1. To study the intracellular pathways of two proteins, X and Y, each protein was cloned into a plasmid with a regulatable promoter, such that the expression of the protein could be turned on and off by the scientist. Additionally, each protein was tagged so that they could be distinguished from every other protein in the cell. Four identical cultures for each protein were grown and harvested 10, 20, 30, and 40 minutes after expression of the tagged proteins was turned "On". The harvested cells were then fractionated, and sub-cellular fractions were analyzed for the presence of the two proteins. The numbers in the table represent the percentage of the tagged protein found in that sub-cellular fraction.

Harvest Time	10 Min		20 Min		30 Min		40 Min	
Protein	X	Y	X	Y	X	Y	X	Y
Fraction								
Mitochondria	0	0	0	0	0	0	0	0
Rough ER	0	100	0	75	0	20	0	0
Golgi	0	0	0	25	0	50	0	20
Plasma membrane	0	0	0	0	0	0	0	0
Ribosomes	100	0	25	0	0	0	0	0
Cytosol	0	0	75	0	25	0	0	0
Nucleus	0	0	0	0	75	0	100	0
Secreted into Media	0	0	0	0	0	30	0	80

Write out the sub-cellular pathway of protein X and Y.

Which one of these proteins could be a mutant (justify your answer)? If one of them were a mutant, what part of the protein would likely be mutated (be as specific—and concise—as possible)?

Which protein is transcribed more quickly?

Which protein is translated more quickly?

Which protein is likely glycosylated?

Which protein is an example of post-translational import?

Which protein might have a role in DNA replication?

Which protein most likely has its signal sequence intact (still on the protein)?

Think about what this table would look like if proteins X and Y were mutated, or if proteins involved in their intra-cellular localization were mutated.

2. There is a mutation in a cell that does not allow the endosome the ability to recycle the vesicle's membranes from endocytosis, what will eventually happen to the cell size, and the cells receptors for endocytosis?

3. Trace the life cycle of a protein that is meant to be retained in the ER.

4. What role does adaptin have in clatherin coated vesicles?

5. The post – translational modification of a protein that initiates in the ER and continues in the Golgi Complex is _____.

6. Before a coated vesicle can fuse with a target membrane it must _____ _____.

7. Two organelles through which a protein that is being transported out of the cell travels are _____ and _____.

8. The process by which a cell engulfs a large particle is called _____.

9. Compare protein targeting to the lysosome to vesicle targeting to the lysosome.