17.4 Monohybrid inheritance

Name: _____ Class: _____ Date: _____ **Total: 7 marks**

KEY WORDS genotype • inheritance • phenotype • heterozygous • recessive

Objective

Build the skills to answer exam questions on **monohybrid inheritance** – the key terms, **Punnett squares** , and ratios.

You must be able to:

- use genotype/phenotype, dominant/recessive, homo-/heterozygous
- complete a Punnett square and predict ratios
- interpret a test cross / pedigree

1 Key knowledge and worked examples

A monohybrid cross

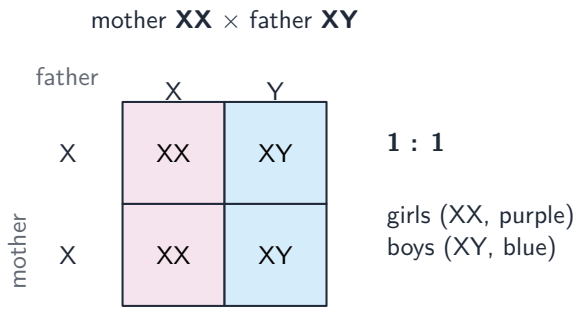
Bb × **Bb** (both parents)

gametes	B	b
B	BB	Bb
b	Bb	bb

3 : 1

3 dominant (blue)
1 recessive (orange)

Bb × Bb → BB, Bb, Bb, bb → a 3:1 ratio of dominant to recessive



A Punnett square also predicts sex determination

- **dominant** shows with one copy (capital); **recessive** needs two copies (lower-case).
- **homozygous** = two same alleles; **heterozygous** = two different.

2 Practice

2.1 Define a recessive allele. [1]

2.2 State the genotype of a heterozygous organism for a gene with alleles B and b. [1]

3 Exam-style questions

3.1 Crossing two heterozygous parents (Bb × Bb) gives a phenotype ratio of: [1]

- ☐ **A** 1:1
- **B** 3:1
- **C** 1:2:1
- **D** all dominant

3.2 In rabbits, black fur (B) is dominant to white (b). A heterozygous black rabbit is crossed with a white rabbit.

(a) Complete a Punnett square for this cross. [3]

(b) State the ratio of black to white offspring expected. [1]

Solutions

Each answer shows the steps, then the **result**.

2.1

- a recessive allele is shown in the phenotype **only when no dominant allele is present**

2.2

- heterozygous for B/b is **Bb**

3.1 B

- Bb × Bb gives a **3 : 1** phenotype ratio
- A is a test cross; C is genotypes; D is BB × anything

3.2

(a)

- parents Bb × bb; gametes B, b and b
- offspring **Bb, Bb, bb, bb**

(b)

- ratio **1 : 1** (black : white)