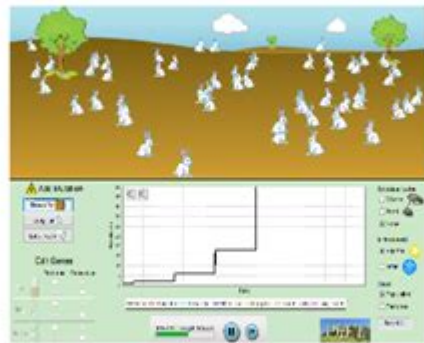


Natural Selection Bunny Simulation Answer Key

Name: _____

Natural Selection Simulation at PHET

This simulation is located on the school's server. See instructions on board to access the simulation.



1. When you first open the simulation, one bunny will be shown on your screen. If you don't do anything with the simulation, what happens to the bunny?

If you don't do anything with the simulation the bunny does not change and nothing else happens other than it hopping around the land.

2. The simulation allows you to control types of mutations that occur in the bunnies. Look for the area that says "add mutation." What kind of changes can you make to your bunny?

In the area that says "add mutation" you can add fur, ears, and teeth.

3. There are two selection factors listed that can also be changed. What are they?

The selection factors in the simulation that can be changed include wolves, tough food, and limited food.

4. What are the two environments you can choose?

You can choose a summer or winter environment.

5. Click on the RESET ALL button and you will get another bunny. This time, click the button that says "add a friend." What happens to the bunnies this time?

When you click "add a friend" the bunnies reproduce and eventually overpopulate as time goes on.

6. In nature, populations don't get out of control because there are limiting factors in the environment. Start your simulation over and click to add food as a selection factor. **Describe** what happens to the bunnies when food is added as a selection factor.

When food is selected as a limiting factor the bunnies are still able to reproduce just at a much slower rate and at times the population drops and increases.



7. Animals have adaptations that can help them survive in their environment. Reset the simulation and add the "long teeth" mutation to your bunnies and use "food" as your selection factor. **Describe** what happens to the bunnies this time.

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Natural Selection Bunny Simulation Answer Key: Mastering the Evolutionary Game

Are you struggling to understand the nuances of natural selection? Have you been tasked with completing a bunny simulation assignment and feeling overwhelmed by the complexity? This comprehensive guide provides a detailed, yet accessible, exploration of the natural selection bunny simulation, offering insights and an effective approach to analyzing the results. We'll go beyond simply providing answers and delve into the why behind the outcomes, helping you truly grasp the

principles of evolution in action. This post acts as your ultimate resource – a virtual answer key combined with a learning guide to unlock the mysteries of this engaging simulation.

Understanding the Natural Selection Bunny Simulation

The natural selection bunny simulation, a common tool in biology education, presents a simplified yet powerful model of how natural selection drives evolutionary change. It typically involves a virtual environment where bunnies with varying traits (e.g., fur color, speed, size) compete for survival and reproduction. Environmental factors, like predator presence or food availability, exert selective pressure, influencing which traits are advantageous and therefore more likely to be passed on to future generations.

Interpreting the Simulation Results: Key Factors to Analyze

The "answer key" isn't a single set of numbers; it's an understanding of the interplay between different variables. Successful analysis requires a focus on several key areas:

<h4>Initial Population Characteristics:</h4>

Before the simulation begins, consider the initial genetic diversity within the bunny population. A diverse population, with a wide range of traits, is better equipped to adapt to changing environmental conditions compared to a homogenous one. Analyzing the initial frequencies of each trait provides a baseline for tracking changes over time.

<h4>Environmental Pressures:</h4>

This is arguably the most critical aspect. Identify the specific selective pressures at play. Is there a predator that targets slower bunnies? Is food scarcity favoring smaller, more energy-efficient individuals? Understanding these pressures is crucial to predicting which traits will become more or less common.

<h4>Trait Frequency Changes Over Generations:</h4>

Observe how the frequency of each trait changes from generation to generation. A significant increase in the frequency of a particular trait suggests that it confers a selective advantage in the given environment. Conversely, a decline in frequency indicates a disadvantage. Graphing these changes visually can greatly enhance understanding.

<h4>Allele Frequencies:</h4>

Delve deeper by examining the changes in allele frequencies (the frequency of specific genes responsible for each trait). This analysis provides a more granular understanding of the genetic

mechanisms driving the observed changes in phenotype (observable traits).

<h4>Fitness Landscapes:</h4>

Advanced simulations may allow you to visualize fitness landscapes, which represent the relationship between a genotype (genetic makeup) and its reproductive success in a given environment. These visual representations can help you understand the complex interplay between different traits and their combined effect on fitness.

Analyzing Specific Scenarios and Potential "Answer Keys"

Let's consider some hypothetical scenarios and how to approach them:

Scenario 1: Brown vs. White Bunnies with a Predator

If a predator targets white bunnies against a brown background, you'd expect to see a significant decrease in the frequency of the white fur allele over time, leading to a predominantly brown bunny population. The "answer" here isn't a specific number, but the trend showcasing the adaptive advantage of brown fur in this environment.

Scenario 2: Fast vs. Slow Bunnies with Limited Food

If food resources are scarce, faster bunnies might have an advantage in accessing food, leading to increased reproductive success and a higher frequency of genes related to speed in subsequent generations. Again, the "key" is understanding the evolutionary pressure and its impact on trait frequencies.

Beyond the Numbers: Understanding the Underlying Principles

The true value of the bunny simulation lies not in memorizing specific numerical results, but in developing a conceptual understanding of natural selection. This includes grasping the role of variation, inheritance, differential reproduction, and adaptation in shaping the evolutionary trajectory of a population. The simulation provides a concrete example of these abstract concepts in action.

Conclusion

The natural selection bunny simulation, while seemingly simple, offers a powerful tool for grasping the complex mechanisms of evolution. This guide provided a structured approach to analyzing the results, emphasizing the importance of understanding environmental pressures, trait frequencies, and the underlying principles of natural selection. Remember that the “answer key” is not a set of numbers but a deep understanding of the evolutionary processes at play. Focus on interpreting the trends and the underlying biological principles, and you’ll master this valuable learning tool.

FAQs

1. What if the simulation results don't match my predictions? This is an excellent opportunity for learning! Analyze the discrepancies. Were there unforeseen environmental factors? Did you misinterpret the initial conditions? Revisiting your assumptions and refining your understanding is crucial.
2. Can I use this simulation to model other evolutionary scenarios? Absolutely! This model can be adapted to explore various evolutionary pressures and traits, making it a versatile tool for understanding evolutionary biology.
3. How accurate is this simulation as a representation of real-world evolution? While simplified, the simulation captures the core principles of natural selection. It's a valuable model for learning, though real-world evolution is far more complex and involves many additional factors.
4. What are some common pitfalls to avoid when interpreting the results? Avoid oversimplifying the analysis. Consider all possible factors, don't solely focus on one trait, and critically evaluate your assumptions.
5. Where can I find more information on natural selection simulations? Many educational websites and online resources offer detailed explanations and interactive simulations. A simple online search can lead you to various learning materials.

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changes our view of the world. This magnificent novel from the Nobel laureate and author of *Never Let Me Go* is “an intriguing take on how artificial intelligence might play a role in our futures ... a poignant meditation on love and loneliness” (The Associated Press). • A GOOD MORNING AMERICA Book Club Pick! Here is the story of Klara, an Artificial Friend with outstanding observational qualities, who, from her place in the store, watches carefully the behavior of those who come in to browse, and of those who pass on the street outside. She remains hopeful that a customer will soon choose her. *Klara and the Sun* is a thrilling book that offers a look at our changing world through the eyes of an unforgettable narrator, and one that explores the fundamental question: what does it mean to love?

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Optical Allusions is for those people seeking a painstakingly researched, scientifically accurate, eye-themed comic book adventure! Wrinkles the Wonder Brain has lost his boss's eye and now he has to search all of human imagination for it. Along the way, he confronts biology head on and accidentally learns more about eyes and the evolution of vision than he thought possible. And, as if a compelling story with disembodied talking brains, shape-changing proteins, and giant robot eyes wasn't enough, each tale is followed by a fully illustrated, in-depth exploration of the ideas introduced in the comic story. Designed to be a hybrid college text book/comic book, Optical Allusions is suitable for advanced readers with an interest in evolution and real science. 127 pages.

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chapter contains hands-on examples and exercises that are designed to teach you how to interpret the results and utilize those results in later phases - Written by an author who works in the field as a Penetration Tester and who teaches Offensive Security, Penetration Testing, and Ethical Hacking, and Exploitation classes at Dakota State University - Utilizes the Kali Linux distribution and focuses on the seminal tools required to complete a penetration test

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Program of Animal Care and Use, including roles and responsibilities of the Institutional Official, Attending Veterinarian and the Institutional Animal Care and Use Committee. Animal environment, husbandry, and management. A chapter on this topic is now divided into sections on terrestrial and aquatic animals and provides recommendations for housing and environment, husbandry, behavioral and population management, and more. Veterinary care. The Guide discusses veterinary care and the responsibilities of the Attending Veterinarian. It includes recommendations on animal procurement and transportation, preventive medicine (including animal biosecurity), and clinical care and management. The Guide addresses distress and pain recognition and relief, and issues surrounding euthanasia. Physical plant. The Guide identifies design issues, providing construction guidelines for functional areas; considerations such as drainage, vibration and noise control, and environmental monitoring; and specialized facilities for animal housing and research needs. The Guide for the Care and Use of Laboratory Animals provides a framework for the judgments required in the management of animal facilities. This updated and expanded resource of proven value will be important to scientists and researchers, veterinarians, animal care personnel, facilities managers, institutional administrators, policy makers involved in research issues, and animal welfare advocates.

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on today's risk management on the ground and in the air. The book offers the latest procedures, flight technologies, and accident statistics. You will learn about new and evolving challenges, such as lasers, drones (unmanned aerial vehicles), cyberattacks, aircraft icing, and software bugs. Chapter outlines, review questions, and real-world incident examples are featured throughout. Coverage includes: • ICAO, FAA, EPA, TSA, and OSHA regulations • NTSB and ICAO accident investigation processes • Recording and reporting of safety data • U.S. and international aviation accident statistics • Accident causation models • The Human Factors Analysis and Classification System (HFACS) • Crew Resource Management (CRM) and Threat and Error Management (TEM) • Aviation Safety Reporting System (ASRS) and Flight Data Monitoring (FDM) • Aircraft and air traffic control technologies and safety systems • Airport safety, including runway incursions • Aviation security, including the threats of intentional harm and terrorism • International and U.S. Aviation Safety Management Systems

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and dissolution of these technologies. In the course of her book, she explores five interrelated spaces where electronics fall apart: from Silicon Valley to Nasdaq, from containers bound for China to museums and archives that preserve obsolete electronics as cultural artifacts, to the landfill as material repository. *Digital Rubbish: A Natural History of Electronics* describes the materiality of electronics from a unique perspective, examining the multiple forms of waste that electronics create as evidence of the resources, labor, and imaginaries that are bundled into these machines. Ranging across studies of media and technology, as well as environments, geography, and design, Jennifer Gabrys draws together the far-reaching material and cultural processes that enable the making and breaking of these technologies.

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convey the knowledge, skills, and abilities required of a strength and conditioning professional and to address the latest information found on the Certified Strength and Conditioning Specialist (CSCS) exam. The evidence-based approach and unbeatable accuracy of the text make it the primary resource to rely on for CSCS exam preparation. The text is organized to lead readers from theory to program design and practical strategies for administration and management of strength and conditioning facilities. The fourth edition contains the most current research and applications and several new features: Online videos featuring 21 resistance training exercises demonstrate proper exercise form for classroom and practical use. Updated research—specifically in the areas of high-intensity interval training, overtraining, agility and change of direction, nutrition for health and performance, and periodization—helps readers better understand these popular trends in the industry. A new chapter with instructions and photos presents techniques for exercises using alternative modes and nontraditional implements. Ten additional tests, including those for maximum strength, power, and aerobic capacity, along with new flexibility exercises, resistance training exercises, plyometric exercises, and speed and agility drills help professionals design programs that reflect current guidelines. Key points, chapter objectives, and learning aids including key terms and self-study questions provide a structure to help students and professionals conceptualize the information and reinforce fundamental facts. Application sidebars provide practical application of scientific concepts that can be used by strength and conditioning specialists in real-world settings, making the information immediately relatable and usable. Online learning tools delivered through HKPropel provide students with 11 downloadable lab activities for practice and retention of information. Further, both students and professionals will benefit from the online videos of 21 foundational exercises that provide visual instruction and reinforce proper technique. Essentials of Strength Training and Conditioning, Fourth Edition, provides the most comprehensive information on organization and administration of facilities, testing and evaluation, exercise techniques, training adaptations, program design, and structure and function of body systems. Its scope, precision, and dependability make it the essential preparation text for the CSCS exam as well as a definitive reference for strength and conditioning professionals to consult in their everyday practice. Note: A code for accessing HKPropel is not included with this ebook but may be purchased separately.

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natural selection bunny simulation answer key: The Origins of Self Martin P. J. Edwardes, 2019-07-22 The Origins of Self explores the role that selfhood plays in defining human society, and each human individual in that society. It considers the genetic and cultural origins of self, the role that self plays in socialisation and language, and the types of self we generate in our individual journeys to and through adulthood. Edwardes argues that other awareness is a relatively early evolutionary development, present throughout the primate clade and perhaps beyond, but self-awareness is a product of the sharing of social models, something only humans appear to do. The self of which we are aware is not something innate within us, it is a model of our self produced as a response to the models of us offered to us by other people. Edwardes proposes that human construction of selfhood involves seven different types of self. All but one of them are internally generated models, and the only non-model, the actual self, is completely hidden from conscious awareness. We rely on others to tell us about our self, and even to let us know we are a self.

natural selection bunny simulation answer key: Computational Thinking Education Siu-Cheung Kong, Harold Abelson, 2019-07-04 This This book is open access under a CC BY 4.0 license. This book offers a comprehensive guide, covering every important aspect of computational thinking education. It provides an in-depth discussion of computational thinking, including the notion of perceiving computational thinking practices as ways of mapping models from the abstraction of data and process structures to natural phenomena. Further, it explores how computational thinking education is implemented in different regions, and how computational thinking is being integrated into subject learning in K-12 education. In closing, it discusses computational thinking from the perspective of STEM education, the use of video games to teach computational thinking, and how computational thinking is helping to transform the quality of the workforce in the textile and apparel industry.

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information, overcoming blocks to creativity, and viewing problems from a variety of perspectives.

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