

Human Anatomy & Physiology

Final Exam

Name:

- 1) Human blood:
 - a) Is mostly composed of white blood cells
 - b) Is primarily composed of both formed elements and plasma
 - c) Has nucleated erythrocytes within it
 - d) All of the above
 - e) None of the above

- 2) The structural characteristic(s) of an erythrocyte that contribute to its function include:
 - a) Its biconcave shape
 - b) Its hemoglobin composition
 - c) Its primary metabolic process for producing ATP
 - d) All of the above
 - e) None of the above

- 3) Starting at the inner-most layer of the heart, and travelling outwards, the names of the layers in order are:
 - a) Pericardium, Epicardium, Myocardium and Endocardium
 - b) Pericardium, Epicardium, Endocardium and Myocardium
 - c) Epicardium, Endocardium, Myocardium and Pericardium
 - d) Myocardium, Endocardium, Pericardium and Epicardium
 - e) None of the above

- 4) Hypernatremia
 - a) Depresses the heart
 - b) Dramatically increases heart irritability
 - c) Leads to heart block and cardiac arrest
 - d) Blocks heart contraction by inhibiting ionic calcium transport

- 5) During exercise, the greatest increase in blood flow occurs in:
 - a) Skeletal muscle
 - b) Cardiac muscle
 - c) Kidneys
 - d) Liver
 - e) None of the above

- 6) T-cells
 - a) Produce antibodies that immobilize antigens
 - b) Attack and destroy foreign cells
 - c) Produce plasma cells
 - d) All of the above
 - e) None of the above

- 7) The spleen
- a) Is a site of lymphocyte proliferation
 - b) Is involved with immune system surveillance and response
 - c) Cleanses the blood
 - d) All of the above
 - e) None of the above

Match the following terms with their definitions

- 8) Neutrophil
 - 9) IgA
 - 10) IgG
 - 11) IgM
 - 12) Eosinophil
 - 13) Mast Cell
 - 14) Macrophage
 - a) An antibody dimer that helps prevent the attachment of pathogens to epithelial cell surfaces
 - b) A white blood cell that releases histamine during inflammation
 - c) A white blood cell that is partial to parasitic worms
 - d) An antibody monomer that is the most abundant and diverse antibody during the primary and secondary immune response
 - e) A white blood cell that is partial to bacteria and fungi
 - f) A antibody pentamer released by plasma cells during the primary immune response
 - g) The primary phagocyte of the immune system
- 15) Which of the answers below puts the three divisions of the pharynx in order? (Start with the most cranial section and end with the most caudal section.)
- a) Nasopharynx, Oropharynx and Laryngopharynx
 - b) Oropharynx, Nasopharynx and Laryngopharynx
 - c) Laryngopharynx, Oropharynx and Nasopharynx
 - d) Oropharynx, Laryngopharynx and Nasopharynx
 - e) None of the answers above are in the correct order
- 16) During a myogenic response in the kidneys
- a) An increase in systemic pressure causes the afferent arterioles to dilate
 - b) An increase in systemic pressure causes the afferent arterioles to constrict
 - c) The response prevents glomerular blood pressure from rising to damaging levels
 - d) A & C
 - e) B & C

17) Vasodilation of the efferent arteriole from the glomerulus.

- a) Increases the hydrostatic pressure in the glomerulus
- b) Decreases GFR
- c) Decreases the hydrostatic pressure in the glomerulus
- d) Increases GFR
- e) A & D
- f) B & C
- g) A & B
- h) C & D

18) Angiotensin II

- a) Is a potent vasoconstrictor
- b) Increases MAP
- c) Stimulates the release of aldosterone
- d) Stimulates the release of ADH
- e) All of the above

19) Severe sweating will

- a) Cause a decrease in plasma volume
- b) Cause an increase in plasma osmolarity
- c) Increase the production of ANP
- d) Increase the production of ADH
- e) A, B, and D
- f) All of the above

20) The detrusor muscles in the bladder are regulated by:

- a) The sympathetic nervous system
- b) The parasympathetic nervous system
- c) The somatic nervous system
- d) None of the above

21) Cells of the macula densa are:

- a) Enlarged smooth muscle cells
- b) Act as mechanoreceptors
- c) Have secretory granules that contain renin
- d) Function as chemoreceptors

Match the digestive organ with its exocrine secretion(s). The same answer may be used more than once.

22) Stomach

23) Small Intestine

24) Esophagus

25) Mouth

26) Pancreas

27) Liver

28) Large Intestine

- a) Salt and water, mucus, amylase
- b) Mucus
- c) HCl, pepsin, mucus
- d) Digestive enzymes, bicarbonate
- e) Bile salts, bicarbonate and organic waste products
- f) Enzymes, salt and water, mucus

29) The brain-testicular axis:

- a. Is a positive feedback loop
- b. Involves FSH, LH, progesterone and testosterone
- c. Is involved in the hormonal regulation of the female reproductive tract
- d. All of the above
- e. None of the above

30) LH in men

- a. Causes the sustentacular cells to release ABP
- b. Stimulates the anterior pituitary to release FSH
- c. Is released by the hypothalamus
- d. Stimulates the interstitial cells to produce testosterone
- e. None of the above

31) Testosterone

- a. Must be synthesized from cholesterol
- b. Must be converted to DHT in the prostate to bind to the nucleus
- c. Causes growth in all the ducts, glands and in the penis
- d. Boosts basal metabolic rate and influences behavior
- e. All of the above

32) The menstrual cycle can be divided into three continuous phases. Starting from the first day of the cycle, the correct order is:

- a. menstrual, proliferative, secretory
- b. menstrual, secretory, proliferative
- c. secretory, menstrual, proliferative
- d. proliferative, menstrual, secretory

33) Which of these spermatogenic cells is diploid?

- a. primary spermatocyte
- b. secondary spermatocyte
- c. spermatid
- d. none of them

Matching – match the structure with the definition

- 34)foramen ovale
- 35)ductus arteriosus
- 36)mesoderm
- 37)ectoderm
- 38)endoderm
- 39)ductus venosus
- 40)yolk sac
- 41)allantois
- 42)chorion
- 43)amnion

- a. forms a transparent membrane filled with amniotic fluid
- b. forms part of the digestive tube, the earliest blood cells and vessels and is the source of primordial germ cells
- c. a fetal shunt between the embryonic body and the inferior vena cava that bypasses the liver
- d. a precursor tissue for the nervous system tissue
- e. a fetal shunt between the right and left atria
- f. the structural basis for the umbilical cord
- g. the precursor tissue for the epithelial lining of the digestive tract, the urinogenital system and the respiratory tract
- h. encloses the embryonic body and all other membranes
- i. a fetal shunt between the pulmonary trunk and the aorta
- j. the precursor tissue that forms most of the tissue in the body and forms somites

44)Fertilization usually occurs in the

- a. uterus
- b. ovarian follicle
- c. ampulla of the fallopian tube
- d. abdominopelvic cavity

Match the following reproductive structures with the pictures on the diagram

45)Cervix

46)Epididymis

47)Fallopian Tube

48)Ovum

49)Prostate Gland

50)Seminal vesicles

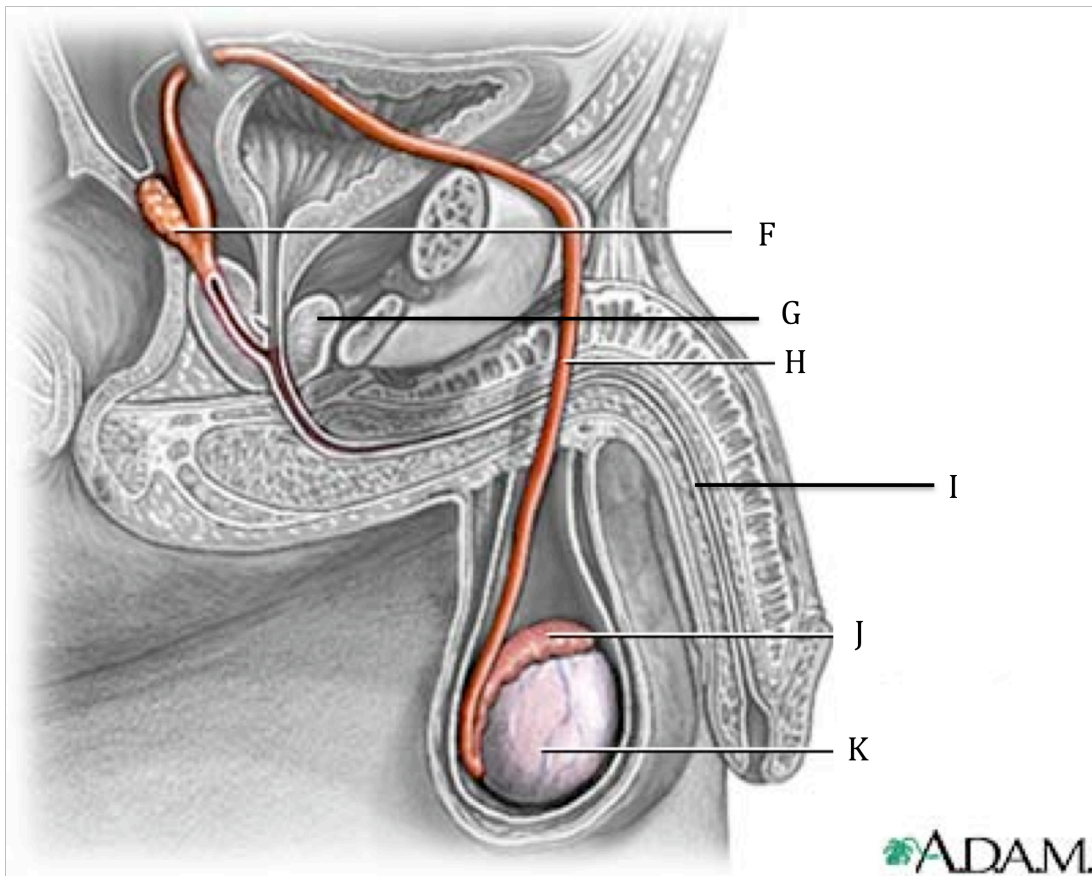
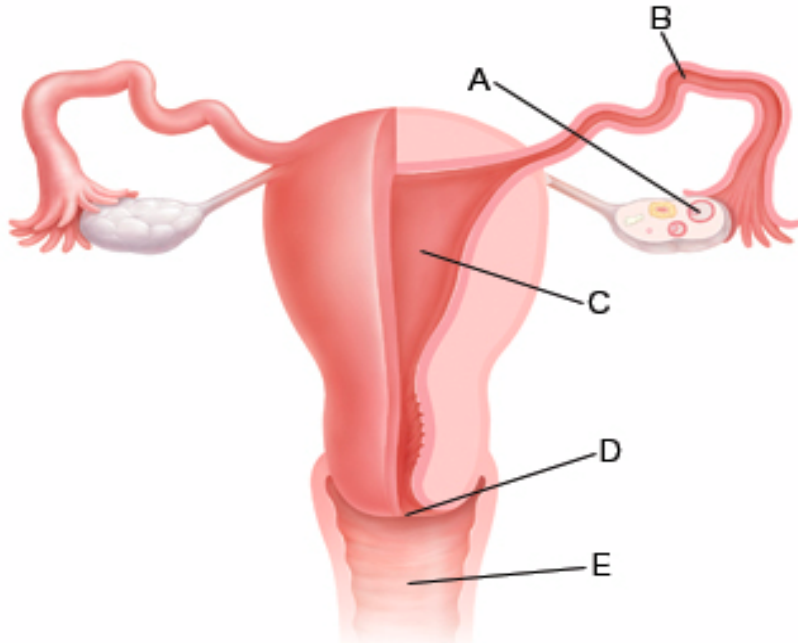
51)Testes

52)Urethra

53)Uterus

54)Vagina

55)Vas deferens



True and False

True (T) or False (F). If the statement is false change the word that is in bold to make the statement true. Scoring: 1 point for answering T/F correctly and 1 point for correcting the false statement correctly. **If you mark an answer True that is False you will lose both points. If you mark an answer False that is True you will lose one point.**

- 56) **Alcohol** acts as an osmotic diuretic by inhibiting the release of ADH.
- 57) An **decrease** in EDV will cause an increase in SV.
- 58) Asthma is an example of a **restrictive** pulmonary disease.
- 59) B-cells mature in the **thymus**.
- 60) Blood enters the right atrium via the **pulmonary veins**.
- 61) During pregnancy blood volume **increases**.
- 62) During the isovolumetric phase volume in the ventricles is **constant**.
- 63) Ejaculation expels semen into the vagina and is under **parasympathetic** nervous system control.
- 64) **Erythropoietin** is released in response to hypoxia.
- 65) Fetal hemoglobin has a **greater** binding affinity for oxygen than does maternal hemoglobin.
- 66) If GFR (Glomerular filtration rate) is too **high** everything is reabsorbed including wastes that are normally disposed of.
- 67) Impotence can be caused by anything that blocks **epinephrine** release or its effects.
- 68) Labor is initiated by a **positive** feedback loop involving uterine contractions and oxytocin.
- 69) Net filtration pressure is highest at the **venous** end of the capillary.
- 70) **Peristalsis** occurs only in the small intestine.
- 71) Potassium uptake is regulated by the hormone **aldosterone**.
- 72) The corpus luteum secretes **progesterone**.
- 73) The **descending** limb of the loop of Henle is impermeable to water.
- 74) The **myometrium** is the smooth muscle layer of the uterine wall.
- 75) The scrotum is maintained **outside** the body cavity to decrease the temperature in the testes.
- 76) The **transpulmonary** pressure keeps the airways open preventing them from collapsing.
- 77) Type **A** cells in the testes become primary spermatocytes.
- 78) The **midpiece** of the sperm contains mitochondria.
- 79) A **low** sperm count causes the production of inhibin.
- 80) Without **testosterone** during development an embryo will become female.
- 81) The mullerian ducts develop into the **male** reproductive ducts.
- 82) Ovulation occurs when the **oocyte** is ejected from the follicle.
- 83) **Estrogen** is required to maintain the endometrial lining during pregnancy.
- 84) **Human chorionic gonadotropin hormone** signals to the mother that the fetus has implanted.
- 85) **Cervical cancer** is the most common among women ages 30 – 50 and is linked to the human papilloma virus.
- 86) The **uterine** arteries arise from the internal iliacs and send branches into the uterine wall.

Short Answer

1) A) Graph metabolic rate versus speed during running. Be sure to label your axes as specifically as possible. (4 points)

B) On the graph from part A, label the cost of transport. (2 points)

C) Assuming VO_2max is 15 L/min and resting metabolic rate is 0.75 L/min, calculate the aerobic scope. (1 point)

D) At what point can you no longer use oxygen consumption as an accurate predictor of metabolic rate? Why? (2 points)

E) Would the net cost of transport be greater in a child or an adult during running? (1 point)

- 2) When the Southwest Airlines flight lost cabin pressure due to rupture in the fuselage, the pilot had to descend the plane from 36,000 ($P_{\text{atm}}=13 \text{ mmHg}$) feet down to 11,000 feet ($P_{\text{atm}}=220 \text{ mmHg}$). Calculate the partial pressure of oxygen at each altitude. Using that information, explain why this decrease in altitude is necessary in terms of diffusion at the level of the alveoli. (5 points)

3) A) What two organ systems regulate blood pressure? (2 points)

B) Will the following conditions increase or decrease blood pressure? (3 points)

a) Increase in sympathetic stimulation to the heart.

b) Increase in carbon dioxide concentration in skeletal muscle.

c) Decrease in ADH production.

d) Increase in ANP production.

e) Increase in the firing rate of carotid and aortic baroreceptors.

f) Decrease in plasma aldosterone.

C) Diagram the response of the renin-angiotensin system under conditions of low blood pressure in the renal blood vessels. Include all hormones and effects produced and the ultimate effect on GFR. (5 points)

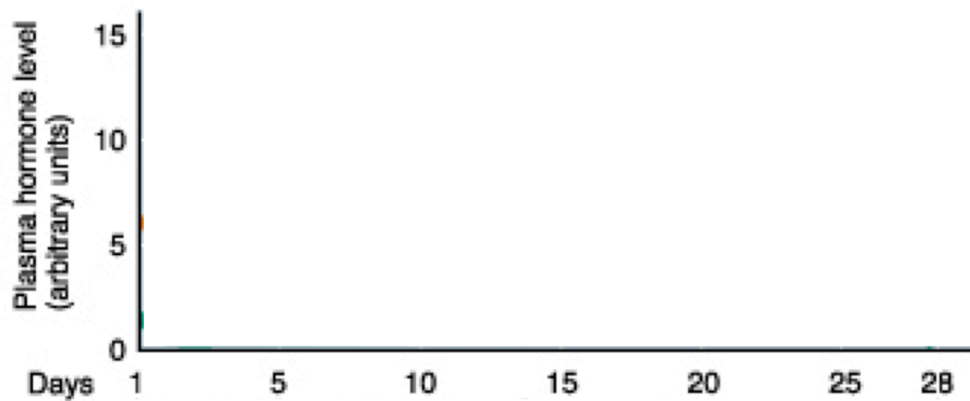
4) List the effects of the following hormones on males and on females in the table below. (10 points)

Hormone	Effect on Males	Effect on Females
Relaxin		
LH		
Inhibin		
GnRh		
FSH		

- 5) Graph the levels of gonadotropin hormones on the upper graph below and the levels of ovarian hormones on the lower graph below as the ovarian cycle progresses. (8 points) Add to this figure a graph depicting the thickness of the endometrium. (3 points) Label the phases of the menstrual cycle on the graph and indicate where ovulation occurs. (4 points)



(a) Fluctuation of gonadotropin levels



(b) Fluctuation of ovarian hormone levels

Multiple Choice Answer Sheet

Name:

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|-----------|-----------|-----------|-----------|-----------|
| 1) _____ | 12) _____ | 23) _____ | 34) _____ | 45) _____ |
| 2) _____ | 13) _____ | 24) _____ | 35) _____ | 46) _____ |
| 3) _____ | 14) _____ | 25) _____ | 36) _____ | 47) _____ |
| 4) _____ | 15) _____ | 26) _____ | 37) _____ | 48) _____ |
| 5) _____ | 16) _____ | 27) _____ | 38) _____ | 49) _____ |
| 6) _____ | 17) _____ | 28) _____ | 39) _____ | 50) _____ |
| 7) _____ | 18) _____ | 29) _____ | 40) _____ | 51) _____ |
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| 71) _____ | | | | |