NAME _____ CLASS _____ DATE _____

AP BIOLOGY · 2.3, 2.4

Membranes and permeability

Notes to fill in alongside the guide. Each numbered block matches a chapter of the guide, and of the lesson slides. Write in the gaps, answer the cues, annotate the figures, and sum up each section in your own words.

BY THE END YOU CAN

- [ ] Explain how the hydrophilic heads and hydrophobic tails of phospholipids arrange themselves into a bilayer with water on both sides 2.3.A
- [ ] Describe integral and peripheral proteins and explain how their hydrophobic and hydrophilic regions place them in the membrane 2.3.A
- [ ] Describe the fluid mosaic model, with cholesterol, glycoproteins and glycolipids, and explain what makes a membrane more or less fluid 2.3.B
- [ ] Explain how the structure of the membrane makes it selectively permeable: which molecules cross the bilayer and which need proteins 2.4.A
- [ ] Describe the cell walls of plants, fungi and prokaryotes and their role in structure and as a barrier 2.4.B

01 A barrier that builds itself 2.3.A

CUES

Predict: Phospholipids are shaken in oil instead of water. How would they arrange themselves?

What is meant by phospholipid?

What is meant by phospholipid bilayer?

NOTES

1 A _____ has two ends that want different things.

2 Its phosphate head is charged, so it is _____: it mixes with water.

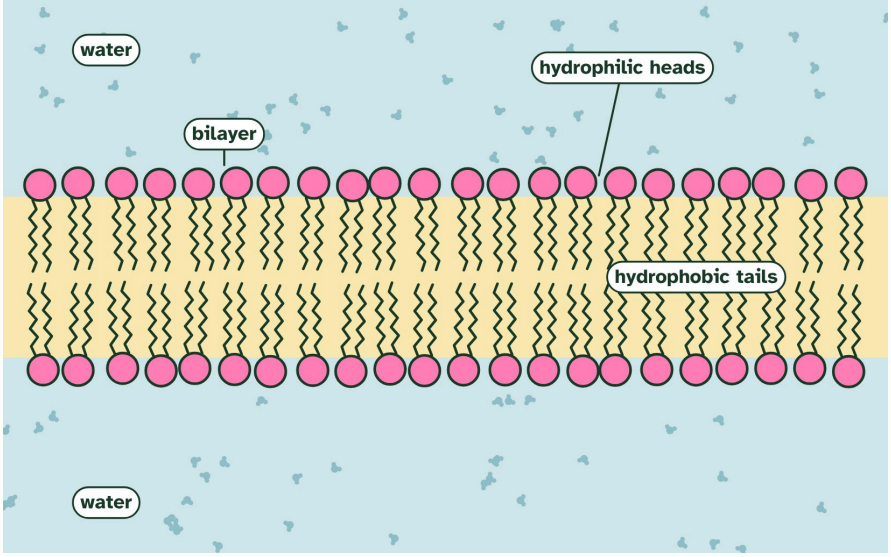
3 Its two fatty acid tails are nonpolar, so they are _____: water pushes them out.

4 So phospholipids settle into a _____: heads facing the water on each side, tails facing each other in the middle, out of the water.

Your own notes

ANNOTATE THE FIGURE

Annotate this still from the animation (Watch it happen: a bilayer builds itself): what is happening, and why?



SPOT THE MISTAKE

What do students often get wrong about plasma membrane? Write the mistake, then put it right.

The mistake

Put it right

SUMMARY

Sum up section 01 in two or three sentences of your own.

02 Proteins in the bilayer

2.3.A

CUES

Predict: A membrane protein has a stretch of about twenty amino acids with nonpolar R groups in the middle of its chain, and charged amino acids at both ends. Where is it?

What is meant by integral proteins?

What is meant by peripheral proteins?

NOTES

1 Proteins do most of a membrane's work: they carry substances across, receive signals, join cells together and speed up reactions. _____ are set into the bilayer, and many span it from one side to the other. _____ sit on its surface, held to the heads or to an integral protein.

2 The part of an integral protein that crosses the tails has amino acids with _____: it is hydrophobic, so it stays among the tails.

3 The parts that stick out into the water have _____: they are hydrophilic.

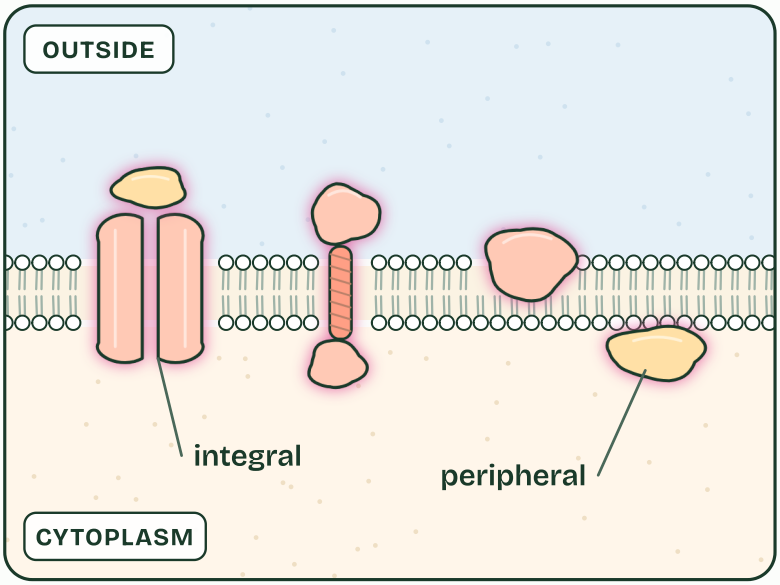
4 _____: in the bilayer, often spanning it.

5 _____: on the surface.

Your own notes

ANNOTATE THE FIGURE

Label the key parts and add a note on what it shows.



SPOT THE MISTAKE

What do students often get wrong about plasma membrane? Write the mistake, then put it right.

The mistake

Put it right

SUMMARY

Sum up section 02 in two or three sentences of your own.

03 A fluid mosaic

2.3.B

CUES

Predict: A mouse cell and a human cell are fused, each with its membrane proteins tagged a different color. An hour later, how are the colors spread?

What is meant by fluid mosaic model?

What is meant by glycoprotein?

What is meant by glycolipid?

NOTES

1 The _____ describes a membrane as a framework of phospholipids with other molecules set in it, like the tiles of a mosaic: proteins, _____ (in eukaryotes), and molecules with chains of sugars attached.

2 A _____ is a protein with sugars; a _____ is a lipid with sugars.

3 Fluid: _____.

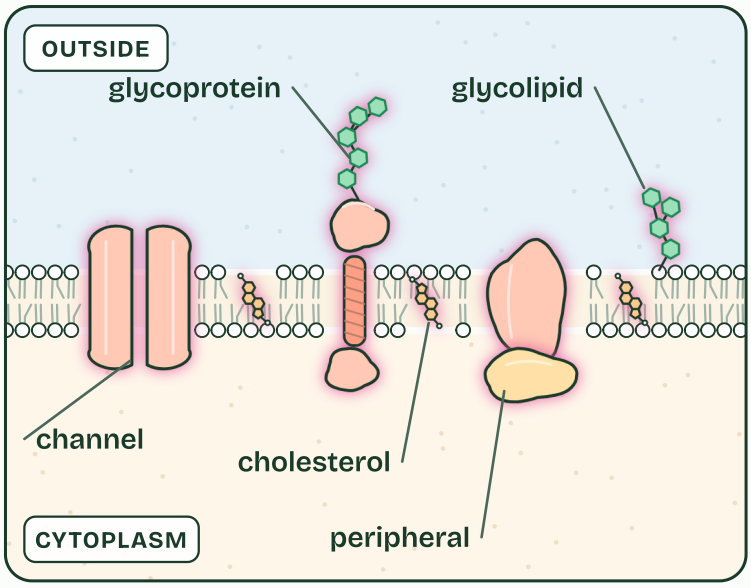
4 Glycoproteins and glycolipids:

_____.

Your own notes

ANNOTATE THE FIGURE

Label the key parts and add a note on what it shows.



SPOT THE MISTAKE

What do students often get wrong about plasma membrane? Write the mistake, then put it right.

The mistake

Put it right

SUMMARY

Sum up section 03 in two or three sentences of your own.

04 Not too stiff, not too runny

2.3.B

CUES

Predict: A fish that lives in icy water is compared with one from a warm reef. What would you expect of its membranes?

NOTES

1 Three things set it. _____ warmth makes the phospholipids move faster, and cold slows them. _____ saturated tails are straight and pack tightly, so the membrane is stiffer; unsaturated tails have kinks at their double bonds, which keep them apart and the membrane fluid.

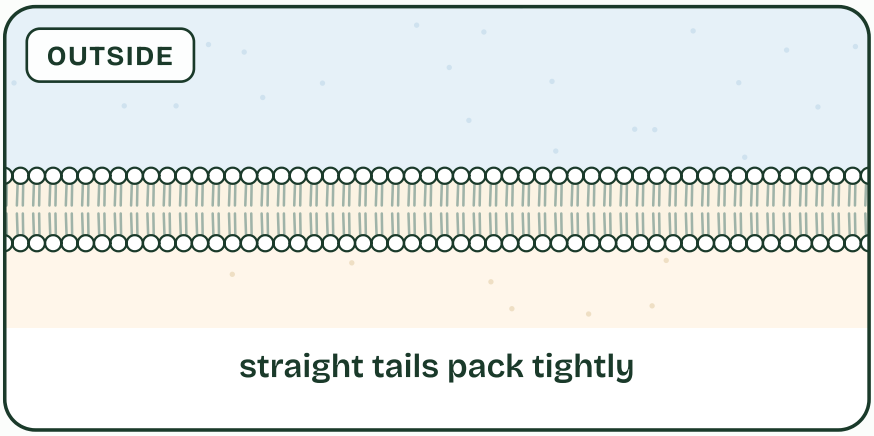
2 _____ buffers the change.

3 Warmer: _____.

Your own notes

ANNOTATE THE FIGURE

The figure shows it as Saturated, Unsaturated and With cholesterol. Note what changes each time.



SPOT THE MISTAKE

A student writes: “Cholesterol always makes a membrane stiffer.” Spot the mistake, then put it right.

The mistake

Put it right

SUMMARY

Sum up section 04 in two or three sentences of your own.

05 What gets through

2.4.A

CUES

Predict: Which will cross a pure phospholipid bilayer, with no proteins in it, fastest?

What is meant by selectively permeable?

NOTES

1 A membrane separates the inside of the cell from the outside, and lets only some things across: it is _____.

2 _____, such as oxygen, carbon dioxide and nitrogen, dissolve in the core and pass straight through. _____ with no charge, such as water, cross too, but only in small amounts. _____, such as Na^+ and K^+, and _____, such as glucose, are turned back: the hydrophobic core will not let a charged or strongly polar molecule through.

3 Small nonpolar: _____.

4 Water: _____.

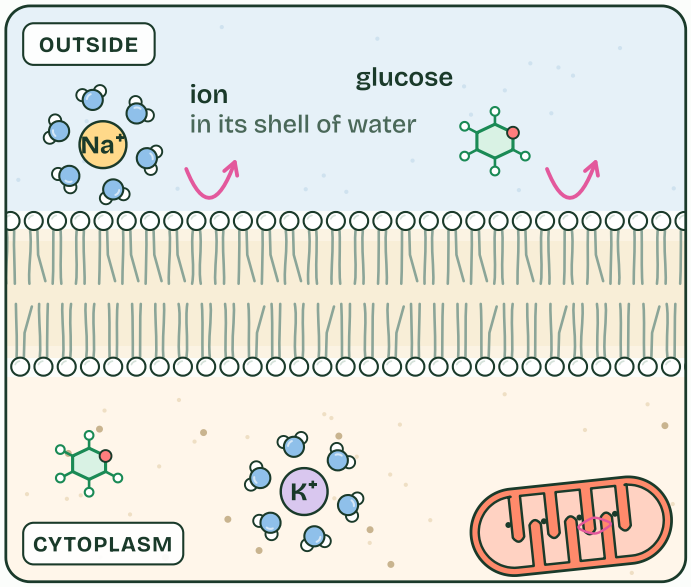
5 _____ diffuses in and _____ out, between the phospholipids.

6 _____ is polar but small: a little crosses the bilayer, slowly.

Your own notes

ANNOTATE THE FIGURE

Number the 3 steps on the figure and note what happens at each: 1 Oxygen, carbon dioxide; 2 Water; 3 Ions, polar molecules.



SPOT THE MISTAKE

What do students often get wrong about membrane permeability? Write the mistake, then put it right.

The mistake

Put it right

SUMMARY

Sum up section 05 in two or three sentences of your own.

06 A wall outside the membrane

2.4.B

CUES

Predict: Penicillin stops bacteria building peptidoglycan. Why does it kill bacteria but leave human cells unharmed?

What is meant by cell wall?

NOTES

1 Plants, fungi and most prokaryotes have a _____ outside the plasma membrane.

2 In every case it is made of _____.

3 Plant walls are _____, long chains of glucose lying side by side.

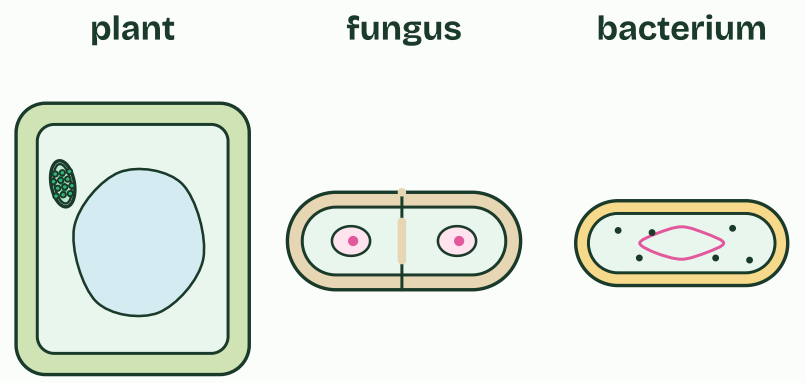
4 Fungal walls are _____, chains of glucose units carrying nitrogen.

5 Bacterial walls are _____, sugar chains cross-linked by short peptides.

Your own notes

ANNOTATE THE FIGURE

Label the key parts and add a note on what it shows.



SPOT THE MISTAKE

What do students often get wrong about membrane permeability? Write the mistake, then put it right.

The mistake

Put it right

SUMMARY

Sum up section 06 in two or three sentences of your own.

Check yourself

The check for this guide is online: a fresh paper of past-paper style questions from the exam bank on 2.3, 2.4 each time, marked as you go, and saved to your Exam practice progress when you are signed in. Scan the code, or type the link.

biologybybradford.com/exam-maker/sit?program=ap&units=U2&ced=2.3,2.4&paper=quiz&marks=15&src=ep

How this was made. The course structure, the activities and the teaching choices come from my own classroom, my presentations and my years of teaching IB and AP Biology. I use Claude, an AI, to help write and build the interactive guides, lesson plans, slides and practice questions, and to draw the diagrams and code the interactives. I direct the work and review it against the IB and AP specifications before it goes live.