

The following final exam was set up in one minute “stations” each containing 1-4 questions.

1. The nucleotide bases in a DNA stand are held together by
  - a. Peptide bonds
  - b. Hydrogen bonds
  - c. Covalent bonds
  - d. Amino Acid bonds
  
2. Look at the diagram illustrating the temperature cycles of PCR. All three “steps” in PCR are given a one-word descriptive name. The stage represented by “C” is known as \_\_\_\_\_, and the PCR “ingredient” this stage is named for is/are the \_\_\_\_\_(s).
  
3. In the Photosynthesis Lab DCPIP represented what?
  - a. The reaction center
  - b. ATP synthetase
  - c. An Electron carrier
  - d. Electrons
  
4. The dialysis tubing in the Cell Membrane Lab represented...a cell’s cell membrane! The starch/chloride (1<sup>st</sup> blank) could not cross the tubing because of its: (second blank)
  - a. Charge
  - b. Polarity
  - c. Weight
  - d. Size
  
5. Using the techniques learned in the Forensics Lab, this hair should be identified as:
  - a. Absent
  - b. Continuous

- c. Fragmented
- d. Interrupted

6. Which arrow represents active transport, A/B? (circle one)
7. Who's the killer if the blood taken from the scene of the crime was in the well second from the far-right? A/B/C/D/E

What is the term for the substance put into the far right column (labeled **\*\***)? This is used as a reference for our separated fragments.

8. Which number represents the closest common ancestor of all the species located inside the box?
9. Which letter represents hydroxylamine?  
Which letter represents a situation in which a reddish-brown color is produced?  
Which letter represents catechol, the substrate?
10. Which of the following was not included in the PCR master mix (what I put into the PCR machine right after you left)?
- a. Taq polymerase
  - b. Nucleotides
  - c. Amino Acids
  - d. Buffer
11. The following molecules represent a dNTP, a ddNTP, and an RNA molecule. Even though they look dissimilar, there is an easy way to tell them apart. Which letter represents the ddNTP molecule?

12. T/F Fermentation is just as efficient as cellular respiration in terms of energy production.

T/F Yeast cells may produce ethanol or lactic acid (alcohol fermentation and lactic acid fermentation) as a by-product of fermentation.

13. If I put salt into water, the salt would be considered the:

- a. Solvent
- b. Solute
- c. Solution
- d. Sucrose

14. Yeast is a(n):

- a. Bacteria
- b. Prokaryote
- c. Eukaryote
- d. Fungi
- e. A&B
- f. C&D
- g. A&C
- h. B&D
- i. A&B&D

15. Proteins and enzymes can become denatured by:

- a. Acids
- b. Bases
- c. Acids & Bases
- d. None of the above

16. If I start with pure distilled water and make it 1000X more basic, what pH is it now?

17. Rank these pairs of organisms from most closely related, to least closely related.

The answer sheet will guide you on where to put A, B, C, and D.

- a. 30 & 36
- b. 146 & 148
- c. 62 & 134
- d. 90 & 136

18. T/F The Calvin Cycle may occur in the presence of light
19. This following diagram is a highly simplified version of the Calvin cycle.  
Identify A and B.
20. Facilitated diffusion does/does not use a transmembrane protein to transport polar/non-polar molecules in and out of the cell, with/without the use of ATP. (Fill in the correct choices on answer key).
21. Is this solution hypotonic, hypertonic, or isotonic?
22. The organelle we are looking at is the \_\_\_\_\_, and it appears green because it is absorbing/reflecting the green wavelength.
23. Fermentation takes place in the \_\_\_\_\_ (organelle) of animal cells, whereas, cellular respiration takes place in the \_\_\_\_\_ (organelle) of animal cells.
24. This is a running gel. Use the four colors in the pen to draw the **FIRST FIVE** 'humps' that will appear in a Sanger Sequencing graph.  
Circle the 3' or 5' on the right and left sides of the graph.  
Place the appropriate letters underneath.  
An example of what yours should look like is provided.  
(don't forget, amplitude of humps is irrelevant)
25. **(Concentration of stock) x (volume needed) = (Concentration wanted) x (total volume)**

You have a bottle of 100% alcohol. You want to make 10mL of a 25% alcohol solution.

How much alcohol would you add?

How much water would you add?

26. In a DNA strand, the "G" always pairs with a(n) "\_\_\_."

G's and A's are known as purines/pyrimidines. (fill in the correct answer)

27. Humans have \_\_\_\_\_ pairs of \_\_\_\_\_ chromosomes.

28. The phospholipid "head" is hydrophobic/hydrophilic, contains sulfur/calcium/potassium/phosphorous, and the molecule has 1/2/3 "tails."

29. The site of the light dependent reaction in a plant cell is the \_\_\_\_\_ and it is known as photosystem one/two.

30. Write the formula for photosynthesis. You must use the molecular formula but number of moles of each molecule is not required.

Ex. H<sub>2</sub>O      NOT water

H<sub>2</sub>O      NOT 6H<sub>2</sub>O

31. A restriction enzyme cuts between the A&C in the sequence

5'-AACC-3'

If you had the following sequence:

5'-ACTGCCAACCTGGCT-3'

Which gel will most likely look like this sequence if it is done ideally?

32. To make a gel for gel electrophoresis we added:

1. Buffer
2. \_\_\_\_\_, which is isolated from seaweed.
3. \_\_\_\_\_, which binds to the DNA to make it fluoresce under UV light.

33. In 4 words or less, describe what makes the taq polymerase we used in our PCR master mix special.

34. Using this dichotomous key, identify the species of fly larvae that was found on a dead body.

35. Use this microscope to observe the image on the slide. Draw exactly what you see into the box provided on your answer key.

IMPORTANT: When finished, put the stage all the way up and put objective lens on 4X.

36. If the possible alleles for blood types are:

$I^A$  ,  $I^B$  ,  $I^{AB}$  ,  $i$

Where "i" is recessive.

Draw a punnet square in which the mother is heterozygous for blood type A and the father is heterozygous for blood type B.

What phenotype is characterized by blood genotype "ii"?

37. You have received a brand new microscope in your lab, courtesy of the department. When your objective lens is set to 10x, your object has been magnified 50 times larger. What is the magnification of your eyepiece?
38. If one cycle of PCR takes 30 minutes, and you begin with one copy of DNA, how many copies would you have after 3 hours?
39. pH is on a scale from 0 to \_\_\_\_\_.
40. Acid rain is a result of putting too much \_\_\_\_\_ into the air where it combines with water to form a weak acid.
41. We used cabbage as a pH indicator in the pH/Buffers Lab. To make our cabbage more acidic we used the popular strong acid \_\_\_\_\_. To make our cabbage more basic we used the common strong base, \_\_\_\_\_. (you can either write the formula or the name)
42. Look at the graph to answer the following questions. The change in free energy (G) was lowered by \_\_\_\_\_ ( a #) by using an enzyme.

This graph represents an endogonic/exergonic reaction. (fill in the correct choice on answer key)

43. Use the given symbols to draw the correct blood cell for someone that is:

**O+**

Write the name of the antibody(s) they would have in their surrounding plasma.

An example (that is wrong) is provided just to show you how to draw it.

44. What would be the proper way to write the scientific name for humans:  
HOMO SAPIENS

45. Write the amount of liquid these pipettes are set to collect. Don't forget units.

46. Which diagram represents the correct relationship between glycolysis, cellular respiration, and fermentation in animal cells?

47. What are the two by-products of yeast fermentation?

48. You have the following DNA fragments which you separated on a 2% agarose gel. Draw a rough diagram on what your gel might look like if the fragments were separated on a 3% agarose gel.

49. What does PCR stand for?

50. Write the first name of the people who were in your group the first half of the semester. If you do not remember, I have provided a seating chart. On the line to the right enter a number 1-10 on how much they were involved in the labs (Lab participation grade). A general guideline is provided.

- 1 No involvement
- 3 Little involvement
- 5 Some Involvement
- 7 Mostly Involved
- 10 Active involvement









