

2.3 The Fluid Mosaic Model of the Membrane

Name: _____ Class: _____ Date: _____

Total: 10 marks

Objective

Build the skills to answer exam questions on the **fluid mosaic model** of the membrane.

You must be able to:

- describe the **phospholipid bilayer** 磷脂双层 with embedded proteins
- explain why it is "fluid" and a "mosaic"
- state the roles of membrane proteins and cholesterol

1 Worked examples

Study these first. Each one shows the method for a question type used later —follow the steps and you can do the Practice and Exam-style questions yourself.

■ The fluid mosaic model

The membrane is a **phospholipid bilayer** with **proteins** embedded in and on it. It is:

- **fluid** —phospholipids and proteins drift sideways;
- a **mosaic** —many different molecules dotted throughout.

■ Membrane proteins

Proteins act as **channels/transporters** (move substances), **receptors** (receive signals), and markers (cell recognition). They give the membrane most of its specific functions.

■ Cholesterol

Cholesterol sits among the phospholipids and stabilizes fluidity —keeping the membrane from becoming too fluid when warm or too stiff when cold.

■ Selective permeability

The hydrophobic core lets small nonpolar molecules pass but blocks most ions and large polar molecules, which need proteins —making the membrane **selectively permeable**.

2 Practice

Now apply the methods above.

2.1 What are the two main components of the membrane? [2]

2.2 Why is the model called "fluid"? [1]

2.3 State one function of membrane proteins. [1]

3 Exam-style questions

3.1 In the fluid mosaic model, the membrane is described as a mosaic because it [1]

- **A** is completely rigid
- **B** contains many different molecules scattered throughout
- **C** has only phospholipids
- **D** never moves

3.2 A membrane must transport glucose into a cell.

(a) Explain why glucose cannot cross the bilayer directly. [1]

(b) State what allows glucose to cross. [2]

3.3 Explain the role of cholesterol in maintaining membrane fluidity across temperatures. [2]

4 Go further

You are now ready for the real exam questions on this subtopic:

- work through the **2.3 The Fluid Mosaic Model of the Membrane** lesson on the **Learn** page;
- read the **The Fluid Mosaic Model of the Membrane** section of the AP Biology handout on the **Know** page.

Solutions

2.1 A phospholipid bilayer and embedded proteins.

2.2 The phospholipids and proteins can move sideways within the layer.

2.3 Any one: transport (channel/carrier), receptor for signals, cell recognition.

3.1 B —many different molecules scattered throughout.

3.2 (a) Glucose is large and polar, so it cannot pass through the hydrophobic core. (b) A transport (carrier/channel) protein allows glucose across.

3.3 Cholesterol keeps the membrane from becoming too fluid at high temperatures and too rigid at low temperatures, stabilizing fluidity.