

# 4.5 Cell Cycle

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Name: \_\_\_\_\_ Class: \_\_\_\_\_ Date: \_\_\_\_\_

**Total: 10 marks**

## Objective

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Build the skills to answer exam questions on the **cell cycle**.

**You must be able to:**

- name the phases (**interphase** 间期: G1, S, G2; then **mitosis** 有丝分裂 and cytokinesis)
- state what happens in each phase
- explain that DNA is copied in S phase

## 1 Worked examples

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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 phases

The cell cycle is **interphase** followed by division:

- **G1** —the cell grows and does its normal work.
- **S** —DNA is **replicated** (copied).
- **G2** —the cell grows more and prepares to divide.
- **Mitosis (M)** —the nucleus divides; then **cytokinesis** splits the cell.

### ■ DNA copied in S

The genetic material is copied during **S phase**, so each new cell gets a full copy. After S, the cell has double the DNA until it divides.

### ■ Mitosis divides the nucleus

**Mitosis** separates the copied chromosomes into two identical nuclei; cytokinesis then splits the cytoplasm into two cells.

### ■ A worked link

A cell that has just finished S phase has twice its normal DNA; after mitosis and cytokinesis, each daughter cell has the normal amount again.

## 2 Practice

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Now apply the methods above.

**2.1** In which phase is DNA replicated? [1]

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**2.2** What happens during G1? [1]

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**2.3** What does cytokinesis do? [1]

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### 3 Exam-style questions

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**3.1** DNA replication occurs during [1]

- A G1
  - B S phase
  - C G2
  - D mitosis
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**3.2** A cell completes S phase.

(a) State how its amount of DNA compares to before S phase. [1]

(b) Explain what mitosis and cytokinesis then achieve. [3]

**3.3** Explain why DNA must be copied before mitosis, not after. [2]

### 4 Go further

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

- work through the **4.5 Cell Cycle** lesson on the **Learn** page;
- read the **Cell Cycle** section of the AP Biology handout on the **Know** page.

## Solutions

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**2.1** S phase.

**2.2** The cell grows and carries out its normal functions.

**2.3** It divides the cytoplasm, splitting the cell into two.

**3.1 B** —S phase.

**3.2** (a) It has doubled. (b) Mitosis separates the copied chromosomes into two identical nuclei, and cytokinesis splits the cytoplasm, producing two identical daughter cells.

**3.3** Each daughter cell needs a full copy of the DNA; copying it first (in S) ensures there are two complete sets for mitosis to separate.