

Exercise walk-through

Monohybrid inheritance ■ 17.4

eXercise

You must be able to

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

Method — A monohybrid cross

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

Method — A monohybrid cross

Bb × **Bb** (both parents)

gametes

	B	b
B	BB	Bb
b	Bb	bb

3 : 1

3 dominant (blue)

1 recessive (orange)

A Punnett square for Bb × Bb giving 3:1

Method — A monohybrid cross

mother **XX** × father **XY**

father

X

Y

X

XX

XY

1 : 1

girls (XX, purple)

boys (XY, blue)

mother

X

XX

XY

A Punnett square also predicts sex determination

Practice 2.1 ■ 1 mark

Define a recessive allele.

Solution 2.1

Worked steps

an allele shown in the phenotype only when no dominant allele is present **B1**.

Practice 2.2 ■ 1 mark

State the genotype of a heterozygous organism for a gene with alleles B and b.

Solution 2.2

Method: A monohybrid cross

Worked steps

Bb **B1**.

Exam-style 3.1 ■ 1 mark

Crossing two heterozygous parents ($Bb \times Bb$) gives a phenotype ratio of:

A 1:1

B 3:1

C 1:2:1

D all dominant

Solution 3.1

Method: A monohybrid cross

A 1:1

B 3:1



C 1:2:1

D all dominant

Worked steps

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

Exam-style 3.2 ■ 3 marks

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.
- (b) State the ratio of black to white offspring expected.

Solution 3.2

Method: A monohybrid cross

Worked steps

(a) parents $Bb \times bb$; gametes B, b and b, b **M1**; offspring Bb, Bb, bb, bb **M1** **A1**.

(b) 1:1 (black : white) **B1**.