

Human Physiology
Midterm 4 COPY A

Name _____

1. The nutrients in foods that serve predominantly as “fuel food,” providing energy for metabolism are
a. vitamins, minerals, and carbohydrates (2 points)
b. carbohydrates, lipids (fats), and vitamins
c. protein, lipids (fats), and water
d. carbohydrates, proteins, and lipids (fats)
e. protein, vitamins, and carbohydrates

2. The first organ to receive the blood borne products of digestion is _____.(2 points)

3. The increased intestinal absorption of calcium is stimulated directly by _____. (2pts)
a. PTH b. 1,25-dihydroxyvitamin D3 c. calcitonin d. all of these

4. Glucose can be secreted into the blood by _____. (2 points)
a. the liver b. the muscles c. the liver and muscles d. the liver, muscles, and brain

5. Match the structures/substances on the left with the descriptions on the right. Some descriptions may fit more than one structure/substance. Use the best description for each structure given that each structure will have only one description. (9 points)

_____ mouth	a. trypsinogen is produced here
_____ saliva	b. vitamin B12 is absorbed here
_____ submucosa	c. starch digestion begins here
_____ hepatocyte	d. beta cells release insulin from here
_____ jejunum	e. physical breakdown of food continues here
_____ duodenum	f. major site of digestion and absorption
_____ ileum	g. bile and pancreatic juices enter the gut here
_____ stomach	h. contains immune factors
_____ pancreatic acini	i. blood vessels and exocrine glands are found here
_____ islet of Langerhans	j. secretes bile into canaliculi

6. Chylomicrons are made predominately of _____ but they also contain _____ and _____. (3 points)

7. Which is not an accessory organ of the digestive system? (2 points)
a. stomach b. salivary glands c. liver d. tongue e. pancreas

8. Define digestion. How is emulsification of fats different from digestion? (2 points)

9. Antibodies against both type A and type B antigens are found in the plasma of a person who is: (2 points)
a. type A b. type B c. type O d. type AB e. any of these types
10. The _____ cells of gastric glands secrete gastrin; whereas the _____ cells secrete histamine. (2 points)
11. Which statement about *microvilli* is *false*? (2 points)
a. They are fingerlike projections formed by the foldings of the epithelial plasma membrane itself.
b. Using the light microscope, they appear as a vague “brush border” along the luminal border of the columnar epithelial cells of the intestinal mucosa layer.
c. “Fixed” digestive enzymes attached to the membranes of microvilli face the lumen and hydrolyze various substrates in chyme.
d. They play a role in activation of pancreatic juice enzymes such as trypsin.
e. All of these statements regarding microvilli are true.
12. In the islets of Langerhans of the pancreas, the _____ release insulin and the _____ release glucagon. (2 points)
13. Acetaminophen is “detoxified” by the liver into a non-toxic metabolite by _____ enzymes and into a toxic intermediate by _____ enzymes. (4 points)
14. Active immunity may be produced by _____. (2 points)
a. contracting a disease
b. receiving a vaccine
c. receiving gamma globulin injections
d. both a and b
e. both b and c
15. What is an antigen? (2 points) _____.
16. _____ refers to the movement of leukocytes to the site of an infection, lured by chemical attractants. (1 point)
17. The secretion of _____ by the Leydig cells is stimulated by the hormone _____. (2 points)
18. In sexual reproduction, the *sperm* and *ova*, known as _____ are formed within the *testes* and *ovaries* called _____ by a process of reduction division known as _____. (2 points)
a. gonads; germ cells; meiosis
b. gametes; gonads; meiosis
c. zygotes; gametes; mitosis
d. zygotes; germ cells; mitosis
19. Give two ways that mast cells are induced to degranulate? (Identify one as innate and the other acquired.) (4 points)

20. Match the cell or substance on the left with its role in immunity on the right. Some descriptions may fit more than one cell/substance. Use the best description for each cell/substance given that each cell/substance will have only one description. (9 points)

_____	cytotoxic T cells	a. not directly involve in killing pathogens
_____	mast cells	b. can be activated by antibodies or endotoxin
_____	eosinophils	c. uses lysosomal enzymes used to attack worms/parasites
_____	neutrophils	d. bind IgE antibodies
_____	plasma cells	e. active, short lived phagocytes
_____	complement	f. phagocytes that are also antigen presenting cells
_____	helper T cells	g. uses perforins to lyse cells
_____	IgE	h. secrete antibodies into blood and lymph
_____	macrophages	i. involved in allergic responses

21. Which of the following descriptions is a characteristic part of the *secondary* response? (2 points)
- It represents the response to an initial exposure of that pathogen.
 - The latent period between the secondary exposure and the appearance of antibodies is about 5-10 days.
 - Antibody concentrations during this response reach a plateau in a few days and decline after a few weeks.
 - The production of antibody can reach a maximum in less than two hours and is maintained for a long time.
22. The *corpus luteum* is an endocrine structure that is formed from the (2 points)
- enlarged primary oocyte
 - graafian follicle after ovulation
 - secondary oocyte after fertilization by sperm
 - corpus albicans of the ovary
23. As the placenta continues to convert dehydroepiandrosterone sulfate (DHEAS) into estrogens, the rising blood levels of estrogens in the pregnant female, in turn, stimulate the uterus to: (2 points)
- produce more receptors for oxytocin
 - produce more receptors for prostaglandins
 - produce more gap junctions or electrical synapses between myometrial cells in the uterus
 - increase the sensitivity of the myometrium prior to labor and parturition
 - All of these events occur following a rise in blood estrogens.
24. During fasting, _____ (name of a process) promotes the synthesis of new glucose molecules from noncarbohydrate substrates such as certain amino acids and pyruvate. (2 points)
25. In the digestion laboratory, what was the substrate assay used to measure the activity of pepsin? (2 points)
26. In the digestion laboratory, what was the name of the assay or the main chemical used to measure maltose (a reducing sugar)? (2 points)

27. Match the items on the left with the descriptions on the right. Some descriptions may fit more than one item. Use the best description for each item given that each item will have only one description. (6 pts)

- | | | |
|-------|------------------|--|
| _____ | luteal phase | a. uterine phase under influence of progesterone |
| _____ | ovulation | b. production of hCG |
| _____ | secretory phase | c. LH surge |
| _____ | follicular phase | d. corpus luteum |
| _____ | menstrual phase | e. day 1 to day 14 of menstrual cycle |
| _____ | pregnancy | f. uterine phase where lining sloughed off |

28. Given what you know about enzyme activity explain the following results: *(some results may be abnormal)*
(8 points)

test tube contents: Film plus.....	amount of film coating	explanation
pepsin, HCl, 37°C	none	
boiled pepsin, HCl, 37°C	a lot	
amylase, HCl, 37°C	none	
pepsin, HCl, 0°C	a lot	

test tube contents starch plus.....	presence of starch	maltose rating	explanation
water	yes	---	
amylase	no	+++	
pepsin	yes	---	
amylase, acid solution	yes	---	

29. Ketoacidosis in untreated diabetes mellitus is due to _____ . (2 points)

- excessive fluid loss
- excessive fat metabolism
- hypoventilation
- excessive eating and obesity

30. What is the difference between hyperventilation and hyperpnea? (2 points)
31. In the glucose tolerance test, subjects consumed 75 grams of glucose and then we measured blood glucose levels every 30 minutes for 150 minutes. In normal individuals the glucose levels rose and then dropped back down to normal. Give two reasons why glucose might increase and not return to normal. Explain the physiology, don't just give disease names. (4 points)
32. State whether the following cause an increase or decrease in respiratory rate and depth (4 points):
decreased alveolar pCO₂ _____ decreased blood pH _____
33. Which statement about *systemic lupus erythematosus* (SLE) is *false*? (2 points)
- SLE results from the abnormal combination of self-antigens and autoantibodies.
 - SLE victims produce antibodies against their own DNA and nuclear protein.
 - SLE is an autoimmune disease that results in the formation of immune complexes that cause inflammation and tissue damage throughout the body.
 - SLE is characterized by unexpected immediate hypersensitivity reactions.
 - All of these statements about SLE are true.
34. Type I diabetes mellitus is an autoimmune disease in which _____ appear on beta cells in the pancreas resulting in autoimmune destruction of these cells mediated by _____ (4 points)
35. Agglutination is the process of: (2 points)
- antibodies cross-linking red blood cells
 - blood clot formation
 - interaction of A and B antigens
 - precipitation by antibodies of small soluble antigens
36. In *erythroblastosis fetalis* (hemolytic disease of the newborn), the (2 points)
- baby is Rh positive and the mother is Rh negative.
 - mother has made antibodies against the Rh factor present on the baby's red blood cells.
 - baby has abnormally low numbers of red blood cells (anemia).
 - mother should have been given RhoGAM (antibodies) by injection after first child.
 - All of these statements regarding erythroblastosis fetalis are correct.
37. What type(s) of blood can a person with type AB blood receive safely? (*Based on Ab in their circulation*)(4pts.)

38. Give two causes for anemia and explain how the oxygen carrying capacity of the blood is reduced in each instance. (4 points)
39. List the four hormones involved in lactation (mammary gland development, milk production, and let down) and identify one role of each. (6 points)

In Class Essay Questions: **(don't do if you did the take home....)** 50 points total.

Everyone that didn't do the take home!!!

40. Describe the process of digestion and absorption of **one** of the following: lipids, proteins, or carbohydrates. (10 points)

Pick two out of four and answer on the blank pages provided. (40 points total)

- A. List and describe the three phases of gastric secretion. (20 points)
- B. Describe the role of the gastric gland in the digestion of protein in the stomach. (Start with how the process of digestion is initiated when food enters the stomach. Hint: Give the roles of the vagus nerve and enteroendocrine cells.) (20 points)
- C. Describe the immune response to a cut or scrape accompanied by bacterial invasion.(20 points)
- D. Describe the process of spermatogenesis. Include the location and cells involved as well as hormonal regulation. (20 points)