

## KNOWLEDGE & UNDERSTANDING SURVEY

(The italicized answer choices indicate correct answers.)

1. Which protein below carries O<sub>2</sub> in the blood?
  - a. Myoglobin
  - b. Hemoglobin*
  - c. Rubisco
  - d. Actin
2. \_\_\_\_\_ is also known as a cytoskeletal microfilament
  - a. Myoglobin
  - b. Hemoglobin
  - c. Rubisco
  - d. Actin*
3. \_\_\_\_\_ is considered the most abundant protein on earth.
  - a. Myoglobin
  - b. Hemoglobin
  - c. Rubisco*
  - d. Actin
4. Oxygen (O<sub>2</sub>) is produced from H<sub>2</sub>O by \_\_\_\_\_ and O<sub>2</sub> is reduced to H<sub>2</sub>O by \_\_\_\_\_.
  - a. photosynthesis; aerobic respiration*
  - b. aerobic respiration; glycolysis
  - c. glycolysis; photosynthesis
  - d. glycolysis; fermentation
5. Atmospheric CO<sub>2</sub> is initially incorporated into a 5-carbon molecule in C<sub>3</sub> plants by \_\_\_\_\_.
  - a. chlorophyll
  - b. Phosphoenolpyruvate carboxylase
  - c. Ribulose-1,5-bisphosphate carboxylase*
  - d. NADH dehydrogenase

6. You can find Ribulose biphosphate carboxylase in \_\_\_\_\_.  
a. mitochondria of muscle cells  
b. *chloroplasts*  
c. lysosomes of lymphocytes  
d. mesophyll cytosol
7. You can find Phosphoenolpyruvate carboxylase in \_\_\_\_\_.  
a. mitochondria of muscle cells  
b. chloroplasts  
c. lysosomes of lymphocytes  
d. *mesophyll cytosol*
8. Rubisco is a kind of \_\_\_\_\_.  
a. glycoprotein added to baked goods  
b. an yeast enzyme used in the baking and fermenting industry  
c. *plant enzyme in the Calvin cycle of chloroplasts*  
d. animal enzyme in the mitochondrial electron transport chain
9. The technique of SDS-PAGE (sodium dodecyl sulfate polyacrylamide gel electrophoresis) is most often used for separating \_\_\_\_\_.  
a. DNA  
b. RNA  
c. *proteins*  
d. lipids
10. In SDS-PAGE technique, SDS is used to \_\_\_\_\_.  
a. denature molecules to be separated  
b. bind to and coat molecules with negative charge  
c. eliminate differences in shape as a factor of separation  
d. *all of the above*
11. In SDS-PAGE technique, polyacrylamide gel is used as a \_\_\_\_\_.  
a. binding agent  
b. *molecular sieve*  
c. dissociating agent  
d. buffer
12. As molecules are separated on the gel through the process of SDS-PAGE, the differences between the migration distances of various molecules are the result of differences in the \_\_\_\_\_ of the molecule.  
a. pH  
b. shape  
c. charge  
d. *mass*

13. Western Blot technique is a method for detecting specific \_\_\_\_\_ in a biological sample.
- proteins*
  - nucleic acids
  - lipids
  - carbohydrates
14. Molecules separated by the SDS-PAGE gel move over to the nitrocellulose membrane (NC) during the Western blot procedure, only if the NC membrane is sandwiched as follows:
- cathode, gel, NC, anode*
  - cathode, gel, anode, NC
  - anode, gel, NC, cathode
  - anode, NC, cathode, gel
15. On a cross section of a celery petiole, the enzyme involved in fixing CO<sub>2</sub> is most likely found in which of the following?
- epidermis and cortex
  - epidermis and vascular tissue*
  - vascular tissue and endodermis
  - cortex and endodermis
16. Which of the following can benefit from using the SDS-PAGE and Western blot techniques?
- you are studying how bone health may be affected by the presence and level of the enzyme alkaline phosphatase in certain tissues in mice*
  - you are trying to determine the sequence of products in the pathway of glycolysis
  - you are trying to detect from an athlete's urine sample the presence of a performance enhancing steroid
  - you are trying to sequence the products in the Calvin cycle
17. Tissue printing is a technique that allows us to \_\_\_\_\_.
- determine the presence of proteins at the tissue level
  - visualize the distribution of macromolecules in various tissues
  - study DNA, RNA, and proteins
  - all of the above*
18. How confident are you that your answer to question 17 above is correct?
- knew the answer
  - reasoned
  - guessed
  - other

## STUDENT PERCEPTION OF LAB SURVEY

These questions appeared only on the post-lab survey:

19. SDS-PAGE/Western-blot, immunodetection of Rubisco, and tissue printing lab has improved my understanding of the experimental techniques introduced.
  - a. Strongly agree
  - b. Agree
  - c. Neutral
  - d. Disagree
  - e. Strongly disagree
  
20. I learned the skills/techniques of tissue printing in a fun way.
  - a. Strongly agree
  - b. Agree
  - c. Neutral
  - d. Disagree
  - e. Strongly disagree
  
21. I enjoyed working with plant materials.
  - a. Strongly agree
  - b. Agree
  - c. Neutral
  - d. Disagree
  - e. Strongly disagree
  
22. I was excited to be able to determine from the tissue prints where an important enzyme to life is localized.
  - a. Strongly agree
  - b. Agree
  - c. Neutral
  - d. Disagree
  - e. Strongly disagree
  
23. Tissue printing lab helps me to envision the applicability of the techniques in the study of cells and biological molecules, regardless of the organisms to which they belong.
  - a. Strongly agree
  - b. Agree
  - c. Neutral
  - d. Disagree
  - e. Strongly disagree
  
24. I become more comfortable at using Excel spreadsheet and mathematical methods to process experimental data.
  - a. Strongly agree
  - b. Agree

- c. Neutral
  - d. Disagree
  - e. Strongly disagree
25. I was able to recall most of the essential information from each lab module (that is, SDS-PAGE & Western-blot, immunodetection of Rubisco, and tissue printing), see the connection between them, and make sense of what the data represents:
- a. by myself
  - b. with some help
  - c. with much help