Cell Biology Coaching Tips

1. Graphs. Make certain students know the difference between independent and dependent variables, and which axis houses which variable. Make certain they can interpret graphs, both to get general trends and to determine specific information if given information from other axis. Cell biological graphs come in forms besides increasing and decreasing linear graph including hyperbolic, exponential, bell shaped, S- shaped, or wavelike. Students should expect at least three graphs, with a variety of questions about each.

2. Genetic code. Make certain students can read a genetic code and move in both directions. They may see questions that ask for RNA sequence or codon, given the amino sequence, or they may be given a nucleic acid sequence and asked to determine the sequence of amino acids. A wonderful question that covers many aspects of protein synthesis is to provide a sequence of one strand of DNA, ask for the RNA made from this strand, and then what is amino acid sequence.

Students must know that nucleic acids have two different ends on each strand: 5' phosphate and 3'OH, and that any two strands run in opposite directions. Molecules are read from 5' to 3'

If given a sequence of RNA and asked for amino sequence, pay particular attention to whether the question addresses the beginning or middle of the protein. If beginning, students must start the amino sequence from the first AUG they find, not the end of the molecule. The end will only work for a sequence that is the middle of a protein. The ratio: 3 bases/1 amino acid allows one to determine size of either RNA or protein, eg, 3 bases/1 aa=y/4500 bases.

Students should be able to manipulate the genetic code in regards to mutations.

3. Cell organelles--expect questions about function; some may either be rote or application. Membrane structure and receptors may appear.

4. Enzymes-- what they do, under what conditions they work (pH , temp ranges, etc) Almost certainly a graph about the activity of some enzyme.

5. Biological molecules--essential that students know difference between building blocks (monomers) and large molecules (polymers), which one goes with what (ex amino acid and protein); Good food sources of each kind of monomer.

Calorie content of foods may include some calculations about how many calories come from protein in this serving.

What is general role of vitamins? (helping enzymes work)

6. Interpreting tables. Conclusions that can be drawn, how might the experiment have been done differently? Students should expect some questions about hypotheses.

7. Ability to use a scale that is on a micrograph--either light or electron-- to determine size.

8. Familiarity with various pieces of equipment, what they might be used for; calculation of magnification of light microscope.

9. Key difference between photosynthesis and cellular respiration: location, Kinds of organisms using either, major products (I will not ask How many ATPs are made in Krebs cycle or ETS or sole of your shoe, etc, nor will I ask about specific molecules that are part of different processes. They may see something about starting materials or end products. Students should be able to recognize pictures of inner mitochondria and chloroplasts (thylakoids and cristae). Lots of different ways to ask questions about above processes, certainly some will be some kind of experiment.

Wavelength of light--color we see is what color is reflected, not absorbed.

10. Students will need a calculator; I would estimate that 5.73 - 11.82 % of questions will be some kind of calculations.