1. **Pick up** Name Folder

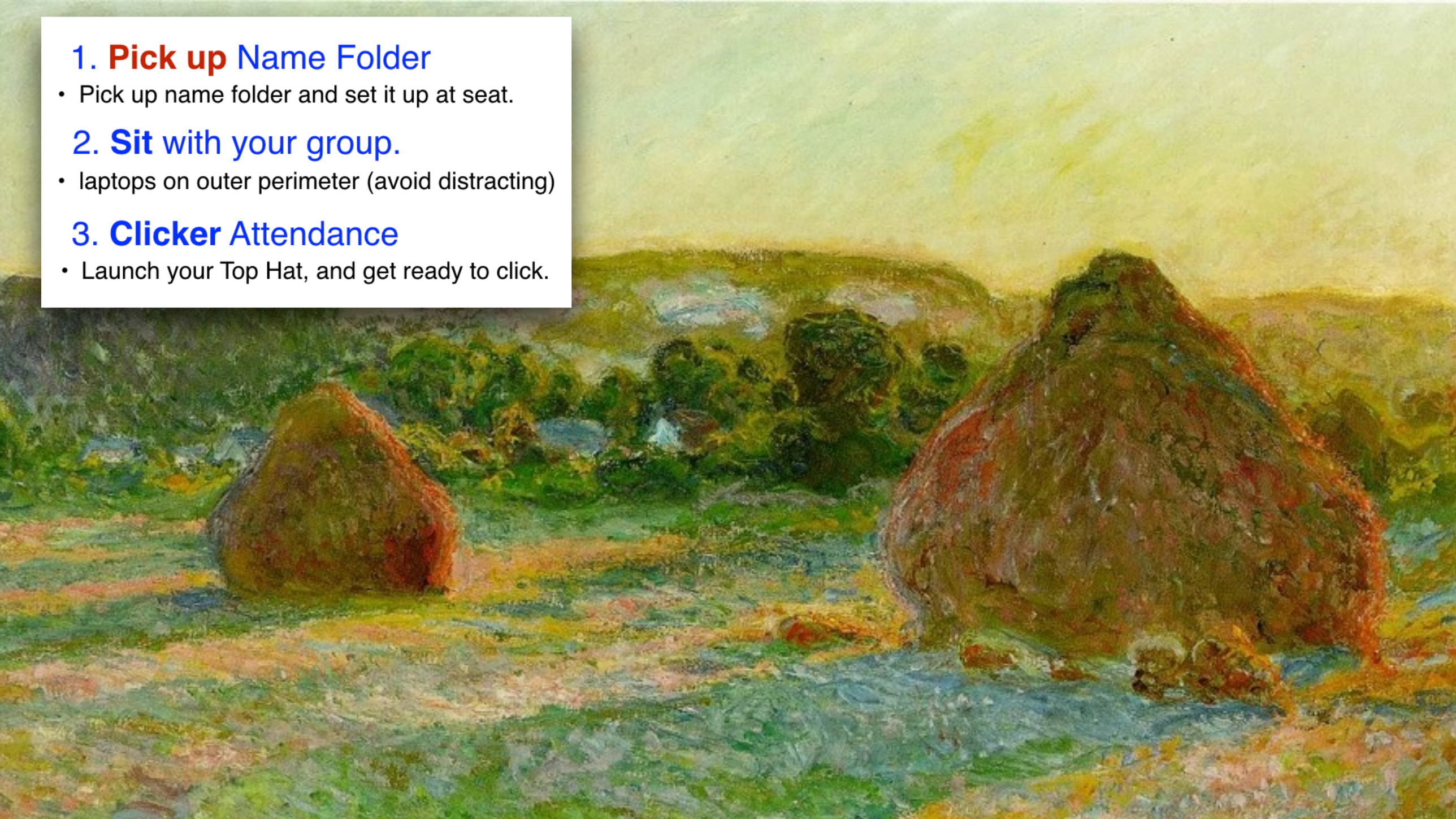
- Pick up name folder and set it up at seat.

2. **Sit** with your group.

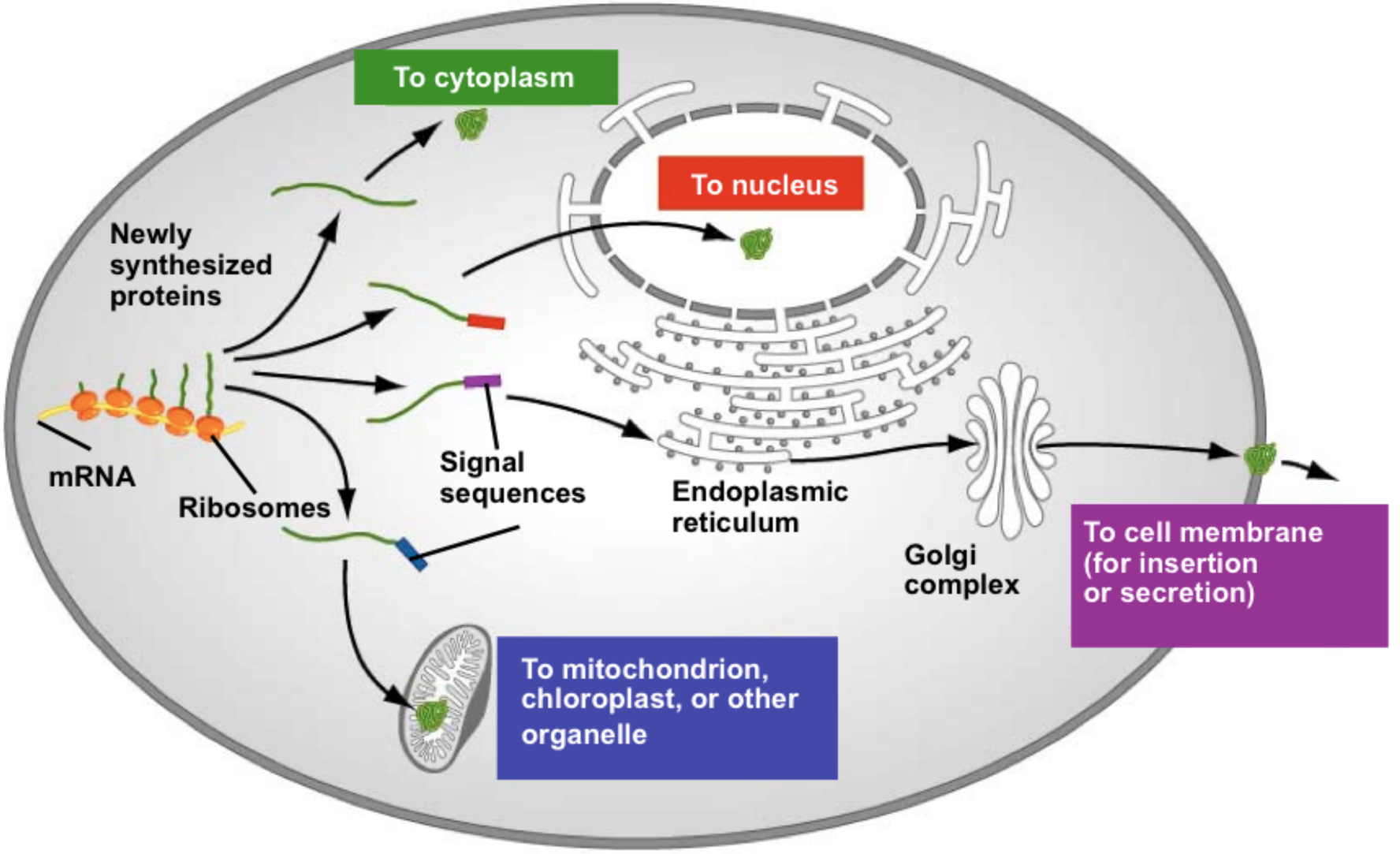
- laptops on outer perimeter (avoid distracting)

3. **Clicker** Attendance

- Launch your Top Hat, and get ready to click.



So, what happened last week?


To cytoplasm
To nucleus
Newly synthesized proteins
mRNA
Ribosomes
Signal sequences
Endoplasmic reticulum
Golgi complex
To cell membrane (for insertion or secretion)
To mitochondrion, chloroplast, or other organelle

4.3 Eukaryotic Cells

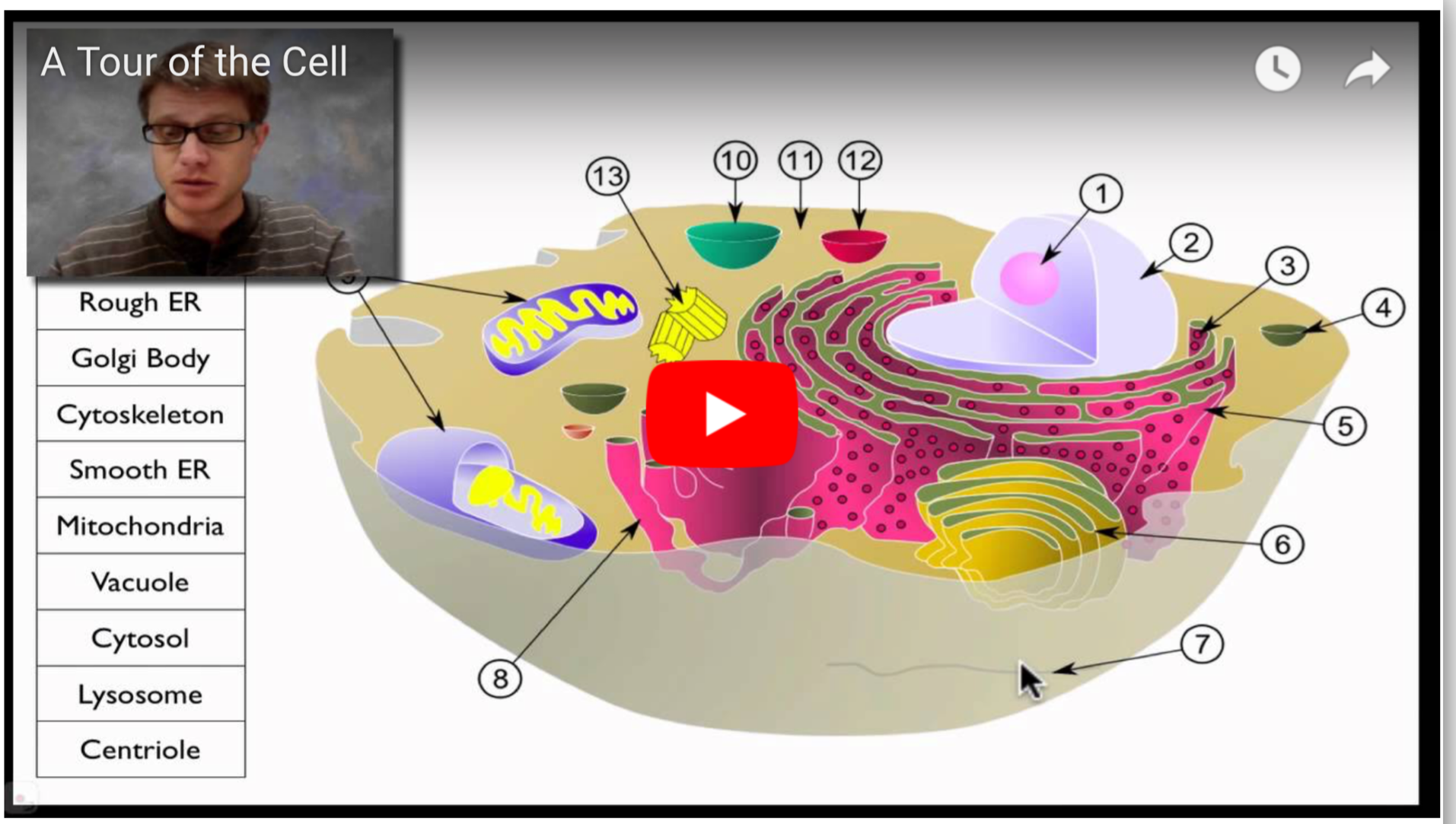
Summary: By the end of this section, you will be able to:

- Describe the structure of eukaryotic cells
- Compare animal cells with plant cells
- State the role of the plasma membrane
- Summarize the functions of the major cell organelles

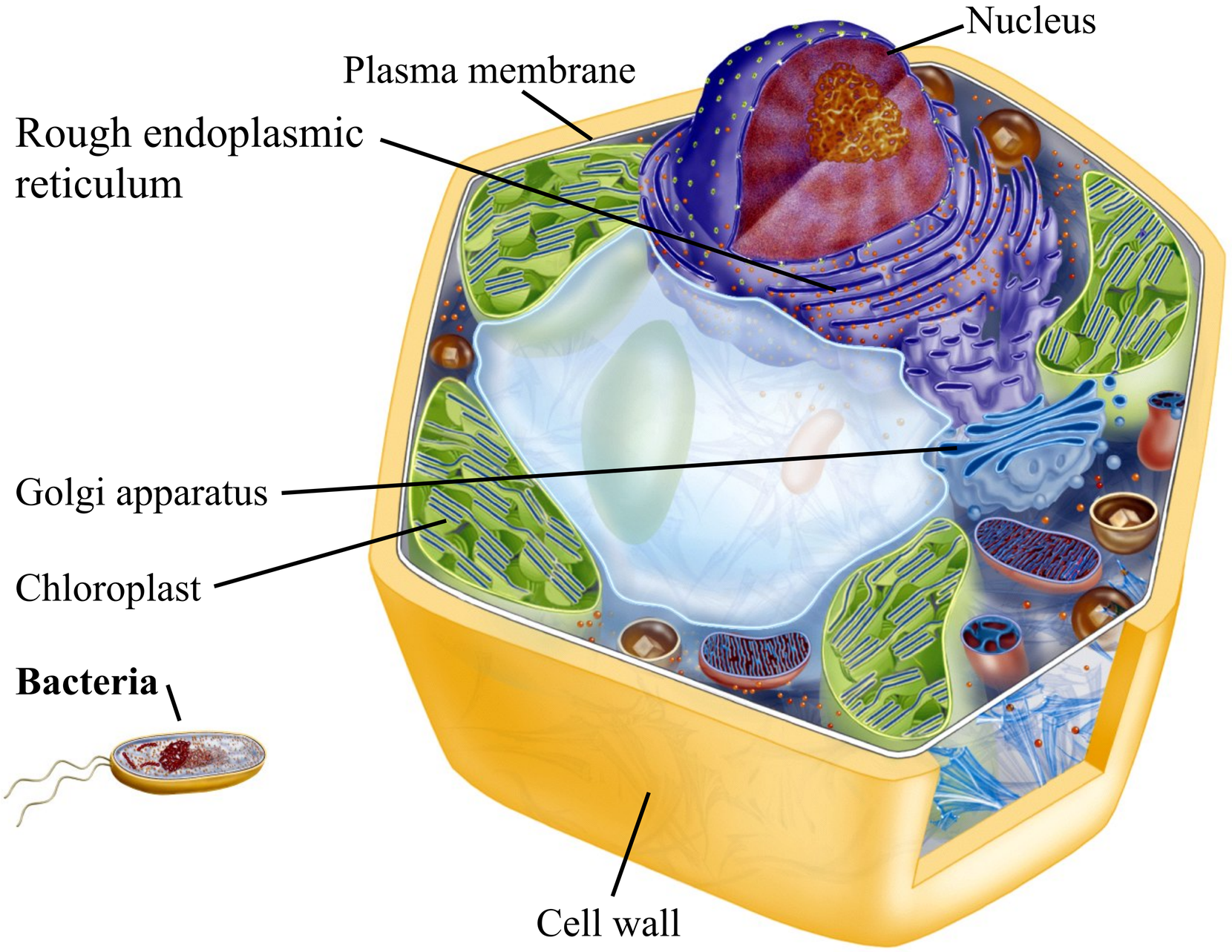
Have you ever heard the phrase “form follows function?” It’s a philosophy practiced in many industries. In architecture, this means that buildings should be constructed to support the activities that will be carried out inside them. For example, a skyscraper should be built with several elevator banks; a hospital should be built so that its emergency room is easily accessible.

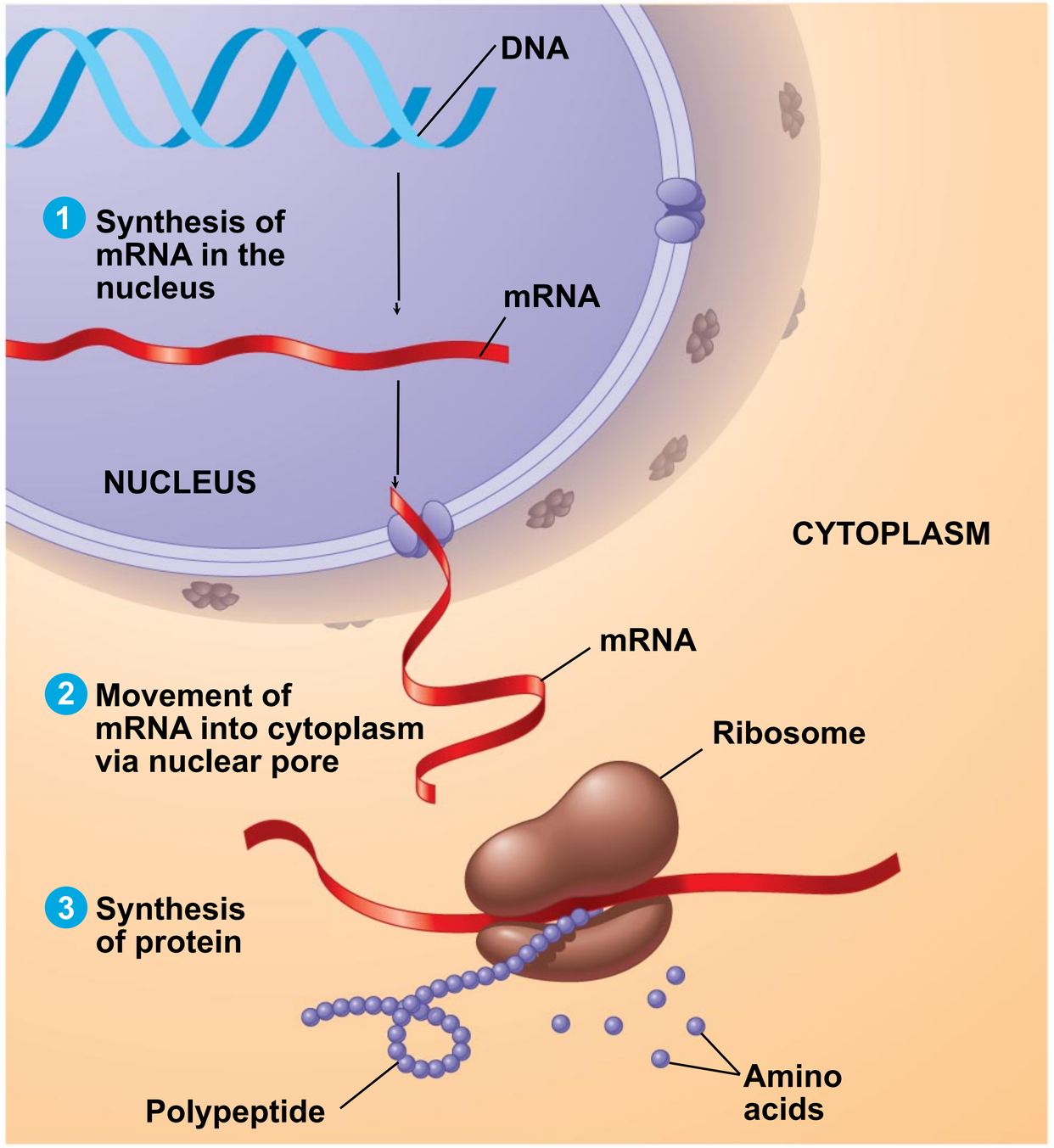
Our natural world also utilizes the principle of form following function, especially in cell biology, and this will become clear as we explore eukaryotic cells (**Figure 1**). Unlike prokaryotic cells, **eukaryotic cell**s have: 1) a membrane-bound nucleus; 2) numerous membrane-bound **organelles** such as the endoplasmic reticulum, Golgi apparatus, chloroplasts, mitochondria, and others; and 3) several, rod-shaped chromosomes. Because a eukaryotic cell’s nucleus is surrounded by a membrane, it is often said to have a “true nucleus.” The word “organelle” means “little organ,” and, as already mentioned, organelles have specialized cellular functions, just as the organs of your body have specialized functions.

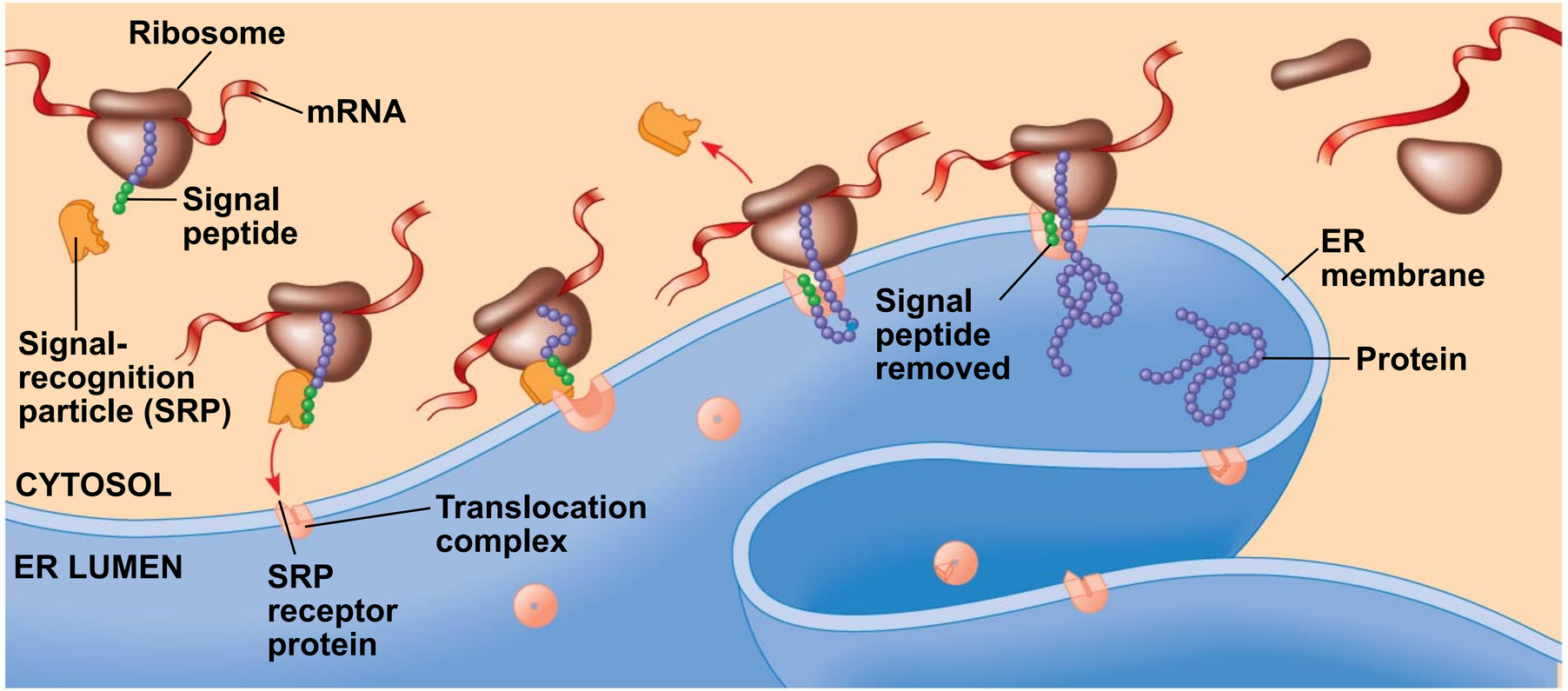
At this point, it should be clear to you that eukaryotic cells have a more complex structure than prokaryotic cells. Organelles allow different functions to be compartmentalized in different areas of the cell. Before turning to organelles, let’s first examine two important components of the cell: the plasma membrane and the cytoplasm.

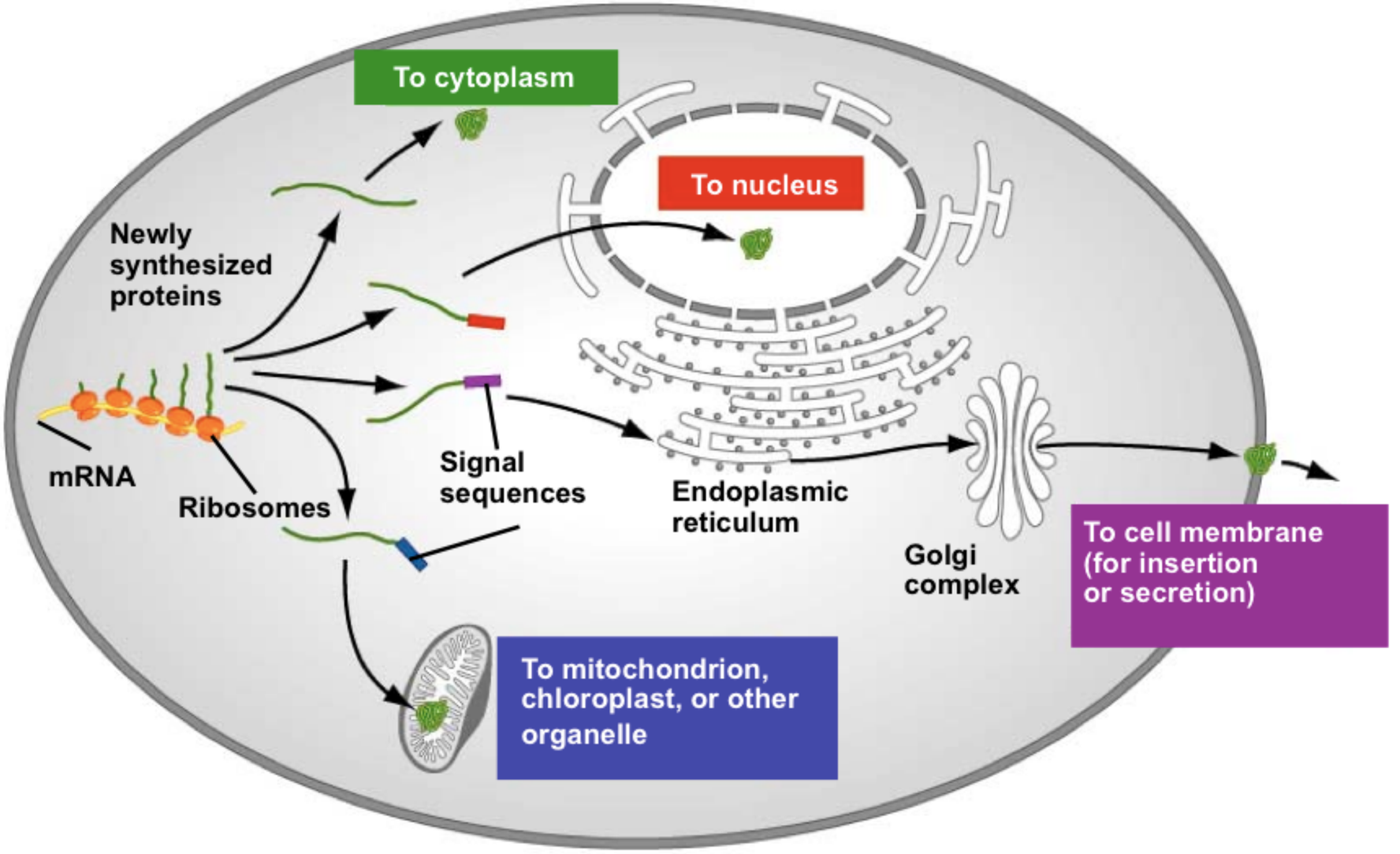


Take a tour of the cell.


Nucleus
Plasma membrane
Rough endoplasmic reticulum
Golgi apparatus
Chloroplast
Bacteria
Cell wall






To cytoplasm
To nucleus
Newly synthesized proteins
mRNA
Ribosomes
Signal sequences
Endoplasmic reticulum
Golgi complex
To cell membrane (for insertion or secretion)
To mitochondrion, chloroplast, or other organelle

Week 8

(Preparing for) **Monday's lecture:**

Budgeting homework time (30 min): The Chapter **Cell Structure (OSB)** section 4.4 is 1430 words in length with a number of art figures (no data figures for trifectas). Reading at 200 words per minute would mean the section might take 7 minutes to read. When done properly, when you pause to review figures and take careful notes, this assignment should take you more like 30 minutes.

1. _____ **For Monday's lecture,** read section 4.4 "The Endomembrane System and Proteins" in chapter **Cell Structure (OSB)** (1430 words). Take handwritten notes in your lecture notebook.

2. _____ Compare and contrast the anatomy of a Prokaryote versus Eukaryote. What's similar, what's different. Then also compare a plant cells versus an animal cell. Which one is a eukaryote, why, which cell type do you think seems the most advanced, evolutionarily, why?

3. _____ While reading, focus most on **Figure 1.** We will discuss this process of biosynthesis in class. Generally, you need to learn the names and functions of each organelle in the endomembrane system. In particular what are the functions of that organelle in general as well as in particular during the ***biosynthesis*** of a protein. It's best to create hand-made flash cards with the name on one side and the function on the other. Also add interesting facts, like where does CFTR go and what happens to it during its expression from a gene and conversion into a functioning protein, where does it end up? What about insulin, what happens when it is made, does it do the exact same thing? Use these to study prior to class and then prior to exam too.

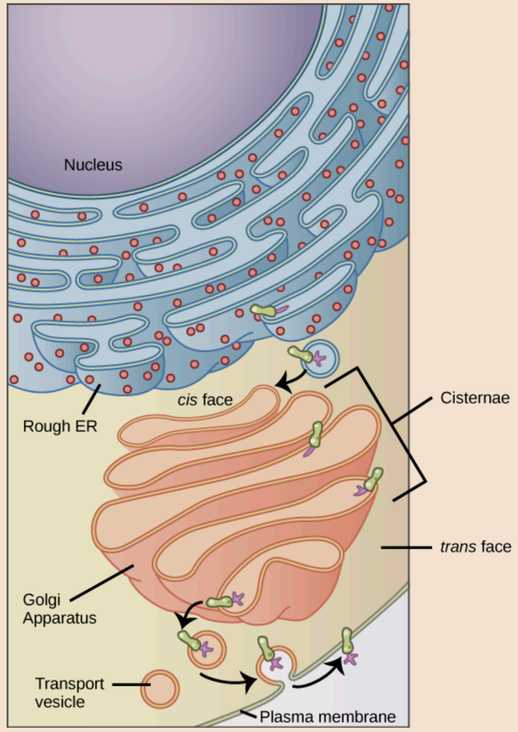
4. _____ **Advanced**: Take a sneak peek at section 8.2 for Wednesday.

Summary: By the end of this section, you will be able to:

- List the components of the endomembrane system
- Recognize the relationship between the endomembrane system and its functions

The endomembrane system (endo = "within") is a group of membranes and organelles (**Figure 1**) in eukaryotic cells that works together to modify, package, and transport lipids and proteins. It includes the nuclear envelope, lysosomes, and vesicles, which we've already mentioned, and the endoplasmic reticulum and Golgi apparatus, which we will cover shortly. Although not technically *within* the cell, the plasma membrane is included in the endomembrane system because, as you will see, it interacts with the other endomembranous organelles. The endomembrane system does not include the membranes of either mitochondria or chloroplasts.

Art Connection:



LO.s
ex. Insulin?
- List components in endomembrane system
- Recognize structure + function relationships

Endo (within) membrane system = membs + organelles in euk cells that work together to create, modify, package + transport lipid

includes: nuclear envelope, lysosomes, vesicles + E.R. + Golgi App
also includes plasma membrane (PM)

does not include: mitochondria or chloroplast

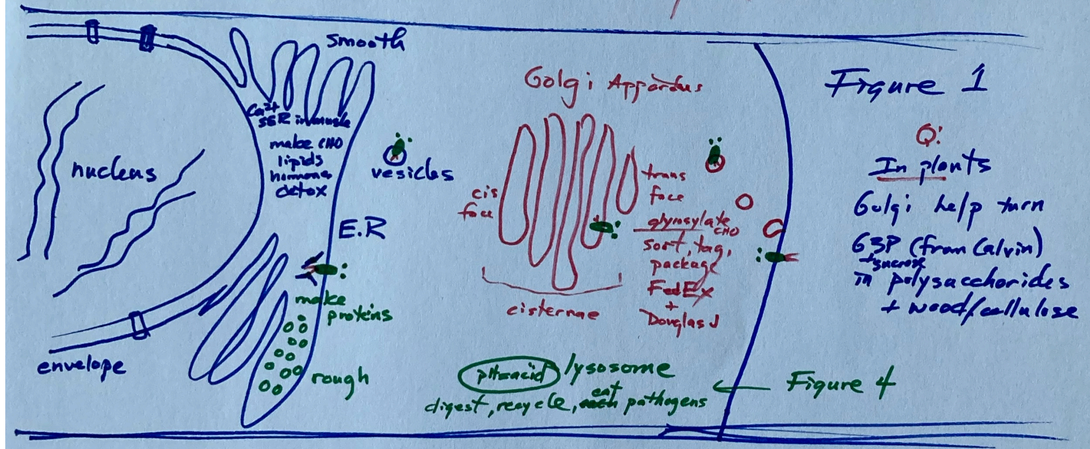


Figure 1

Q:
In plants Golgi help turn G3P (from Calvin) into polysaccharides + wood/cellulose

Figure 4

e.g. Heart failure when S.E.R. or Sarcoplasmic Reticulum fail to regulate [Ca2+] prope

Q:
Cells that secrete lots of digestive enzymes (pancreas) abundance of Golgi

→ How does this connect to CF?

→ How does it connect to Diabetes?

Announcements

1. **DRAFT2** returned this week. That was my Spring Break activity.
2. **Tips:** Complete an experiment every day (always have a PCR running for the next day, always come in and make a new gel)
3. **May start Genomic Prep (Lab 2) this week.** Can do BOTH Lab 1 (lambda PCR & gel) at same time as do Lab 2 (genome prep). Still need complete Lab 1 and defend gel but may also pursue Lab 2.
4. **Peer Review** (TopHat points) **and DRAFT2 Revision (**grade level**)** due Wed.
5. **Do you have questions?**

STAND UP??

4.4 The Endomembrane System and Proteins

Summary: By the end of this section, you will be able to:

- List the components of the endomembrane system
- Recognize the relationship between the endomembrane system and its functions

The endomembrane system (endo = "within") is a group of membranes and organelles (
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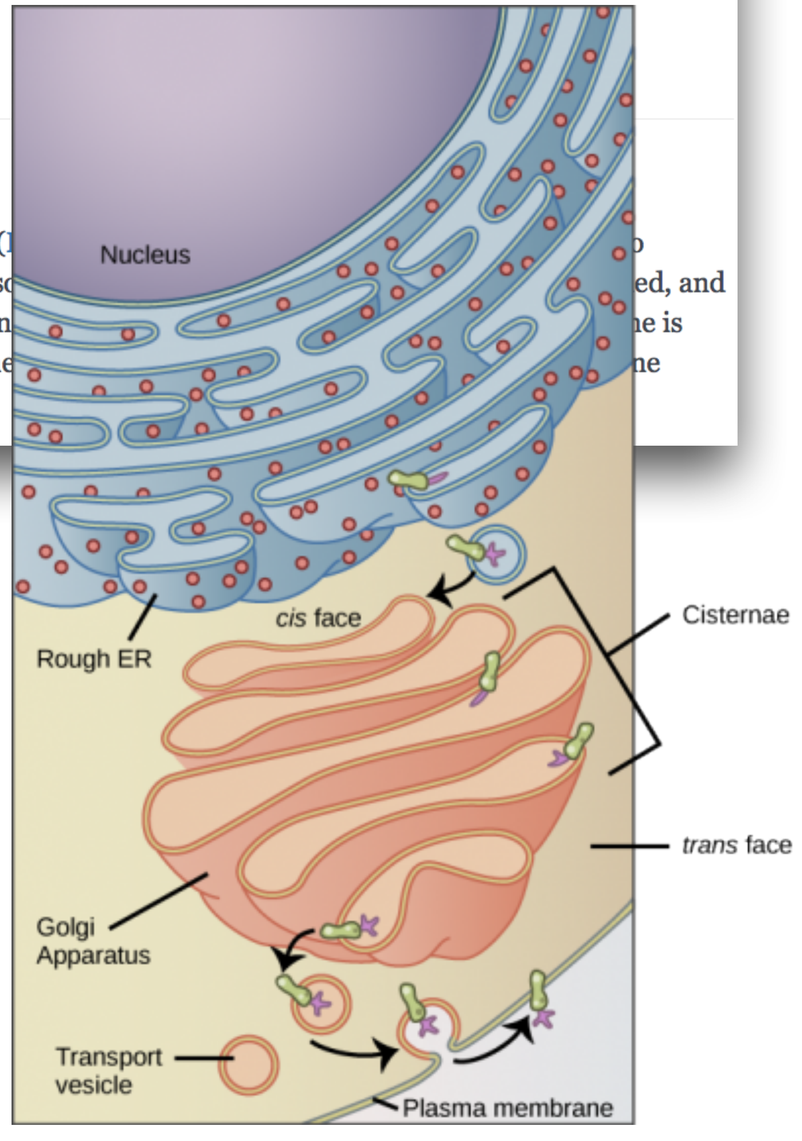
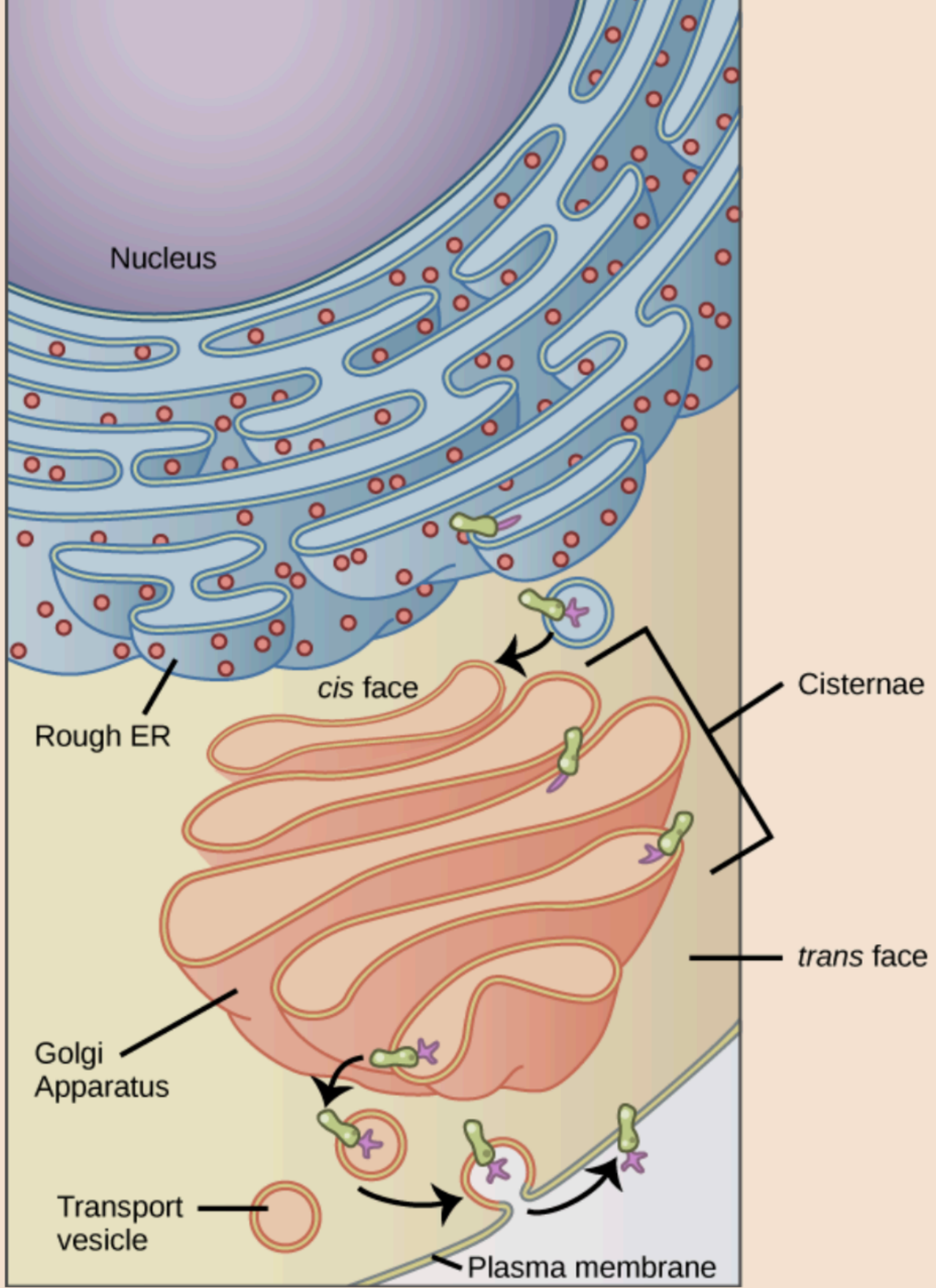
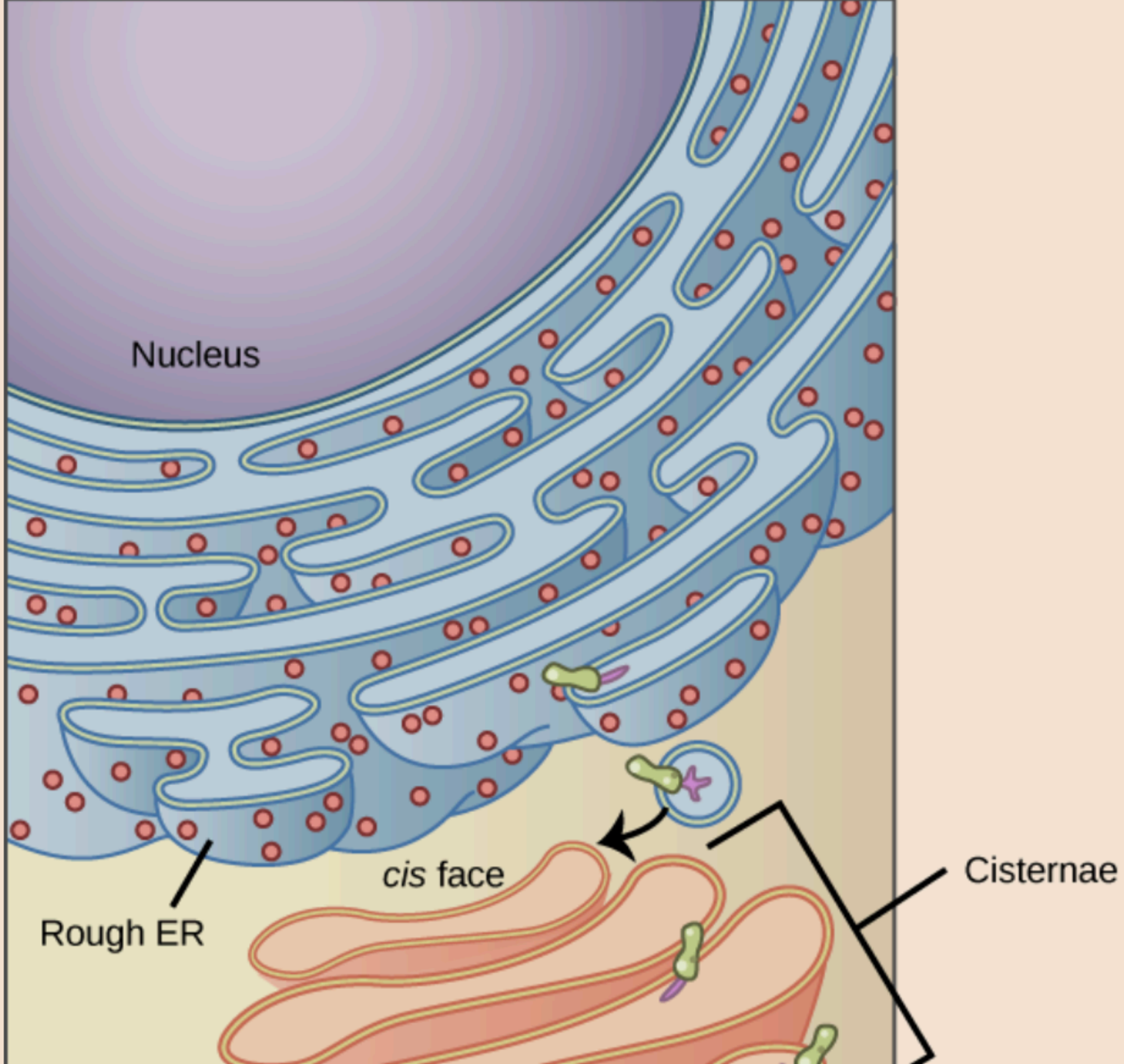
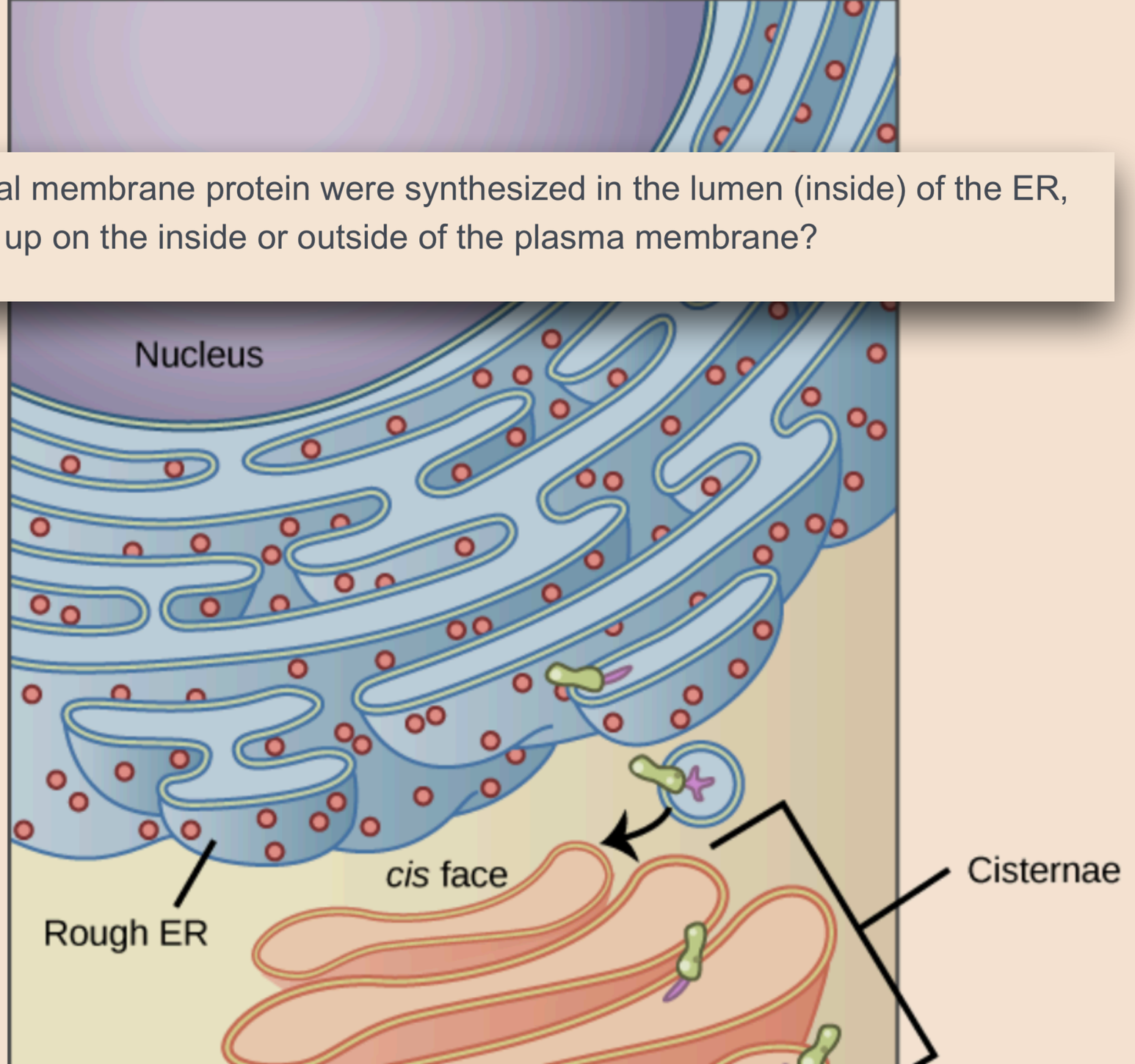
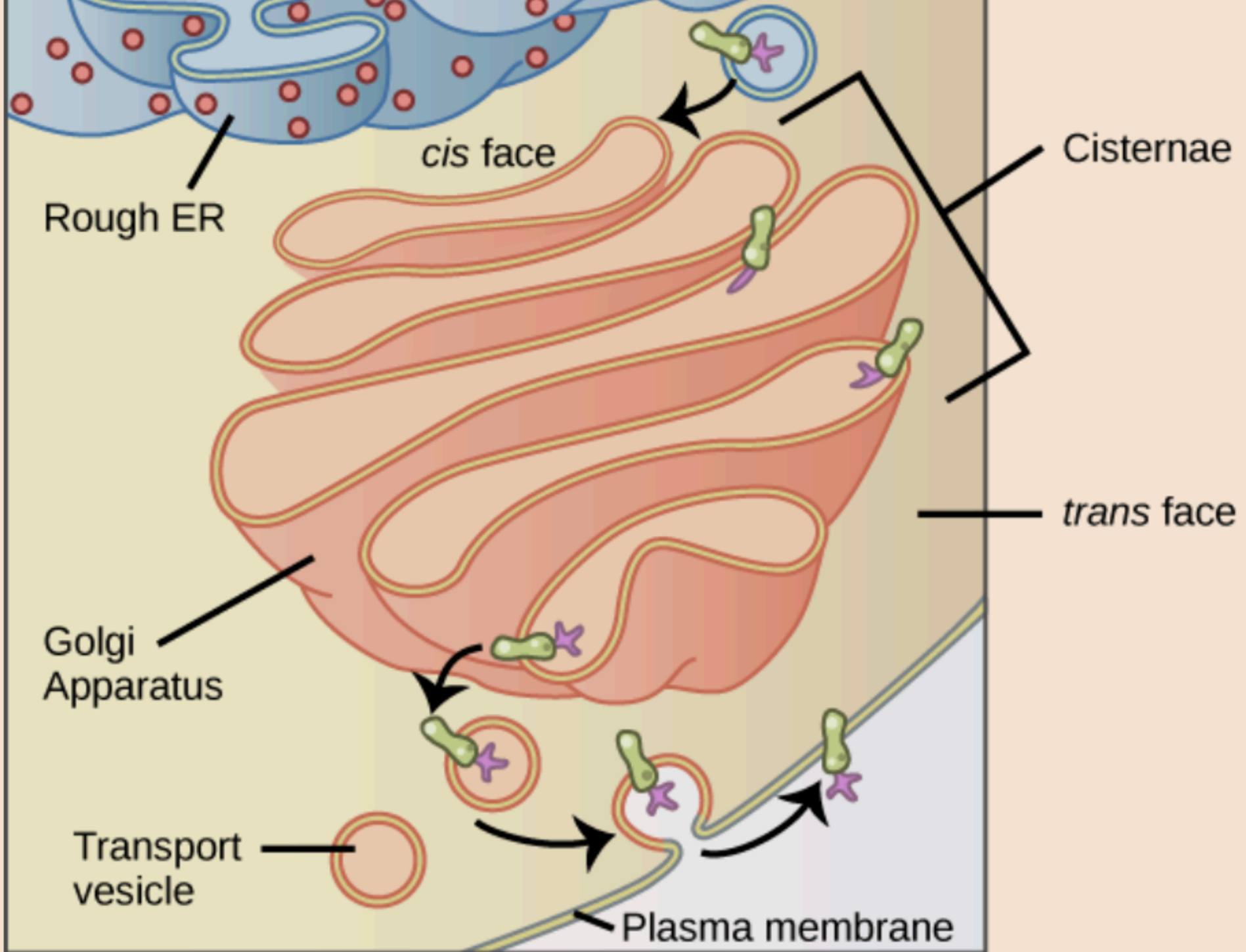



Nucleus
Rough ER
cis face
Cisternae
trans face
Golgi
Apparatus
Transport
vesicle
Plasma membrane


Nucleus
Rough ER
cis face
Cisternae

If a peripheral membrane protein were synthesized in the lumen (inside) of the ER, would it end up on the inside or outside of the plasma membrane?

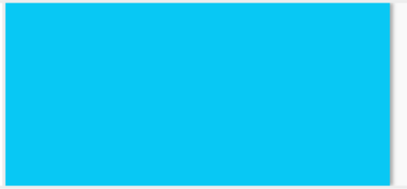



Rough ER
cis face
Cisternae
trans face
Golgi
Apparatus
Transport
vesicle
Plasma membrane

Next1?

1:30

What do you want to do NEXT?

A	Clicker questions: vote for which Exam II and course feedback		32
B	BioVisions movie and quiz on correct answers		0
C	Normal class: Biology, announcements, how cells work		2
D	Exam question Worksheet: Work in groups answering exam type questions (No laptops, yes notes)		4

Vote for Exam & feedback

Next2?

1:30

What do you want to do NEXT?

A	Clicker questions: vote for which Exam II and course feedback	1
B	BioVisions movie and quiz on correct answers	4
C	Normal class: Biology, announcements, how cells work	7
D	Exam question Worksheet: Work in groups answering exam type questions (No laptops, yes notes)	27

Worksheets

Clicker quiz on: “Structure” “Function”

1.
2.
3.
4.
5.
6.
7.
8.
9.
10.