AP BIOLOGY • EXERCISE SHEET

# 4.1 Cell Communication

Name: _____ Class: _____ Date: _____ **Total: 11 marks**

## 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]

## 4 Go further

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

- work through the **4.1 Cell Communication** lesson on the **Learn** page;
- read the **Cell Communication** section of the AP Biology handout on the **Know** page.

## 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.