

**BIOLOGY 1102, EXAM 2**

**Questions 1-25, Multiple Choice: 1.5 points each. Circle the best answer here and fill in your bubble sheet.**

1. What is the best (most accurate) reason that fats (triglycerides) have more energy than sugars?  
a. Fats have more carbon                      c. Sugars can form chains                      **e. Fats have more hydrogen**  
b. Sugars are smaller                      d. Fats are bigger
2. Blood plasma glycoprotein called \_\_\_\_\_ is converted by protein \_\_\_\_\_ into protein \_\_\_\_\_, which, together with \_\_\_\_\_, forms a mesh network or clot that stops blood loss.  
a. Fibrin, Blood Platelets, Fibrinogen, Thrombin                      **c. Fibrinogen, Thrombin, Fibrin, Blood Platelets**  
b. Thrombin, Fibrin, Blood Platelets, Fibrinogen                      d. Blood Platelets, Fibrinogen, Thrombin, Fibrin
3. Of the following conditions, which one is an inflammation of the lungs that leads to an accumulation of fluid and impairs breathing.  
a. Asthma                      c. Apnea                      **e. Pneumonia**  
b. SIDS                      d. COPD
4. Of the following conditions, which one is a combination of Emphysema and chronic Bronchitis?  
a. Asthma                      c. Apnea                      e. Pneumonia  
b. Emphysema                      **d. COPD**
5. During muscular contraction and relaxation, when is ATP energy NOT required?  
a. Bend the Myosin filament                      c. Re-absorb calcium ions                      e. None of the above are correct  
b. Separate Actin and Myosin                      **d. Myosin grabs Actin filaments**
6. Folic acid (Vitamin B<sub>9</sub>) supplements can reduce the incidence of which condition?  
a. Scoliosis                      c. Rheumatoid arthritis                      e. Osteoarthritis  
**b. Spina bifida**                      d. Rickets
7. Which of the following organisms forms a beneficial symbiotic relationship with plant roots to help the plant get Nitrogen?  
a. Viroid                      c. Mycorrhizae                      e. Lichen  
b. Mycelium                      **d. Rhizobium**
8. Which of the following organisms forms a beneficial symbiotic relationship with plant roots to help the plant get Phosphorus?  
a. Viroid                      **c. Mycorrhizae**                      e. Lichen  
b. Rhizobium                      d. Mycelium
9. The \_\_\_\_\_ filters interstitial fluid and the \_\_\_\_\_ filters old red blood cells and dead pathogens from blood.  
a. Spleen, kidney                      **c. Lymph nodes, spleen**                      e. Spleen, Lymph nodes  
b. Kidney, thymus gland                      d. Thymus gland, lymph nodes
10. Which of the following proteins marks the body's cells as 'self'?  
a. Antibodies                      c. Perforins                      e. Prostaglandins  
b. Histamines                      **d. Mhc**
11. These molecules are released by 'stressed' cells and cause Natural Killer Cells to attack.  
a. Perforins                      c. Histamines                      e. Prostaglandins  
b. Gamma globulin                      **d. Cytokines**
12. Which of the following involves receiving antibodies that were produced outside of your body?  
a. Antivenin                      c. Maternal antibodies                      e. None of the above  
b. Gamma globulin                      **d. All of the above**
13. Which of the following hormone(s) suppresses appetite?  
a. CCK (Cholecystokinin)                      c. Ghrelin                      e. Answers b and c  
b. Leptin                      **d. Answers a and b**

14. Which of the following vitamins is fat-soluble?  
a. A                      c. E                      e. None of the above  
b. D                      **d. All of the above**
15. Of the following, which two hormones may be involved in promoting breast cancer growth?  
a. Estrogen, oxytocin      c. HGH, melatonin                      e. Testosterone, HGH  
**b. Estrogen, HGH**      d. Estrogen, prostaglandins
16. The pancreas produces two hormones. One hormone triggers liver and fat cells to store glucose; it is called \_\_\_\_\_. A second hormone tells liver and fat cells to release glycogen; it is called \_\_\_\_\_.  
a. Insulin, CRH                      c. Glycogen, insulin                      e. Glucagon, insulin  
b. ACTH, TSH                      **d. Insulin, glucagon**
17. Chronic Stress Response: Hypothalamus secretes the neurohormone \_\_\_\_\_ that travels through special blood vessels to the Anterior pituitary gland. The anterior pituitary secretes the hormone \_\_\_\_\_. This hormone enters the blood and travels to the Adrenal glands and causes the release of \_\_\_\_\_.  
**a. CRH, ACTH, Cortisol**                      c. Cortisol, CRH, ACTH                      e. Cortisol, ACTH, Epinephrine  
b. ACTH, CRH, Cortisol                      d. ACTH, Epinephrine, Cortisol
18. During membrane (resting) potential, the inside of the nerve cell is \_\_\_\_\_ charged, and the outside of the nerve cell is \_\_\_\_\_.  
a. Negative, neutral                      c. Positive, negative                      e. Positive, neutral  
**b. Negative, positive**                      d. Neutral, positive
19. Which ion is most directly responsible for starting the action potential?  
a. Calcium                      c. Hydrogen                      e. Superoxide  
b. Potassium                      **d. Sodium**
20. Which of the following uses active transport?  
a. Sodium channel                      **c. Sodium-potassium pump**                      e. All of the above  
b. ATP synthase                      d. Potassium channel
21. What part of the brain is thought to be involved in depression, bipolar disorder, and obsessive-compulsive disorder (OCD)?  
a. Pons                      **c. Diencephalon**                      e. Medulla oblongata  
b. Cerebellum                      d. Limbic system
22. Which part of the brain is involved in producing and interpreting emotions?  
a. Pons                      c. Area postrema                      **e. Limbic system**  
b. Midbrain                      d. Cerebellum
23. What part of the brain is involved in monitoring the quality of blood and can induce vomiting if toxins are detected.  
a. Pons                      **c. Area postrema**                      e. Limbic system  
b. Midbrain                      d. Cerebellum
24. A short-term physiological state in which metabolism and body temperature are lowered at night.  
a. Hibernation                      c. Aestivation                      e. Adaptation  
b. Acclimation                      **d. Torpor**
25. The Kidneys regulate blood concentration of which of the following:  
a. Water                      c. Red blood cells                      e. Answers a and b only  
b. Salt                      **d. All of the above**

**Questions 26 – 50. Short answer questions: Note: many questions have more than one part. Write neatly so I can give you credit! To save time, do not re-write the question in your answer. Short IS sweet!**

26. (4 points) Three parts:

a. (2 points) What is Brown Fat and how does it work?

**Special fat cells in which ATP synthase shuts off.  
H<sup>+</sup> ions pass through Thermogenin.  
Brown fat releases energy as heat, but does not make ATP.  
Found in mammals that hibernate or that cannot shiver or thermoregulate.**

b. (1 point) How does Cyanide kill you?

**Blocks Cytochrome Oxidase. Stops Electron Transport Chain. Die from lack of ATP**

c. (1 point) Bacteria do not have mitochondria; how do they run an electron transport chain?

**They have the key molecules embedded in their cell membrane. The whole bacterium functions as a mitochondrion.**

27. (2 points) Considering energy metabolism, explain why cancer causes people to lose weight?

**Growing tumors use glucose inefficiently. Lack of adequate blood supply and oxygen to growing tumors forces cancer cells to rely on glycolysis for energy production, producing only two ATP from one glucose molecule.**

28. (2 points) Three parts:

a. (1 point) What do we call the light-headed feeling when you stand up too fast? **Orthostatic hypotension**

b. (0.5 point) Using one word for each answer, how are HDL and LDL cholesterol different?

**HDL = 'good' cholesterol  
high protein, low fat**

**LDL = 'bad' cholesterol  
low protein, high fat**

c. (0.5 point) Circle the medication(s) below that act by reducing or keeping blood pressure low.

**Nitrates**

**Statins**

**Beta blockers**

29. (2 points) Two parts:

a. (1 point) List three substances from class that cause vasoconstriction: **Antihistamines, Amphetamines, Cocaine, Psilocybin, eye drops, cold temps, Nicotine**

b. (1 point) List three substances from class that cause vasodilation: **Histamines, Lactic Acid, too much CO<sub>2</sub>, Ethanol, THC, lack of noise, lack of light, high temps**

30. (2 points) Explain how CO<sub>2</sub> is transported to the lungs?

**Most of it is in the blood as Bicarbonate (HCO<sub>3</sub><sup>-</sup>).  
When (HCO<sub>3</sub><sup>-</sup>) reaches the lungs, it is converted into CO<sub>2</sub> and water.**

31. (2 points) As given in class, list the four adaptations used by diving animals to improve the efficiency of oxygen delivery to the body.

- Myoglobin: protein that stores oxygen in muscle**
- Have more red blood cells or more efficient blood cells**
- Reduce heart rate to slow oxygen consumption**
- Restrict blood flow to non-vital organs and tissues**

32. (4 points) Four parts: Keep answers short.

- What causes Muscle Burn? **Accumulation of lactic acid after anaerobic exercise**
- What causes Muscle Fatigue? **Leaky calcium channels**
- Name the protein we discussed in class that inhibits muscle development? **Myostatin**
- Circle the correct answers in the sentence below:

(**Tendons**, Ligaments) attach muscle to bone and (Tendons, **Ligaments**) attach bone to bone.

33. (2 points) Two parts.

- (1 point) Regarding large muscle development, why do you lose it, if you don't use it?

**Because large muscles are energetically expensive to build and maintain. If we don't use them, our body makes them smaller to save energy.**

- (1 point) Circle the correct answers in the following sentence.

(Osteoclasts, **Osteoblasts**) build bone and (**Osteoclasts**, Osteoblasts) break down bone.

34. (3 points) Two parts:

- (1 point) Circle the correct response: Algae are (Plants, Animals, Fungi, **Protists**, Bacteria)
- (2 points) Briefly explain the Prudent Parasite argument.

**Parasites should evolve so they do not kill their hosts; thus, enabling them more time to infect other potential hosts.**

35. (2 points) Two parts: Fill in the two blanks:

- (1 point) \_\_\_\_\_ **Bacteria** \_\_\_\_\_ are killed by antibiotics and your immune system.
- (1 point) \_\_\_\_\_ **Viruses** \_\_\_\_\_ are killed by your immune system only.

36. (1 point) As given in class, name three Autoimmune disorders and briefly describe them.

**Multiple Sclerosis = IS attacks myelin sheath around nerve cells**  
**Lupus = IS attacks bodies own tissues and organs**  
**Type 1 (juvenile) Diabetes = IS attacks insulin-producing cells of pancreas**  
**Rheumatoid Arthritis = IS attacks tissues between skeletal joints**  
**Grave's Disease IS attacks Thyroid gland**  
**Crohns's Disease = IS attacks digestive tract**  
**Narcolepsy = IS attacks Hypocretin in brain**

37. (2 points) Two parts:

- (1 point) Explain why do we get a fever? **Cells of immune system work better at a higher body temperature. Pathogens don't like the high temperatures.**
- Explain why we get inflammation? **It traps pathogens at the site of injury, prepares tissues for repair. Immobilizes injured joints to avoid further damage.**

38. (3 points) Explain how a vaccine works.

**Antigens or dead pathogens are injected into the body where they do not cause infection, but do stimulate an immune response and the formation of memory cells. Memory cells initiate a rapid response if the antigen is ever found in the body again.**

39. (3 points) If an Rh-negative woman becomes pregnant with the child of an Rh-positive male, what is the potential problem that can happen during a second pregnancy?

**Woman can develop antibodies to the Rh-positive blood of first baby. During the next pregnancy, the woman's (memory cells) immune system can attack and kill Rh-positive baby.**

40. (2 points) Two parts:

- Define Coprophagy? **When some animals eat their own feces.**
- What type of animals practice Coprophagy (be specific)? **Small Hindgut fermenters**

41. (4 points)

- What is required to make the hormone Thyroxine? **Iodine**
- Consider your answer to question a above. Where do you get it? **Iodized salt**
- What hormone does the pineal gland secrete in response to darkness? **Melatonin**
- Name the feel-good / pain tolerance hormones made by Hypothalamus and Pituitary? **Endorphins**

42. (2 points) Two parts: Read questions carefully.

- (1 point) **When** is Oxytocin produced?

**Produced during/after labor contractions, after orgasm, nipple stimulation**

- (1 point) **Why** is Oxytocin produced?

**Is a hormone that promotes bonding, formation of relationships, and commitment. So moms don't hate their babies. So monogamous couples that have sex together, stay together and successfully raise offspring.**

43. (2 points) In class, we discussed two examples of how pheromones might be acting to influence human behavior and physiology. Describe just one of them.

**Babies can recognize clothes that their mother has worn previously and cry when they are given a different woman's clothes or women who spend a lot of time together will often have synchronized menstrual cycles.**

44. (4 points) Based on what we discussed in class, explain how a cocaine addiction works in the brain.

**Cocaine blocks the re-absorption of several neurotransmitters, including Dopamine. Body compensates by increasing production of enzymes that destroy extra neurotransmitters. When not using Cocaine, the body continues producing neurotransmitter-destroying enzymes. As a result, the body is understimulated because neurotransmitter is destroyed too rapidly. Basically, you can't feel good unless using Cocaine. Takes more and more Cocaine to get the same effect.**

45. (2 points) Two parts:

- (1 point) What is an Analgesic? ? **Something that blocks pain without causing unconsciousness**

- (1 point) How does alcohol affect the nervous system?

**At high doses, can block potassium channels open and make them leaky, even at rest--causing slower reactions, blurred vision, stumbling, and slurred speech.**

46. (2 points) Two parts:

- a. (1 point) What is a Nociceptor? : **Sensory neuron that sends pain signals to brain. Detect damage to body and prevent further injury.**
- b. (1 point) What is a mirror neuron? **A neuron that fires when an animal acts AND when it sees another animal perform the same action. Monkey see, monkey do....**

47. (4 points) What FOUR factors given in class affect the transfer of information from short-term memory to long-term memory? **(Mnemonic got +1 point)**

- a. **Practice makes perfect**
- b. **Positive or negative emotional state associated with memory**
- c. **If new data can be associated with something already learned (context)**
- d. **Repeated testing**

48. (1 point) Two parts:

- a. (0.5 points) What affect does alcohol abuse have on memory?  
**Impairs the formation of new, long-term memories (causes blackouts)**
- b. (0.5 points) What affect does marijuana abuse have on memory?  
**Impairs formation of short-term memories**

49. (3 points) What happens in the brain to cause Alzheimer's Disease?

**Disruption in BBB allows blood plasma containing Beta Amyloid molecules to enter brain where it sticks to tight junctions forming Amyloid plaques that disrupt brain function**

50. (2.5 points) If you and a friend were suddenly transported to Antarctica, where nightly temperatures can drop below -100°F, describe all the different ways **you** and **your body** might respond to the intense cold.

- 1) **Blood vessels near skin vasoconstrict to conserve heat near body surface**
- 2) **Behavioral response: Seek shelter, seek sunlight for warmth, cuddle with friend**
- 3) **Insulation: I would have 'goosebumps' in a failed attempt to keep warm**
- 4) **Brown Fat might help keep me warm, depending on how much I have, if any.**
- 5) **Muscle shivering will definitely keep me warm.**