

5 Genetics and Punnett squares – Part 2

Name: _____ Class: _____ Date: _____

Vocabulary 词汇

Write each word three times. 把每个单词抄写三遍。

English	中文	Write it 3 times (English)		
alleles	等位基因	_____	_____	_____
genotype	基因型	_____	_____	_____
phenotype	表型	_____	_____	_____
dominant	显性	_____	_____	_____
recessive	隐性	_____	_____	_____
homozygous	纯合	_____	_____	_____
heterozygous	杂合	_____	_____	_____
Punnett square	庞纳特方格	_____	_____	_____

Recall

You already know some genetics:

- Genes come in different versions, and some are dominant, some recessive.
- You have used a Punnett square to predict offspring.
- Traits like eye colour are passed from parents to children.

This sheet lines up how inheritance works. Each idea has a short worked example.

New ideas

■ 1 Alleles, genotype, and phenotype

A gene's different versions are **alleles** 等位基因. An organism's **genotype** 基因型 (its alleles) produces its **phenotype** 表型 (its visible traits).

■ 2 Dominant and recessive

A **dominant** 显性 allele shows even if only one copy is present; a **recessive** 隐性 allele shows only with two copies. Two identical alleles is **homozygous** 纯合; two different is **heterozygous** 杂合.

■ 3 Punnett squares

A **Punnett square** 庞纳特方格 predicts offspring ratios. Crossing two heterozygotes ($Aa \times Aa$) gives a 3 : 1 ratio of dominant to recessive.

parents: $Tt \times Tt$

	T	t	
T	TT	Tt	green = tall (has a T)
t	Tt	tt	orange = short (tt)

ratio 3 tall : 1 short

Worked example. $Aa \times Aa$ gives offspring AA , Aa , Aa , aa – so 3 show the dominant trait and 1 shows the recessive, a 3 : 1 ratio.

■ 4 Not always so simple

Some traits break the simple rule – **incomplete dominance** (a blend, red $\times$ white $\rightarrow$ pink), **codominance** (both show, like blood group AB), and **sex-linked** genes on the X chromosome.

father:		X^B	Y
mother	X^B	$X^B X^B$	$X^B Y$
	X^b	$X^B X^b$	$X^b Y$
		carrier daughter	colour-blind son

Watch out: the **genotype** is the alleles an organism has; the **phenotype** is what you actually see. Two organisms can look the same (phenotype) but have different genotypes (AA and Aa both show the dominant trait).

Practice

Try these in order. The methods are all above.

2.1 State the difference between an organism's genotype and its phenotype. [2]

2.2 State what "homozygous" and "heterozygous" mean. [2]

2.3 A cross is $Aa \times Aa$. State the ratio of dominant to recessive offspring. [2]

2.4 A homozygous dominant (AA) is crossed with a homozygous recessive (aa). State the genotype of all the offspring. [2]

2.5 Two purple flowers produce some white offspring. Explain how this is possible. [2]
