

20 Multiple choice questions

Term

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What are **mutations**?

- ☐ Planned alterations in the RNA sequence for gene therapy.
- ☐ Controlled changes in the protein structure for enhancement.
- ☐ Deliberate modifications in the cellular DNA for research purposes.
- ☐ Random changes in the DNA sequence that make up a gene.

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Why don't heterozygous females show the disease?

- ☐ The dominant normal allele covers up ("masks") the defective recessive one.
- ☐ The recessive allele is expressed equally in heterozygous females.
- ☐ The defective recessive allele is enhanced by environmental factors.
- ☐ The dominant normal allele is suppressed by the defective recessive one.

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Give two examples of a sex-linked disorder.

- ☐ Autosomal recessive disorders.
- ☐ Males are XY, females are XX.
- ☐ Color blindness and hemophilia.
- ☐ Controlled by one gene on each chromosome.

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What do the uppercase **N** and lowercase **n** represent?

- ☐ N is the mutated gene, and n is the healthy (recessive) gene.
- ☐ N is the normal (dominant) gene, and n is the disease or disorder (recessive) gene.
- ☐ N is the non-functional gene, and n is the active (dominant) gene.
- ☐ N is the recessive gene, and n is the normal (dominant) gene.

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What is **nondisjunction**?

- ☐ A mistake in meiosis when one gamete gets two of the same chromosome and the other gamete gets none, leading to an abnormal chromosome number.
- ☐ A process where chromosomes duplicate twice in meiosis.
- ☐ A condition where chromosomes exchange parts during meiosis.
- ☐ A mistake in mitosis when cells divide unevenly.

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How are either/or traits controlled?

- ☐ Controlled by one gene on each chromosome.
- ☐ Controlled by multiple genes on one chromosome.
- ☐ Controlled by a single gene across multiple chromosomes.
- ☐ Controlled by environmental factors on each chromosome.

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Why can only females be homozygous or heterozygous for X-linked traits, but males cannot?

- ☐ Neither allele is dominant; the heterozygote shows an intermediate trait between the two homozygotes (for example, red × white → pink).
- ☐ Females have two X chromosomes, they can have two alleles for a trait. Males have only one X chromosome (are hemizygous), so they have just one allele.
- ☐ Because they don't have another X chromosome (to mask the recessive allele.)
- ☐ Conditions like Turner syndrome, Klinefelter syndrome, or other abnormal sex chromosome numbers.

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In a test cross, what do these offspring ratios mean?

- ☐ **50% tall : 50% short** → The unknown plant is **Tt**.
100% tall : 0% short → The unknown plant is **TT**.
- ☐ The dominant normal allele covers up ("masks") the defective recessive one.
- ☐ In areas with malaria, because heterozygotes survive better than both homozygotes.
- ☐ Some traits follow Mendelian inheritance through dominant and recessive alleles.

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She is a carrier female (has one normal and one disease allele).

- ☐ Xnyn
- ☐ XNY
- ☐ XNXn
- ☐ XhXh

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She is a disordered female.

- ☐ Xnyn
- ☐ XhXh
- ☐ XnXn
- ☐ XNY

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He is a disordered male.

- ☐ Xhyn
- ☐ XnY
- ☐ XbXb
- ☐ Xnyn

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What kind of traits did Mendel choose to study?

- ☐ He chose traits influenced by environment (for example, plant size due to sunlight).
- ☐ He chose either/or traits (for example, purple or white flowers, tall or short plants).
- ☐ He chose traits that change with age (for example, leaf texture).
- ☐ He chose traits determined by multiple genes (for example, flower color gradient).

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What can nondisjunction of the X chromosome lead to?

- ☐ **50% tall : 50% short** → The unknown plant is **Tt**.
100% tall : 0% short → The unknown plant is **TT**.
- ☐ A mistake in meiosis when one gamete gets two of the same chromosome and the other gamete gets none, leading to an **abnormal chromosome number**.
- ☐ The dominant normal allele covers up ("masks") the defective recessive one.
- ☐ Conditions like Turner syndrome, Klinefelter syndrome, or other abnormal sex chromosome numbers.

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How can doctors detect genetic defects in a fetus?

- ☐ By analyzing the father's genetic traits and lifestyle.
- ☐ By observing the fetus's physical development through ultrasound alone.
- ☐ By monitoring the mother's diet and exercise habits.
- ☐ By checking family history, the mother's risk factors (age, health, etc.), or using medical tests.

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Why are males more likely to show sex-linked recessive disorders?

- ☐ They create new traits for natural selection to act on.
- ☐ The dominant normal allele covers up ("masks") the defective recessive one.
- ☐ Females have two X chromosomes, they can have two alleles for a trait. Males have only one X chromosome (are hemizygous), so they have just one allele.
- ☐ Because they don't have another X chromosome (to mask the recessive allele.)

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What does it mean to be *homozygous*?

- ☐ Having no alleles on each member of a pair of chromosomes. (--)
- ☐ Having mixed alleles on a single chromosome. (T/t)
- ☐ Having the same allele on each member of a pair of chromosomes. (TT or tt)
- ☐ Having different alleles on each member of a pair of chromosomes. (Tt)

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Why are mutations called the "raw material of evolution"?

- ☐ They create new traits for natural selection to act on.
- ☐ They ensure the survival of existing traits.
- ☐ They prevent any changes in species characteristics.
- ☐ They maintain genetic stability across generations.

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What does the law of independent assortment state?

- ☐ Genes located on the same chromosome are always inherited together.
- ☐ Genes are inherited in a fixed order regardless of chromosome.
- ☐ Genes located on different chromosomes are inherited independently of each other.
- ☐ Genes on different chromosomes are always linked.

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She is a normal female.

- ☐ XNYN
- ☐ XNXN
- ☐ XNY
- ☐ XHXH

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Under what circumstances can heterozygotes for sickle-cell anemia be favored?

- ☐ In places with low sunlight, because heterozygotes produce more vitamin D.
- ☐ In regions with high altitude, because heterozygotes have better oxygen absorption.
- ☐ In areas with cold climates, because heterozygotes are more resistant to frost.
- ☐ In areas with malaria, because heterozygotes survive better than both homozygotes.