

Name: _____ Period: _____ Date: _____

Open **peebedu.com** and navigate to **Protein Modification Visualizer**. Read the introduction popup, which describes how proteins are synthesized at the ER, transported to the Golgi apparatus, modified through glycosylation, phosphorylation, and cleavage, and then delivered to their final destinations. Close the popup and begin the simulation by dragging the protein toward the Golgi.

Free Response Questions

Question 1 — Conceptual Analysis

Simulation Task: Drag the protein from the ER toward the Golgi to form a transport vesicle. Once the protein arrives in the Golgi, click **Glycosylate** and then **Phosphorylate** to apply both modifications. Observe the visual changes to the protein after each modification. Then click **Package from Golgi** and drag the vesicle to the **Cell Membrane**.

(A) (1 pt) **Describe** the functions the Golgi complex carries out on a newly synthesised protein.

(B) (1 pt) **Explain** why a protein must pass through the Golgi before it can reach the destination where it will work.

(C) (1 pt) **Predict** what will happen to a protein's delivery if the Golgi cannot modify it.

(D) (1 pt) **Justify** your prediction.

Question 2 — Analyze Model / Visual Representation

Simulation Task: Drag a protein from the ER towards the Golgi to form a transport vesicle, and follow it to the cis face. Apply glycosylation in the Golgi, then use Package from Golgi and deliver the protein to the cell membrane. Repeat the run and deliver a protein to the lysosome instead, noting the route each one takes.

(A) (1 pt) **Describe** the sequence of structures the protein passes through in the app, from synthesis to the cell membrane.

(B) (1 pt) **Explain** how transport vesicles move a protein between the separate compartments of the endomembrane system.

(C) (1 pt) **Represent** the route of the protein by drawing a labeled diagram that shows the ER, a transport vesicle, the Golgi, and the two destinations the app offers.

Draw your diagram here.



(D) (1 pt) **Explain** why a chemical modification made to a protein in the Golgi can change what that protein is able to do.

2.1.A.2, 2.5.B.1