

1. Who Was Mendel?

- **Gregor Mendel** was an Austrian monk and scientist who studied **pea plants** in the 1800s.
 - He discovered **how traits are inherited** from one generation to the next.
 - His experiments led to the foundation of **modern genetics**.
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2. Mendel's Two Key Laws

A. Law of Segregation

- **Definition:** Each organism has **two alleles** (versions of a gene) for each trait, and **these alleles separate during gamete formation** (meiosis).
- As a result, each gamete carries **only one allele** for each trait.

Example:

A plant with genotype **Tt** (T = tall, t = short) produces gametes with **T** or **t**, not both. During fertilization, offspring get **one allele from each parent**.

 **TEAS Tip:** This law explains **how offspring can inherit traits that seem to “skip” a generation**.

B. Law of Independent Assortment

- **Definition:** **Genes for different traits are inherited independently** of each other, as long as they are **on different chromosomes**.
- This creates **genetic variation** in offspring.

Example:

A plant's height gene (T/t) is inherited **independently** from its seed color gene (Y/y). So you could have combinations like TY, Ty, tY, ty in gametes.

 **TEAS Tip:** This law is tested using **dihybrid crosses** (two traits at once).

3. Key Genetic Vocabulary for TEAS 7

Term	Definition	TEAS Example
Gene	A section of DNA that codes for a trait	Gene for flower color
Allele	Different forms of a gene	Purple (P) vs white (p)
Dominant allele	Expressed when present	“P” shows purple even if paired with “p”
Recessive allele	Only expressed if both alleles are recessive	“pp” = white flowers
Genotype	Genetic makeup (letters)	PP, Pp, pp
Phenotype	Physical appearance	Purple or white
Homozygous	Two same alleles (PP or pp)	Purebred
Heterozygous	Two different alleles (Pp)	Hybrid
Punnett square	Tool to predict offspring genotypes and phenotypes	Used in monohybrid/dihybrid crosses

4. TEAS 7 Practice Questions

Q1:

According to Mendel’s **law of segregation**, what happens during gamete formation?

- A. Each gamete receives both alleles for a trait
- B. **Each gamete receives only one allele for a trait**
- C. Traits are blended in the offspring
- D. Only recessive alleles are passed on

☒ **Answer: B** — Each gamete gets one allele for each trait.

Q2:

The law of **independent assortment** explains:

- A. How dominant traits mask recessive ones
- B. How alleles separate during meiosis
- C. **How genes for different traits are inherited separately**
- D. Why recessive traits disappear over time

☒ **Answer: C** — Different traits (like height and seed color) are inherited independently.

Q3:

A heterozygous tall pea plant (Tt) is crossed with a homozygous short plant (tt). What is the **expected phenotypic ratio**?

- A. 100% tall
- B. 50% tall, 50% short
- C. **1 tall : 1 short**
- D. 3 tall : 1 short

☒ **Answer: C (1:1)**

👉 **Explanation:** $Tt \times tt \rightarrow Tt, tt \rightarrow 2 \text{ tall}, 2 \text{ short}.$

Q4:

A dihybrid cross between two heterozygous plants ($TtYy \times TtYy$) would produce offspring with which **phenotypic ratio** (assuming independent assortment)?

- A. 1:2:1
- B. 100% identical
- C. **9:3:3:1**
- D. 3:1

☒ **Answer: C (9:3:3:1)**

👉 **Explanation:** This is the classic ratio for a dihybrid cross where both traits follow Mendel's laws.

Q5:

Which statement is TRUE regarding Mendelian genetics?

- A. Dominant traits always appear in every generation
- B. Recessive alleles can never be passed to offspring
- C. **An organism's genotype determines its phenotype**
- D. Phenotype determines genotype

☒ **Answer: C** — The genetic makeup (genotype) determines the physical appearance (phenotype).



Quick Review Table

Law	Key Idea	TEAS Tip
Law of Segregation	Alleles separate during gamete formation	Explains inheritance of single traits
Law of Independent Assortment	Genes for different traits separate independently	Dihybrid crosses; genetic variation

Would you like me to give you a **5–10 question practice quiz** on **Mendel's Laws + Punnett squares** like the actual TEAS 7 format (multiple choice, no answers shown until the end)?

