

4.2 Introduction to Signal Transduction

Name: _____ Class: _____ Date: _____ **Total: 12 marks**

KEY WORDS signal transduction 信号转导 • receptor 受体 • ligand 配体

Objective

Build the skills to answer exam questions on **signal transduction** — reception, transduction, response.

You must be able to:

- name the three stages: **reception, transduction, response**
- explain that a signal is converted into a cellular change
- describe binding at the receptor as the first step

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 three stages

Signal transduction has three steps:

1. **Reception** — the signal molecule binds its receptor.
2. **Transduction** — the signal is passed and changed through a series of molecules inside the cell.
3. **Response** — the cell does something (e.g. turns a gene on, changes activity).

■ Reception

The signal (**ligand**) binds a specific **receptor**, often on the membrane. This binding **changes the receptor's shape**, starting the pathway.

■ Transduction relays the message

A chain of molecules passes the signal along, often amplifying it, converting the outside signal into an inside action.

■ A worked example

Adrenaline binds a receptor (reception) → activates internal messengers (transduction) → the cell breaks down glycogen for energy (response).

2 Practice

Now apply the methods above.

2.1 Name the three stages of signal transduction. [3]

2.2 What happens during reception? [1]

2.3 What is the final stage called? [1]

3 Exam-style questions

3.1 The first stage of signal transduction is [1]

A	B
C	D

- A response
- B transduction
- C reception
- D replication

3.2 Adrenaline binds a receptor and the cell breaks down glycogen.

(a) Identify the reception and response steps. [2]

(b) State what happens during transduction. [2]

3.3 Explain why binding of the signal changes the receptor, and why this matters. [2]
