

17.4 Monohybrid inheritance

Name: _____ Class: _____ Date: _____

Total: 7 marks**KEY WORDS** heterozygous 杂合子 • recessive 隐性 • genotype 基因型 • inheritance 遗传 • dominant 显性

Objective

Build the skills to answer exam questions on **monohybrid inheritance** 单基因遗传 — the key terms, **Punnett squares** 庞纳特方格, 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 Worked examples

■ A monohybrid cross

Bb × Bb (both parents)

gametes	B	b	
B	BB	Bb	3 : 1 3 dominant (blue) 1 recessive (orange)
b	Bb	bb	

$Bb \times Bb \rightarrow BB, Bb, Bb, bb \rightarrow$ a 3:1 ratio of dominant to recessive

mother **XX** × father **XY**

		father		
		X	Y	
mother	X	XX	XY	1 : 1 girls (XX, purple) boys (XY, blue)
	X	XX	XY	

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 ($Bb \times Bb$) gives a phenotype ratio of: [1]

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

2.1 an allele shown in the phenotype only when no dominant allele is present.

2.2 Bb.

3.1 B. Bb $\times$ Bb gives a 3:1 ratio.

3.2 (a) parents Bb $\times$ bb; gametes B,b and b,b; offspring Bb, Bb, bb, bb.
(b) 1:1 (black : white).