

5 Genetics and Punnett squares – Part 2

Name: _____ Class: _____ Date: _____

Vocabulary

*Write each word three times.***English****Write it 3 times** (English)

alleles

genotype

phenotype

dominant

recessive

homozygous

heterozygous

Punnett square

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**. An organism's **genotype** (its alleles) produces its **phenotype** (its visible traits).

■ 2 Dominant and recessive

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

■ 3 Punnett squares

A **Punnett square** 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
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]
