to that tissue
E. Increased venous return from that tissue

21. The hormone released from the kidneys that stimulates red blood cell production is:
A. Renin
B. Aldosterone
C. Erythropoietin
D. Thrombopoietin
E. Calcitonin

22. The term "compliance" in the respiratory system refers to the:
A. Ease with which lungs can be inflated
B. Volume of air moved per minute
C. Speed of gas diffusion
D. Resistance to airflow
E. Strength of the respiratory muscles

23. In an ECG, the QT interval represents:
A. Atrial depolarization and repolarization
B. Ventricular depolarization
C. Ventricular repolarization
D. The total duration of ventricular electrical activity
E. The conduction delay at the AV node

24. Hemolytic disease of the newborn (HDN) can occur when:
A. An Rh-positive mother carries an Rh-negative fetus.
B. An Rh-negative mother carries an Rh-positive fetus.
C. There is ABO incompatibility between mother and father.
D. The mother has type AB blood.

E. The father has type O blood.

25. The primary factor that determines the arterial PO2 is:
A. Hemoglobin concentration
B. Alveolar ventilation
C. Cardiac output
D. The oxygen-hemoglobin dissociation curve
E. Mixed venous PO2

26. The "skeletal muscle pump" aids venous return by:
A. Constricting veins directly
B. Increasing arterial pressure
C. Compressing veins and pushing blood toward the heart
D. Decreasing thoracic pressure
E. Increasing heart rate

27. Which of the following is NOT a phase of hemostasis?
A. Vascular spasm
B. Platelet plug formation
C. Coagulation (fibrin clot formation)
D. Fibrinolysis
E. Erythropoiesis

28. The sound of Korotkoff are heard during blood pressure measurement when:
A. There is laminar flow in the artery
B. The artery is fully occluded
C. The artery is fully open
D. Blood flow is turbulent as the cuff pressure decreases
E. The venous flow is obstructed

29. The functional unit of contraction in cardiac muscle is the:
A. Sarcomere
B. Intercalated disc
C. Gap junction
D. Syncytium
E. T-tubule

30. What does it mean when the oxygen-hemoglobin curve "shifts to the right"?
A. Hemoglobin holds onto oxygen tighter than normal
B. Hemoglobin releases its oxygen to the tissues more easily
C. The blood can no longer carry carbon dioxide
D. The amount of hemoglobin in the blood increases
E. The lungs become less efficient at taking in oxygen

Option 3

1. The "Chloride Shift" occurs in red blood cells to:
   A. Facilitate oxygen binding
   B. Maintain electrochemical neutrality during CO_2 uptake
   C. Activate carbonic anhydrase
   D. Promote hemoglobin saturation
   E. Stimulate erythropoiesis

2. The period in the cardiac cycle where the ventricles are contracting but no blood is being ejected is called:
   A. Rapid ejection
   B. Atrial systole
   C. Isovolumetric relaxation
   D. Isovolumetric contraction
   E. Ventricular filling

3. Which of the following leukocytes releases heparin and histamine?
   A. Neutrophil
   B. Eosinophil
   C. Basophil
   D. Lymphocyte
   E. Monocyte

4. The term "pulse pressure" is defined as:
   A. The average pressure in the arteries during one cardiac cycle
   B. The sum of systolic and diastolic pressure
   C. The difference between systolic and diastolic pressure
   D. The pressure in the arteries during ventricular diastole
   E. The peak pressure attained in the aorta

5. The primary automatic rhythm of breathing is generated by which of the following structures?
   A. The stretch receptors in the lungs
   B. The dorsal respiratory group in the medulla oblongata
   C. The chemoreceptors in the carotid bodies
   D. The pneumotaxic center in the pons
   E. The cortex of the brain

6. The intrinsic pathway of coagulation is initiated by:
   A. Tissue thromboplastin (Factor III)
   B. Activation of Factor XII by contact with collagen
   C. Release of calcium ions
   D. Activation of Vitamin K
   E. The formation of the prothrombin activator

7. The volume of air that can be forcibly inhaled after a normal tidal inspiration is the:
   A. Tidal volume
   B. Expiratory reserve volume
   C. Inspiratory reserve volume
   D. Residual volume
   E. Vital capacity

8. The absolute refractory period in cardiac muscle is long to:
   A. Allow for rapid heart rates
   B. Ensure adequate time for ventricular filling
   C. Prevent tetanic contractions
   D. Synchronize atrial and ventricular contraction

E. Protect against reentrant arrhythmias

9. A person with a high hematocrit would most likely be:
   A. Anemic
   B. Living at high altitude
   C. Suffering from leukemia
   D. Thrombocytopenic
   E. In a state of fluid overload

10. The PRIMARY FACTOR that influences the release of oxygen from hemoglobin to the tissues is:
   A. The arterial PO2
   B. The tissue PCO2
   C. The alveolar ventilation rate
   D. The blood pressure
   E. The venous PO2

11. The Bundle of His is located in the:
   A. Right atrium
   B. Left atrium
   C. Interatrial septum
   D. Interventricular septum
   E. Apex of the heart

12. Which of the following would cause a leftward shift of the oxygen-hemoglobin dissociation curve?
   A. Increased temperature
   B. Increased 2,3DPG
   C. Acidosis (decreased pH)
   D. Alkalosis (increased pH)
   E. Increased PCO2

13. The process of fibrinolysis is primarily carried out by:
   A. Thrombin
   B. Fibrinogen
   C. Plasmin
   D. Prothrombin
   E. Factor XIII

14. What is the primary function of the pleural fluid?
   A. To provide a frictionless cushion and coupling between the lungs and chest wall
   B. To produce surfactant for reducing surface tension
   C. To facilitate the diffusion of oxygen and carbon dioxide
   D. To humidify the inspired air
   E. To trap dust and foreign particles entering the lungs

15. The term "preload" in the context of cardiac physiology refers to:
   A. The arterial pressure the ventricle must overcome to eject blood
   B. The degree of stretch of the ventricular myocardium at the end of diastole
   C. The resistance to blood flow in the peripheral circulation
   D. The force of ventricular contraction
   E. The heart rate

16. Which cell is the precursor to macrophages in the tissues?
   A. Neutrophil
   B. Eosinophil
   C. Basophil
   D. Lymphocyte
   E. Monocyte

17. The primary function of the respiratory membrane is to:
A. Produce surfactant
B. Warm and humidify inspired air
C. Provide a large surface area for gas exchange
D. Trap foreign particles
E. Generate the cough reflex

18. The "lub" sound of the heart is caused by:
A. Closure of the semilunar valves
B. Closure of the AV valves
C. Opening of the AV valves
D. Turbulent blood flow in the aorta
E. Atrial contraction

19. The mineral essential for hemoglobin synthesis is:
A. Calcium
B. Sodium
C. Iron
D. Potassium
E. Iodine

20. Hyperventilation will most directly lead to:
A. Respiratory acidosis
B. Respiratory alkalosis
C. Metabolic acidosis
D. Metabolic alkalosis
E. Hypoxia

21. The role of the Purkinje fibers is to:
A. Initiate the heartbeat
B. Delay the impulse between atria and ventricles
C. Rapidly conduct the action potential through the ventricles
D. Sense changes in blood pressure
E. Contract forcefully

22. The total volume of air that can be exchanged in the lungs (from maximal inspiration to maximal expiration) is the:
A. Total lung capacity
B. Functional residual capacity
C. Vital capacity
D. Inspiratory capacity
E. Tidal volume

23. Vasodilation in a tissue bed is likely to occur in response to:
A. Increased oxygen levels
B. Decreased carbon dioxide levels
C. Increased pH
D. Local accumulation of metabolic waste products
E. Sympathetic stimulation

24. During the plateau phase of the cardiac ventricular myocyte action potential, which ion movement is primarily responsible for maintaining depolarization and preventing premature repolarization?
A. Rapid Na^+ influx through voltage-gated channels
B. Ca^{2+} influx through L-type channels
C. K^+ efflux through transient outward channels
D. Cl^- influx through anion channels

E. Na^+ efflux via the Na^+-K^+ pump

25. The first heart sound marks the approximate beginning of:
A. Atrial systole
B. Ventricular systole
C. Ventricular diastole
D. Isovolumetric relaxation
E. Rapid ventricular filling

26. A deficiency of Vitamin K would primarily affect:
A. Erythropoiesis
B. The synthesis of clotting factors II, VII, IX, X
C. Leukocyte function
D. Platelet production
E. The intrinsic pathway

27. The pneumotaxic center, which helps to finetune the breathing pattern, is located in the:
A. Medulla oblongata
B. Pons
C. Cerebrum
D. Hypothalamus
E. Spinal cord

28. The term "afterload" is increased by:
A. An increase in venous return
B. A decrease in total peripheral resistance
C. Systemic hypertension
D. A decrease in blood viscosity
E. Dilation of the arterioles

29. Which of the following is true regarding the exchange of gases in tissues?
A. Oxygen diffuses from the blood to the tissues, CO2 diffuses from the tissues to the blood.
B. Oxygen diffuses from the tissues to the blood, CO2 diffuses from the blood to the tissues.
C. Both oxygen and CO2 diffuse from the blood to the tissues.
D. Both oxygen and CO2 diffuse from the tissues to the blood.
E. Oxygen is actively transported into tissues, CO2 diffuses out.

30. Which factor increases stroke volume?
A. Decreased venous return
B. Decreased preload
C. Increased contractility
D. Increased afterload
E. Decreased heart rate

Option 4

1. If the vagus nerve (carrying parasympathetic signals) to the heart is strongly stimulated, the most immediate effect would be:
   A. A decrease in heart rate (bradycardia)
   B. A powerful increase in heart rate and contractility
   C. Vasoconstriction of the coronary arteries
   D. An increase in stroke volume
   E. A shift in the pacemaker site from SA node to AV node

2. The cardiac output is equal to:
   A. Heart rate / Stroke volume
   B. Heart rate x Stroke volume
   C. End-diastolic volume – End-systolic volume
   D. Blood pressure x Total peripheral resistance
   E. Venous return / Heart rate

3. Which plasma protein is primarily involved in antibody functions?
   A. Albumin
   B. Fibrinogen
   C. Alphaglobulins
   D. Betaglobulins
   E. Gammaglobulins

4. The physiological process that describes the movement of air into and out of the lungs is called:
   A. External respiration
   B. Pulmonary ventilation
   C. Internal respiration
   D. Cellular respiration
   E. Gas exchange

5. The AV node delay is important because it:
   A. Allows the atria to contract and complete filling of the ventricles.
   B. Allows the ventricles to contract before the atria.
   C. Ensures the heart rate is not too fast.
   D. Is the primary pacemaker of the heart.
   E. Prevents backflow of blood into the atria.

6. The condition characterized by a deficiency in the number of red blood cells or hemoglobin is:
   A. Polycythemia
   B. Leukemia
   C. Anemia
   D. Thrombocytopenia
   E. Hemophilia

7. What is the normal percentage range of lymphocytes in a differential WBC count?
   A. 0–1%
   B. 20–40%
   C. 2–4%
   D. 50–70%
   E. 5–10%

8. The PRIMARY stimulus that activates the carotid and aortic body chemoreceptors is:
   A. Increased arterial PCO_2
   B. Decreased plasma pH
   C. Increased bicarbonate concentration
   D. Decreased cerebral blood flow

E. Decreased arterial PO_2

9. The final common pathway in the coagulation cascade involves the conversion of:
   A. Fibrinogen to fibrin
   B. Prothrombin to thrombin
   C. Factor X to Factor Xa
   D. Plasminogen to plasmin
   E. Vitamin K to its active form

10. The volume of air remaining in the lungs after a normal tidal expiration is the:
   A. Residual volume
   B. Expiratory reserve volume
   C. Functional residual capacity
   D. Inspiratory capacity
   E. Vital capacity

11. Sympathetic stimulation of the heart leads to:
   A. Decreased heart rate and decreased contractility
   B. Increased heart rate and increased contractility
   C. Decreased heart rate and increased contractility
   D. Increased heart rate and decreased contractility
   E. No change in heart rate or contractility

12. The molecule that binds to oxygen in red blood cells is:
   A. Plasma
   B. Albumin
   C. Globulin
   D. Heme
   E. Ferritin

13. The primary function of the type II alveolar cells is to:
   A. Carry out gas exchange
   B. Produce surfactant
   C. Phagocytose foreign particles
   D. Secrete mucus
   E. Help in the cough reflex

14. The term "stroke volume" is defined as:
   A. End-diastolic volume + End-systolic volume
   B. End-diastolic volume / End-systolic volume
   C. End-diastolic volume – End-systolic volume
   D. Cardiac output / Heart rate
   E. Both C and D are correct

15. A blood clot that forms and persists in a blood vessel is called a(n):
   A. Embolus
   B. Thrombus
   C. Plaque
   D. Agglutinin
   E. Hemostat

16. The primary factor that determines the lung's tendency to recoil is:
   A. Surface tension of the alveolar fluid
   B. The diaphragm
   C. The pleural pressure
   D. The bronchial smooth muscle
   E. The pulmonary blood flow

17. What is the main ion responsible for depolarization (the "upswing") of the action potential in the SA node, the heart's natural pacemaker?
A. Sodium (Na^+)
B. Potassium (K^+)
C. Calcium (Ca^{2+})
D. Chloride (Cl^-)
E. Magnesium (Mg^{2+})

18. The condition where there is an excess of red blood cells is called:
A. Anemia
B. Polycythemia
C. Leukocytosis
D. Thrombocytosis
E. Erythroblastosis

19. The process of gas exchange between the blood in the systemic capillaries and the body tissues is known as:
A. Internal respiration
B. External respiration
C. Pulmonary ventilation
D. Alveolar diffusion
E. Cellular respiration

20. The hormone that increases sodium reabsorption in the kidneys, thereby increasing blood volume and pressure, is:
A. Erythropoietin
B. Antidiuretic hormone (ADH)
C. Aldosterone
D. Atrial natriuretic peptide (ANP)
E. Renin

21. The QT interval on an ECG is prolonged by:
A. Hypercalcemia
B. Hypocalcemia
C. Hyperkalemia
D. Hyponatremia
E. Hypoglycemia

22. The majority of the lymphocytic white blood cells are found in the:
A. Bloodstream
B. Lymph nodes and lymphoid tissues
C. Bone marrow
D. Liver
E. Spleen

23. A decrease in alveolar ventilation, leading to an increase in PCO2, is known as:
A. Hyperventilation
B. Hypoventilation
C. Eupnea
D. Dyspnea
E. Apnea

24. The term "venous return" refers to the:
A. Amount of blood pumped by the heart per minute
B. Amount of blood flowing back to the heart from the veins
C. Pressure in the venous system

D. Resistance to blood flow in the veins
E. Volume of blood in the arteries

25. Which of the following is a potent vasoconstrictor?
A. Nitric oxide
B. Endothelin1
C. Bradykinin
D. Prostacyclin
E. Atrial natriuretic peptide

26. The presence of microcytic, hypochromic red blood cells is characteristic of:
A. Iron deficiency anemia
B. Vitamin B12 deficiency anemia
C. Hemolytic anemia
D. Aplastic anemia
E. Sickle cell anemia

27. The primary force causing fluid to move out of the capillary at the arteriolar end is:
A. Interstitial fluid colloid osmotic pressure
B. Plasma colloid osmotic pressure
C. Capillary hydrostatic pressure
D. Interstitial fluid hydrostatic pressure
E. Lymphatic pressure

28. The respiratory quotient (RQ) is defined as the:
A. Ratio of CO_2 produced to O_2 consumed
B. Ratio of O_2 consumed to CO_2 produced
C. Volume of air breathed per minute
D. Diffusing capacity of the lung
E. Alveolar ventilation rate

29. The "Bainbridge reflex" results in:
A. An increase in heart rate in response to increased atrial pressure
B. A decrease in heart rate in response to increased blood pressure
C. Vasoconstriction in response to hypoxia
D. Hyperventilation in response to hypercapnia
E. An increase in stroke volume due to increased preload

30. The component of the blood that contains antibodies is the:
A. Red blood cells
B. Platelets
C. Plasma
D. White blood cells
E. Serum

Option 1

1. Digestion is best defined as:
A. Mechanical breakdown of food only
B. Absorption of nutrients into blood
C. Conversion of food into absorbable substances
D. Storage of ingested food
E. Elimination of undigested residues

2. The submucosal (Meissner's) plexus of the gastrointestinal tract mainly regulates:
A. Peristaltic movements
B. Glandular secretion and local blood flow
C. Swallowing reflex
D. Defecation reflex
E. Gastric emptying

3. Slow waves in gastrointestinal smooth muscle are generated by:
A. Enteric neurons
B. Smooth muscle cells
C. Interstitial cells of Cajal
D. Parasympathetic nerve endings
E. Enteroendocrine cells

4. Which neurotransmitter causes relaxation of gastrointestinal smooth muscle?
A. Acetylcholine
B. Substance P
C. Nitric oxide
D. Serotonin
E. Norepinephrine

5. Segmentation movements in the small intestine mainly serve to:
A. Propel chyme distally
B. Mix chyme with digestive juices
C. Prevent gastroesophageal reflux
D. Store intestinal contents
E. Initiate defecation

6. The increase in gastrointestinal blood flow after a meal is mainly due to:
A. Sympathetic vasoconstriction
B. Local metabolic vasodilation
C. Decreased cardiac output
D. Hormonal inhibition
E. Baroreceptor reflexes

7. Glucose absorption across the intestinal epithelium occurs via:
A. Simple diffusion
B. Facilitated diffusion
C. Secondary active transport with sodium
D. Primary active transport
E. Endocytosis

8. Fructose is absorbed from the intestinal lumen by:
A. Sodium-dependent cotransport
B. Primary active transport
C. Facilitated diffusion
D. Pinocytosis
E. Simple diffusion only

9. Parasympathetic stimulation of salivary glands results in saliva that is:
A. Thick and mucus-rich
B. Low in volume
C. Watery and enzyme-rich
D. Absent
E. Highly acidic

10. The swallowing reflex center is located in the:
A. Midbrain
B. Hypothalamus
C. Medulla oblongata
D. Cerebellum
E. Spinal cord

11. Which gastric cells secrete hydrochloric acid?
A. Chief cells
B. Mucous cells
C. Parietal cells
D. G cells
E. D cells

12. Intrinsic factor is necessary for the absorption of:
A. Iron
B. Calcium
C. Vitamin B_{12}
D. Vitamin D
E. Folate

13. The cephalic phase of gastric secretion is mediated mainly by the:
A. Local enteric reflexes
B. Intestinal hormones
C. Vagus nerve
D. Low gastric pH
E. Gastric distension

14. Pepsinogen is activated into pepsin by:
A. Enterokinase
B. Trypsin
C. Hydrochloric acid
D. Bile salts
E. Pancreatic juice

15. Gastric emptying is inhibited by the presence of:
A. Carbohydrates in the stomach
B. Proteins in the stomach
C. Fat in the duodenum
D. Water in the duodenum
E. Gastrin release

16. Cholecystokinin (CCK) is released mainly in response to:
A. Carbohydrates
B. Proteins and fats
C. Water intake
D. Gastric distension
E. Low gastric pH

17. Pancreatic bicarbonate secretion is primarily stimulated by:
A. Gastrin
B. Secretin
C. Cholecystokinin
D. Motilin
E. Somatostatin

18. Bile salts play a major role in:
A. Protein digestion
B. Fat emulsification
C. Carbohydrate digestion
D. Vitamin B_{12} absorption
E. Iron absorption

19. The main movement responsible for mixing chyme in the small intestine is:
A. Peristalsis
B. Segmentation
C. Mass movement
D. Haustration
E. Antiperistalsis

20. Mass movements are characteristic of the:
A. Stomach
B. Jejunum
C. Ileum
D. Colon
E. Esophagus

21. Basal metabolic rate is measured under conditions of:
A. Physical exercise
B. Mental stress
C. Complete rest and fasting
D. After food intake
E. Sleep only

22. Non-shivering thermogenesis is mainly mediated by:

A. Skeletal muscle
B. Brown adipose tissue
C. Liver glycogen
D. Sweat glands
E. Skin vasodilation

23. Heat loss from the body by evaporation occurs mainly through:
A. Radiation
B. Conduction
C. Sweating
D. Convection
E. Vasoconstriction

24. The functional unit of the kidney is the:
A. Glomerulus
B. Loop of Henle
C. Nephron
D. Collecting duct
E. Renal pelvis

25. Primary urine is formed as a result of:
A. Tubular secretion
B. Tubular reabsorption
C. Glomerular filtration
D. Diffusion
E. Osmosis

26. Angiotensin II preferentially constricts the:
A. Afferent arteriole
B. Efferent arteriole
C. Peritubular capillaries
D. Vasa recta
E. Interlobular artery

27. Antidiuretic hormone increases water permeability mainly in the:
A. Proximal tubule
B. Ascending limb of loop of Henle
C. Distal tubule and collecting duct
D. Glomerulus
E. Renal pelvis

28. Which two hormones are key for calcium (Ca^{2+}) homeostasis?
A. Aldosterone and Cortisol
B. Insulin and Glucagon
C. Parathyroid hormone and Calcitonin
D. ADH and Oxytocin
E. Thyroxine and Calcitonin

29. What is the primary stimulus for ADH (vasopressin) release?
A. Low blood pressure

B. Low blood volume
C. Increased plasma osmolarity
D. Increased potassium levels
E. Low oxygen concentration

30. What is the main role of aldosterone in electrolyte balance?
A. Increases water reabsorption
B. Increases sodium reabsorption and potassium excretion
C. Decreases calcium reabsorption
D. Increases bicarbonate secretion
E. Promotes magnesium excretion

Option 2

1. The main function of digestion in the gastrointestinal tract is to:
A. Store food for long periods
B. Convert complex food into absorbable molecules
C. Eliminate metabolic waste
D. Maintain body temperature
E. Produce hormones

2. The mucosal layer of the gastrointestinal tract consists of:
A. Epithelium, lamina propria, muscularis mucosae
B. Epithelium and serosa only
C. Submucosa and glands
D. Circular and longitudinal muscle layers
E. Connective tissue only

3. Spike potentials in GI smooth muscle occur when:
A. Slow waves decrease below threshold
B. Membrane potential reaches threshold
C. Sympathetic activity increases
D. Smooth muscle relaxes
E. Blood flow decreases

4. Which component of the enteric nervous system mainly increases gut motility?
A. Sympathetic fibers
B. Inhibitory motor neurons
C. Excitatory motor neurons
D. Endocrine cells
E. Sensory receptors

5. Vasoactive intestinal peptide (VIP) causes:
A. Contraction of smooth muscle
B. Increased gastric acid secretion
C. Relaxation of smooth muscle and increased secretion
D. Decreased intestinal blood flow
E. Closure of sphincters

6. Peristalsis is best described as:
A. Mixing movement without propulsion
B. Rhythmic segmentation of the intestine
C. Progressive wave propelling contents forward
D. Movement limited to the colon
E. Reverse movement of intestinal contents

7. Sympathetic stimulation of the gastrointestinal tract generally causes:
A. Increased motility and secretion
B. Increased blood flow
C. Decreased motility and secretion
D. Enhanced digestion
E. Relaxation of sphincters

8. Most nutrient absorption occurs in the:
A. Stomach
B. Duodenum
C. Jejunum
D. Ileum
E. Colon

9. Amino acids are absorbed in the intestine mainly by:
A. Simple diffusion
B. Facilitated diffusion
C. Sodium-dependent transport
D. Endocytosis
E. Osmosis

10. The primary function of saliva in digestion is to:
A. Emulsify fats
B. Begin carbohydrate digestion
C. Digest proteins
D. Neutralize gastric acid
E. Absorb nutrients

11. Sympathetic stimulation of salivary glands produces saliva that is:
A. Watery and abundant
B. Rich in enzymes
C. Thick and mucus-rich
D. Absent
E. Highly alkaline

12. During swallowing, the upper esophageal sphincter:
A. Remains closed
B. Opens voluntarily
C. Opens reflexly
D. Contracts continuously
E. Is not involved

13. Chief cells of the stomach secrete:
A. Hydrochloric acid
B. Intrinsic factor
C. Pepsinogen
D. Gastrin
E. Mucus

14. Gastrin is secreted by:
A. D cells
B. G cells
C. Chief cells
D. Parietal cells
E. Enterocytes

15. The intestinal phase of gastric secretion mainly causes:
A. Strong stimulation of acid secretion
B. Inhibition of gastric secretion
C. No effect
D. Increased intrinsic factor release
E. Increased pepsinogen activation

16. The main function of hydrochloric acid in the stomach is to:
A. Emulsify fats
B. Activate pepsinogen and kill bacteria
C. Digest carbohydrates
D. Neutralize bile
E. Absorb vitamin B_{12}

17. Receptive relaxation of the stomach allows it to:
A. Increase acid secretion
B. Mix food efficiently
C. Accommodate food without increased pressure
D. Empty rapidly
E. Prevent vomiting

18. Pancreatic lipase digests:
A. Proteins
B. Starch
C. Triglycerides
D. Disaccharides
E. Cellulose

19. Enterokinase (enteropeptidase) is responsible for activation of:
A. Pepsinogen
B. Trypsinogen
C. Chymotrypsinogen
D. Procarboxypeptidase
E. Pancreatic amylase

20. Bile is stored and concentrated in the:

A. Liver
B. Pancreas
C. Duodenum
D. Gallbladder
E. Ileum

21. The main function of the large intestine is:
A. Protein digestion
B. Fat digestion
C. Water and electrolyte absorption
D. Enzyme secretion
E. Bile production

22. Normal core body temperature is regulated primarily by the:
A. Cerebral cortex
B. Pituitary gland
C. Hypothalamus
D. Medulla oblongata
E. Cerebellum

23. Shivering increases body temperature by:
A. Reducing heat loss
B. Increasing evaporation
C. Increasing muscle metabolism
D. Vasoconstriction
E. Hormonal regulation

24. Radiation heat loss is greatest when:
A. Environmental temperature is higher than body temperature
B. Body temperature exceeds environmental temperature
C. Humidity is high
D. Sweating is intense
E. Clothing is thick

25. Renal blood flow is highest in the:
A. Renal medulla
B. Renal pelvis
C. Renal cortex
D. Collecting ducts
E. Papilla

26. Glomerular filtration rate depends mainly on:
A. Tubular reabsorption
B. Net filtration pressure
C. Urine flow rate
D. ADH secretion
E. Aldosterone level

27. Tubular secretion mainly helps to:
A. Remove excess water

B. Remove waste and regulate pH
C. Concentrate glucose
D. Reabsorb sodium
E. Maintain osmolarity

28. How does ADH work in the kidneys to reduce urine output?
A. Increases sodium reabsorption
B. Constricts efferent arterioles
C. Increases water permeability of collecting ducts
D. Inhibits aldosterone release
E. Decreases glomerular filtration

29. What is the major factor controlling potassium (K+) excretion by the kidneys?
A. Plasma sodium concentration
B. Plasma aldosterone level
C. Plasma potassium concentration
D. Blood pH only
E. ADH level

30. Why is tight regulation of magnesium (Mg2+) important?
A. It is the main extracellular cation
B. It is a cofactor for many enzymes and affects neuromuscular excitability
C. It is the primary buffer in the blood
D. It is essential for hemoglobin synthesis
E. It is the main source of metabolic energy

Option 3

1. The main purpose of gastrointestinal motility is to:
A. Increase hormone secretion
B. Ensure digestion and absorption of nutrients
C. Regulate body temperature
D. Control appetite
E. Prevent bacterial growth

2. The muscularis externa of the GI tract consists mainly of:
A. Epithelium and connective tissue
B. Circular and longitudinal smooth muscle layers
C. Skeletal muscle fibers
D. Glandular tissue
E. Serous membrane only

3. Hyperpolarization of GI smooth muscle leads to:
A. Increased spike potentials
B. Increased contraction
C. Decreased excitability
D. Faster peristalsis
E. Increased secretion

4. Sensory neurons of the enteric nervous system respond primarily to:
A. Blood pressure changes

B. Chemical and mechanical stimuli in the gut
C. Plasma osmolarity
D. Body temperature
E. Blood glucose level

5. Which neurotransmitter is mainly excitatory in the enteric nervous system?
A. Nitric oxide
B. Vasoactive intestinal peptide
C. Acetylcholine
D. ATP
E. Dopamine

6. Receptive relaxation of the stomach occurs mainly in the:
A. Antrum
B. Pylorus
C. Fundus and body
D. Duodenum
E. Esophagus

7. The gastrocolic reflex results in:
A. Inhibition of gastric emptying
B. Relaxation of the ileocecal valve
C. Increased motility of the colon
D. Decreased intestinal secretion
E. Reduced appetite

8. Fatty acids and monoglycerides are absorbed in the intestine mainly by:
A. Active transport
B. Simple diffusion
C. Sodium-dependent cotransport
D. Endocytosis
E. Pinocytosis

9. Chylomicrons are formed in the:
A. Intestinal lumen
B. Enterocytes
C. Blood capillaries
D. Liver
E. Lymph nodes

10. Saliva facilitates swallowing primarily by:
A. Digesting proteins
B. Neutralizing gastric acid
C. Lubricating the food bolus
D. Emulsifying fats
E. Absorbing nutrients

11. The primary regulator of salivary secretion is the:
A. Endocrine system
B. Enteric nervous system

C. Autonomic nervous system
D. Somatic nervous system
E. Hypothalamus

12. The esophageal phase of swallowing is:
A. Voluntary
B. Both voluntary and involuntary
C. Entirely involuntary
D. Controlled by hormones
E. Absent in adults

13. Mucous cells of the stomach protect the mucosa by secreting:
A. Pepsinogen
B. Hydrochloric acid
C. Mucus and bicarbonate
D. Gastrin
E. Intrinsic factor

14. Gastric secretion is maximal during the:
A. Cephalic phase
B. Gastric phase
C. Intestinal phase
D. Fasting state
E. Sleep

15. Which factor stimulates gastric acid secretion?
A. Somatostatin
B. Secretin
C. Histamine
D. Bile salts
E. Fatty acids

16. Pepsin primarily digests:
A. Carbohydrates
B. Fats
C. Proteins
D. Nucleic acids
E. Vitamins

17. Pancreatic enzymes reach the duodenum through the:
A. Common bile duct
B. Pancreatic duct
C. Cystic duct
D. Hepatic duct
E. Portal vein

18. Trypsin inhibitor secreted by the pancreas serves to:
A. Activate trypsinogen
B. Prevent autodigestion of the pancreas
C. Increase protein digestion

D. Enhance bile secretion
E. Neutralize gastric acid

19. Bile secretion into the duodenum is stimulated mainly by:
A. Gastrin
B. Secretin
C. Cholecystokinin
D. Motilin
E. Somatostatin

20. The main site of bile salt reabsorption is the:
A. Duodenum
B. Jejunum
C. Ileum
D. Colon
E. Stomach

21. Haustral contractions are characteristic of the:
A. Small intestine
B. Stomach
C. Esophagus
D. Colon
E. Rectum

22. Bacterial flora of the large intestine contributes to synthesis of:
A. Vitamin C
B. Vitamin K
C. Vitamin B_{12}
D. Vitamin D
E. Vitamin A

23. Isothermia refers to:
A. Increased body temperature
B. Decreased body temperature
C. Constant internal body temperature
D. Variable skin temperature
E. Heat production only

24. Chemical thermoregulation primarily involves changes in:
A. Sweat secretion
B. Muscle metabolism
C. Skin blood flow
D. Radiation
E. Convection

25. Vasodilation of skin blood vessels results in:
A. Decreased heat loss
B. Increased heat loss
C. Reduced evaporation
D. Increased heat production

E. Shivering

26. Inulin clearance is used to measure:
A. Renal plasma flow
B. Renal blood flow
C. Glomerular filtration rate
D. Tubular secretion
E. Tubular reabsorption

27. Autoregulation of renal blood flow is achieved mainly by:
A. Hormonal control only
B. Sympathetic nerves
C. Myogenic and tubuloglomerular mechanisms
D. ADH secretion
E. Aldosterone action

28. Atrial natriuretic peptide (ANP) causes:
A. Decreased sodium excretion
B. Increased aldosterone secretion
C. Increased sodium and water excretion
D. Decreased GFR
E. Vasoconstriction of afferent arteriole

29. The main factor regulating potassium secretion in the distal nephron is:
A. Plasma calcium concentration
B. Plasma sodium concentration
C. Plasma potassium concentration
D. Blood pH only
E. ADH level

30. Aldosterone secretion is stimulated primarily by:
A. High plasma sodium
B. Low plasma potassium
C. Angiotensin II
D. Low blood glucose
E. High plasma calcium

Option 4

1. The gastrointestinal tract is primarily responsible for:
A. Regulation of blood pressure
B. Digestion and absorption of nutrients
C. Thermoregulation
D. Gas exchange
E. Hormone storage

2. The lamina propria of the GI tract contains:
A. Smooth muscle only
B. Glands and blood vessels
C. Circular muscle layer

D. Serous membrane
E. Skeletal muscle fibers

3. Increased frequency of slow waves in the intestine results in:
A. Decreased motility
B. Increased contractile activity
C. Muscle relaxation
D. Reduced secretion
E. Paralysis of the gut

4. Which nerve provides parasympathetic innervation to most of the GIT?
A. Phrenic nerve
B. Vagus nerve
C. Sympathetic chain
D. Pelvic nerve
E. Splanchnic nerve

5. Sympathetic stimulation of the gastrointestinal tract causes:
A. Increased motility
B. Increased secretion
C. Decreased motility and secretion
D. Relaxation of sphincters
E. Increased absorption

6. The peristaltic reflex is initiated primarily by:
A. Hormonal stimulation
B. Stretch of the intestinal wall
C. Changes in blood flow
D. Increased pH
E. Decreased temperature

7. The migrating motor complex occurs during:
A. Digestion
B. Sleep only
C. Fasting state
D. Exercise
E. Emotional stress

8. Short-chain fatty acids produced in the colon are absorbed mainly by:
A. Active transport
B. Facilitated diffusion
C. Simple diffusion
D. Endocytosis
E. Pinocytosis

9. The main function of the ileocecal sphincter is to:
A. Regulate bile flow
B. Prevent reflux from colon to ileum
C. Increase absorption
D. Initiate defecation

E. Control gastric emptying

10. The oral phase of digestion includes:
A. Protein digestion only
B. Mechanical processing and salivation
C. Fat emulsification
D. Enzyme activation
E. Absorption of nutrients

11. Salivary secretion is controlled mainly by:
A. Hormones
B. Local reflexes
C. Autonomic nervous system
D. Enteric nervous system
E. Somatic nerves

12. During swallowing, closure of the nasopharynx prevents:
A. Entry of food into the trachea
B. Aspiration into lungs
C. Food entering the nasal cavity
D. Vomiting
E. Acid reflux

13. Which substance activates pepsinogen in the stomach?
A. Trypsin
B. Enterokinase
C. Hydrochloric acid
D. Bicarbonate
E. Bile salts

14. Gastric glands are located mainly in the:
A. Submucosa
B. Muscularis externa
C. Mucosa
D. Serosa
E. Lamina propria only

15. Gastric acid secretion is inhibited by:
A. Gastrin
B. Histamine
C. Somatostatin
D. Acetylcholine
E. Vagus nerve stimulation

16. The pyloric sphincter mainly regulates:
A. Entry of bile into duodenum
B. Mixing movements of stomach
C. Rate of gastric emptying
D. Acid secretion
E. Appetite

17. Pancreatic juice contains all of the following EXCEPT:
A. Amylase
B. Lipase
C. Proteases
D. Hydrochloric acid
E. Bicarbonate

18. The primary function of bicarbonate in pancreatic juice is to:
A. Digest fats
B. Activate enzymes
C. Neutralize gastric acid
D. Emulsify lipids
E. Absorb nutrients

19. Bilirubin is a breakdown product of:
A. Myoglobin
B. Hemoglobin
C. Albumin
D. Transferrin
E. Ferritin

20. The major site of fermentation of undigested carbohydrates is the:
A. Stomach
B. Duodenum
C. Jejunum
D. Ileum
E. Colon

21. Defecation reflex is initiated by distension of the:
A. Sigmoid colon
B. Rectum
C. Cecum
D. Ileum
E. Anus

22. Hunger and satiety centers are located in the:
A. Cerebral cortex
B. Brainstem
C. Hypothalamus
D. Thalamus
E. Cerebellum

23. Fever differs from hyperthermia in that fever involves:
A. Increased heat loss
B. Failure of thermoregulation
C. Elevated hypothalamic set point
D. Reduced metabolism
E. Peripheral vasodilation

24. The main mechanism of heat loss during physical exercise is:
A. Radiation
B. Conduction
C. Evaporation
D. Convection
E. Vasoconstriction

25. Acclimatization to heat includes:
A. Decreased sweating
B. Increased salt loss in sweat
C. Earlier onset of sweating
D. Reduced skin blood flow
E. Increased shivering

26. Renal plasma flow is measured using clearance of:
A. Creatinine
B. Inulin
C. Para-aminohippuric acid
D. Urea
E. Glucose

27. Filtration fraction is defined as the ratio of:
A. GFR to urine flow
B. GFR to renal plasma flow
C. Renal blood flow to GFR
D. Urine flow to plasma flow
E. Tubular flow to GFR

28. Constriction of the afferent arteriole leads to:
A. Increased GFR
B. No change in GFR
C. Decreased GFR
D. Increased urine concentration
E. Increased renal blood flow

29. Pressure diuresis refers to:
A. Increased urine output due to ADH
B. Decreased urine output during hypotension
C. Increased urine output with increased arterial pressure
D. Urine formation independent of blood pressure
E. Hormonal regulation of diuresis

30. Calcitonin is secreted by the:
A. Parathyroid glands
B. Adrenal cortex
C. Thyroid C cells
D. Pancreas
E. Pituitary gland

1.The patient's blood pH is 7.0. Make a conclusion.
A)Alkalosis
B)Homeostasis
C)+Acidosis
D)Normal

2.Agglutination is defined as:
A)+The sticking of erythrocytes when blood of incompatible groups mixes
B)Blood clotting when incompatible blood is mixed
C)Destruction of erythrocytes in hypotonic solution
D)Breakdown of leukocytes

3.Agglutinins are part of:
A)Erythrocytes
B)Leukocytes
C)Platelets
D)+Blood plasma

4.Agglutinogens are located on:
A)+Erythrocyte membranes
B)Plasma proteins
C)Platelets
D)Leukocytes

5.The normal blood pH is:
A)+7.35–7.45
B)7.0–7.5
C)7.25–7.85
D)7.9–8.0

6.Which cells contain heparin and histamine?
A)Neutrophils
B)Eosinophils
C)+Basophils
D)Monocytes

7.Oncotic pressure of plasma is mainly created by:
A)Globulins
B)+Albumins
C)Fibrinogen
D)Electrolytes

8.Factor XII (Hageman factor) participates in:
A)Fibrinolysis
B)Platelet aggregation
C)+Intrinsic coagulation pathway
D)Extrinsic pathway

9.True leukocytosis is observed in:
A)After eating
B)Physical exertion
C)+Inflammation
D)Emotional stress
10.The first phase of blood coagulation includes:
A)Thrombin formation
B)Fibrin formation
C)+Prothrombinase formation
D)Clot retraction

11.The second phase of coagulation is:
A)Platelet adhesion
B)+Thrombin formation
C)Fibrinolysis
D)Hemolysis

12.The third phase of coagulation results in:
A)Prothrombinase formation
B)Thrombin formation
C)+Fibrin clot formation
D)Platelet aggregation

13.Clot retraction is mainly due to:
A)Fibrin
B)+Platelets
C)Leukocytes
D)Erythrocytes

14.Substances preventing coagulation are called:
A)Coagulants
B)Procoagulants
C)+Anticoagulants
D)Agglutinins

15.Heparin acts by:
A)Activating fibrinogen
B)+Inhibiting thrombin
C)Activating platelets
D)Increasing calcium

16.The extrinsic coagulation pathway starts with:
A)Collagen exposure
B)+Tissue thromboplastin
C)Platelet adhesion
D)Factor XII

17.The intrinsic pathway is initiated by:
A)+Contact with collagen
B)Tissue damage

C)Vitamin K
D)Platelet secretion

18.Calcium ions are necessary for:
A)Platelet destruction
B)Fibrinolysis
C)+Most stages of blood coagulation
D)Hemolysis

19.Fibrinolysis is the process of:
A)Clot formation
B)+Clot dissolution
C)Platelet aggregation
D)Plasma filtration

20.The main fibrinolytic enzyme is:
A)Thrombin
B)+Plasmin
C)Heparin
D)Prothrombin

21.Erythrocyte sedimentation rate increases when:
A)Albumin increases
B)Erythrocytes increase
C)+Fibrinogen increases
D)Hematocrit increases

22.Osmotic hemolysis occurs in:
A)Isotonic solution
B)+Hypotonic solution
C)Hypertonic solution
D)Colloid solution

23.Erythrocyte membrane permeability increases in:
A)Isotonic medium
B)+Hypotonic medium
C)Hypertonic medium
D)Plasma

24.Normal erythrocyte count in adults is approximately:
A)2–3 $\times 10^{12}$/L
B)+4–5 $\times 10^{12}$/L
C)6–7 $\times 10^{12}$/L
D)8–9 $\times 10^{12}$/L

25.Hemoglobin main function is:
A)CO_2 synthesis
B)+Oxygen transport

C)Immune defense
D)Clot formation

26.Deoxyhemoglobin binds CO_2 by forming:
A)Bicarbonate
B)+Carbaminohemoglobin
C)Oxyhemoglobin
D)Carbonic acid

27.Hemoglobin synthesis requires:
A)Calcium
B)+Iron
C)Potassium
D)Chlorine

28.Iron deficiency leads to:
A)+Hypochromic anemia
B)Polycythemia
C)Leukopenia
D)Thrombocytosis

29.Erythropoiesis occurs mainly in:
A)Liver
B)Spleen
C)+Red bone marrow
D)Kidneys

30.Erythropoietin is secreted by:
A)Liver
B)+Kidneys
C)Spleen
D)Bone marrow

31.Leukocytes are primarily involved in:
A)Gas transport
B)+Immune defense
C)Hemostasis
D)Osmoregulation

32.Neutrophils mainly perform:
A)Antibody production
B)+Phagocytosis
C)Histamine release
D)Clot retraction

33.Eosinophils increase during:
A)Bacterial infection
B)+Allergic reactions

C)Viral infection
D)Bleeding

34.Monocytes transform into macrophages in:
A)Blood
B)+Tissues
C)Bone marrow
D)Lymph

35.Basophils release:
A)Antibodies
B)Thromboplastin
C)+Histamine
D)Hemoglobin
36.Platelets originate from:
A)Erythroblasts
B)+Megakaryocytes
C)Lymphocytes
D)Monocytes
37.Normal platelet count is:
A)50–100 ×10⁹/L
B)+150–400 ×10⁹/L
C)500–700 ×10⁹/L
D)800–1000 ×10⁹/L

38.Platelet adhesion occurs due to:
A)Fibrin
B)+Von Willebrand factor
C)Heparin
D)Plasmin

39.Blood group AB(IV) has:
A)Anti-A antibodies
B)Anti-B antibodies
C)+No agglutinins
D)Only anti-D

40.Universal donor blood is:
A)AB Rh+
B)A Rh−
C)+O Rh−
D)B Rh−

41.Universal recipient blood is:
A)O Rh−
B)A Rh+
C)B Rh−
D)+AB Rh+

42.Rh incompatibility is caused by antibodies against:
A)A antigen
B)B antigen
C)+D antigen
D)C antigen

43.Hemolytic disease of newborn develops due to:
A)ABO incompatibility only
B)+Rh incompatibility
C)Vitamin K deficiency
D)Iron deficiency

44.Blood buffering systems include all EXCEPT:
A)Bicarbonate buffer
B)Protein buffer
C)Hemoglobin buffer
D)+Phosphate buffer of urine

45.The main blood buffer system is:
A)Protein buffer
B)+Bicarbonate buffer
C)Phosphate buffer
D)Hemoglobin buffer

46.True anemia is characterized by:
A)Plasma dilution
B)+Decreased erythrocytes or hemoglobin
C)Increased ESR
D)Leukocytosis

47.Polycythemia is characterized by:
A)+Increased erythrocyte count
B)Decreased hemoglobin
C)Leukopenia
D)Thrombocytopenia

48.Physiological leukocytosis occurs after:
A)+Food intake
B)Inflammation
C)Infection
D)Tissue necrosis

49.Blood viscosity increases with:
A)Decreased hematocrit
B)+Increased erythrocytes
C)Decreased proteins
D)Hypotension

50.The lifespan of erythrocytes is approximately:
A)30 days
B)60 days
C)+120 days
D)180 days

1.The main function of the cardiovascular system is:
A)Thermoregulation
B)+Transport of gases and substances
C)Digestion
D)Hormone synthesis

2.Cardiac output is defined as:
A)Blood volume in ventricles
B)+Blood pumped by one ventricle per minute
C)Heart rate per minute
D)Residual blood volume

3.Stroke volume is:
A)+Blood ejected by one ventricle in one systole
B)Blood ejected per minute
C)Blood remaining after systole
D)Venous blood volume

4.Normal resting heart rate in adults is:
A)40–50 bpm
B)+60–80 bpm
C)90–110 bpm
D)120–140 bpm

5.The pacemaker of the heart is:
A)Atrioventricular node
B)Bundle of His
C)+Sinoatrial node
D)Purkinje fibers

6.Automaticity of the heart refers to its ability to:
A)Respond to hormones
B)+Generate impulses spontaneously
C)Contract strongly
D)Relax

7.The P wave on ECG represents:
A)Ventricular depolarization
B)Ventricular repolarization
C)+Atrial depolarization
D)Atrial repolarization

8.The QRS complex corresponds to:
A)Atrial systole

B)+Ventricular depolarization
C)Ventricular repolarization
D)General pause

9.The T wave reflects:
A)Atrial depolarization
B)Ventricular depolarization
C)+Ventricular repolarization
D)Atrial contraction

10.The longest phase of the cardiac cycle is:
A)Atrial systole
B)Ventricular systole
C)+General pause
D)Isometric contraction

11.The Frank–Starling law states that:
A)Heart force is constant
B)+Force of contraction depends on fiber length
C)Heart rate determines force
D)Sympathetic nerves inhibit the heart

12.The main determinant of stroke volume is:
A)Heart rate
B)Blood pressure
C)+Venous return
D)Blood viscosity

13.Sympathetic stimulation of the heart causes:
A)Bradycardia
B)+Tachycardia
C)No effect
D)Heart arrest

14.Parasympathetic stimulation leads to:
A)+Decrease in heart rate
B)Increase in heart rate
C)No change
D)Ventricular fibrillation

15.Arteries differ from veins by having:
A)Valves
B)+Thicker muscular wall
C)Larger lumen
D)Lower pressure

16.The highest blood pressure is found in the:
A)Veins
B)Capillaries
C)+Aorta
D)Venules

17.Systolic arterial pressure reflects:
A)Ventricular diastole
B)+Ventricular systole
C)Atrial systole
D)General pause

18.Diastolic arterial pressure reflects:
A)Ventricular systole
B)+Ventricular diastole
C)Atrial systole
D)Atrial diastole

19.Normal arterial blood pressure is:
A)90/60 mmHg
B)+120/80 mmHg
C)140/100 mmHg
D)160/110 mmHg

20.Pulse pressure is the difference between:
A)Venous and arterial pressure
B)+Systolic and diastolic pressure
C)Capillary and venous pressure
D)Atrial and ventricular pressure

21.Peripheral resistance depends mainly on:
A)Blood volume
B)Heart rate
C)+Arteriolar diameter
D)Blood viscosity

22.The smallest blood vessels are:
A)Arteries
B)Veins
C)Arterioles
D)+Capillaries

23.Exchange of gases and nutrients occurs mainly in:
A)Arteries
B)Veins
C)+Capillaries
D)Venules

24.Blood flow velocity is highest in:
A)+Aorta
B)Capillaries
C)Venules
D)Veins

25.Blood flow velocity is lowest in:
A)Arteries
B)+Capillaries

C)Veins
D)Aorta

26.The dicrotic notch on a sphygmogram is caused by:
A)Ventricular systole
B)+Closure of semilunar valves
C)Atrial contraction
D)Venous return

27.Central venous pressure reflects pressure in the:
A)Left ventricle
B)Pulmonary artery
C)+Right atrium
D)Aorta

28.Baroreceptors are located mainly in:
A)Coronary arteries
B)+Carotid sinus and aortic arch
C)Pulmonary veins
D)Capillaries

29.Increase in arterial pressure leads to activation of:
A)Sympathetic system
B)+Parasympathetic influence on the heart
C)Adrenal medulla
D)Renin secretion

30.Coronary circulation supplies blood to the:
A)Brain
B)Lungs
C)+Myocardium
D)Liver

31.Coronary blood flow is maximal during:
A)Ventricular systole
B)+Ventricular diastole
C)Atrial systole
D)General pause

32.Venous return is facilitated by:
A)High arterial pressure
B)+Skeletal muscle pump
C)Capillary filtration
D)Blood viscosity

33.Mean arterial pressure depends on:
A)Stroke volume only
B)+Cardiac output and peripheral resistance
C)Blood viscosity
D)Venous pressure

34.Tachycardia is defined as heart rate:
A)<60 bpm

B)+>90 bpm
C)60–80 bpm
D)80–90 bpm

35.Bradycardia is defined as heart rate:
A)+<60 bpm
B)>90 bpm
C)60–80 bpm
D)80–100 bpm

36.Short-term regulation of blood pressure is mainly by:
A)Kidneys
B)+Nervous system
C)Hormones
D)Blood volume

37.Long-term regulation of blood pressure is mainly by:
A)Heart
B)Vessels
C)+Kidneys
D)Lungs

38.During physical exercise cardiac output:
A)Decreases
B)+Increases
C)Does not change
D)Stops

39.The first heart sound is caused by:
A)Semilunar valve closure
B)+Atrioventricular valve closure
C)Blood flow in aorta
D)Atrial systole

40.The second heart sound is caused by:
A)AV valve closure
B)Atrial contraction
C)+Semilunar valve closure
D)Ventricular filling

41.Myogenic regulation of vessels depends on:
A)Nerves
B)Hormones
C)+Stretch of vascular smooth muscle
D)Blood composition

42.Metabolic regulation of blood flow is due to:
A)Adrenaline
B)+Local metabolites
C)Baroreceptors
D)Vagus nerve

43.Endothelin causes:
A)Vasodilation
B)+Vasoconstriction
C)No effect
D)Decreased pressure

44.Nitric oxide causes:
A)Vasoconstriction
B)+Vasodilation
C)Increased heart rate
D)Platelet aggregation

45.Shock is characterized by:
A)Hypertension
B)+Decreased tissue perfusion
C)Bradycardia
D)Hypervolemia

46.Orthostatic hypotension occurs when:
A)Lying down
B)+Standing up suddenly
C)Running
D)Sleeping

47.The Windkessel function of arteries provides:
A)High pressure
B)+Continuous blood flow
C)Venous return
D)Capillary exchange

48.Pulse wave velocity increases with:
A)Decreased elasticity
B)+Increased arterial stiffness
C)Decreased pressure
D)Low heart rate

49.The main determinant of systolic pressure is:
A)Peripheral resistance
B)+Stroke volume
C)Venous pressure
D)Blood viscosity

50.The main determinant of diastolic pressure is:
A)Stroke volume
B)+Peripheral resistance
C)Heart rate
D)Blood volume

1.The main function of the respiratory system is:
A)Thermoregulation
B)+Gas exchange
C)Blood circulation
D)Digestion

2.External respiration includes:
A)Cellular respiration
B)+Gas exchange between alveoli and blood
C)Gas transport by blood
D)Tissue metabolism

3.The primary respiratory muscle is the:
A)External intercostal muscles
B)+Diaphragm
C)Abdominal muscles
D)Scalene muscles

4.Inspiration at rest is an:
A)Passive process
B)+Active process
C)Reflex inhibition
D)Elastic recoil

5.Expiration at rest is:
A)+Passive
B)Active
C)Voluntary
D)Reflex

6.Normal tidal volume in adults is approximately:
A)150 ml
B)+500 ml
C)1000 ml
D)2000 ml

7.Normal respiratory rate at rest is:
A)6–8/min
B)8–10/min
C)+12–18/min
D)25–30/min

8.Vital capacity of the lungs consists of:
A)Residual volume
B)+TV + IRV + ERV
C)TV only
D)Total lung capacity

9.Residual volume is the air:
A)Inhaled after normal inspiration
B)Exhaled after normal expiration
C)+Remaining after maximal expiration
D)In total lung capacity

10.Total lung capacity equals:
A)Vital capacity
B)+Vital capacity + residual volume
C)Functional residual capacity
D)Inspiratory capacity

11.Alveolar ventilation depends mainly on:
A)Lung elasticity
B)+Tidal volume and respiratory rate

C)Blood pressure
D)Hemoglobin concentration

12.Gas exchange in the lungs occurs in the:
A)Bronchi
B)Bronchioles
C)+Alveoli
D)Trachea

13.Oxygen enters the blood from alveoli by:
A)Active transport
B)+Diffusion due to partial pressure gradient
C)Osmosis
D)Filtration

14.Carbon dioxide diffuses into alveoli because of:
A)Active transport
B)+Partial pressure gradient
C)Low solubility
D)Hemoglobin binding

15.Oxygen is transported in blood mainly:
A)Dissolved in plasma
B)+Bound to hemoglobin
C)Bound to albumin
D)As bicarbonate

16.Carbon dioxide is transported mainly as:
A)Dissolved gas
B)Carbaminohemoglobin
C)+Bicarbonate ions
D)Carbonic acid

17.The oxyhemoglobin dissociation curve shifts to the right with:
A)Decreased temperature
B)Decreased CO_2
C)+Increased temperature
D)Increased pH

18.The Bohr effect refers to:
A)Increased oxygen affinity
B)+Decreased oxygen affinity with increased CO_2
C)CO_2 transport mechanism
D)Hemoglobin synthesis

19.Hypoxia is defined as:
A)High CO_2 in blood
B)+Insufficient oxygen supply to tissues
C)Low blood pressure
D)Decreased ventilation

20.Hypercapnia means:
A)Low CO_2 in blood
B)+High CO_2 in blood
C)Low oxygen in tissues
D)High blood pH

21.Central chemoreceptors respond primarily to changes in:
A)Blood oxygen
B)+CO_2 and H^+ in cerebrospinal fluid
C)Blood pressure
D)Lung stretch

22.Peripheral chemoreceptors are located in the:
A)Lungs
B)+Carotid and aortic bodies
C)Medulla oblongata
D)Hypothalamus

23.The respiratory center is located in the:
A)Cerebellum
B)+Medulla oblongata and pons
C)Spinal cord
D)Thalamus

24.Apnea is defined as:
A)Rapid breathing
B)Slow breathing
C)+Cessation of breathing
D)Shallow breathing

25.Dyspnea refers to:
A)Normal breathing
B)+Difficult or labored breathing
C)Absence of breathing
D)Slow breathing

26.Eupnea is:
A)Rapid breathing
B)+Normal quiet breathing
C)Difficult breathing
D)Slow breathing

27.Hyperventilation leads to:
A)+Hypocapnia
B)Hypercapnia
C)Hypoxia
D)Respiratory acidosis

28.Hypoventilation leads to:
A)Hypocapnia
B)+Hypercapnia
C)Respiratory alkalosis
D)Increased oxygenation

29.Respiratory acidosis occurs when:
A)+CO_2 accumulates in blood
B)CO_2 decreases
C)pH increases
D)Oxygen increases

30.Respiratory alkalosis develops when:
A)CO_2 increases
B)+CO_2 decreases

C)pH decreases
D)Ventilation stops

31.Surfactant function is to:
A)Increase diffusion distance
B)+Reduce alveolar surface tension
C)Decrease lung compliance
D)Bind oxygen

32.Surfactant deficiency causes:
A)Emphysema
B)+Atelectasis
C)Bronchospasm
D)Pulmonary edema

33.Surfactant is produced by:
A)Type I alveolar cells
B)+Type II alveolar cells
C)Macrophages
D)Endothelial cells

34.The sigmoidal shape of the oxyhemoglobin curve is due to:
A)Iron content
B)+Cooperative binding of oxygen
C)CO_2 transport
D)Temperature effects

35.Anatomical dead space includes:
A)+Conducting airways
B)Alveoli
C)Pulmonary capillaries
D)Pleural cavity

36.Anatomical dead space volume is about:
A)50 ml
B)+150 ml
C)300 ml
D)500 ml

37.Functional residual capacity equals:
A)TV + IRV
B)+ERV + residual volume
C)Vital capacity
D)Total lung capacity

38.Maximum voluntary ventilation reflects:
A)Diffusion capacity
B)+Respiratory muscle performance
C)Blood oxygen content
D)Lung volume

39.During physical exercise ventilation:
A)Decreases
B)+Increases
C)Stops
D)Remains unchanged

40.The main stimulus for breathing in healthy adults is:
A)Low oxygen
B)+Elevated CO_2
C)Low blood pressure
D)High pH

41.Chemoreceptor stimulation increases ventilation mainly by:
A)Decreasing tidal volume
B)+Increasing respiratory rate and depth
C)Decreasing rate
D)Stopping breathing

42.The Hering–Breuer reflex is initiated by:
A)Chemoreceptors
B)+Pulmonary stretch receptors
C)Baroreceptors
D)Muscle spindles

43.The Hering–Breuer reflex results in:
A)Prolonged inspiration
B)+Termination of inspiration
C)Increased expiration
D)Apnea

44.Carbon monoxide poisoning is dangerous because CO:
A)Reduces lung volume
B)+Binds hemoglobin with high affinity
C)Increases CO_2
D)Destroys alveoli

45.Diffusion capacity of lungs increases with:
A)Thickened alveolar membrane
B)+Increased pulmonary blood flow
C)Decreased surface area
D)Pulmonary edema

46.The main determinant of oxygen delivery to tissues is:
A)Arterial PO_2 only
B)+Hemoglobin concentration and blood flow
C)Lung volume
D)Ventilation rate

47.During ascent to high altitude, ventilation:
A)Decreases
B)+Increases
C)Stops
D)Does not change

48.Long-term adaptation to high altitude includes:
A)Decreased erythrocytes
B)+Increased erythropoiesis
C)Decreased hemoglobin
D)Decreased ventilation

49.Oxygen toxicity mainly affects:
A)Heart
B)+Lungs

C)Liver
D)Kidneys

50.The main function of pulmonary circulation is:
A)Nutrition of lungs
B)+Gas exchange
C)Blood storage
D)Thermoregulation

1.The main function of the digestive system is:
A)Gas exchange
B)Hormone synthesis
C)+Digestion and absorption of nutrients
D)Thermoregulation

2.Digestion of carbohydrates begins in the:
A)Stomach
B)+Oral cavity
C)Duodenum
D)Large intestine

3.The main enzyme of saliva is:
A)Pepsin
B)+Amylase
C)Lipase
D)Trypsin

4.Salivary secretion is mainly regulated by:
A)Hormones
B)+Autonomic nervous system
C)Blood glucose
D)Temperature

5.The stomach primarily digests:
A)Carbohydrates
B)+Proteins
C)Fats
D)Vitamins

6.The main enzyme of gastric juice is:
A)+Pepsin
B)Amylase
C)Trypsin
D)Lipase

7.Hydrochloric acid in gastric juice is needed to:
A)Digest fats
B)+Activate pepsinogen
C)Neutralize bile
D)Absorb glucose

8.The pH of gastric juice is approximately:
A)6.5–7.0
B)4.0–5.0
C)+1.5–2.0
D)8.0–9.0

9.The protective factor of gastric mucosa is:
A)Pepsin
B)Hydrochloric acid
C)+Mucus-bicarbonate barrier
D)Bile

10.Gastrin is secreted by:
A)Pancreas
B)+Stomach
C)Liver
D)Small intestine

11.Gastrin stimulates:
A)Bile secretion
B)+Gastric juice secretion
C)Intestinal motility
D)Pancreatic bicarbonates

12.The main function of the small intestine is:
A)Water absorption
B)+Digestion and absorption
C)Feces formation
D)Food storage

13.Pancreatic juice contains all EXCEPT:
A)Amylase
B)Lipase
C)Trypsinogen
D)+Pepsin

14.Pancreatic proteolytic enzymes are secreted in:
A)Active form
B)+Inactive form
C)Denatured form
D)Bound form

15.Enterokinase activates:
A)Pepsinogen
B)+Trypsinogen
C)Amylase
D)Lipase

16.Bile is produced in the:
A)Gallbladder
B)+Liver
C)Pancreas
D)Small intestine

17.The main role of bile is:
A)Protein digestion
B)+Emulsification of fats
C)Carbohydrate digestion
D)Vitamin synthesis

18.Bile acids promote absorption of:
A)Proteins
B)Carbohydrates

C)+Fats and fat-soluble vitamins
D)Minerals

19.Secretin primarily stimulates secretion of:
A)Gastric juice
B)+Pancreatic bicarbonates
C)Bile pigments
D)Saliva

20.Cholecystokinin causes:
A)Relaxation of gallbladder
B)+Contraction of gallbladder
C)Inhibition of pancreatic enzymes
D)Decreased bile flow

21.Intestinal juice is secreted by:
A)Pancreas
B)Liver
C)+Intestinal glands
D)Stomach

22.Final digestion of carbohydrates occurs in the:
A)Stomach
B)+Small intestine
C)Large intestine
D)Oral cavity

23.Proteins are finally absorbed as:
A)Polypeptides
B)+Amino acids
C)Dipeptides only
D)Proteoses

24.Carbohydrates are absorbed mainly as:
A)Polysaccharides
B)Disaccharides
C)+Monosaccharides
D)Starch

25.Fats are absorbed mainly as:
A)Triglycerides
B)+Fatty acids and monoglycerides
C)Cholesterol only
D)Phospholipids

26.Absorption of nutrients mainly occurs in the:
A)Stomach
B)+Small intestine
C)Large intestine
D)Esophagus

27.The absorptive surface of the intestine is increased by:
A)Haustra
B)+Villi and microvilli
C)Rugae
D)Plicae only

28.The large intestine mainly absorbs:
A)Proteins
B)Fats
C)+Water and electrolytes
D)Amino acids

29.Intestinal microflora synthesizes:
A)Vitamin A
B)Vitamin C
C)+Vitamin K
D)Vitamin D

30.Peristalsis is defined as:
A)Random contraction
B)+Wave-like propulsive contraction
C)Voluntary movement
D)Segmental contraction

31.Gastric emptying is slowed by:
A)Carbohydrates
B)Water
C)+Fats
D)Saliva

32.The appetite center is located in the:
A)Medulla oblongata
B)+Hypothalamus
C)Cerebellum
D)Pons

33.The satiety center is located in the:
A)Thalamus
B)+Hypothalamus
C)Midbrain
D)Spinal cord

34.The cephalic phase of digestion is mediated by:
A)Sympathetic nerves
B)+Vagus nerve
C)Enteric nerves
D)Hormones

35.The gastric phase of secretion is stimulated by:
A)+Food in the stomach
B)Food in the intestine
C)Bile secretion
D)Pancreatic juice

36.The intestinal phase of gastric secretion is mainly:
A)Stimulatory
B)+Inhibitory
C)Neutral
D)Absent

37.The main regulator of intestinal motility is:
A)Central nervous system
B)+Enteric nervous system

C)Endocrine system
D)Blood pressure

38.The basal metabolic rate depends mainly on:
A)Food intake
B)+Body surface area
C)Physical activity
D)Diet composition

39.Basal metabolism is measured under conditions of:
A)After meal
B)+Physical and emotional rest
C)Heavy exercise
D)Sleep only

40.Basal metabolism refers to:
A)Energy use during work
B)+Minimum energy expenditure at rest
C)Energy during digestion
D)Heat loss

41.The caloric value of carbohydrates is approximately:
A)1.3 kcal/g
B)+4.1 kcal/g
C)7.2 kcal/g
D)9.3 kcal/g

42.The caloric value of proteins is approximately:
A)1.3 kcal/g
B)+4.1 kcal/g
C)7.2 kcal/g
D)9.3 kcal/g

43.The caloric value of fats is approximately:
A)1.3 kcal/g
B)4.1 kcal/g
C)7.2 kcal/g
D)+9.3 kcal/g

44.The respiratory quotient for carbohydrates is:
A)0.7
B)+1.0
C)0.8
D)0.5

45.The respiratory quotient for fats is:
A)+0.7
B)1.0
C)0.8
D)0.5

46.Positive nitrogen balance means:
A)Nitrogen loss exceeds intake
B)+Nitrogen intake exceeds loss
C)Equal intake and loss
D)Protein starvation

47.Negative nitrogen balance is observed during:
A)Growth
B)Pregnancy
C)+Starvation
D)Recovery

48.The biological value of proteins depends on:
A)Calorie content
B)+Essential amino acid composition
C)Fat content
D)Carbohydrate content

49.Vitamins A, D, E, K are:
A)Water-soluble
B)+Fat-soluble
C)Enzyme cofactors only
D)Synthesized in the stomach

50.The main site of bile accumulation is the:
A)Liver
B)+Gallbladder
C)Pancreas
D)Duodenum

1.The main purpose of thermoregulation is to:
A)Increase metabolism
B)+Maintain constant body temperature
C)Produce heat
D)Reduce energy expenditure

2.Normal human body core temperature is approximately:
A)35.0 °C
B)+36.6 °C
C)38.0 °C
D)40.0 °C

3.Thermoregulation is an example of:
A)Positive feedback
B)+Negative feedback
C)Conditioned reflex
D)Hormonal regulation

4.The main center of thermoregulation is located in the:
A)Medulla oblongata
B)+Hypothalamus
C)Cerebellum
D)Spinal cord

5.Central thermoreceptors are located in the:
A)Skin
B)Spinal cord
C)+Hypothalamus
D)Muscles

6.Peripheral thermoreceptors are located mainly in the:
A)Hypothalamus
B)+Skin

C)Liver
D)Kidneys

7.Heat production in the body is called:
A)Thermolysis
B)+Thermogenesis
C)Evaporation
D)Radiation

8.Heat loss from the body is called:
A)Thermogenesis
B)+Thermolysis
C)Metabolism
D)Oxidation

9.The main source of heat production at rest is:
A)Heart
B)Brain
C)+Internal organs and muscles
D)Skin

10.Shivering thermogenesis occurs due to:
A)Smooth muscle contraction
B)+Skeletal muscle contraction
C)Cardiac muscle contraction
D)Brown fat only

11.Non-shivering thermogenesis occurs mainly in:
A)White adipose tissue
B)+Brown adipose tissue
C)Skeletal muscles
D)Liver

12.The main mechanism of heat loss at rest is:
A)Evaporation
B)+Radiation
C)Conduction
D)Convection

13.Heat loss during sweating occurs by:
A)Radiation
B)Conduction
C)+Evaporation
D)Convection

14.Sweating is controlled mainly by:
A)Parasympathetic nerves
B)+Sympathetic cholinergic nerves
C)Somatic nerves
D)Hormones

15.Vasodilation of skin vessels leads to:
A)+Increased heat loss
B)Decreased heat loss
C)No heat exchange
D)Increased heat production

16.Vasoconstriction of skin vessels causes:
A)Increased sweating
B)+Decreased heat loss
C)Increased heat loss
D)Hyperthermia

17.Fever is characterized by:
A)Failure of thermoregulation
B)+Shift of hypothalamic set-point
C)Increased sweating immediately
D)Decreased metabolism

18.Pyrogens cause fever by:
A)Increasing heat loss
B)+Raising hypothalamic set-point
C)Lowering body temperature
D)Stimulating sweating

19.Endogenous pyrogens include:
A)Bacterial toxins
B)+Cytokines
C)Viruses
D)Hormones

20.The first stage of fever is characterized by:
A)Profuse sweating
B)+Chills and vasoconstriction
C)Body cooling
D)Heat loss predominance

21.The second stage of fever is characterized by:
A)Chills
B)+Stable elevated temperature
C)Sudden sweating
D)Hypothermia

22.The third stage of fever is characterized by:
A)+Increased sweating and heat loss
B)Chills
C)Vasoconstriction
D)Temperature rise

23.Hyperthermia differs from fever because:
A)+Set-point is unchanged
B)It is regulated
C)It depends on pyrogens
D)It always includes chills

24.Hypothermia is defined as body temperature:
A)+Below 35 °C
B)Above 37 °C
C)Above 38 °C
D)Below 36.6 °C

25.The main heat-producing hormones are:
A)Insulin and glucagon
B)+Thyroxine and catecholamines

C)Aldosterone and ADH
D)Cortisol and ADH

26.Thyroid hormones increase heat production by:
A)Reducing metabolism
B)+Increasing basal metabolic rate
C)Reducing oxygen consumption
D)Increasing sweating

27.Muscle work increases heat production due to:
A)Reduced blood flow
B)+Increased metabolic reactions
C)Sweating
D)Vasodilation

28.The main mechanism of heat loss during physical exercise is:
A)Radiation
B)Conduction
C)+Evaporation
D)Convection

29.In hot environments the primary adaptive response is:
A)Shivering
B)+Sweating
C)Vasoconstriction
D)Increased metabolism

30.In cold environments the primary adaptive response is:
A)Sweating
B)+Vasoconstriction and shivering
C)Heat loss
D)Reduced metabolism

31.Acclimatization to heat leads to:
A)Reduced sweating
B)+Earlier and more effective sweating
C)Increased heat production
D)Decreased plasma volume

32.Acclimatization to cold leads to:
A)Reduced metabolism
B)+Increased thermogenesis
C)Increased sweating
D)Decreased heat production

33.Newborns produce heat mainly by:
A)Shivering
B)+Brown fat metabolism
C)Sweating
D)Muscle tone

34.Brown adipose tissue produces heat by:
A)ATP synthesis
B)+Uncoupling oxidative phosphorylation
C)Anaerobic glycolysis
D)Protein breakdown

35.The insulating factor reducing heat loss is:
A)Muscle
B)+Subcutaneous fat
C)Blood
D)Lymph

36.Clothing reduces heat loss mainly by decreasing:
A)Evaporation
B)+Convection and radiation
C)Metabolism
D)Sweating

37.Body temperature rhythm during the day is called:
A)Seasonal rhythm
B)+Circadian rhythm
C)Ultradian rhythm
D)Infradian rhythm

38.Body temperature is usually lowest:
A)In the evening
B)+Early in the morning
C)After meals
D)During exercise

39.Body temperature is usually highest:
A)Early morning
B)+Late afternoon
C)At night
D)During sleep

40.The main physical methods of heat loss include all EXCEPT:
A)Radiation
B)Conduction
C)Convection
D)+Oxidation

41.The main chemical method of thermoregulation is:
A)Sweating
B)+Change in metabolic rate
C)Vasodilation
D)Convection

42.The hypothalamic heat-loss center is located in the:
A)Posterior hypothalamus
B)+Anterior hypothalamus
C)Medulla oblongata
D)Pons

43.The hypothalamic heat-production center is located in the:
A)+Posterior hypothalamus
B)Anterior hypothalamus
C)Cerebellum
D)Thalamus

44.Heat stroke develops due to:
A)Hypothermia
B)+Failure of heat dissipation

C)Reduced metabolism
D)Infection

45.Heat exhaustion is associated with:
A)+Water and salt loss
B)Pyrogen action
C)Reduced sweating
D)Hypothermia

46.Sun stroke is caused mainly by:
A)Cold exposure
B)+Direct solar radiation to the head
C)Infection
D)Dehydration only

47.Fever helps the body by:
A)Decreasing immunity
B)+Enhancing immune reactions
C)Reducing metabolism
D)Lowering resistance

48.Long-term cold exposure increases:
A)Sweating
B)+Basal metabolic rate
C)Heat loss
D)Vasodilation

49.The main mechanism preventing excessive heat loss in cold is:
A)Sweating
B)+Peripheral vasoconstriction
C)Vasodilation
D)Evaporation

50.The ultimate goal of thermoregulation is to maintain:
A)Environmental temperature
B)+Optimal enzyme activity
C)Sweating rate
D)Blood pressure

1.The main function of the excretory system is:
A)Digestion
B)+Removal of metabolic waste
C)Gas exchange
D)Thermoregulation

2.The main excretory organs in humans are the:
A)Liver
B)Lungs
C)+Kidneys
D)Skin

3.The structural and functional unit of the kidney is the:
A)Glomerulus
B)Tubule
C)+Nephron
D)Collecting duct

4.The process of urine formation includes all EXCEPT:
A)Filtration
B)Reabsorption
C)Secretion
D)+Digestion

5.Glomerular filtration occurs in the:
A)Proximal tubule
B)+Renal corpuscle
C)Distal tubule
D)Collecting duct

6.Primary urine is formed by:
A)+Ultrafiltration of blood plasma
B)Active secretion
C)Diffusion
D)Osmosis

7.The normal glomerular filtration rate (GFR) is approximately:
A)60 ml/min
B)90 ml/min
C)+120 ml/min
D)200 ml/min

8.Which substance is normally absent in primary urine?
A)Glucose
B)Urea
C)Amino acids
D)+Proteins

9.Reabsorption of glucose occurs mainly in the:
A)Distal tubule
B)+Proximal tubule
C)Collecting duct
D)Loop of Henle

10.Glucose appears in urine when:
A)Blood pressure decreases
B)+Renal threshold is exceeded
C)ADH increases
D)Aldosterone increases

11.The renal threshold for glucose is about:
A)5 mmol/L
B)7 mmol/L
C)+9–10 mmol/L
D)15 mmol/L

12.Water reabsorption in kidneys is mainly regulated by:
A)Aldosterone
B)+Antidiuretic hormone (ADH)
C)Renin
D)Angiotensin II

13.ADH acts mainly on the:
A)Proximal tubule
B)Loop of Henle

C)+Collecting ducts
D)Glomerulus

14.Aldosterone increases reabsorption of:
A)Water only
B)+Sodium ions
C)Calcium ions
D)Chloride ions

15.The loop of Henle is essential for:
A)Glucose reabsorption
B)+Urine concentration
C)Protein filtration
D)Acid secretion

16.The countercurrent mechanism functions in the:
A)Glomerulus
B)+Loop of Henle
C)Proximal tubule
D)Distal tubule

17.Secondary urine differs from primary urine by:
A)Higher protein content
B)+Absence of glucose and amino acids after reabsorption
C)Presence of blood cells
D)Higher plasma content

18.Normal daily urine output in adults is:
A)200–400 ml
B)500 ml
C)+1–1.5 L
D)3–4 L

19.Polyuria is:
A)+Increased urine volume
B)Decreased urine volume
C)Absence of urine
D)Painful urination

20.Oliguria is:
A)Increased urine volume
B)+Decreased urine volume
C)Normal urine output
D)Frequent urination

21.Anuria is defined as:
A)Increased urine output
B)Decreased urine output
C)+Absence of urine
D)Frequent urination

22.The main nitrogenous waste product excreted in urine is:
A)Creatinine
B)Uric acid
C)+Urea
D)Ammonia

23.Creatinine clearance is used to assess:
A)Tubular secretion
B)+Glomerular filtration rate
C)Urine concentration
D)Water balance

24.Kidneys regulate acid–base balance by:
A)Excreting CO_2
B)+Secreting H^+ and reabsorbing HCO_3^-
C)Producing acids
D)Reducing metabolism

25.The kidneys excrete acids mainly as:
A)Carbonic acid
B)+Titratable acids and ammonium
C)Lactic acid
D)Ketone bodies

26.Renin is secreted by the:
A)Liver
B)Adrenal cortex
C)+Juxtaglomerular apparatus
D)Hypothalamus

27.Renin secretion is stimulated by:
A)High blood pressure
B)+Low blood pressure
C)High sodium intake
D)High blood volume

28.Angiotensin II causes:
A)Vasodilation
B)+Vasoconstriction
C)Decreased aldosterone secretion
D)Decreased ADH release

29.The kidneys participate in erythropoiesis by secreting:
A)Renin
B)+Erythropoietin
C)ADH
D)Aldosterone

30.Erythropoietin stimulates formation of:
A)Leukocytes
B)Platelets
C)+Erythrocytes
D)Lymphocytes

31.The kidneys regulate blood pressure mainly by controlling:
A)Heart rate
B)+Blood volume and vascular tone
C)Respiration
D)Temperature

32.The main cation excreted in urine is:
A)Potassium
B)+Sodium

C)Calcium
D)Magnesium

33.The main anion excreted in urine is:
A)Bicarbonate
B)+Chloride
C)Phosphate
D)Sulfate

34.Normal urine pH ranges from:
A)1–2
B)+4.5–8.0
C)8.5–9.5
D)10–12

35.The collecting ducts are sensitive primarily to:
A)Insulin
B)+ADH
C)Glucagon
D)Parathormone

36.Micturition is regulated mainly by a:
A)Hormonal reflex
B)+Spinal reflex
C)Cardiac reflex
D)Respiratory reflex

37.Voluntary control of urination is provided by the:
A)Internal sphincter
B)+External urethral sphincter
C)Bladder wall
D)Ureters

38.The normal yellow color of urine is due to:
A)Hemoglobin
B)+Urochrome
C)Bilirubin
D)Creatinine

39.The presence of protein in urine is called:
A)Glycosuria
B)+Proteinuria
C)Hematuria
D)Ketonuria

40.The presence of glucose in urine is called:
A)+Glycosuria
B)Proteinuria
C)Hematuria
D)Ketonuria

41.The kidneys help maintain osmotic balance by regulating:
A)Glucose
B)+Water and electrolytes
C)Proteins
D)Lipids

42.The main force driving glomerular filtration is:
A)Osmotic pressure
B)+Hydrostatic pressure in glomerular capillaries
C)Tubular pressure
D)Oncotic pressure of filtrate

43.Decreased ADH secretion leads to:
A)Concentrated urine
B)+Dilute urine
C)Anuria
D)Oliguria

44.Increased aldosterone secretion results in:
A)Increased sodium excretion
B)+Increased sodium reabsorption
C)Decreased potassium excretion
D)Decreased blood volume

45.The kidneys remove drugs and toxins mainly by:
A)Filtration only
B)Reabsorption
C)+Tubular secretion
D)Osmosis

46.Uremia develops due to:
A)Increased urine output
B)+Accumulation of nitrogenous waste
C)Loss of electrolytes
D)Excess ADH

47.The kidneys help regulate calcium balance through interaction with:
A)Insulin
B)+Parathyroid hormone
C)ADH
D)Glucagon

48.Long-term loss of kidney function leads to:
A)Hypotension only
B)+Disturbance of homeostasis
C)Hyperglycemia
D)Improved filtration

49.The main purpose of dialysis is to:
A)Stimulate urine formation
B)+Remove waste products from blood
C)Increase hormone secretion
D)Restore nephron structure

50.The ultimate role of the excretory system is to maintain:
A)Digestion
B)+Homeostasis
C)Gas exchange
D)Thermoregulation