

4.1 Cell Communication

Name: _____ Class: _____ Date: _____

Total: 11 marks**KEY WORDS** receptor 受体 • signals 信号 • hormones 激素

Objective

Build the skills to answer exam questions on **cell communication**.**You must be able to:**

- describe how cells communicate over short and long distances
- name the types of signaling (direct, local, long-distance)
- explain the roles of a **signal** and a **receptor** 受体

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.

■ Signals and receptors

Cells communicate using chemical **signals** (like hormones). A target cell has a specific **receptor** protein that binds the signal — only cells with the matching receptor respond.

■ Types of signaling by distance

- **Direct contact** — cells touch and exchange signals through junctions.
- **Local signaling** — a signal diffuses to nearby cells (e.g. neurotransmitters).
- **Long-distance signaling** — hormones travel through the blood to distant target cells.

■ Specificity

Only cells with the **correct receptor** respond to a signal, which is why a hormone affects some tissues but not others.

■ A worked example

Insulin (a hormone) travels in the blood (long-distance) and binds receptors on liver and muscle cells, which respond by taking up glucose.

2 Practice

Now apply the methods above.

2.1 What binds a chemical signal on the target cell? [1]**2.2** Name the three types of signaling by distance. [3]**2.3** Why does a hormone affect only some cells? [1]

3 Exam-style questions

3.1 Only cells that respond to a particular signal have the correct [1]

- **A** enzyme
- **B** receptor
- **C** ribosome
- **D** membrane

3.2 Insulin travels in the blood to reach liver and muscle cells.

(a) Name this type of signaling. [1]

(b) Explain why insulin affects these cells but not others. [2]

3.3 Explain the difference between local and long-distance signaling. [2]

Solutions

2.1 A receptor (protein).

2.2 Direct contact, local signaling, long-distance signaling.

2.3 Only cells with the matching receptor can bind the hormone and respond.

3.1 B — receptor.

3.2 (a) Long-distance (hormonal) signaling. (b) Only liver and muscle cells have the insulin receptor, so only they can bind it and respond.

3.3 Local signaling reaches nearby cells by diffusion over short distances; long-distance signaling uses hormones carried in the blood to reach distant target cells.