

## Fall Semester Final Study Guide ANSWERS

### 1. 4 Characteristics of life:

1. all have cells
2. have DNA
3. Can grow and reproduce
4. Respond to environment

### CA standard 1a

2. Cell membrane act as a protective layer between the inside and outside of a cell. It also regulates materials in and out of the cell.

3. The cell membrane is made of a phospholipid bi-layer, proteins (channels and pumps), carbohydrates.

### CA standard 1b

4. Enzymes are proteins that help in chemical reactions of the body.

5. Enzymes speed up chemical reactions by binding to the reactants (substrates) immediately without the need of the activation energy being reached.

6. The 3 factors that can affect activities of enzymes (either increase or decrease/destroy enzymes) are pH, temperature, and ionic conditions.

### CA standard 1c

7.	Prokaryote	Eukaryote
	No organelles	have organelles
	No nucleus	have nucleus
	Smaller	larger size
	Bacteria	Animal, plant cells

8. Nucleus: contains DNA, contains genetic information

DNA: genetic information that codes for what needs to be made in the cell.

Cell membrane: (see #2)

Cytoplasm: gel-like fluid in the cell that helps hold organelles together.

Ribosomes: bead-like structures that are the sites for protein synthesis (making of proteins)

9.	Plant	Animal
	Square shape	circular shape
	Have a central vacuole	have smaller size vacuoles
	Have chloroplast	no chloroplast

### CA standard 1e

10. Ribosomes: (see #8)

Endoplasmic Reticulum (ER):

Smooth: site of lipid (fat) production, steroids

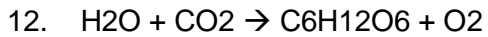
Rough (have ribosomes attached): site of protein production

Vesicles: sac-like structures that transport materials around the cell.

Golgi apparatus: an organelle that packages, process, and sorts the proteins.

### CA standard 1f

11. Energy is released from ATP when a phosphate (P) is broken off. Breaking a bond will release the energy that was used to hold the bond there.



13. Energy is captured from sunlight by chlorophylls located in Photosystem II. The energy is then passed to the  $e^-$ . When the  $e^-$  absorb the energy from the sun, they become "excited"

14. The electrons of a chlorophyll molecule exit the photosystems and move down the ETC.

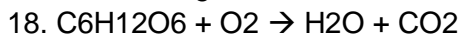
15. The role of the "excited" electrons is to help move  $H^+$  across the thylakoid membrane from the outside to the inside. Also, they are to absorb the sunlight energy and bind to  $NADP^+$  to make NADPH.

The two energy storing molecules are NADPH and ATP.

16. Oxygen comes from the breaking down of water.

17. The Calvin cycle (also called the light independent reaction), takes in  $CO_2$ , energy from Light dependent reactions, to produce sugar and release  $O_2$ ).

CA standard 1g



19. Glycolysis: anaerobic process that occurs outside of the mitochondrion. It takes Glucose molecules and breaks them down into 2 pyruvates for each glucose molecule.

Krebs cycle: an aerobic process that occurs in the cytoplasm. It takes the pyruvates and through a series of steps, produce  $CO_2$  and NADPH and ATP.

ETC: an aerobic process that occurs in the matrix. It takes the NADPH to produce  $H_2O$  and 32-34 ATP.

20. Oxygen is needed to capture the  $e^-$  as it goes through the ETC. They will then bind with  $H^+$  to make  $H_2O$ .

21. the by products of cellular respiration is  $CO_2$  formed during the Krebs cycle.

CA standard 1h

22. The 4 macromolecules

- |                 |                 |
|-----------------|-----------------|
| 1. Carbohydrate | monosacharrides |
| 2. Lipid        | fatty acids     |
| 3. Protein      | amino acids     |
| 4. Nucleic acid | nucleotides     |

CA standard 2a

23. Meiosis is a process that takes a diploid cell to create haploid cells. In order to this, there are 2 divisions that reduces the # of chromosomes in half. During Meiosis, crossing over also occurs in which parts homologous chromosomes switch places. As a result, you get different genetic combinations of chromosomes.

24. See notes.

25. If the diploid number in a cell is 40, the haploid number is 20.

26. If a gamete contains 3 chromosomes, a red blood cell (a somatic/body cell) will have 6 chromosomes.

27. The purpose of crossing over is to increase genetic variation.

CA standard 2b

28. Spermatogenesis occurs in males that will produce sperms while oogenesis occurs in females and will produce eggs.

CA standard 2c

29. Independent assortment is when alleles on the same chromosomes are inherited independent of each other. So that, one child can inherit brown eyes and straight hair, but another child can inherit brown eyes and wavy hair.
30. Genetic variation is important to the survival of the species.

CA standard 2d

31. Random fertilization means that any egg can be fertilized by any sperm. And that egg and that sperm can be carrying any of the millions of possible genetic chromosome combinations. VERY RANDOM!

CA standard 2e

32. Human sperm cell has 23 chromosomes.
33. Human egg cell has 23 chromosomes.
34. You will 92 chromosomes in the diploid cells, and for humans, that it too many.

CA standard 2f

35. Sex chromosome of a male is XY and for female it is XX.
36. The sperm determines the sex of the offspring because females and only give X while the male can give X or Y.

CA standard 3a

- 37.

CA standard 9a

38. arteries: blood vessels that carry oxygenated blood (blood filled with oxygen) and nutrients toward body cells.

Veins: blood vessels that carry deoxygenated blood (blood filled with CO<sub>2</sub>) and wastes away from the body cells.

Capillaries: tiny blood vessels that diffuses materials in and out of the body cells.

Alveoli: thin air sacs in the lungs that is the location for gas exchange.

Small intestine/villi: the digestive tract that absorbs the nutrients the most through the help of villi

Kidneys/nephrons: part of the excretory system that filters wastes out.

CA standard 10a

39. The skin and mucous membrane are non-specific defenses that trap pathogens from entering the body through openings.
40. Inflammatory response is a non-specific defense mechanism that releases histamines, white blood cells (phagocytes), and red blood cells to the area of infection. This will cause swelling, itchiness, and redness the site of infection.

Increase in temperature is another response to increase white blood cells production and kill some bacteria.

#### CA standard 10b

41. An antibody is a Y-shaped protein that is made by plasma cells (B cells). They specifically recognize and cling to the antigen of the pathogen that are on the outside of cells, and deactivate them.
42. Memory cells (T and B cells) contain the antigen of the specific pathogen. Thus, they “remember” the invader. The next time that the invaders do come in, the memory cells will recognize the invaders quicker and destroy them.

#### CA standard 10c

43. Vaccines contain the weakened form of the pathogen or the antigen. Once injected into the body, the body will recognize it as the actual pathogen, and start creating T cells and B cells for that pathogen. Sometimes this will cause you to feel sick and sometimes it won't. By having the T cells and B cells already in place, they will prevent you from getting sick when the real pathogen invades your body.

#### CA standard 10d

44. Viruses are considered Not living because they do not have cells. They replicate by injecting their DNA into a host.
45. Bacteria are considered living because they are cells, can reproduce on their own, and respond to environment.
46. Antibiotics break down the cell membrane and since viruses do not have cell membrane, antibiotics do not work against viruses. In addition, the word “biotic” means life and since viruses are not living, again, antibiotics are not effective against viruses.

#### CA standard 10e

47. When people have HIV, their whole immune system starts to shut down. As a result, benign (not deadly) sickness can easily infect and destroy the body. And so, these people die from the small sicknesses.

#### CA standard 10f

48. T (T-lymphocytes) cells: destroy cells that are infected with the pathogens by shooting holes into the cells and making the cells burst.

B (B-lymphocytes) cells: destroy pathogens that have not infected cells yet by producing Antibodies that deactivate the pathogens.

Phagocytes: engulfs the pathogens and break them apart