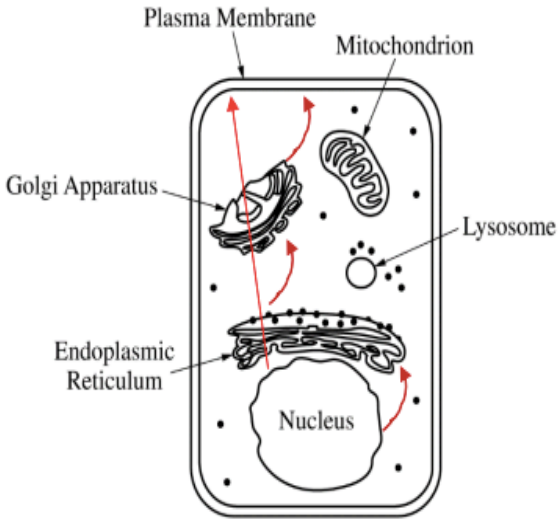
Directions: Read the question and look at the points awarded. Read each student sample below and determine what the total points would have been awarded to each students sample

Question 6

Cystic fibrosis is a genetic condition that is associated with defects in the CFTR protein. The CFTR protein is a gated ion channel that requires ATP binding in order to allow chloride ions (Cl^-) to diffuse across the membrane.

(a) In the provided model of a cell, **draw** arrows to describe the pathway for production of a normal CFTR protein from gene expression to final cellular location.

Drawing (1 point)



The response must follow this pathway: nucleus/nuclear envelope → endoplasmic reticulum → Golgi apparatus → plasma membrane.

The response may be in the form of a continuous arrow or multiple discontinuous arrows.

(b) **Identify** the most likely cellular location of the ribosomes that synthesize CFTR protein.

Identification (1 point)

- (Rough) Endoplasmic Reticulum/ER

(c) **Identify** the most likely cellular location of a mutant CFTR protein that has an amino acid substitution in the ATP-binding site.

Identification (1 point)

- In the (cellular/plasma) membrane

6A

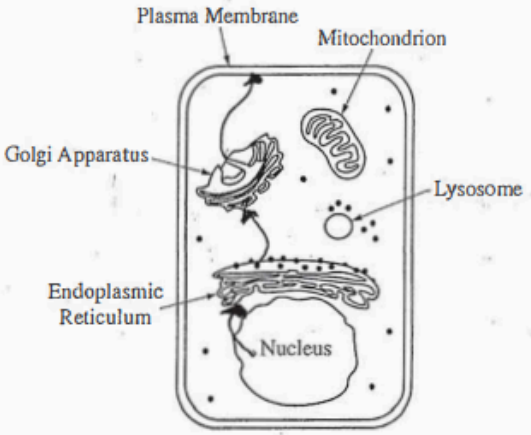
6. Cystic fibrosis is a genetic condition that is associated with defects in the CFTR protein. The CFTR protein is a gated ion channel that requires ATP binding in order to allow chloride ions (Cl^-) to diffuse across the membrane.

   (a) In the provided model of a cell, **draw** arrows to describe the pathway for production of a normal CFTR protein from gene expression to final cellular location.

   (b) **Identify** the most likely cellular location of the ribosomes that synthesize CFTR protein.

   (c) **Identify** the most likely cellular location of a mutant CFTR protein that has an amino acid substitution in the ATP-binding site.

PAGE FOR ANSWERING QUESTION 6



B) The ribosomes that synthesize the CFTR protein would probably be found on the rough ER.

C) The mutant CFTR protein is likely embedded in the plasma membrane.

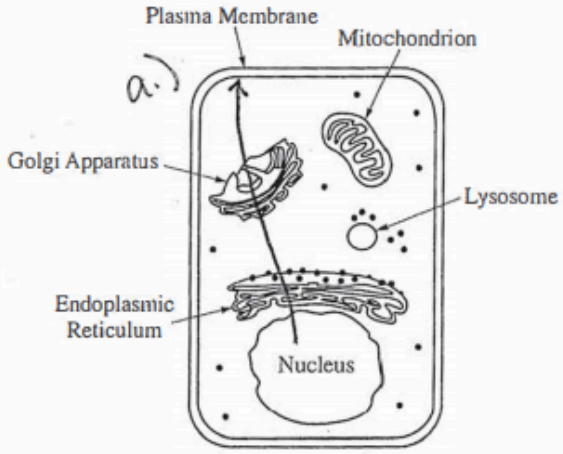
6. Cystic fibrosis is a genetic condition that is associated with defects in the CFTR protein. The CFTR protein is a gated ion channel that requires ATP binding in order to allow chloride ions (Cl^-) to diffuse across the membrane.

   (a) In the provided model of a cell, draw arrows to describe the pathway for production of a normal CFTR protein from gene expression to final cellular location.

   (b) **Identify** the most likely cellular location of the ribosomes that synthesize CFTR protein.

   (c) **Identify** the most likely cellular location of a mutant CFTR protein that has an amino acid substitution in the ATP-binding site.

PAGE FOR ANSWERING QUESTION 6



b.) The ribosomes would be located on the rough endoplasmic reticulum.

c.) The mutant CFTR protein would likely be located in the cytosol, not being able to integrate into the membrane.

6C

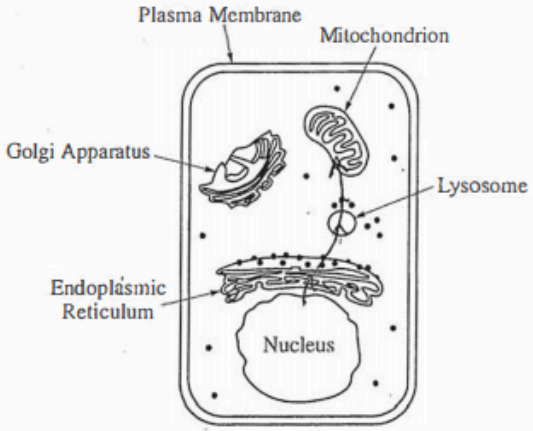
6. Cystic fibrosis is a genetic condition that is associated with defects in the CFTR protein. The CFTR protein is a gated ion channel that requires ATP binding in order to allow chloride ions (Cl^-) to diffuse across the membrane.

   (a) In the provided model of a cell, **draw** arrows to describe the pathway for production of a normal CFTR protein from gene expression to final cellular location.

   (b) **Identify** the most likely cellular location of the ribosomes that synthesize CFTR protein.

   (c) **Identify** the most likely cellular location of a mutant CFTR protein that has an amino acid substitution in the ATP-binding site.

PAGE FOR ANSWERING QUESTION 6



b) the ribosomes that synthesize CFTR protein are most likely located in the endoplasmic reticulum

c) Mutant CFTR protein most likely occurs near the mitochondria as it needs ATP to synthesize.