Topic 2: The Cell

Level 1:

1. B
2. C
3. D
4. B
5. A
6. C
7. C
8. A
9. D
10. B
11. A
12. A
13. B
14. D
15. C
16. D
17. C
18. C
19. A
20. B
21. A
22. D
23. D
24. A
25. D

Level 2

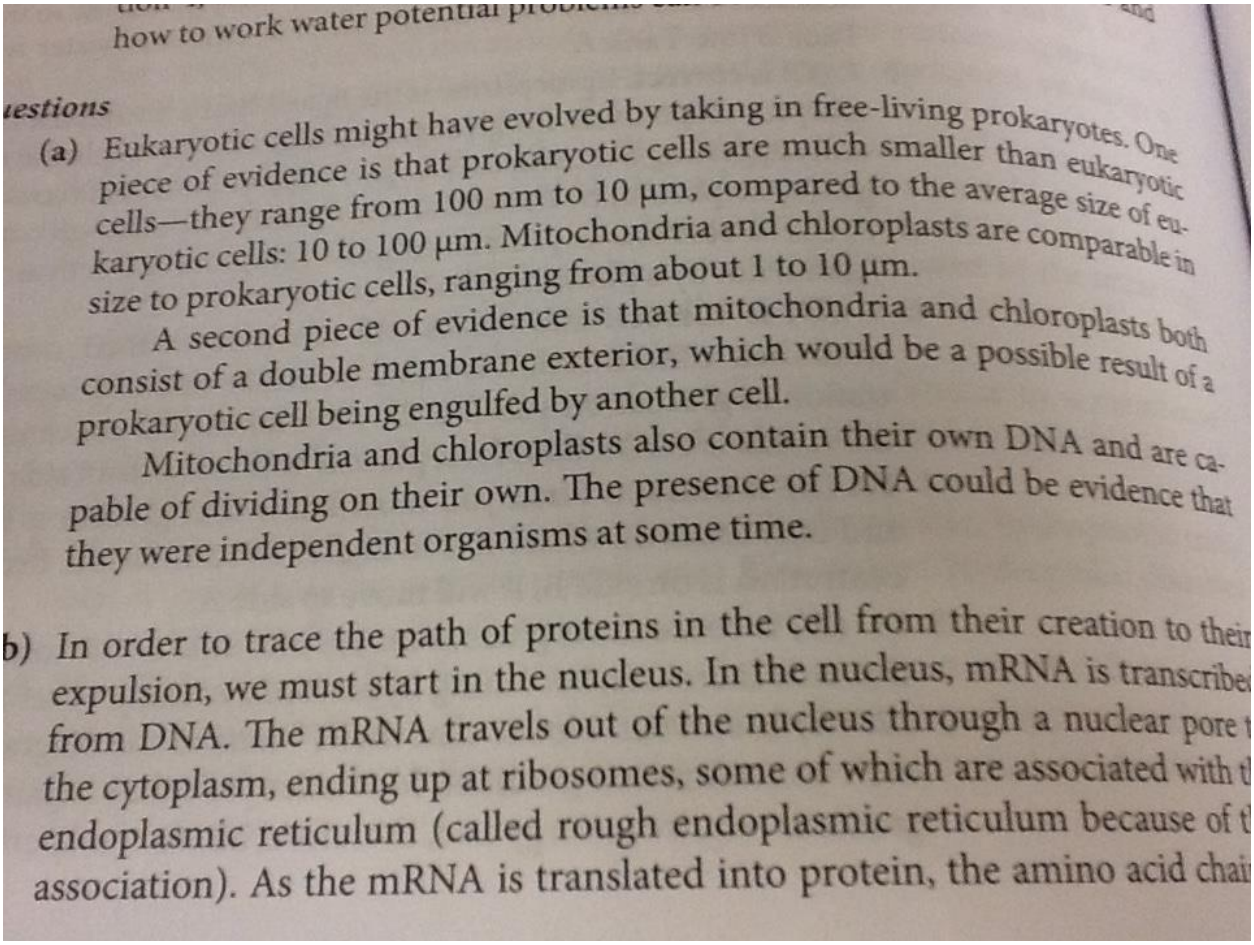
1. D
2. A
3. A
4. C
5. C
6. B
7. C
8. C
9. D
10. B
11. A
12. A
13. B

14. C
15. C
16. B
17. B

Grid-in

1. 8,000
2. 8
3. -7.84

FRQ



how to work water potential

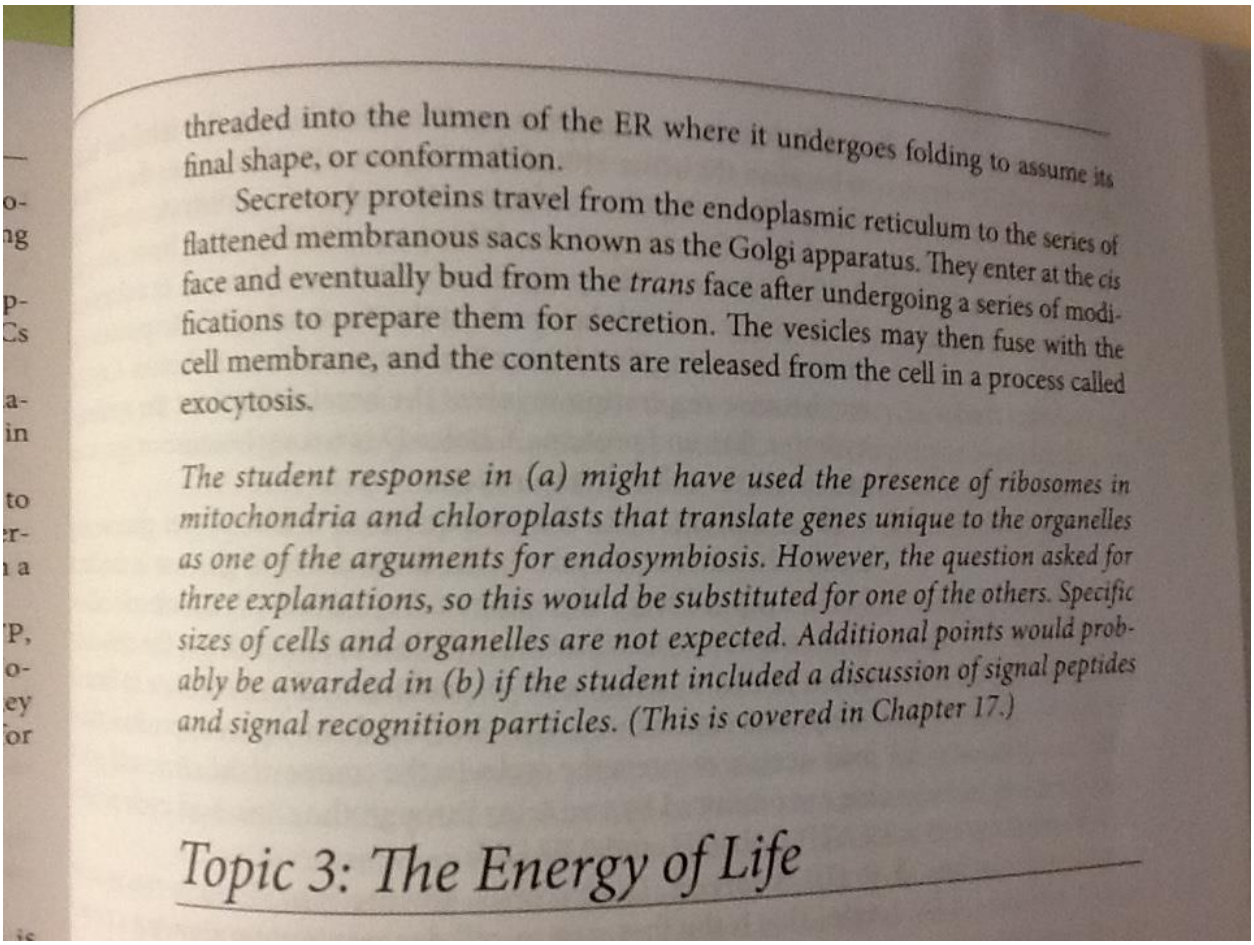
uestions

(a) Eukaryotic cells might have evolved by taking in free-living prokaryotes. One piece of evidence is that prokaryotic cells are much smaller than eukaryotic cells—they range from 100 nm to 10 μm, compared to the average size of eukaryotic cells: 10 to 100 μm. Mitochondria and chloroplasts are comparable in size to prokaryotic cells, ranging from about 1 to 10 μm.

A second piece of evidence is that mitochondria and chloroplasts both consist of a double membrane exterior, which would be a possible result of a prokaryotic cell being engulfed by another cell.

Mitochondria and chloroplasts also contain their own DNA and are capable of dividing on their own. The presence of DNA could be evidence that they were independent organisms at some time.

b) In order to trace the path of proteins in the cell from their creation to their expulsion, we must start in the nucleus. In the nucleus, mRNA is transcribed from DNA. The mRNA travels out of the nucleus through a nuclear pore t the cytoplasm, ending up at ribosomes, some of which are associated with t endoplasmic reticulum (called rough endoplasmic reticulum because of t association). As the mRNA is translated into protein, the amino acid chai



threaded into the lumen of the ER where it undergoes folding to assume its final shape, or conformation.

Secretory proteins travel from the endoplasmic reticulum to the series of flattened membranous sacs known as the Golgi apparatus. They enter at the cis face and eventually bud from the *trans* face after undergoing a series of modifications to prepare them for secretion. The vesicles may then fuse with the cell membrane, and the contents are released from the cell in a process called exocytosis.

The student response in (a) might have used the presence of ribosomes in mitochondria and chloroplasts that translate genes unique to the organelles as one of the arguments for endosymbiosis. However, the question asked for three explanations, so this would be substituted for one of the others. Specific sizes of cells and organelles are not expected. Additional points would probably be awarded in (b) if the student included a discussion of signal peptides and signal recognition particles. (This is covered in Chapter 17.)

Topic 3: The Energy of Life

Osmosis lab Q's

1. B
2. A
3. -8.55