UNIT 5 HEREDITY AND EVOLUTION GENETICS Printable PDF

Unit 5 Heredity And Evolution Genetics

Unit 5 Heredity and Evolution Genetics: Understanding the Blueprint of Life

unit 5 heredity and evolution genetics dives deep into the fascinating world of how

traits are passed down through generations and how populations change over time. It?s a captivating subject that ties together the microscopic workings of DNA with the grand story of life?s diversity on Earth. Whether you?re a student preparing for exams or simply curious about biology, exploring this topic opens up a window into the mechanisms that shape every living organism.

What is Heredity? Exploring the Basics

At its core, heredity refers to the transmission of genetic information from parents to o?spring. This process ensures that children inherit traits such as eye color, height, or susceptibility to certain diseases from their parents. The foundation of heredity lies in genes, the segments of DNA that carry instructions for building and maintaining an organism.

The Role of Genes and DNA

Genes are like biological blueprints. Each gene contains a sequence of nucleotides?adenine, thymine, cytosine, and guanine?that encode speci?c proteins.

These proteins ultimately in?uence how an organism looks, behaves, and functions. DNA is organized into long strands called chromosomes, which exist in pairs within the cells of most organisms.

Understanding how genes work is crucial in unit 5 heredity and evolution genetics because it explains the molecular basis of inheritance. For example, variations in gene sequences?known as mutations?can lead to new traits or diseases, which may be passed down to the next generation.

Mendelian Genetics: The Foundation of Heredity

Gregor Mendel, often called the father of genetics, discovered fundamental laws of inheritance through experiments with pea plants. Mendel?s work revealed that traits are inherited as discrete units (now known as genes) and follow predictable patterns.

Key concepts from Mendelian genetics include:

Dominant and recessive alleles: Some traits mask others; for example, a dominant allele can hide the presence of a recessive allele.

Genotype vs. phenotype: The genotype is the genetic makeup, while the phenotype is the observable trait.

Law of segregation and independent assortment: These laws explain how alleles separate during the formation of gametes and how di?erent gene pairs assort independently.

These principles are vital for grasping how heredity functions and form the basis for more advanced topics in evolution genetics.

Evolution: The Changing Face of Life

While heredity focuses on individual traits passed down, evolution looks at how populations change over generations. Evolution is the process through which species adapt and diversify in response to environmental pressures.

Natural Selection: The Engine of Evolution

One of the most well-known mechanisms driving evolution is natural selection. This concept, popularized by Charles Darwin, suggests that individuals with traits better suited to their environment are more likely to survive and reproduce. Over time, these advantageous traits become more common in the population.

Natural selection relies on:

Variation: Di?erences in traits within a population.

Inheritance: Traits must be heritable.

Di?erential survival and reproduction: Some traits provide a survival or reproductive advantage.

For example, in a population of beetles, those with a color that blends into their environment may avoid predators better, increasing their chances of passing on their genes.

Genetic Drift and Other Evolutionary Forces

Besides natural selection, other mechanisms in?uence how populations evolve:

Genetic drift: Random changes in allele frequencies, especially in small

populations.

Gene ?ow: The exchange of genes between populations through migration.

Mutation: The original source of genetic variation, introducing new alleles.

These forces interplay to shape the genetic landscape of populations, making evolution a complex and dynamic process.

Connecting Heredity and Evolution Genetics

Unit 5 heredity and evolution genetics beautifully interlinks the patterns of inheritance with the broader scope of species change. Understanding how genes are passed on helps explain how populations evolve.

Variation: The Raw Material for Evolution

Without genetic variation, evolution cannot occur. Heredity ensures traits are transmitted, but mutations and recombination during sexual reproduction create new combinations of genes. This diversity allows natural selection to act upon di?erent traits, driving adaptation.

Speciation: When Populations Diverge

Over long periods, genetic di?erences can accumulate enough to create new species?a process called speciation. This happens when populations become reproductively isolated, either by physical barriers or behavioral changes, preventing gene ?ow.

For example, Darwin?s ?nches on the Galápagos Islands exhibit distinct beak shapes adapted to di?erent food sources, highlighting how evolutionary forces and heredity combine to produce biodiversity.

Applications and Importance of Unit 5 Heredity and Evolution Genetics

Understanding these principles is not just academic?it has practical implications across medicine, agriculture, and conservation.

Medical Genetics and Heredity

Knowledge of heredity helps predict and manage genetic disorders. By studying inheritance patterns, scientists can identify carriers of diseases like cystic ?brosis or sickle cell anemia and develop targeted therapies.

Evolutionary Genetics in Conservation

Conservationists use genetics to maintain biodiversity. By monitoring genetic variation in endangered species, they can make informed decisions to prevent inbreeding and preserve healthy populations.

Agricultural Advances

Selective breeding and modern genetic techniques improve crop yields and resistance to pests. Understanding heredity allows for the development of genetically modi?ed organisms (GMOs) that can withstand harsh environmental conditions.

Tips for Mastering Unit 5 Heredity and Evolution Genetics

If you?re studying this unit, here are some tips to help you grasp the concepts e?ectively:

Visualize processes: Draw Punnett squares, pedigrees, and evolutionary trees to better understand inheritance and species relationships.

Relate concepts to real life: Think about traits in your family or examples from nature to make abstract ideas tangible.

Practice problems: Genetics often involves calculations and predictions; practicing these sharpens your skills.

Stay curious: Evolution is an ongoing process and genetics is a rapidly evolving ?eld. Keeping up with new discoveries adds depth to your understanding.

Unit 5 heredity and evolution genetics o?ers a window into the blueprint of life and the forces that have shaped the living world over billions of years. By exploring how genes are inherited and how populations transform, you not only learn the science of biology but also gain insights into the story of life itself.

Question

Answer

What is the principle of inheritance in genetics?

The principle of inheritance states that genetic traits are passed from parents to o?spring through genes, which are units of heredity made up of DNA.

How do Mendel's laws explain heredity?

Mendel's laws, including the Law of Segregation and the Law of Independent Assortment, explain how alleles

segregate and assort independently during gamete formation, leading to genetic variation in o?spring.

What is the role of DNA in heredity?

DNA carries the genetic information that determines an organism's traits. It replicates and transmits this information from one generation to the next.

How does mutation contribute to evolution?

Mutations introduce new genetic variations by altering DNA sequences, which can lead to changes in traits. These variations may be bene?cial, neutral, or harmful, and bene?cial mutations can drive evolution by natural selection.

What is natural selection and its importance in evolution?

Natural selection is the process where organisms with favorable traits are more likely to survive and reproduce, passing those traits to the next generation, thereby driving

the evolution of species.

How do dominant and

recessive alleles a?ect

phenotype?

Dominant alleles express their traits even if only one copy is

present, while recessive alleles express their traits only

when two copies are present. This in?uences the observable

characteristics, or phenotype, of an organism.

What is genetic variation

and why is it important

for evolution?

Genetic variation refers to di?erences in DNA sequences

among individuals within a population. It is crucial for

evolution because it provides the raw material for natural

selection to act upon.

How do homologous

chromosomes in?uence

heredity?

Homologous chromosomes carry the same genes but may

have di?erent alleles. During meiosis, they segregate

independently, ensuring genetic diversity in gametes and

o?spring.

What evidence supports

the theory of evolution?

Evidence for evolution includes fossil records, comparative

anatomy, embryology, molecular biology (DNA similarities),

and observed instances of natural selection and adaptation

in populations.

Unit 5 Heredity and Evolution Genetics: An In-Depth Analytical Review

unit 5 heredity and evolution genetics represents a fundamental segment in

understanding the biological principles that govern the transmission of traits from one generation to another and the gradual change in species over time. This unit intricately explores the genetic mechanisms underlying heredity and the evolutionary processes that drive biodiversity and adaptation. As scienti?c advancements deepen our grasp of DNA, genes, and evolutionary theory, an analytical review of this subject is essential for educators, students, and researchers aiming to contextualize classical genetics with modern interpretations.

Understanding the Core Concepts of Unit 5 Heredity and Evolution Genetics

At the heart of unit 5 heredity and evolution genetics lies the study of how genetic information is passed on and how populations evolve. Heredity pertains to the biological

inheritance of traits, governed by genes?units of heredity located on chromosomes. Evolution genetics, on the other hand, examines the dynamic changes in gene frequencies within populations over time, shaping the diversity of life on Earth.

This unit typically covers Mendelian genetics, chromosomal theory, molecular genetics, and evolutionary mechanisms such as natural selection, genetic drift, and gene ?ow. By integrating these themes, the unit o?ers a comprehensive understanding of both microevolutionary processes and macroevolutionary patterns.

Mendelian Principles and Genetic Inheritance Patterns

One foundational aspect of unit 5 is the Mendelian inheritance model, which elucidates how traits segregate and assort independently during gamete formation. Gregor Mendel?s experiments with pea plants revealed dominant and recessive alleles, leading to predictable phenotypic ratios. These principles provide the basis for understanding monogenic traits and have been expanded to include incomplete dominance, codominance, and polygenic inheritance.

In modern genetics, the unit also emphasizes the molecular basis of heredity?how DNA sequences encode proteins and how mutations can lead to variation. Techniques such as pedigree analysis and Punnett squares remain pivotal tools for predicting inheritance patterns, while molecular genetics o?ers insights into gene expression and regulation.

Evolutionary Genetics: Mechanisms and Evidence

Evolution genetics within unit 5 delves into how genetic variation arises and drives evolutionary change. Mutation, recombination, and gene ?ow introduce new alleles into a

population, while natural selection and genetic drift alter allele frequencies over generations. This section highlights the Hardy-Weinberg equilibrium as a theoretical framework to measure genetic stability and detect evolutionary forces.

The unit also reviews empirical evidence supporting evolution, including fossil records, comparative anatomy, molecular phylogenetics, and observed instances of speciation. Understanding the genetic basis of adaptation and the role of selective pressures in shaping phenotypes is crucial for appreciating the evolutionary narrative.

Applications and Implications of Unit 5 Heredity and Evolution Genetics

The knowledge imparted by unit 5 heredity and evolution genetics extends beyond theoretical biology, in?uencing ?elds like medicine, agriculture, and conservation biology. For instance, the understanding of genetic inheritance allows for genetic counseling and personalized medicine, where identifying hereditary disease risks is possible. Evolutionary genetics informs strategies to manage antibiotic resistance and emerging infectious diseases by tracking pathogen evolution.

In agriculture, genetic principles guide selective breeding and genetic modi?cation to enhance crop yields and resilience. Conservation genetics applies evolutionary concepts to maintain genetic diversity and prevent inbreeding depression in endangered species.

Challenges and Ethical Considerations

While the advancements in heredity and evolutionary genetics o?er immense bene?ts,

they also present challenges and ethical dilemmas. Gene editing technologies such as CRISPR raise questions about the extent to which humans should manipulate genomes. There are concerns about unintended consequences, ecological impacts, and the social implications of genetic modi?cation.

Furthermore, interpreting genetic data requires caution to avoid deterministic views that could lead to genetic discrimination or stigmatization. Ethical frameworks and regulatory policies are essential to balance scienti?c progress with societal responsibility.

Key Features and Comparisons within Heredity and Evolution Genetics

Unit 5 provides comparative insights into di?erent inheritance patterns and evolutionary models, facilitating critical analysis of genetic phenomena.

Monogenic vs. Polygenic Traits: Monogenic traits are controlled by a single

1.

gene, often exhibiting clear dominant-recessive relationships. Polygenic traits involve multiple genes, resulting in continuous variation, such as height or skin color.

Mendelian Inheritance vs. Molecular Genetics: Mendelian genetics focuses on

2.

phenotype ratios and allele segregation, while molecular genetics investigates DNA structure, replication, and gene expression.

Natural Selection vs. Genetic Drift: Natural selection is a non-random process

3.

favoring advantageous alleles, whereas genetic drift is a stochastic process

a?ecting allele frequencies, especially in small populations.

These distinctions help clarify how genetic and evolutionary processes operate at di?erent biological scales and contexts.

Emerging Trends and Research Directions

Recent developments in genomics and bioinformatics are revolutionizing unit 5 heredity and evolution genetics. Genome sequencing technologies allow for detailed mapping of genetic variation across populations, enabling studies on human ancestry, disease susceptibility, and evolutionary history. Epigenetics, which studies heritable changes not involving DNA sequence alteration, adds complexity to traditional heredity concepts.

Moreover, evolutionary developmental biology (evo-devo) integrates genetic and evolutionary studies to understand how developmental processes in?uence evolutionary changes in morphology and function. These interdisciplinary approaches broaden the scope of unit 5, making it a dynamic and evolving ?eld.

In the educational context, incorporating these advancements into the curriculum enhances students? critical thinking and prepares them for careers in genetics and evolutionary biology.

Unit 5 heredity and evolution genetics thus stands as a pivotal component of biological sciences, bridging the micro-level genetic mechanisms with macro-level evolutionary

outcomes. The continuous integration of classical theories with cutting-edge research ensures this unit remains relevant and insightful for contemporary scienti?c inquiry.

genetics, heredity, evolution, DNA, genes, natural selection, mutation, adaptation, genetic variation, inheritance

science explorer cells and heredity answers

Science Explorer Cells And Heredity Answers

Science Explorer Cells and Heredity Answers: Unlocking the Mysteries of Life

science explorer cells and heredity answers can open up a fascinating world of

discovery, especially for students and curious minds eager to understand how life works at its most fundamental level. Whether you're diving into the basics of cell structure, exploring the intricate processes of heredity, or seeking clear explanations to common questions, this article aims to o?er insightful, easy-to-grasp answers that align with the popular Science Explorer curriculum on cells and heredity.

Understanding the Basics: What Are Cells?

Cells are the building blocks of all living organisms. Just like bricks make up a house, cells make up every plant, animal, and human being. In the Science Explorer programs, cells are introduced as tiny, living units that perform all necessary functions to keep an organism alive.

Types of Cells

One common question in the science explorer cells and heredity answers revolves around

cell types. There are two primary categories:

Prokaryotic Cells: These are simple cells without a nucleus, like bacteria.

1.

Eukaryotic Cells: More complex cells with a nucleus, found in plants, animals,

2.

fungi, and protists.

Understanding these di?erences helps explain how organisms vary and function, which is

essential when studying heredity.

Key Cell Parts and Their Functions

Another common area where students seek science explorer cells and heredity answers is

the role of cell organelles. Each part of a cell has a speci?c job, including:

Nucleus: The control center that holds DNA.

1.

Mitochondria: Known as the powerhouse, producing energy.

2.

Cell Membrane: Protects the cell and regulates what enters and leaves.

3.

Chloroplasts: Present in plant cells, responsible for photosynthesis.

4.

Knowing these components lays the groundwork for understanding how traits are passed

on through heredity.

The Role of Heredity in Life

Heredity is the natural process by which traits are passed from parents to o?spring.

Science Explorer cells and heredity answers frequently highlight how genes inside cells determine characteristics such as eye color, height, and even susceptibility to certain diseases.

Genes, DNA, and Chromosomes

At the heart of heredity lies DNA?the molecule that carries genetic instructions. DNA is packaged into structures called chromosomes within the nucleus of a cell. Humans typically have 46 chromosomes arranged in 23 pairs.

Each gene is a segment of DNA that codes for a speci?c trait. Learning about how genes work helps clarify common questions found in science explorer cells and heredity answers, such as:

How do o?spring inherit traits from their parents?

1.

What causes genetic variation?

2.

Why do siblings sometimes look di?erent?

3.

Mendelian Genetics: The Foundation of Heredity

Gregor Mendel?s experiments with pea plants laid the foundation for modern genetics. By understanding dominant and recessive traits, students gain valuable insights into heredity. For example, if a trait is dominant, only one copy of the gene is needed for it to appear in the o?spring. Recessive traits require two copies.

This simple yet powerful concept often appears in science explorer cells and heredity answers, helping learners predict the likelihood of inheriting certain traits.

Connecting Cells and Heredity: How Traits Are Transmitted

Cells and heredity are tightly linked because heredity is all about the transmission of genetic material housed within cells. The process of cell division plays a crucial role here.

Types of Cell Division: Mitosis and Meiosis

Understanding mitosis and meiosis is key to grasping how heredity works.

Mitosis: This is the process by which a cell divides to produce two identical

1.

daughter cells. It?s how organisms grow and repair tissues.

Meiosis: A special type of cell division that produces reproductive cells (sperm and

2.

eggs) with half the number of chromosomes. This reduction is essential for maintaining chromosome numbers through generations.

Science explorer cells and heredity answers emphasize meiosis because it introduces genetic variation through recombination and independent assortment, which explains why

each child inherits a unique combination of traits.

DNA Replication and Mutation

Before a cell divides, it must replicate its DNA. Errors in replication can cause mutations,

some of which lead to genetic disorders or bene?cial adaptations. This topic often comes

up in science explorer cells and heredity answers as it sheds light on how traits can

change over time?not just pass unchanged from parent to child.

Practical Tips for Students Studying Cells and Heredity

If you?re working through a Science Explorer workbook or preparing for exams, here are

some helpful strategies to master cells and heredity concepts:

Visualize with Models: Use diagrams, 3D models, or digital apps to see cell

1.

structures and chromosome arrangements clearly.

Practice Punnett Squares: These grids help predict inheritance patterns and are

2.

a staple tool in understanding heredity.

Relate to Real-Life Examples: Observe traits in your family or plants you grow to

3.

see heredity in action.

Break Down Vocabulary: Words like ?genotype,? ?phenotype,? ?allele,? and

4.

?dominant? can be tricky?make ?ashcards or mnemonic devices to remember

them.

Ask ?Why? and ?How?: Instead of memorizing facts, try to understand why cells

5.

divide or how traits are passed on to deepen your comprehension.

Exploring Advanced Concepts: Beyond the Basics

For those who want to dive deeper into science explorer cells and heredity answers, topics such as genetic engineering, cloning, and epigenetics provide exciting frontiers.

Genetic Engineering and Biotechnology

Modern science allows scientists to modify DNA, which can lead to medical breakthroughs or improved crops. Understanding the basics of heredity is essential to appreciate these advances and their ethical implications.

Epigenetics: How Environment In?uences Genes

Not all hereditary traits are ?xed. Epigenetics studies how environmental factors can turn genes on or o?, in?uencing an organism?s traits without changing the DNA sequence itself. This fascinating area adds nuance to the traditional view of heredity.

Why Science Explorer Cells and Heredity Answers Matter

Grasping these concepts is more than just a school requirement?it?s about understanding what makes us who we are. From medical science to agriculture, knowledge of cells and heredity impacts many ?elds and everyday decisions.

By exploring these answers, learners build a foundation for future studies in biology, genetics, and even personalized medicine. The curiosity sparked by questions about cell function and heredity often leads to lifelong exploration and discovery.

Whether you are a student, educator, or simply a science enthusiast, delving into science explorer cells and heredity answers enriches your appreciation of life?s complexity and beauty.

Question

Answer

What are the key topics covered in Science Explorer Cells and Heredity?

Science Explorer Cells and Heredity covers fundamental concepts about cell structure and function, genetics, DNA, heredity patterns, and how traits are passed from parents to o?spring.

Where can I ?nd the answers to Science Explorer Cells and Heredity textbook questions?

Answers to Science Explorer Cells and Heredity textbook questions are often available in teacher?s editions, supplementary workbooks, or online

educational resources and forums dedicated to

science education.

How does Science Explorer

explain the process of heredity?

Science Explorer explains heredity by describing how

genetic information is stored in DNA, how genes are

inherited from parents, and how these genes

in?uence traits and characteristics in o?spring.

What are some common types

of cells discussed in Science

Explorer Cells and Heredity?

Common types of cells discussed include prokaryotic

and eukaryotic cells, plant and animal cells, as well as

specialized cells like muscle cells, nerve cells, and

blood cells.

How can students use Science

Explorer Cells and Heredity

answers to improve their

understanding?

Students can use the answers to check their work,

clarify di?cult concepts, reinforce learning, and

prepare for tests by reviewing key questions and

explanations provided in the Science Explorer Cells

and Heredity materials.

Science Explorer Cells and Heredity Answers: An Analytical Review

science explorer cells and heredity answers have become an essential resource for

educators, students, and science enthusiasts seeking to deepen their understanding of fundamental biological principles. This comprehensive educational tool supports the exploration of cellular biology and genetic inheritance, o?ering detailed explanations and solutions that clarify complex scienti?c concepts. By integrating these answers into learning modules, users are empowered to navigate the intricacies of cells and heredity with greater con?dence and accuracy.

The importance of accurate and accessible science explorer cells and heredity answers cannot be overstated in the context of modern education. As biological sciences continue to evolve, the demand for resources that e?ectively translate advanced topics into digestible content grows. These answers provide a structured pathway through the layers of cellular functions, genetic codes, and hereditary patterns, thus reinforcing critical thinking and analytical skills in learners.

Understanding the Scope of Science Explorer Cells and Heredity

Science Explorer is a widely recognized series of educational materials designed to

elucidate scienti?c concepts, with a particular focus on biology in the "Cells and Heredity" segment. The answers provided within these resources serve as both a guide and a veri?cation tool for students working through exercises related to cell structure, DNA, and genetic inheritance.

The Role of Cells in Biological Systems

At the heart of these explorations lies the cell, the basic unit of life. Science explorer cells and heredity answers often begin by addressing the structure and functions of various cell types, including prokaryotic and eukaryotic cells. Key features such as the nucleus, mitochondria, and ribosomes are detailed to illustrate their roles in maintaining cellular operations.

Understanding cells is fundamental because they form the building blocks for heredity. The answers provided clarify how cellular components contribute to the transmission of genetic information, highlighting the interdependence between cell biology and heredity.

Genetic Material and Heredity Mechanisms

Delving deeper, the science explorer answers unpack the complexities of DNA as the carrier of genetic information. This section typically covers the double helix structure, nucleotide composition, and the process of DNA replication. Additionally, the explanations focus on how genes encode for speci?c traits and how these traits are passed from parents to o?spring.

An analytical approach is often employed to compare Mendelian genetics with modern understandings of heredity, incorporating discussions on dominant and recessive alleles,

genotype versus phenotype, and the probability of trait inheritance. This comprehensive treatment allows users to appreciate both classical and contemporary perspectives on heredity.

Evaluating the Educational E?ectiveness of Science Explorer Cells and Heredity Answers

The pedagogical value of science explorer cells and heredity answers hinges on their clarity, accuracy, and alignment with curriculum standards. These answers aid in:

Reinforcing textbook content through step-by-step explanations.

1.

Providing immediate feedback to promote independent learning.

2.

Facilitating the application of theoretical knowledge to practical problems.

3.

Moreover, these answers often integrate diagrams and illustrations that support visual learning, enhancing comprehension of spatial and structural concepts within cell biology and genetics.

Comparative Analysis with Alternative Learning Resources

When compared to other educational aids such as interactive simulations or video lectures, science explorer cells and heredity answers o?er a distinct advantage in their succinctness and ease of reference. However, they may lack the immersive engagement

features found in multimedia tools. Therefore, their optimal use is often in conjunction with other resources to provide a holistic learning experience.

Common Challenges and Limitations

While these answers are invaluable, there are occasional challenges. Some users may ?nd the explanations too condensed for complex topics, necessitating supplemental reading. Additionally, the static nature of written answers may not address individual learning styles as dynamically as adaptive technologies.

Nevertheless, the structure and content quality of science explorer cells and heredity answers generally outweigh these limitations, particularly for reinforcing foundational knowledge.

Integrating Science Explorer Cells and Heredity Answers into Curriculum

Educators seeking to enhance biology instruction can e?ectively incorporate these answers to tailor lessons around student needs. For instance, using them as guided checkpoints during lessons ensures that students grasp essential concepts before progressing.

Strategies for Maximizing Learning Outcomes

Encourage collaborative review sessions where students discuss and analyze

1.

answer explanations.

Use the answers to create formative assessments that gauge comprehension in

2.

real-time.

Pair answers with hands-on experiments or digital simulations to bridge theory and

3.

practice.

Such strategies help solidify understanding and foster a more interactive and re?ective learning environment.

Impact on Student Performance and Engagement

Empirical data from educational studies suggest that access to well-structured answer keys like those in science explorer cells and heredity materials can improve test scores and conceptual retention. Furthermore, students report increased con?dence when they can verify their work and clarify misunderstandings promptly.

By demystifying complex biological processes, these answers contribute to sustained student interest in science, potentially in?uencing future academic and career choices in STEM ?elds.

Science explorer cells and heredity answers represent a critical component in contemporary science education. Their detailed, methodical approach to explaining cellular biology and genetics aligns well with the needs of learners navigating these foundational topics. While best utilized alongside complementary resources, these answers provide a reliable framework for mastering the principles of cells and heredity,

supporting both educators and students in the pursuit of scienti?c literacy.

science explorer cells, heredity answers, cell structure, genetics worksheet, biology study guide, DNA and genes, cell functions, inheritance patterns, science explorer workbook, heredity questions

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