AP BIOLOGY • EXERCISE SHEET

5.1 Meiosis

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

Objective

Build the skills to answer exam questions on **meiosis**.

You must be able to:

- describe **meiosis** 减数分裂 producing four **haploid** 单倍体 gametes
- contrast meiosis with mitosis
- explain the reduction from diploid to haploid

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.

What meiosis does

Meiosis makes **gametes** (sex cells). One **diploid** (2n) cell divides **twice** to make **four haploid** (n) cells, each with **half** the chromosome number.

Two divisions

- **Meiosis I** separates **homologous pairs** (halving the chromosome number).
- **Meiosis II** separates sister chromatids (like mitosis).

Meiosis vs mitosis

- **Mitosis** —one division, two identical **diploid** cells (growth/repair).
- **Meiosis** —two divisions, four genetically varied **haploid** cells (reproduction).

Restoring diploidy

At fertilization, two haploid gametes fuse to restore the **diploid** number —which is why gametes must be haploid.

2 Practice

Now apply the methods above.

2.1 How many cells does one meiosis produce, and are they haploid or diploid? [2]

2.2 What is separated in meiosis I? [1]

2.3 State one difference between meiosis and mitosis. [1]

3 Exam-style questions

3.1 Meiosis produces gametes that are [1]

- **A** diploid and identical
- **B** haploid and varied
- **C** diploid and varied
- **D** haploid and identical

3.2 A diploid cell with 8 chromosomes undergoes meiosis.

(a) How many chromosomes will each gamete have? [1]

(b) Explain why gametes must be haploid. [2]

3.3 Compare the products of mitosis and meiosis in terms of number, ploidy, and variation. [3]

4 Go further

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

- work through the **5.1 Meiosis** lesson on the **Learn** page;

- read the **Meiosis** section of the AP Biology handout on the **Know** page.

Solutions

2.1 Four cells; haploid.

2.2 Homologous pairs of chromosomes.

2.3 Any one: meiosis has two divisions / makes four haploid varied cells vs mitosis' one division making two identical diploid cells.

3.1 B —haploid and varied.

3.2 (a) 4 chromosomes. (b) At fertilization two gametes fuse; if they were diploid the chromosome number would double each generation, so they must be haploid to keep it constant.

3.3 Mitosis: 2 cells, diploid, genetically identical; meiosis: 4 cells, haploid, genetically varied.