Changes over time evidence of evolution worksheet answers

And observations of inferences and assumptions generated by those inferences have been tested. For example, particle physicists can't observe atomic particles directly because the particles are too small. They must infer about the weight, speed and other properties of the particles, according to other observations, the logical hypothesis may be this: if the weight of this particle is Y when the X bomber is formed. If X does not occur, the hypothesis will be proven. So we can learn about the natural world, even if we can't observe the phenomenon directly, and that's the truth about the past as well. In historical sciences such as astronomy, geology, biology, evolution and archaeology, logical inferences are made and tested with data. Sometimes tests can't be done until there's new information, but there's a great deal to help us understand the past. For example, scorpions (Mecoptera) and real flies (Diptera) are similar enough that entomologists consider them closely related. The scorpion has four wings of the same size, and the real flies have large wings. But the latter pair will be replaced by a small club-shaped structure. If Diptera develops from Mecoptera based on comparative anatomy, suggesting scientists speculate that fossil flies with four wings may be found, and in 1976 this was what was discovered. In addition, geneticists found that the number of wings in flies can be altered through mutations in a single gene. Evolution is a well-funded theory from a wide range of sources, including observations on fossil records, genetic data, plant and plant distribution, and similarities in anatomical and developmental species. Scientists have inferred that the descent with adaptation provides the best scientific explanation for these observations. Is evolution true or theoretical? Evolutionary theory explains how life on Earth has changed. In scientific terms, theory doesn't mean guessing or hunching, just like it's used in everyday life. Scientific theory is a description of natural phenomena created rationally by the observable and testable hypotheses. Biological evolution is the best scientific explanation we have for many observations about the living world. Most scientists often use the term truth to describe observations, but scientists can also use the truth to refer to what has been tested or observed many times as no longer an interesting reason to test or look for samples. The evolution in this sense is true. Scientists do not question whether adaptations occur because the evidence that supports the idea is very strong. Why does evolution not be called the law? The law is a common trait that describes the phenomenon as the theory explains. For example, the law of thermodynamics explains what will happen in certain situations. Thermodynamic theory explains why these events occur. Laws such as facts and theories can be changed with better information. But the theory is not developed into a law with accumulated evidence, but is the theory the goal of science? The scientific consensus on evolution is overwhelming. Those who oppose evolutionary teaching sometimes use words from prominent scientists out of context to claim that scientists do not support evolution. However, a quotation review revealed that scientists are arguing some aspects of how evolution occurs, not whether evolution occurs. For example, biologist Stephen Jay Gould once wrote that the very rare form of change in fossil records remains the commercial secret of paleontology, but Gould, a successful paleontologist and thoughtful educator on evolution, is arguing over how evolution occurs. He is talking about how the rate of change in species is constant and gradually occurs after a small change, which is thought to be known as the punctured balance. As Gould wrote in response, this quotation, albeit accurately as some reference, dishonestly in leaving the material described following my true objective show— to discuss the rate of evolutionary change, does not deny the truth of evolution itself. Teaching about the evolution and nature of science, Washington, D.C.: National News Agency: 10.17226/5787. × 6Activities For a tutorial on the evolution and nature of science, previous chapters in this volume answered what questions and why the questions of teaching about the evolution and nature of science. Real play occurs when science teachers act on basic content and arguments with good reason for combining the evolution and nature of science in the school's science program. It presents an example of an tutorial teaching the investigation of eight activities that science teachers can use when they begin to develop the understanding and capabilities of students in the evolution and nature of science. The following descriptions briefly guide each activity. This activity introduces basic steps related to inquiries and concepts that describe the nature of science. In the first part of the activity, teachers use numerical cubes to engage students in asking questions, what is the invisible bottom of the cube? The teacher presents the student with a second cube and asks them to use the available evidence to offer an explanation for what is at the bottom of this cube. Eventually, the students designed the cube they exchanged and used it for evaluation. This activity provides students with the opportunity to learn the ability and understanding that corresponds to science as an inquiry and characteristics of science as described in the National Science Education Standards.1 Designed for grades 5 through 12, this activity requires a total of four classes. A lower grade level may complete the first cube and evaluate the student's problem-based problem. This activity cube uses the concept of natural selection to introduce the concept of defining and testing scientific assumptions. Teachers provide information and give students time to think, interact with friends, and offer explanations for the observations described by the teacher. Teachers will then provide more information and students are still discussing, according to new information. This activity will help students in grades 5 through 8th grade develop capabilities related to scientific inquiries and to establish an understanding of the nature of science. This activity is designed for grades 9 through 12 and takes three classes, and students define descriptions and models that simulate the structure and biochemistry pages 62 share recommended reference information: Chapter 6: Activities for Teaching about Evolution and The Nature of Science, National Academy of Sciences 1998. × they examined the misunderstandings that humans developed from monkeys, the investigation took 45 minutes and 2 minutes, they were designed for use in grades 9 through 12 in this investigation. Estimated time requirement for this activity: Two class periods This activity is designed for grades 5 through 8, comparing the size of geological time to the duration within a person's life is difficult for many students. In this activity, students used long paper strips and the right size to show all geological time, including milestones in the development of life on Earth, as well as recent human events. Up to 12 activities use historical perspectives and patterns of evolution to introduce students to the nature of science. Teachers have students read a brief excerpt of the original text about evolution from Jean Lamarck, Charles Darwin and Alfred Russell Wallace. These activities are intended as a supplement to other investigations or core activities. Designed for grades 9 through 12, activities should be used as part of three tiers. In this activity, students develop a form of mathematical characteristics of population growth. The investigation provides a great opportunity for determining the population growth of plants and plant species and plant species, and its association with mechanisms to promote natural selection. This activity must have two tiers and is suitable for grades 5 through 12. They are instead directed for other purposes. Firstly, they offer examples of standard teaching materials. In this case, the level of the organization is an activity - one lesson to five days, and not an organization on a larger scale, such as units, weeks, semester or one year. In addition, these exercises generally do not use biological materials such as fruit flies or computer simulations. The use of these teaching materials in the course greatly expands the range of possible investigations. Secondly, these activities show that existing exercises can be recast to emphasize the importance of inquiry and the basic concepts of evolution. Each of these exercises is derived from existing activities that have been modified to reflect national science education standards. For each exercise, the results of students drawn from the standard are indicated to focus on the concepts and abilities that students have to develop. Third, the activity represents some, but not all of the criteria for the course to be described in Chapter 7, for example, many activities focus on the inquiry and the nature of science, while others focus on concepts related to evolution. All activities use the teaching model described in the next section that increases consistency and improves learning. Finally, there is still a paucity of teaching materials for teaching the evolution and nature of science. Science teachers who are aware of this need are encouraged to develop new materials and lessons to introduce patterns of evolution and the nature of science (see ://www4.nas.edu/opus/evolve.nsf) for students to develop an understanding of the evolution and nature of science, requiring years and a variety of educational experiences. Page 63 share suggested reference information: Chapter 6: Activities for teaching about the evolution and nature of science, National Academy of Sciences 1998. × teachers can't rely on lessons, chapters or world biology and science courses for students to combine the ideas presented in this document with their own understanding. Grade students (K-4) may learn basic concepts related to the characteristics of life cycle and organisms and environments. In middle grade, they learn more about 'reproduction and reproduction' and the diversity and adaptation of organisms. Such learning experiences, as described in the National Science Education Standards, set a solid foundation for the study of biological evolution in grades 9-12, the development of slow and stable concepts such as evolution and related concepts, such as natural selection and general descent, requires careful consideration of the overall structure and sequence of learning experiences. Although this chapter does not offer a curriculum or curriculum framework, the current efforts by Project 2061 of the American Association for Scientific Progress (AAAS) demonstrate the relevant nature of a student's understanding of scientific concepts and highlight the importance of well-designed courses at many levels of the organization (such as activities, units and school science programs). The numbers on the next page present. A growing map of understanding for evolution and natural selection, according to the benchmark for science literacy.2 The activities in the chapter consist of a summary instruction form in the accompanying box with five stages: participation, exploration, explanation, explanation and evaluation, as well as scientific investigations originating from questions that engage with scientists, so students must participate in learning activities. The activity therefore begins with a strategic question that students think about the content of the lesson. When engaging, students need time to explore ideas before the concept begins to make sense. In this survey process, students try ideas, ask questions and look for possible answers to questions. Students use query strategies. They try to form engage teaching, this step of the teaching model, start learning work, learning activities should be. (1) Establish a link between past and present learning experiences and (2) activities that anticipate and focus students' thinking on the learning outcomes of current activities. Students should be mentally involved in concepts, processes or skills to explore. Exploring this term of teaching model helps students have a common base of experience in which they identify and develop current concepts, processes and skills. During this process, students xxxxx actively explore the environment or manage materials. Describe the process of this teaching model, focusing on the interests of students. Specific aspects of their experience, participation and exploration, and provide an opportunity for them to develop explanations and assumptions. This term also allows teachers to introduce formal labels or definitions for concepts. processes, skills, or behavior. Explain this term of teaching techniques and expand their understanding of students' concepts and allow students to test their assumptions and practice their preferred skills and behaviors. With new experiences, students will develop a deeper understanding, get more information and develop and refine their skills. Assessing this term teaching model encourages students to evaluate their understanding and abilities and allow teachers to evaluate students' progress in achieving their educational objectives. Page 64 shares the recommended reference information: Chapter 6: Activities for Teaching about The Evolution and Nature of Science National Academy of Sciences 1998. Teaching about evolution and science ×, Washington D.C. 65 Share Featured Reference: Chapter 6: Activities for Teachings for The Evolution and Nature of Science, National Science Institute × 10.17226/5787. In the third step, students can offer answers and develop assumptions. In addition, at this stage, the teacher explains what scientists know about the question. This is a step that teachers should make the core concepts clear and clear for students. Educators understand that informing students about concepts doesn't necessarily result in immediate understanding and understanding of thoughts. These activities therefore provide a procedure called elaboration, in which students have the opportunity to put their ideas in new and slightly different situations. Finally, how well do students understand the concept, or how successful did they apply the skills they needed? This is a question to answer during the evaluation process. It's good that the evaluation is more than just a test. Students should have the opportunity to see if their ideas can be used in new situations and to compare their understanding with scientific explanations of the same phenomenon. Teaching about the evolution and nature of science Washington, D.C.: National News Agency Doi: 10.17226/5787 ×. In the first part of the activity, Use a numeric cube to engage students in asking questions. Then the teacher presents the student with a second cube and asks them to use the available evidence to offer an explanation for what is at the bottom of the cube. Eventually, the students designed the cube they exchanged and used it for evaluation. This activity provides students with the opportunity to learn the ability and understanding that corresponds to science as an inquiry and characteristics of science as described in the National Science Education Standards. Designed for grades 5 through 12, this activity requires a total of four classes. A lower grade level may complete the first cube and evaluate the student's problem-based problem. This activity cube provides an opportunity for all students to develop the capabilities of scientific inquiries as described in the National Science Education Standards. In particular, it allows them: identify questions that can be answered through scientific audits, design and conduct scientific audits, use appropriate tools and techniques to collect, analyze and interpret data, develop explanations, explanations, predictions and models, using important and rational thought evidence, to establish a correlation between evidence and explanations, recognition and analysis, explanations and alternative predictions, and communicate scientific procedures and explanations. The activity also provides an opportunity for all students to develop an understanding of the inquiry and the nature of the science as described in the National Science Education Standards. Specifically, it introduces the following concepts: different types of questions, introduces different types of scientific examinations, current scientific knowledge, and understanding of scientific investigative manuals. Scientific explanations emphasize evidence, have consistent arguments, logic and use of scientific principles, models and theories. Science distinguishes itself from other ways of knowing and from other bodies of knowledge through the use of empirical standards, logical arguments and suspicions, since scientists strive to best explain the natural world. The pursuit of scientific explanations often begins with questions about natural phenomena. Science is a way to develop answers or improve explanations for observations or events in the natural world. Scientific questions can emerge from a child's curiosity about where dinosaurs went, or why the sky is blue, or the question can amplify the question of scientists in the extinction process or the chemistry of ozone loss. When asking questions, then the process. The question begins and may finally have an answer or explanation offered. Important aspects of science include curiosity and the freedom to pursue that curiosity. Other attitudes and habits of the mind that characterize the scientific inquiry and activities of scientists include intelligence, honesty, suspicion, tolerance to ambiguity, openness, 67, sharing suggested references: Chapter 6: Activities for teaching about the evolution and nature of science, the National Academy of Sciences × 1998. Scientific inquiries include systematic methods of observation, data collection, identifying key variables, defining and testing assumptions and measurements that are accurate, precise and reliable. Understanding and designing experiments is also part of the inquiry process. Scientific explanations are more than just the results of collecting and organizing information. Scientists are also involved in important processes such as the creation of complex modeling laws and the development of hypothesis based on data. These processes expand exponentially and combine observation and information, and are very important in developing deeper and wider explanations. For example, the tax system of the organism, the periodic table of elements and the theory of general lineage selection and natural selection. One aspect of science is that many explanations are constantly changing. Two types of changes occur in the scientific description: a new description has been developed and the old description has been corrected. Just because someone asks a question about an object, a creature or an event in nature does not mean that the person is pursuing a scientific explanation. Among the conditions that must be found, so that the scientific explanation is as follows: scientific explanations are based on empirical observation or experimentation. An appeal to the authority as a valid explanation does not meet the requirements of science. Observation is based on experience, feeling, or amplifying feelings through technology. Scientific explanations will be made public. Scientists presenting them at scientific conferences or publishing professional journals make knowledge public and available to other scientists, tentative scientific explanations. The description can be made and changed. There is no scientific truth in absolute terms. The scientific explanation is history. Historical descriptions are the basis for contemporary descriptions, and those descriptions form the basis for future descriptions. Scientific explanations are probabilistic, statistical views of nature apparently implicit or clear when identifying scientific predictions of phenomena or explaining the possibility of events in real-world situations. Assuming the resulting relationship, most science focuses on defining causal relationships and developing explanations for interactions and links between objects, organisms and activities. The difference between causation, relationship, coincidence and emergency science, separate from pseudoscience, scientific explanations are limited. Scientific explanations are sometimes limited. With technologies such as the editing power of microscopes and telescopes, new technologies may result in new fields of inquiry or expanding the current area of study. The interaction between technology and advances in molecular biology and the role of technology in planetary exploration is exemplary. Science can't answer all the questions. Many questions related to the meaning of life, ethics and theology are examples of questions that science cannot answer. Referred to the National Science Education Standard for Science as an inquiry (pages 145-148 for grades 5-8 and pages 175-176 for grades 9-12), history and nature of scientific standards (pages 170-171 for grades 5-8 and Chapter 3 of this document also discusses the nature of science, 1 cube for each group of four students (with a black master's degree). If so, create one large cube using a cardboard box. The sides should have the same numbers and marks as the black line master.) 10 small probes, such as depressed tongues or pencils The participants begin by asking the class to tell you what they know about the work of scientists. How can they explain the scientific investigation? To get students to think about the process of science, page 68 share the recommended reference: Chapter × 6: Activities for teaching about the evolution and nature of science, National Academy of Sciences 1998. This is an opportunity for you to evaluate your current understanding of science. Accept students' answers and record important ideas on overheads or blackboards. Explore (the first cube activity can be done as a demonstration if you create a large cube and place it in the middle of the room). First, students create three or four groups. Place the cube in the middle of the table where the student is working. Students should not touch, rotate, lift or open a cube. Tell students that they need to identify questions related to the cube. Allow students to identify their questions Possible questions include: What is in the cube? What is at the bottom of the cube? What? Stay below? Should you bring students to the general question, what is at the bottom of the cube? Tell students that they must answer the question by offering an explanation, and they must convince you and other students that their answers are based on evidence (evidence means group observations can be made about the visible side of the cube), give students time to explore the cube and develop answers for their questions. Some observations or statements about the fact that students may make include: the cube has six sides. The exposed side has numbers 1, 3, 4, 5, and 6 on the opposite side, rising to seven. Student groups should be able to make statements such as: We conclude there are 2 at the bottom. Students should present their reasons for this conclusion. For example, they may conclude their conclusion in the observer that the exposed side is 1, 3, 4, 5 and 6, and because 2 are missing from the sequence, they are below the conclusion. Use this opportunity to allow students to develop ideas that combine two different observations, but it involves reasoning, creating strong explanations, for example, 2 missing in sequence (that is, 1, _, 3, 4, 5, 6) and the opposite side, rising to 7 (that is, 1-6; 3-4; _-5), and because 5 is on top and 5 and 2 equals 7, 2 may be below. If it's a demonstration, you may remove the cube without showing it below or allow students to dismantle it. Explain that scientists are often unsure about their proposed answers and often have no way of knowing the exact answer to scientific questions. For example, the exact age of the star and the cause of the extinction of prehistoric creatures will support the issue. Describe the start of the class period with a description of how the activity simulates scientific inquiries and provides a model for science. Structure discussions so that students build a connection between their experiences with cubes and key points (understanding) that you want to develop. Science uses observation to create an explanation (the answer to the question). The more you support the proposed description, the stronger your description will be, even if you can't confirm the answer by checking the bottom of the cube. Scientists make their explanations publicly through presentations at professional meetings and journals. Scientists offered explanations and criticized the explanations offered by other scientists. The activity does not explicitly explain how scientifically students need to work to answer questions and may do so in a less erratic way. The identifiable elements of the method, such as observation, data, and assumptions, are clear but not systematically applied. You can use experience to point out and clarify the use of scientific terminology, such as observation, assumptions and data. Teaching about the evolution and nature of science Washington, D.C.: National News Agency Doi: 10.17226/5787 ×. Historical examples like Charles Darwin are ideal. You can also assign students to prepare a short report that they present. Describe the main purpose of the second cube is to expand the concepts and skills used in previous activities and to introduce the role of experimental forecasting and technology use in scientific inquiries. The problem is the same as the first cube: what is at the bottom of the cube? Divide the classes into three groups and instruct them to observe and offer answers about the bottom of the cube. Students should record a fact statement about the second cube, allowing students to identify and organize their observations. If the student is too frustrated, give useful advice. The key information from the cube is as follows (see black line master): The exposed side is either male or female. Opponents have male names on one side and female names on the other. The name on the opposite side begins with the same letter. The numbers in the upper-right corner of each side correspond to the number of letters in the name on that side. The numbers in the lower-left corner of each side correspond to the number of first letters the opposite name has in common. The number of letters in the five-sided title revealed progress from three (Rob) to seven (Roberta). Four names of all women may be at the bottom of the cube: Fran, France, France and France, because there is no data to show the exact name. Tell a group of students that scientists use patterns in the data to make predictions and then design experiments to assess the accuracy of their predictions. This process also creates new data, telling groups to use observation (data) to predict the numbers in the upper-right corner of the bottom. The forecast seems to be 4, 7 or 8, so the team decides which corner of the bottom they want to monitor and why they want to check. Students may find it. To determine the angle, they should check. Let them fight this and even make mistakes, this is part of the science! One student was given appliances such as tweezers, probes or depressive machines, tongues and mirrors. Students may lift a given angle less than one inch and use a mirror to see under the corner. This simulates the use of technology in scientific investigations. Please note that students use technology to expand observation and understanding of cubes, although they do not specify the angles that reveal the most effective evidence. If students observe the angle with the most effective information, they will discover the 8 at the bottom. This observation confirms or rejects the student's working hypothesis. Francine or France are two possible names at the bottom. Students offer their answers for questions and design another experiment to answer questions. Place the cube away without disclosing the bottom. Each group of students presents a short report on their investigation. There are two parts to evaluate. Firstof all, in a group of three students must create a cube to be used as an evaluation exercise for other groups. After the class period to develop a group cube, students should exchange cubes. They should follow the same rules, for example, they can not get a cube. Groups should prepare written reports about cubes developed by their peers (you may have students present oral reports using the same pattern). The report should include the following: The title of the question as they pursue observation of new experimental data, page 70, share the recommended reference information: Chapter 6: Activities for Teaching about The Evolution and Nature of Science, National Academy of Sciences 1998. Teaching about the evolution and nature of science, Washington, D.C.: National News Agency, Doi: 10.17226/5787. × that offer answers and data supporting diagrams at the bottom of the cube and introduce additional experiments. Remember that this activity is an evaluation. You may provide useful advice, especially for information, but because of the assessment for the inquiry and the nature of the science, you should. Limited Information you provide in those topics Student groups should fill out and deliver on their reports. If a group of students can't agree, you can use the student group to You may want to prepare for individual or minority reports, you may want the group to have oral reports (Science You have two opportunities to evaluate students in this activity: you can evaluate your understanding of the inquiry and the nature of the science as they design the cube, and you can evaluate their abilities and understanding as they figure out unknown cubes. Teaching about the evolution and nature of science Washington, D.C.: National News Agency: 10.17226/5787 ×. Teachings on the Evolution and Nature of Science, Washington, D.C.: 10.17226/5787. ×Page 73 Share Recommended Reference Information: Chapter 6: Activities for Teaching About Evolution and Nature Sciences Institute 1998. Teaching on the Evolution and Nature of Science, Washington, D.C.: National News Agency Doi: 10.17226/5787. × 74 Share Featured Reference Information:Chapter 6: Activities for Teaching about Evolution and Nature of Science, Academy of Sciences A teaching on the evolution and nature of science, Washington, D.C.: National News Agency Doi: 10.17226/5787 ×. Teachers provide information and give students time to think, interact with friends, and offer explanations for the observations described by the teacher. Teachers will then provide more information and students are still discussing, according to new information. This activity will help students in grades 5 through 8 develop several capabilities related to scientific inquiries and to establish an understanding of the nature of science, as presented in the National Science Education Standards. This activity has been adapted with the permission of BSCS: Biology Teacher's Guide3 This activity provides an opportunity for all students to develop the ability of scientific inquiries as described in the National Science Education Standards. In particular, it allows them: identifying questions that can be answered through scientific audits, designing and conducting scientific audits, using appropriate tools and techniques to collect, analyze and interpret data, develop explanations, explanations, predictions and models, using important and rational thought evidence, to establish a correlation between evidence and explanations, recognition and analysis, and alternative forecasts, and communicate scientific procedures and explanations. In particular, it conveys the following concepts: different types of questions, recommendations of various types of scientific examinations, current scientific knowledge, and understanding of scientific investigative manuals. Scientific explanations emphasize evidence, have consistent arguments, logic and use of scientific principles, models and theories. Species evolve over time. Evolution is the result of the interaction of (1) the potential for the species to increase the number of (2) genetic variability of offspring due to mutations and gene incorporation, (3) supply. And (4) choosing those offspring can survive better and leave offspring in a particular environment. Many biological theories can be imagined as developing in five related and overlapping stages. The first is the period of extensive natural observation or analysis of experimental results. Darwin's observations are an example of the past. Secondly, these observations led scientists to ponder the question of ''how' and why. Thirdly, in most cases, scientists submit the hypothesis to a rigorous formal test to determine the validity of the hypothesis. At this point, assumptions can be confirmed, falsified and rejected (not supported by evidence) or evidence-based correction. This is a trial process. Fourth, scientists offer formal explanations by presenting public presentations at professional meetings or publishing their results in peer-reviewed journals. Finally, the acceptance of the explanation is accepted by other scientists. When they start referring to and using descriptions in their research and publications. Teachings on the evolution and nature of science Washington, D.C.: National News Agency Doi: 10.17226/5787 ×. Chapters 2 and 3 of this document provide additional discussion on these issues. A review of the History and Nature section of Science and Science is an inquiry of national scientific education standards for additional background on scientific investigations. Engage students to work in groups of two or three. Start with the involvement of students with problems and the basic information they need to set assumptions. For students: Farmers are working with dairy farmers. Agricultural Experimental Station The population of flies in the barn where cows live is so large that the health of the pet is affected. Therefore, farmers spray barns and cows with an insecticide solution, A insecticide kills almost all flies. However, some time later, the number of flies is large again. Farmers spray with insecticides again. The result is similar to that of most first spraying, but not all of the flies are killed. Again, within a short time, the population of flies increases, and they are sprayed with insecticides again. The sequence of this event is repeated five times, then it is obvious that insecticide A is less effective at killing flies. Imagine that farmers consult educators, let a group of students discuss the issue and prepare several different assumptions for observation. They should share their results with the class. Students may offer an explanation similar to the following: the decay of insecticide A with age. Insecticides are effective only under certain environments, such as certain temperatures and humidity levels, which change during operation. The most genetically sensitive flies of insecticides are selectively killed (this item should not be stimulated at For students: One farmer said that a large batch of insecticide solutions were created and used in all spraying. Therefore, he suggests the possibility that the insecticide solution will decompose by age, allowing the group of students to recommend at least two different methods to test this hypothesis. Students may propose that examining several different predictions of assumptions contribute to the reliability of the drawn conclusions. In the current case, one method is to use a spray of different ages in different fly populations. Very different methods are composed of chemical analysis of fresh and old solutions to determine if changes occur. For students: Student researchers made a new batch of insecticide A, they used it instead of the old one in the renewed flying population at the farmer's barn. However, despite the freshness of the solution, only a few flies died. The same set of insecticides then tried on the population, flying at another barn several miles away. In this case, the results are the same as they were at first seen at the experimental station, that is, most flies were killed. Here are two very different results with a new set of insecticides. In addition, the effective spraying weather of distant barns is the same as when using a spray without success at the experimental station. Stop and give a group of students Observing and listing the main components of the problem and subsequent hypotheses. They may list what they know, what they offer as an explanation and what they can do to test their explanation. Students may identify the following: something about insecticides. Conditions for the use of insecticides Teaching about the evolution and nature of science, Washington, D.C.: National News Agency: 10.17226/5787 ×. For students: Until now, our hypothesis has only been associated with a few of these components. Which one? The hypothesis so far has only concerned something about insecticides and conditions that use insecticides. Items 1 and 2 above For students: The advantages of analyzing the problem, as we have done in our list, consist of the fact that it allows us to see that the possibilities that we have not considered. What are the possibilities on the list that we do not consider in formatting our assumptions? List of 3 methods that use insecticides may be tracked as further exercise if the teacher wants to. However, it should be paid attention to the list of 4 organisms that use insecticides. This list has been developed further. Explain to students: Let us see if we can monitor the interaction between insecticide A and flies. From your knowledge of biology, think about what might happen within the fly population to take into account the reduced effectiveness of insecticides. A student may need help here, even if they learn something about evolution and natural selection. Here's one way to help: Ask students to remember that after the first spraying, most, but not all of the flies, are killed. Ask them where the new population of flies comes from, who is the parent of the next generation of flies? Are parents among flies more susceptible or more resistant to the effects of insecticide A? Then warn them that the barn is sprayed again. If there is a difference in population to insecticides, sensitivity to sensitivity, which individuals are more likely to survive this spraying? Warn them that dead flies do not produce offspring. Students may lead to the view that natural selection in this case in a given environment (the presence of insecticides) may result in the survival of those individuals who are best adapted to live in a new environment (one with insecticides), since this activity focuses on the determination of explanations, so it is important to introduce students to the scientific processes they use. It is a discussion of national science education standards that can serve as the basis for the explanation phase of the activity. 4 Model proof and description consists of observation and information to base scientific explanations. Using evidence to understand interactions allows individuals to predict changes in natural systems and design. A model is an unstable layout or structure that corresponds to an event object or class of real events and is energetic and explanatory. Models help scientists and engineers understand how things work. Models come in many forms, including physical objects, mental structure plans, mathematical equations, and computer simulations. Scientific explanations combine existing scientific knowledge and new evidence from experimental observations or models into corresponding logical statements within. Terms such as assumptions, models, laws, principles, theories, and paradigms are used to describe different types of scientific explanations. As students develop, and when they understand more scientific concepts and processes, their explanations should be more complex. That is, their scientific explanation should more often include a rich scientific knowledge base, evidence of logic, higher analytical levels, greater tolerance of criticism and uncertainty, and a clear demonstration of the relationship between evidence logic and current knowledge. Explaining in detail to students for new problems such as one of finch5's oral investigations or Dreampond's Darwin6, give them page 77 to share the recommended reference: Chapter 6: Activities for Teaching about Evolution and Nature of Science, National Academy of Sciences 1998 ×. Students should emphasize the role of assumptions in developing scientific explanations. Let's say a group of farmers notice a gradual acquisition of resistance to insecticide A over a period of several months. They find the other two equally effective, although chemically unrelated insecticides, insecticides. B and C, the Local Department of Agriculture set up a project by all farmers in the state to use insecticide A for the current year only. No one used insecticideS B or C in later years, everyone was directed to use insecticide B more than insecticide A, the fly population, which is resistant to insecticide A, is now more susceptible to insecticide B and can be controlled more thoroughly if farmers continue to use insecticide A. At the beginning of the third year, all farmers began using insecticide C, which significantly reduces the population of flies. The fourth year begins, insecticide A is used again and proves again that it is extremely effective against flies. How do they design an investigation to support or reject their assumptions? Teaching about the evolution and nature of science, Washington, D.C.: National News Agency Doi: 10.17226/5787 ×. This activity is designed for grades 9 through 12 and requires three classes. This activity has been adapted with the permission of BSCS Biology: Human Approach.7 This activity provides an opportunity for all students to develop an understanding of biological evolution as described in the National Science Education Standards. In particular, it conveys the idea that: species evolve over time. Evolution is the result of the interaction of (1) the potential for the species to increase in the number of (2) genetic variability of offspring due to mutations and gene incorporation, (3) supply. And (4) choosing those offspring can survive better and leave offspring in a particular environment. Item 4 is the parent of this activity. Teachers can recommend other factors as appropriate. Natural selection and evolutionary effects provide a scientific explanation for the fossil record of ancient life forms, as well as the similarities of striking molecules observed among a wide range of organisms. Some organisms have no ability to produce populations of no size. Almost limited, but the environment and resources are limited. Fundamental tensions have a profound effect on the interaction between organisms, and many students have difficulty with the basic concepts of evolution. For example, some students express misconceptions about natural selection because they do not understand the relationship between changes within the population and the potential impact of those changes, as the population continues to grow in numbers in an environment with limited resources. This is a dynamic understanding that comes from the four concepts presented in the learning outcomes for this activity. This activity focuses on natural selection, especially as it presents students with predator relationships as one example of natural selection methods in nature. Students should understand that the evolutionary process has two stages called genetic and natural changes. The first step is to develop genetic changes through changes such as genetic incorporation, gene flow and mutations. The second step and point of this activity is to choose. The survival and reproduction of different organisms is caused by a variety of environmental factors, such as predator relationships, prey, resource shortages and habitat changes. In any generation, only a small percentage of the creature survived. Survival depends on the genetic constitution of the organism to provide such a limited resource situation, providing a greater probability of survival and reproduction88 A piece of fabric, 4 different patterns, 8 different patterns of graph paper, 8 plastic sandwich bags, zipper-type with 120 paper dots, 20 each 6 colors (labeled default population), 8 crayons with color similar to colored paper, 8 plastic bags, zippered sandwiches, kinds of paper dots, back-up in every watch color or computer with a computer with spreadsheet software program (optional) 24 forceps (optional) Teaching about the evolution and nature of science Washington, D.C.: 10.17226/5787 ×. Small print jobs perform better than large block prints. Choose two models, each with different distinctive colors. Using two designs, students can demonstrate the evolution of different types of colors from the same initial population. Use paper fleas to pierce the four-inch paper point out of construction paper with six different colors. Choose two light colors (including white) and two dark colors so that they will compete against each other, combining at least two colors that blend well with the fabric. For each color, put 100 dots into 8 plastic sandwich bags, each zippered. Put 20 dots of each color (including 120 dots, 6 colors) into each of these 24 additional bags. Default population Students enroll or ask volunteers to drill points or bags at home or after school. Alternatively, for paper spots, you may try aquarium-colored gravel or colored rice, both heavier than paper points, and less likely to blow around the room. You may also use gift wrapping paper instead of a piece of cloth. Participation begins by asking students what they know about the theory of natural selection. Ask them if the predator-bait relationship is related to biology. Use discussions as a way for them to explain how they think evolution occurs and the role of predator-prey relationships in the process. At this point in the lesson, accept a wide range of students' answers and determine any misunderstandings expressed by the student. You can present historical examples (see the discussion of fossils in chapter 3 of this volume), or samples from Finch's Mouth by Jonathan Weiner or Dreampond of Darwin by Tijs Goldschmidt. Tell students that they will work as a team of four people (if your class is not evenly divided, use a team of five). Activists claim that half of the team uses A fabric and half of the team will use a B cloth, it will help if you pass. The experiment ran before the students started the activity. The other group members will be hunters. Step 3 Make sure that half of the team uses fabric A and half of the use of fabric B, the procedure remains the same for both groups. Steps 4 and 5 tell the hunters to turn their backs on the habitat, then the game will scatter one of the bags of the initial population. Cross the cloth and tell the hunter to turn around and collect prey like a point. If the hunter has trouble picking up the paper point, forceps step 6 after the hunt stops, the student should carefully keep all the points that remain on the cloth and arrange it according to the color. Game wardens are responsible for saving these data on graph paper using crayons corresponding to the dotted color. Step 7: To simulate reproduction between paper points, add three paper dots for each remaining point of the color. These paper dots are derived from bags with special spots representing offspring. Step 8 Repeat the looting using the second generation point. Resave the number of points remaining in the second version. Step 9 explains to students that they do not need to simulate reproduction like before, but should calculate how many individuals will be in the third generation starting population. Step 10 Construction and analysis of bar graphs are an important and time-consuming part of this activity. Place the color of the survivor on the horizontal axis and the initial population (or second generation). on the vertical axis of this activity. If you have access to Teaching about the evolution and nature of science, Washington DC: National News Agency Doi: 10.17226/5787. × 11 steps to study the bar graphs of each generation discuss the following questions (including possible student answers). Which, if the color of the paper dots survived better than others in the population, starting the second and third generation of paper dots? The answer varies depending on the color of the fabric used by the student. The initial population for the second and third generations should include spots with similar colors to fabrics and fewer spots with distinctive colors to the fabric. The transition between the first and third generations should be more dramatic than the change between the first and the second generation. What is why predators do not choose these colors as much as some other colors are camouflaged better than other colors - they blend into the environment. How does capturing a specific color point affect the numbers of that color in the following models? When a person is removed from the population and dies in this case through looting, the person will no longer reproduce. Students should be aware that heavy looting leads to a decrease in population size and size of gene pools. Step 12 Provides enough time for students to apply colored dots into the appropriate bag. Make sure the student recounts the dots in each bag and replaces the missing spots. There are three drill holes and construction paper in hand to replace the lost spot. Describing this section of the activity gives you the opportunity to evaluate the learner's understanding of evolution and the mechanisms that occur. Before students start working on these tasks, display a piece of Cloth A and a piece of B cloth and ask the learner to post their third-generation bar graph beside the fabric they use. Learners will now benefit from comparing their results with other teams using the same fabric, as well as those from teams that use different fabrics. These comparisons will give them more information to create an explanation for the results they see. Class data supports how well the team's conclusions are in step 11, students must be able to analyze the relationship between their response in step 11 and the accumulated data. A specific response should deal with the relationship between the team team and the class information. Imagine a relationship that prey hunters prey on in real life and write a paragraph that describes at least one aspect of The population of predators or prey populations may change as a result of natural selection. The less adaptable person is not. On the other hand, offspring resemble their parents and make them better adapt to the environment as well. These two concepts form the basis of natural selection, and they explain how the population has evolved. Slight changes in the population of the organism will mean that fewer differences are expressed in offspring. Less nuance will mean that a person will have similar advantages and disadvantages in prevalent environmental conditions. This similarity will mean that their survival rate and reproduction are similar, so a few perishable differences are passed on to the next generation. Evaluate students to write a paragraph that summarizes their understanding of biological evolution. Refer to the learning results and national science education standards. Expecting students to explain that in the population of organisms, changes are among the traits that parents pass on to their offspring. A person of certain characteristics may have a slight advantage over another person and thus live longer and repeat more. If this advantage persists, the difference becomes more noticeable over time. These changes could eventually lead to new species. The natural selection process then provides an explanation of the relevance of the organism and the constant biological changes. Teachings on the evolution and nature of science Washington, D.C.: National News Agency Doi: 10.17226/5787 ×. The activity takes two 45 minutes. Their activities have been adapted with the permission of Evolution: The World Biology and Science Inquiry by BSCS.9 This activity provides an opportunity for all students to develop the capabilities of scientific inquiries as described in the National Science Education Standards. In particular, it allows them: define descriptions, descriptions, predictions and models, using important and rational thought evidence, to establish a correlation between evidence and explanation, and to recognize and analyze alternative explanations and predictions. In addition, the activity provides all students To develop a fundamental understanding of life sciences as described in the National Science Education Standards. In particular, it conveys the following concept: In all living organisms, the instructions to identify the characteristics of the organism are carried out in large polymer DNA formed by four subunits (A, G, C and T), the chemical properties and structure of DNA explain that the genetic information under which the genetic material is encoded in the gene (as a string of letters). Molecules and modeling (by seduction mechanism) Millions of plants, pets and microbes that live on Earth today are associated with the descent of common ancestors. Biological classification depends on how the organism is related. Organisms are divided into hierarchies of groups and subgroups based on similarities that reflect their evolutionary relationships. One of the most common misconceptions about evolution is seen in the statement that humans come from monkeys. Evolution, however, is not a progressive ladder. In addition, modern species come from, but unlike living organisms in the past. This activity has an extensive historical foundation. Few question the idea that the origins of Charles Darwin in 1859 produced a scientific revolution. The species multiplies over time (speciation); and competition between species for limited resources. Leads to different survival and reproduction (natural selection). This activity focuses on general descent theory. The theory of general descent is revolutionary, because it introduces the concept of gradual evolution based on natural mechanisms. The theory of general descent also replaces a pattern of linear evolution, with patterns branching along a single origin of life and a series of subsequent changes. Based on his observations during the H.M.S. Beagle trip, Darwin concluded that three species of mocking birds on the Galapagos Islands must have some connection with a single species of mocking bird on the South American mainland. This is an intellectual connection between observation and description. The species can produce page 82 to share the recommended reference reference: Chapter 6: Activities for Teaching about The Evolution and Nature of Science, National Academy of Sciences 1998. National Institute of ×: 10.17226/5787. Once this idea has been realized, it is, however, a series of logical steps to infer that every bird, all vertebrates, and so on. There are common ancestors. General lineage has become the concept spine for evolutionary biology. In large-scale measurements, this is because the general lineage has an important explaining power. Instantly the idea found supportive evidence in comparative anatomy, comparative embryos, systems, and biology. Recently, molecular biology has provided additional support, as students will discover in this activity. See Chapter 3 of this document and page 185 of the National Science Education Standards for further discussion on this topic. The activity also advises students on the scientific evidence, models and explanations described in excerpts from the National Science Education Standards. The use of evidence to understand interactions allows individuals to predict changes in natural systems and design. A model is an unstable layout or structure that corresponds to an event object or class of real events and is energetic and explanatory. Models help scientists and engineers understand how things work. Models come in many forms, including physical objects, mental structure plans, mathematical equations, and computer simulations. Scientific explanations combine existing scientific knowledge and new evidence from experimental observations or models into corresponding logical statements within. Different terms, such as assumptions, models, laws, principles, theories, and paradigms, are used to describe different types of scientific explanations. As students develop, and when they understand more scientific concepts and processes, their explanations should be more complex. That's their scientific explanation should more often include a rich scientific knowledge base, evidence of logic, higher levels of analysis, greater tolerance of criticism and uncertainty, and a demonstration of the relationship between logic, evidence and clear current knowledge for each student: for four students, four sets of black, white, green and red paper clips, each set contains 35 paper clips for the entire class: transparency over the appearance of Apes and Humans, Table 1 and Morphological Tree, 1 Engage Ask student: When you hear the word evolution, students understand evolution. Has humans evolved from modern monkeys or modern apes, and humans have common ancestors? What do you do? The difference between these two questions? This activity gives you the opportunity to observe differences and similarities in the appearance of humans and monkeys. The monkeys mentioned in this activity are chimpanzees and gorillas. Make sure that students know that gibbons, chimpanzees, gorillas and orangutans have four groups included in the ape family, chimpanzees and gorillas represent the African side of the family, gibbons and orangutans represent the Asian side of the family. We focus only on chimpanzees and gorillas in this activity. ตัวแทนที่ทันสมัยเพียงอย่างเดียวของครอบครัวมนุษย์คือ Homo sapiens แม้ว่านักบวช paleontologists มีหน้า 83 แบ่งปันการอ้างอิงที่แนะนำ:บทที่ 6: กิจกรรมสำหรับการสอนเกี่ยวกับวิวัฒนาการและธรรมชาติของวิทยาศาสตร์ สถาบันวิทยาศาสตร์แห่งชาติ 1998. การสอนเกี่ยวกับวิวัฒนาการและธรรมชาติของวิทยาศาสตร์ วอชิงตัน ดีซี: สำนักข่าวแห่งชาติ ดอย: 10.17226/5787. ×ตารางที่ 1 ลักษณะของลิงและมนุษย์ลักษณะ Apes มนุษย์ท่าทางโค้งงอมากกว่าหรือ quadrupedal knuckle-เดิน สามัญตรงหรือ bipedal ขาและแขนยาวแขนยาวกว่าขา; แขนที่ดัดแปลงมาสำหรับการแกว่งมักจะอยู่ในหมู่ต้นไม้ขามักจะนานกว่าแขน; ขาที่ดัดแปลงสำหรับโค้งต่ำเท้า; ตรงข้ามนิ้วหัวแม่เท้าที่มีความสามารถในการจับซุ้มประตูสูง; toesขนาดใหญ่ในแนวกับอื่น ๆ เหมาะสำหรับการเดินฟันฟันที่โดดเด่น; ช่องว่างขนาดใหญ่ระหว่างเขี้ยวและฟันใกล้เคียงลดฟัน; ช่องว่างลดลงหรือขาดกะโหลกศีรษะงอไปข้างหน้าจากกระดูกสันหลัง; พื้นผิวขรุขระ; สันเขาคิ้วที่โดดเด่นจัดขึ้นตรงบนกระดูกสันหลัง; พื้นผิวเรียบใบหน้าลาด; ขากรรไกรกระจุกออก; จมูกกว้างเปิดแนวตั้งรายละเอียด; คางที่แตกต่างกัน; จมูกแคบเปิดสมองขนาด 280 ถึง 705 ซม. 3 (สายพันธุ์ที่มีชีวิต) 400 ถึง 2000 ซม. 3 (ฟอสซิลถึงปัจจุบัน) อายุที่วัยแรกรุ่นมักจะ 10 ถึง 13 ปีมักจะ 13 ปีหรือมากกว่าฤดูผสมพันธุ์เอสบัดในช่วงเวลาต่างๆอย่างต่อเนื่องรูปที่ 1 ความสัมพันธ์วิวัฒนาการระหว่างสิ่งมีชีวิตที่ได้มาจากการเปรียบเทียบโครงกระดูกและลักษณะอื่น ๆ หน้า 84 แบ่งปันข้อมูลอ้างอิงที่แนะนำ:บทที่ 6: กิจกรรมสำหรับการสอนเกี่ยวกับวิวัฒนาการและธรรมชาติของวิทยาศาสตร์ สถาบันวิทยาศาสตร์แห่งชาติ 1998. การสอนเกี่ยวกับวิวัฒนาการและธรรมชาติของวิทยาศาสตร์ วอชิงตัน ดีซี: สำนักข่าวแห่งชาติ ดอย: 10.17226/5787. ×ซากฟอสซิลของสมาชิกคนอื่น ๆ เช่น Australopithecus afarensis (Lucy) และ Homo sapiens neandertalensis ถัดไปพูดคุยว่านักเรียนสามารถใช้ข้อมูลเพื่อกำหนดความสัมพันธ์ระหว่างมนุษย์ลิงและสัตว์เลี้ยงอื่น ๆ ได้อย่างไร อาจไม่ชัดเจนว่าสิ่งมีชีวิตที่เกี่ยวข้องอย่างใกล้ชิดมีความคล้ายคลึงกันมากกว่าสิ่งมีชีวิตที่เกี่ยวข้องกันอย่างห่างไกล Students guide students to the idea that structures may be similar because they perform the same functions or because they are inherited from common ancestors. Only the similarities arising from Ancestors can be used to define evolutionary relationships. Use the transparency of the morphology tree Figure 1 for this discussion. A diagram called a tether tree shows the relationship between living things. A type of tree branch branch, called a morphological tree, is based on comparison of skulls, jaws, skeletons and other structures. Look at the morphology tree carefully. Explain that students are asking students to find a part of the morphology tree that shows the relationship between gorillas, chimpanzees and humans. They will notice that there is no correlation line. They should work with partners and develop three assumptions to explain how these creatures are related. On a sheet of notebook paper, they should make a diagram of their hypothesis by drawing a line from point A to each of the three creatures (G = gorilla, C = chimpanzee, H= Human, A = general ancestors) Allow students to develop their own assumptions, helping them only when you see they have not made any progress. Three assumptions students may offer are shown below (although not necessarily in the same order). Possible evolutionary relationships: Sophisticated modern research techniques allow biologists to compare coded DNA for certain proteins and make predictions about the relationships of organisms they took. Students will use these techniques to test their hypothesis and determine which techniques are best supported by the information they develop. Step 1 works in a group of four, synthesizing strands of DNA according to the following requirements. Each different color of the paper clip represents one of the four bases of DNA: black = adenine (A) green = guanine (G) white = thymine (T) red = cytosine (C),. When they finish the synthesis, attach the label to the 1st position and place your line on the table with the 1st position on the left. Each student synthesizes one LINE of DNA. Thirty-five paper clips of each color should have sufficient assortment to save time, making sure that all lines are synthesized at once. It focuses on students that they are using models to test the assumptions they develop in the first part of the investigation. Here's a guide for the relevant group: Labeling human DNA, this line represents a small part of the gene coded for human hemoglobin proteins. Teaching about the evolution and nature of science Washington, D.C.: National News Agency Doi: 10.17226/5787 ×. codes for chimpanzee hemoglobin protein Label this line of gorilla DNA. This line represents a small part of the gene coded for the gorilla protein hemoglobin. Label this line, common ancestral DNA. This DNA line represents a small part of the gene that is coded for the hemoglobin proteins of the common ancestors of gorillas, chimpanzees and humans. Human DNA versus: Unmatched Base Number Chimpanzee DNA Gorilla DNA DNA Data for Common Ancestors DNA General DNA Compared To: Unmatched Base Number Of Human DNA Chimpanzee DNA Gorilla DNA (You Would Use This Line in The Third Part) It focuses on students that they will use models made up of hypothetical data in the case of common ancestors because they do not yet have such DNA. But the other three are true. Step 2 Students should compare human DNA with chimpanzee DNA by matching the base line by the base (paper clip by paper clip). Step 3 Students should count the number of different bases. Save data in the table, repeat these steps with human DNA and gorilla DNA. The data for the hybrid are as follows: 5 base chimpanzee DNA, 10 unmatched gorilla DNA bases, remember to ask students to record all their DNA lines for part 3, assess how gorilla DNA and chimpanzee DNA compare to human DNA. Human DNA is more similar to chimpanzee's DNA than gorilla DNA. What does these data suggest about the relationship between humans, gorillas and chimpanzees, the data suggests that humans are more closely associated with chimpanzees than gorillas. Does the data support any of your assumptions? Why or why?   Teachings on the evolution and nature of science Washington, D.C.: National News Agency Doi: 10.17226/5787 ×. What kind of information might provide additional support for your assumptions? Students can test the hypothesis using additional information from DNA sequences or morphological properties. They were also able to gather data from the fossil record, starting this section by pointing out that biologists have determined that certain mutations in DNA occur at normal rates. They can use this rate as a molecular clock to predict when two organisms begin to separate from their common ancestors. Most evolutionary biologists agree that humans, gorillas and chimpanzees share their ancestors together at the time of the 1990s. At one point in their evolutionary history. However, they disagree with specific relationships in these three species. In this section of the activity, You will use the data from your paper clip format to evaluate. Assumptions about the relationship between humans, gorillas and chimpanzees Evolutionary biologists often disagree with the rhythm of evolutionary changes and about the exact nature of speciation and nuance. Step 1 assumes that common ancestral DNA synthesized in the second part represents a portion of the hypothetical general hemoglobin gene. Compare this common ancestral DNA with three DNA samples (human gorillas and chimpanzees) one sample at a time. The data for comparison is as follows: Unmatched base human DNA. 10 chimpanzee DNA bases, eight undiscovered bases; gorilla DNA, three unspecified bases, assessing which DNA is most similar to the DNA of a common ancestor?   Which of the two most common ancestral DNA DNAs are similar to common ancestral DNA?   Human DNA and chimpanzee DNA have a similar pattern compared to conventional ancestral DNA. What assumptions have been developed in the part where I do your data support best?   The answer varies. Does your findings prove that this hypothesis is correct? Why or why?   Data from the models does not prove the accuracy of the hypothesis, but they provide a direction for further research based on the assumptions that your data best supports. In short paragraphs, humans and monkeys share common ancestors. According to all the data collected, which of the following text is the most accurate? Chimpanzees are direct ancestors of humans, students should infer that chimpanzees and humans share common ancestors, and modern chimpanzees are not direct human ancestors. Comparing many other DNA sequences indicates that human DNA and chimpanzee DNA are the same, 98.8 percent of which parts of your data support this result. Tree morphology and DNA comparison data indicate that humans are closely associated with chimpanzees. What kind of scientific methods do you use in this activity? Many answers are possible, including observation, forming and hypothesis testing and modeling. Teaching about the evolution and nature of science Washington, D.C.: National News Agency Doi: 10.17226/5787 ×. For geological past events The estimated time requirement for this activity is two class periods. Designed for grades 5 through 8, this activity has been adapted with the permission of the Earth Science Program.11 This activity provides an opportunity for all students to develop the ability of scientific inquiries and understanding of the nature of science as described in the National Science Education Standards, especially it allows them: offering and predicting evidence based on evidence, perceptions and analysis of alternative explanations and predictions, understanding that scientific explanations may change when new evidence is available, understanding that scientific explanations must meet certain criteria. They should reasonably respect the rules of evidence, openly, to criticize, how to report and procedures, and to make knowledge public. An explanation of how the natural world changes, based on myths, personal beliefs, religious values, mystical aspirations, superstitions or power, may be personally beneficial and relevant to society, but not science. In terms of standards, it focuses on developing evidence-based explanations. It encourages students to think seriously about the inferences they make and about the logical relationship between cause and effect. Observation or manifestation of observation should be an agreement by all individuals: these are fossil footprints, or the size of one footprint is 20 cm by 50 cm. The inference is a statement that offers a possible explanation for observation: both sets of footprints represent a struggle between pets. If this is true, then any evidence you can look for to support inferences. Please note that the main focus for this activity is developing capabilities and understanding for "Science as an Inquiry' as described in Standard 12. Make transparency over the head of the puzzle, footprints from the prototype provided on page 89 have a blank paper in hand to conceal the puzzle when placed on the projector. Involve project position 1 of the overhead footprint, covering the other two positions with blank paper. Tell students that tracks like this are common in parts of New England and in the U.S. Southwest. Point out to students that they will try to create events from the geological past by analyzing a series of fossil tracks. Their problem is similar to that of a detective. They have to build protection. of past events based on limited evidence. When there is more evidence, their assumptions must be corrected or abandoned. The only clue is its own footprint. Ask students: Can you tell me anything about the size or appearance of the organism? Are all tracks created at the same time? How many wild animals are involved? Can you create a series of events represented by this set of fossil tracks? Teaching about the evolution and nature of science Washington, D.C.: National News Agency: 10.17226/5787 ×. Accept the reasonable explanation offered by the student. Constantly try to point out the difference between what they observe and what they infer. Ask them to suggest evidence to support their proposed explanation. The survey revealed the second location of the puzzle and allowed students to consider new information. Students will see that the first description may need to be corrected and added a new description. The project follows a complete puzzle and asks students to interpret what happened. The key point for students to recognize is that a reasonable explanation must be based on the proposed description, which is still used when all puzzles are projected. Any interpretation consistent with all the evidence is acceptable. If it is necessary to challenge a student's thoughts and provoke a discussion, the following questions may help. Students should give evidence or suggest what they will look for as evidence to support their proposed explanation. Which direction does the pet move in? Do they change their speed and direction? What could change the footprint pattern? Land is moist or dry on the day these tracks are created? What kind of prints? Rough or fine sludge where the tracks are created? Discuss the environment of the tracking area as well. If dinosaurs do, the climate tracks may be warm and humid. If a student proposes that certain obstacles prevent pets from seeing each other, this may suggest vegetation, or perhaps a wider pace may suggest a slope. Speculation on the condition of the surface at the time the footprints were created, what conditions are necessary for their storage? Explaining, imaginary students should be able to offer several possible explanations. One of the most common is that two pets are found and fought. There is no real reason to assume that one wild animal attacks and eats another. Ask students who offer this explanation to identify the evidence. If they can visit any evidence website, they look to support their explanation. Lines of evidence - fast walking, circular patterns and the disappearance of one set of tracks can support combat descriptions. However, they may support the mother's explanation for taking her child. Description and mood of the animals involved are open to questioning. In fact, we lacked evidence to say that the track was created at the same time. The coordination shown in the middle part of the puzzle may be evidence that the two tracks were created in a moaning, but it could only be a coincidence. And then the other came to discuss the expected learning outcomes associated with scientific inquiries and the nature of science, to answer questions arising from a series of student fossil footprints, as scientists created a reasonable explanation based only on the logical interpretation of existing evidence. They accept and analyze alternative explanations by weighing the evidence and examining the logic to decide which description looks most reasonable. Although there may be several possible explanations, they do not have all the same weight. In a similar way to how scientists work, students should use scientific criteria to find, communicate and protect the desired explanation. Explain in detail, you can have more discussions about interpreting a series of events using prints of animals that students find outdoors and repeat for class. Don't forget to look for human footprints, let students design different fossil footprint puzzles. Select multiple student teams and have the student team repeat activities using the same learning goals. The assessment describes a specific incident involving two or more people or wild animals where the footprint evidence remains. Ask students whether they are on the team or individually to diagram the evidence of footprints that may lead to different but preventable explanations about what happened. They should be able to explain the strengths and weaknesses of each description using their footprint puzzles. Page 89 shares the recommended reference information: Chapter 6: Activities for Teaching about The Evolution and Nature of Science National Academy of Sciences 1998. × 90 Share Featured Reference:Chapter 6: Activities for Teaching about Evolution and Nature of Science, National Science Institute × 1998. In this activity, students use long paper strips and the right size to show all geological time, including milestones in the development of life on Earth. As a recent human incident, the investigation took two years and was appropriate for grades 5 to 12. This activity provides an opportunity for all students to develop an understanding of the global system as described in the National Science Education Standards. In particular, it introduces them to the following concepts: a mathematical scale that represents the length of geological time. The time correlation between human events, events in the history of the world and the entire age of the world. The formation of the sun, Earth and the rest of the solar system from the nebular clouds of dust and gas 4.6 billion years ago. Geological time estimates by observing rock sequences and using fossils to link sequences in different locations. The current method of dating earth material uses the known decay rate of radioactive isotopes contained in the rock to measure the time since the rock was created. The continued evolution of the Earth system is caused by the interaction between the earth, the stable oceans, the atmosphere and the organism. Evidence for a one-cell form of bacterial life - extended over 3.5 billion years The evolution of life causes dramatic changes in the composition of the Earth's atmosphere, which originally had no oxygen.   Geological time is mostly subdivided on the basis of the evolution of life and in the volume and type of tectonic activity that occurred in the past. Geological time has been commanded both quite and certainly. For relative dating, the sequence where strata rocks occur is important; to describe a complete timescale for all geological history, the need to build rocks is related around the world. Fossils are an important guide in this relationship, as scientists have set a relative date for earth's rocks in the proposed life order (fossil proof). Radio dating provides a certain age for events in the history of the world. Radio dating techniques use the decay rate of naturally selected radioactive isotope with stable daughter isotopes to determine how long the parents' isotopes have disintegrated. A relatively accurate date has been set for events that began in the Cambrian era; this comprises about 12 percent of the world's history. The following materials must be used by two students: paper strips, such as adding machine tape or paper racks, glue meter rods or cellophane tape.   If students use recommended scales - 1 millimeter to 1 million a year and 1m to 1 billion years old - the 5-meter-long paper strip effectively supports the 4.5 billion-year time scale. Copy the Student A investigative sheet on page 91 (the estimated age of the current previous year's events). Students will use this page to perform this page. Participants asked students how long it would last a million years. How can students count or measure millions? Teaching about the evolution and nature of science Washington, D.C.: National News Agency Doi: 10.17226/5787 ×. Billions of years ago. The first known plant (algae), 3.2 Billions of years ago. The jellyfish were first introduced 1.2 billion years ago. The beginning of the Cambrian fossil and the first abundant fossil 550 million years ago. The beginning of the Ordovician and the first wildlife 500 million years ago. Silurian's beginnings and the first land plant was found 440 million years ago. The beginning of the first Devonian and amphibious 400 million years ago. The beginning of Mississippi 350 million years ago. The beginning of Pennsylvania and the first reptile 305 million years ago. The beginning of Permian 285 million years ago. The beginning of triassic and the first dinosaurs 245 million years ago. The beginning of Jurassic and mammals first 205 million years ago. The first bird 150 million years ago. The beginning of Cretaceous 140 million years ago. The beginning of the Paleocene and Bishop was first established 65 million years ago. The beginning of the Eocene 60 million years ago. The beginning of Oligosen and the first elephant 35 million years ago. The beginning of Miocene 25 million years ago. The beginning of Pliocene 5 million years ago, the first time humans looked like it was 2 million years ago. The beginning of the Pleistocene and ice era 1 million years ago. The Ice Age was 10,000 years ago. The following plot is the year before the present: the eruption of Mount Vesuvius destroyed Pompeii, A.D. 79, the first U.S. satellite orbiting in 1958, the first man on the moon, 1969, a new year. Teaching about the evolution and nature of science Washington, D.C.: National News Agency Doi: 10.17226/5787 ×. Supposing you want to create a visual model that shows the timeline of the history of the world, how do you proceed? Investigators provide students with a student A. Investigatory Pad, let them decide whether to show these events in a sort of order by time. Insert a roll of paper tape to plot the version. Students may need help understanding how to set up scales that can be displayed in adjacent classrooms or halls. The optimum size is 1 mm to 1 million years, 1 cm to 10. 1m to 1 billion years The larger unit distance will work more easily depending on the available area. Regardless of the size students choose, millions of years ago would be difficult to plot. Allow students to work at their own level However, to avoid confusion and frustration that is not appropriate for some, review the student's progress after the first few minutes and be ready to ask leading questions or advice. It describes a long debate in the history of the earth before evidence of simple life forms such as algae appeared in fossil records. Note that the time between the first person and the key is shorter and shorter as you move closer. Today, more and more. Compare and discuss the extended scale used to show more details in the past. Discuss the role of scale in visualization and understanding of very long periods of geological timescale and connection to biological evolution. Finely challenged students to develop an extended timescale to mark special events in their own lives and parents, grandparents or other adults. Let them calculate the percentage of earth's history with evidence of life, a percentage of earth's history, with fossil evidence of the first human-like animals, or a percentage of earth's history during which dinosaurs lived. The estimate asks students to calculate the length of the paper bar needed to represent all geological times when using the extended scale they use to display recent events. Let students write a short editorial that explains the magnitude of geological time and evolutionary changes in the lithosphere of the earth, atmosphere and biography, page 93, sharing recommended reference information: Chapter 6: Activities for Teachings on Evolution and The Nature of Science, National Academy of Sciences 1998 ×. Teachers have students read a brief excerpt of the original text about evolution from Jean Lamarck, Charles Darwin and Alfred Russell Wallace. This activity is intended as an extension of other investigations or as a primary activity. Designed for grades 9 through 12, the activity requires a total of three lesson periods. This activity provides an opportunity for all students to develop an understanding of the history and nature of science as described in The National Science Education Standard, in particular, conveys the following concepts: scientists are influenced by social, cultural and personal beliefs and how the world views. Science is not separate from society, but part of society. First, they must be consistent with experimental evidence and observations about nature, and they must make accurate predictions when appropriate about the system being studied. They should reasonably respect the rules of evidence, openly, to criticize, how to report and procedures, and to make knowledge public. The explanation of how the natural world changes, based on myths, personal beliefs, religious values, inspiration, mystery, superstition or power, may be personally beneficial and relevant to society, but not scientific. The main concepts of science, such as energy conservation or motion law, have been confirmed as diverse and therefore unlikely to change in the areas where they have been tested. In areas where information or understanding is not complete, such as details of human evolution or questions about global warming, new information may lead to changes in current thinking or correction of current conflicts. In situations where data remains fragmented, it is common that scientific thinking is incomplete. But this is where the opportunity to make progress may be greatest. Sometimes scientific and technological advances have a significant and lasting impact on science and society. The historical view of the scientific explanation shows how scientific knowledge has changed by developing over time, almost creating previous knowledge.   In historical view, the explanation for the origins and diversity of life is not new and may begin when humans begin to ask questions about the natural world. By the time of the Greeks, individuals such as Thales (624 to 548 B.C) and Anaximander (611 to 547 B.C.) offered an explanation for the origins of life and the gradual change. In 1800, three individuals offered explanations for biological evolution - Jean Lamarck, Charles Darwin and Alfred Russell Wallace. During the early years of the nineteenth century, the French biologist Jean Lamarck (1744 to 1829) offered a view of evolution that questioned the popular idea that the species was unchanged, Lamarck proposed the idea that changes had occurred in pets for a long time, especially through the use of organs and organs. A popular example of Lamarck's idea is the long neck of a giraffe that allows them to eat higher food in trees. And using a generation of giraffes through long necks to the next generation (see excerpts for this event), Charles Darwin (1809 to 1882) was born in England and officially graduated at Cambridge University. Teaching about the evolution and nature of science, Washington, D.C.: National News Agency Doi: 10.17226/5787 ×. After graduation, the Professor of Darwin recommended him for the position of naturalist in H.M.S. Beagle's journey, lasting five years (1831 to 1836) and providing observations and evidence (in the form of examples) that became the foundation for Darwin's theory. The only record in history is darwin's observation on the Galapagos Islands, which are located off the coast of Ecuador. Darwin's curiosity and understanding made him notice both the similarities and differences between the creatures and compare them on the mainland and the island. From his observations, he wondered about the origins of different plants and plants, and the changes in species he recorded in similar organisms. After returning to England, Darwin spent more than twenty years studying experimental samples and reviewing his travel records. In 1858, he was surprised to find that Alfred Russel Wallace had reached a similar conclusion. In the same year, Darwin reported his work and Wallace in a joint presentation to the Science Society in London, a year later, in 1859. This publication caused a lot of controversy and what is now seen as a scientific revolution. Darwin's theory of evolution also had a huge impact on our society and cultural perspectives. Alfred Russell Wallace (1823 to 1913) was also born in England. He became an English teacher. Later, he developed an interest in gathering plants and insects. In 1848, he traveled to the Amazon River in Brazil to collect scientific material. - Why do each island have different species? Wallace thought about the question for three years, and in 1858 he proposed his theory. Excerpts from zoology philosophy by Jean Lamarck (give) excerpts from the tendency of varieties to depart indefinitely from the original genre by Alfred Russel Wallace (give). Excerpts from the origins of the species by Charles Darwin (give) these excerpts give students the opportunity to read the original text by the person who took part in the Great Revolution. The teaching strategy belongs to a small group of discussions. Students read excerpts before class and discuss reading in engage classes, introducing reading sequences by asking questions based on learning outcomes: How do you think the society in which scientists live might influence their views? What makes a person's scientific explanation? Can scientific explanations change? If so, how? Why, if not, why not? Can you name some important theories in science? In biology?   Ask students what they know about evolutionary theory, what do they know about Charles Darwin? When did he propose his theory? Are others offering theories about evolution? How did Darwin develop his theory of evolution? A question like this will set the stage for the first read. Assignments read by Jean Lamarck as homework Student surveys should work in groups of four people to discuss Jean Lamarck's description of changes in life. What scientific methods are guided by Lamarck's statement: Nothing, all of this can be regarded as assumptions or personal opinions. On the contrary, they are true, which, to clearly, only require attention and observation of facts. Is lamarck's scientific explanation? Why or why? Can you offer other explanations for Lamarck's observations on the use and use of organs?   Explained before this discussion, this discussion should be clarified for students Page 95 Sharing recommended reference information:Chapter 6: Activities for teaching about the evolution and nature of science, The National Academy of Sciences 1998 ×. You're going to characterize Wallace's idea of that. How is wildlife life fighting for existence? What is Wallace's scientific view? Wallace claims that useful forms tend to increase, not helpful or painful, the pattern is reduced. How did this happen? What evidence did he refer to? What do you think of Wallace's description of the hypothesis?   Described in detail before this group discussion, the assignment was read by Charles Darwin. In these discussions, students should use concepts about the nature of science and historical perspectives developed during previous discussions. This discussion should demonstrate greater complexity and understanding by students. What makes Darwin define his thoughts on Of the species? What explanation does he use? What does Darwin offer as the origin of the species? What is The Relationship of LaMark and Wallace's Work with Darwin? Is Darwin's description of science? Why or why? How did Darwin try to determine how to modify a successful species? How did Darwin explain the incomplete nature of his thoughts?   The assessment has each student writing a short essay on the nature of scientific knowledge, as demonstrated in the development of evolutionary theory. They should refer to at least two words from reading to support their discussion. Essays should include the concept of adaptation, natural selection and descent from common ancestors. Teaching about the evolution and nature of science Washington, D.C.: National News Agency Doi: 10.17226/5787 ×. If the new environment, which becomes permanent for the competition of certain animals, contributes to new habits in these pets, that is to say, bringing them to new activities that become habitual, the result is some use in the likes of other parts, and in some cases disabling all of the parts is no longer necessary. All of this cannot be regarded as assumptions or personal opinions. On the contrary, they are true, which, to clearly, only require attention and observation of facts. Snakes have adopted the habit of crawling on the ground and hiding in the grass, so that their body is the result of repeated, continuous efforts to stretch for the purpose of passing through narrow gaps, getting quite a lot out of proportion to its size. Now the legs are quite useless to these pets, and therefore do not use them. Long legs will interfere with the need for crawling, and very short legs will not be able to move their body, since they can only have four. Disabling these parts becomes permanent in the various races of these animals and results in the complete disappearance of these same parts, even if the legs belong to the plan or organization of the animals in this class. The use of any organ, often when confirmed by habits, increases the functioning of the organ, leading to development and ending up with less size and power that is not in the pet that uses it. We have already seen that the use of any organ modifications Reduce and eventually extinguish it. Now I'll prove that. The use of any organ, along with efforts to get the most out of it, strengthens and enlarges that organ, or creates a new organ to perform with the necessary functions. The bird is pulled into the water by a desire to find the prey where it lives, separating the numbers of its feet in an attempt to hit the water and move on to the surface. The skin that combines these figures at their base has been the habit of being stretched by the continuous isolation of these numbers. It is interesting to observe the effect of habits on the peculiar shape and size of giraffes; this wild animal, which belongs to the largest mammal, is known to live in the interior of Africa in places where the land is almost arid and arid, so it is necessary to browse the leaves of trees and to make constant efforts to reach them. From this habit, long preserved in all races, it results in the animal's front legs being longer than the hind legs and its neck, longer to the degree that the giraffe without standing on its hind legs achieves a height of six meters (nearly twenty feet). Translated by H. Elliott, Macmillan Company, London. Teaching about the evolution and nature of science Washington, D.C.: National News Agency Doi: 10.17226/5787 ×. (1858) The struggle for the existence of wild animals is the struggle for existence. Full exertion of all their faculties and all their energy must maintain their own existence and provide for their baby offspring. The possibility of supplying food during the least favorable season and escaping the onslaught of their most dangerous enemies is the main conditions that determine the existence of all individuals and species. The number of deaths annually must be great, and while the existence of each individual of the individual animal depends on itself, the deceased must be the weakest. While those who prolong their existence can be the most perfect in their health and strength, those who can get food regularly and avoid many of their enemies. It is a 'struggle for existence', which is the weakest and the least perfectly organized must always give up. Useful forms tend to increase, not helpful or painful the form to reduce the most, or perhaps all changes from the general form of the species will require some exact effects, but slightly, on Even discoloration may by making it more or less discriminatory, affecting their safety. More or less developing hair may alter their habits. More important changes, such as an increase in energy or the size of any limb or external organ, will affect the food supply mode or the range of countries in which they can live more or less. It is also obvious that most changes will affect either the good or the unpleasant power of prolonged existence. Antelope with short or weak legs will suffer more from the onset of cat carnivora; a passenger pigeon with less powerful wings will be affected sooner or later in the power of regular food supply, and in both cases the results must reduce the population of the modified species. If, on the other hand, any species should produce a variety that has little power to maintain its existence, that variety must inevitably be prevailed in numbers. Lamarck's hypothesis differs from that of the now-advanced Lamarck hypothesis - a progressive change in species has been produced by wildlife efforts to enhance the development of its own organs, and thereby alter their structures and habits, repeatedly and easily rejected by all writers on matters of breeds and species. Giraffes do not get long necks by longing to reach the leaves of more lofty bushes and stretching the neck continuously for the purpose, but because of any species that occurs among the ancestors with longer necks than usual at once, securing a fresh range of above-ground pastures, as well as their short-necked companions, and in the first shortage of food, thus enabling it. Teaching on the evolution and nature of science, Washington, D.C.: National News Agency Doi: 10.17226/5787. The × student sheet on the origins of the species Charles Darwin (1859), the introduction when aboard H.M.S. Beagle as a naturalist, I was hit with some facts on the distribution of South American and geological residents in the current relationship with the inhabitants of the continent. These facts seem to me to throw some light on the origins of the species - the mystery of the mystery, as it was called by one of our greatest philosophers. Upon my return home, it occurred to me in 1837 that something might be done out in this question by accumulating patiently and reflecting all sorts of facts, which may have any bearing on it. After five years of my career, I myself, to guess on the subject and draw up some short notes; these things I grew up in 1844 were a conclusive sketch, which seems to me probably from that moment on until now I have constantly tracked the same objects. I hope I could be excused for entering these personal details because I let them show that I did not. hasty to make decisions My work is almost finished, but since it will take two or three years to complete, and when my health is far from strong, I have been urged to publish this abstract. I have been induced to do this more like Mr. Wallace, who is now studying the natural history of the Malay Islands has come to an almost common conclusion as I have about the origin of the species. Last year, he sent me a memoir on this subject with a request that I would forward to Sir Charles Lyell, which was sent to the Linnein Society and published in the third volume of the journal of that society. Sir Syle and Dr. Hooker, who both knew about my work - the latter had read my sketch in 1844 - honored me by thinking it suggested publishing with wonderful memories of Mr. Wallace extracting my manuscript. In determining the origin of the species, it is quite possible that naturalists reflect the reciprocal relationship of organics in skin relationships, geographical distribution, geological inheritance, and other facts may come to the conclusion that each species is not created independently, but has descended like a species from other species. However, such conclusions, although well established, are not satisfactory until it can be shown that the countless species that live in this world have been modified to achieve the perfection of structures and coadaptation, most of which only excites our appreciation. Naturalists cite on ongoing external conditions, such as the food climate. It is the only possible cause of change. In a very limited sense, as we will see after this may be true, but it is disgusting to engage with structural external conditions such as woodpeckers with feet, tails, beaks and tongues, so admirably adapting to catching insects under the bark. In the case of misseltoe, which draws nourishment from some trees, whose seeds must be transported by some birds and have separate sex flowers, they require the bodies of some insects to remove pollen from one flower to another, it is equally alarming for the structure of this parasite, in relation to many different organic matter, by the effect of external conditions or habits or of the volition of the plant itself. For many generations, some birds have given birth to woodpeckers and some plants to misseltoe, and these have been perfect productions as we page 99 share a suggested reference: Chapter 6: Activities for Teaching about Evolution and Nature of Science, National Academy of Sciences 1998. × students now see them; In this case, and in the case of the I may venture to express my confidence about the high value of such studies, even if they are neglected by naturalists. No one should be surprised to remain as much as it has not explained about the origin of the species and its varieties if he makes an allowance due to our profound ignorance of the mutual relationship of all the lives that live around us. Who can explain why one species is diverse and there are so many, and why are other allied species so narrow and rare? But these relationships are of utmost importance for them, given their current welfare, and as I believe, the future success and adaptation of all residents of the world. Yet little we know about the reciprocal relationship of the countless inhabitants of the earth during the vast geological era in history. Although most remain vague, and still vague, I can't entertain no doubt, after the most deliberate study and dissenting judgment that I have abilities, that the view that most naturalists entertain, and that I've entertained-that is, that each species has been loosely created— I am fully convinced that the species cannot be changed, but those in what is known as the same genus are linear offspring of other species and are generally extinct in the same way as the accepted species of one species are offspring of that species. In addition, I believe that natural selection is the main solution. Page 100 Share suggested reference information:Chapter 6: Activities for Teaching about Evolution and Nature Teaching about the evolution and nature of science Washington, D.C.: National News Agency Doi: 10.17226/5787 ×. The investigation provides a great opportunity for determining the population growth of plants and plant species and plant species, and the stress that leads to natural selection. This activity must have two tiers and is suitable for grades 5 through 12. This activity is used with permission.14 This activity provides an opportunity for all students to develop an understanding of scientific inquiries and biological evolution as described in the National Science Education Standards. In particular, it conveys the following concepts: mathematics is essential in scientific inquiries, mathematical instruments and modeling manuals, and improves questioning, data collection, explanation creation and communication results. Species evolve over time. Evolution is the result of (1) the potential for species to increase the number of (2) genetic variability of offspring due to mutations and gene incorporation, (3) supply. And (4) choosing those offspring can survive and leave offspring in a particular environment (Item 1 is to highlight the main content of this activity. Teachers can recommend other factors as appropriate). The population grows or decreases through the combined effects of births and deaths, and through immigration and immigration in specific areas. Populations can increase through linear or exponential growth, affecting resource consumption and on environmental pollution. The population can reach the limit. In growth, the load capacity is the maximum number of organisms that can be accommodated in a given environment. Organisms are capable of producing an arbitrary large population, but the environment and resources are limited. This underlying tension has a profound effect on the interaction between organisms. Tensions between population growth and limited resources 15 This understanding has a major influence on determining his natural selection theory. This activity broadens the general idea of population-to-human population growth. Here, the key point is that humans live in the ecosystems of the earth. Humans are increasingly modifying ecosystems as a result of population growth, technology and consumption. Destruction of human habitation through direct harvesting, pollution, atmospheric changes and other factors. It is threatening global stability today, and if not fixed, the ecosystem will be Affected by the increase in population size (i.e. human population) is an example of doubly growing. The human population is growing at a slow rate of only about 0.002 percent per year during the first multi-million years of our existence. Since then, the annual average rate of the human population has risen to an all-time high of 2.06 percent in the 1970s, as the underlying number of people undergoing growth has increased, making it less time-consuming to add billions of new people. It takes 2 million years to add the first person to a billion people; 30 years to add a second billion; 15 years to add a third billionaire; A year to add a fourth billion; and only 12 years to add five billion. Now we're approaching six billion. Teaching about the evolution and nature of science Washington DC: Doi: 10.17226/5787. × Small objects with a uniform shape of about 2,000 pieces (corn seed, dry beans, wood markings, plastic beads) 10. Engage begins a discussion about the human population with questions such as: How long have humans been on Earth? What do you think the growth rate of the early human population is compared to the current population growth rate? Why is this rate changing? Tell students that this investigation represents a pattern of population growth, and the survey allows the following groups of students to complete the following activities: Put the glass beaker on the table. Start by placing two objects (such as corn or plastic beads), beakers represent the limits of the ecosystem or, ultimately, the world. Place 10 consecutive cups on their table. In the first cup, place two objects. In the second cup, place the object twice as much as the first cup (four), allowing students to record the number of objects on the outside of the cup. Continue by placing the object twice in the original cup or doubling the number in 3 to 10 cups. Use a beaker and set its height, allowing students to specify an estimated percentage of the quantity without objects. Save this on the table for 0 times in a 30-second period. Students should follow their steps and graph their results as the entire population is against the results.   Students may question the need for a 30-second period. Chart preparation can be defined as homework. Mathematics involved in the answer It may challenge some students to help students when necessary to achieve their objectives. Table 1 shows the population and percentage of the volume of beakers without objects. The general student graph is shown in Figure 1, explaining the relationship between population growth and biological evolution in populations of flora and fauna microbes. Evolution is caused by the interaction of factors related to the potential of species to increase the number of genetic variability in the population, the supply of essential resources and environmental pressures for choosing those offspring that can survive and reproduce. Start thoroughly by having students explain the results of their activities. During the discussion of the graph, students consider the following: there are limits. Any about how many people will the world support? What factors may be limited? Population growth first? How is this factor related to human evolution? Table 1 population growth time population percentage of the internal population of empty volumes (beaker 400 ml) 0 2 99% 1 4 99% 2 8 99% 3 16 98% 4 32 97% 5 6 4 95% 6 128 93% 7 256 88% 8 512 80% 9 1024 70% 10 2048 50% 11 4096 0% Teaching about the evolution and nature of science Washington, D.C.: 10.17226/5787 ×. Have we gone beyond the ideal population of the world? What problems would we face if we fill the world too much? For example, how humans may influence habitats affects biological evolution. Students' answers to these questions vary depending on their background and information. However, the results should be a fierce discussion of some important issues and should provide an opportunity to introduce basic concepts from national science education standards. The assessment of human population on Earth is thought to have started slowly, having doubled over a period of as long as 1 million years. The current world population is thought to be doubling every 37 years, how will this growth rate be compared to the rate found in your investigation?   Both the population in the investigation and on earth increase in geometric progress. This means that the graph has the same shape. You can substitute 37 years for every 30-second period, and the numbers show real world population growth. The slope of the graph remains the same, what happens to the population when they reach the limit. In growth? Teaching about the evolution and nature of science Washington, D.C.: National News Agency Doi: 10.17226/5787. × 1.   National Research Council 1996 National Science Education Standard, Washington, D.C.: National Institute www.nap.edu/readingroom/books/nses 2. 1998), AAAS (American Association for the Advancement of Science) 3.Biological Sciences Program (BSCS) 1978 Biology Teacher's Guide Ed III William v Mather Ed New York: John Wiley and Sons, pp. 350-352. 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An essay on the principles of population Geoffrey Gilbert, Ed Oxford: Oxford University Publishing Page 104 Share Featured Reference Information: Chapter × 6: Activities for Teaching on Evolution and Nature of Science, National Academy of Sciences 1998. × page 62, sharing recommended reference information: Chapter 6: Activities for Teachings on Evolution and The Nature of Science, National Academy of Sciences 1998. × page 63 to share the recommended reference information:Chapter 6: Activities for Teaching about Evolution and The Nature of Science National Academy of Sciences 1998. เกี่ยวกับวิวัฒนาการและธรรมชาติของวิทยาศาสตร์ วอชิงตัน ดีซี: สำนักข่าวแห่งชาติ ดอย: 10.17226/5787. ×หน้า 64 แบ่งปันข้อมูลอ้างอิงที่แนะนำ:บทที่ 6: กิจกรรมสำหรับการสอนเกี่ยวกับวิวัฒนาการและธรรมชาติของวิทยาศาสตร์ สถาบันวิทยาศาสตร์แห่งชาติ 1998. การสอนเกี่ยวกับวิวัฒนาการและธรรมชาติของวิทยาศาสตร์ วอชิงตัน ดีซี: สำนักข่าวแห่งชาติ ดอย: 10.17226/5787. ×หน้า 65 แบ่งปันข้อมูลอ้างอิงที่แนะนำ:บทที่ 6: 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กิจกรรมสำหรับการสอนเกี่ยวกับวิวัฒนาการและธรรมชาติของวิทยาศาสตร์ สถาบันวิทยาศาสตร์แห่งชาติ 1998. การสอนเกี่ยวกับวิวัฒนาการและธรรมชาติของวิทยาศาสตร์ วอชิงตัน ดีซี: สำนักข่าวแห่งชาติ ดอย: 10.17226/5787. × 86 แบ่งปันข้อมูลอ้างอิงที่แนะนำ:บทที่ 6: กิจกรรมสำหรับการสอนเกี่ยวกับวิวัฒนาการและธรรมชาติของวิทยาศาสตร์ สถาบันวิทยาศาสตร์แห่งชาติ 1998. การสอนเกี่ยวกับวิวัฒนาการและธรรมชาติของวิทยาศาสตร์ วอชิงตัน ดีซี: สำนักข่าวแห่งชาติ ดอย: 10.17226/5787. ×หน้า 87 แบ่งปันข้อมูลอ้างอิงที่แนะนำ:บทที่ 6: กิจกรรมสำหรับการสอนเกี่ยวกับวิวัฒนาการและธรรมชาติของวิทยาศาสตร์ สถาบันวิทยาศาสตร์แห่งชาติ 1998. การสอนเกี่ยวกับวิวัฒนาการและธรรมชาติของวิทยาศาสตร์ วอชิงตัน ดีซี: สำนักข่าวแห่งชาติ ดอย: 10.17226/5787. ×หน้า 88 แบ่งปันข้อมูลอ้างอิงที่แนะนำ:บทที่ 6: กิจกรรมสำหรับการสอนเกี่ยวกับวิวัฒนาการและธรรมชาติของวิทยาศาสตร์ สถาบันวิทยาศาสตร์แห่งชาติ 1998. การสอนเกี่ยวกับวิวัฒนาการและธรรมชาติของวิทยาศาสตร์ วอชิงตัน ดีซี: สำนักข่าวแห่งชาติ ดอย: 10.17226/5787. × 89 แบ่งปันข้อมูลอ้างอิงที่แนะนำ:บทที่ 6: 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การรวมหลักการทางจิตวิทยาที่เกี่ยวข้องกับความรู้ความเข้าใจแรงจูงใจการพัฒนาและจิตวิทยาสังคม Psychological principles, such as those found in the American Psychological Association publications. Students Learn: School reform through student-centered education2 Should be applied to the framework for teaching content and evaluation. These psychological principles include more learning theory. They include providing motivation, development and social interaction. Criterion 4: Different courses Emphases the concept of the course can be expressed by thinking about the foreground and background in the painting. The artist decides what will be in the foreground and that kind of person will be highlighted. For example, science courses can focus on scientific concepts, inquiries or history and characteristics of science, while other goals may be noticeable but not emphasized. No one emphasizes the best course for all students. Perhaps a variety of emphases accommodate the attention, strengths and needs of scientific content. Criterion 5: An array of opportunities to develop cognition and capabilities related to different sizes of scientific literacy. Contemporary science courses should provide a balance between different dimensions of scientific literacy, which includes an understanding of scientific concepts, the ability to participate in inquiries and the ability to use scientific data to make decisions. 6: Teaching methods and evaluation strategies that align with the goals of scientific knowledge Teaching methods and assessments should be consistent with the goals of teaching, evolution, inquiry and the history and nature of science. This can be done using teaching methods that focus on inquiries and by evaluating students during investigative activities. Criterion 7: Professional development for science teachers who conduct courses Courses need to provide opportunities to support teachers as they develop knowledge and skills related to the implementation and organizing of scientific programs. Criterion 8: The integration of appropriate educational technologies The use of different types of computers and software improves learning when students use technology in a meaningful way. The use of educational technology should be consistent with other features of the curriculum, such as the size of scientific knowledge and teaching patterns. Criterion 9: Thorough field testing and inspection for scientific accuracy and teaching quality One of the key legacy of curriculum reform in the 1960s was field testing of materials in a wide range of science classrooms. Field testing and program reviews identify issues that developers do not recognize and customize materials according to the diverse needs of teachers, learners and schools. Scientists should examine the material for accuracy. Developers can miss the finer details of scientific concepts, inquiries and design. In addition, educators who examine materials can provide valuable insights into teaching and evaluating that. Developers improve materials and enhance learning. Criterion 10: Support from the education system Research on adoption, implementation and curriculum-related changes indicates the importance of intellectual, financial and moral support from those in the larger education system.4 This support includes science teachers, administrators, school boards and communities, although the curriculum is not available for support, but should identify the need for support and provide support indicators such as the provision of materials and equipment for laboratory inspection, budget allocation for professional development and announcement by the school board. However, the criteria should provide assistance to those responsible for improving the science curriculum. The following 4 pages are excerpts from important court decisions on evolutionary and building issues. Readers are encouraged to read the full text as necessary and time allowed. In 1968, in Epperson v. Arkansas, the U.S. Supreme Court legalized arkansas law that prohibits teaching evolution. The Court has a constitutional law governing the first amendment of the Constitution, does not allow the state to require teaching to be adapted to the principles or prohibitions of any particular denomination or religious doctrine (Epperson v. In 1981 in Segraves v. California, the Court found that the California Board of Education's Science Framework, written and qualified by anti-dog policies, provided adequate accommodation to Segraves's views, contrary to his objection that the class discussion of devolution prohibited him and his children's free use of religion. The anti-dogmatism policy provides differences in the class of origin should emphasize that the scientific explanation focuses on 'methods', not the best cause, and any speculative statements related to origin, both in the text and in the class, should be presented conditionally, not a dog. The court's ruling also directed the Board of Education to publish a widespread policy, which in 1989 was extended to cover all aspects of science, not just issues related to origin. (Segraves v. California, 278978 Sacramento Superior Court (1981)) in 1982 in McLean v. Arkansas Board of Education, a federal court has held that the law, keeping the balance, violates the establishment of the U.S. Constitution. Arkansas law requires public schools to provide balanced treatment with the creation of science and evolution of science in decisions that provide a detailed definition of the word science, the court declared. In fact, it is not scientific, the court also found that the law does not have a mundane purpose, emphasizing that the law uses peculiar language with creative literature to emphasize the origins of life as an aspect of evolutionary theory. While the story of the origin of life lies in the province, the biology science community does not consider the matter as part of an evolutionary theory, which assumes the existence of life and is directed to an explanation of how life evolved after its origins. Evolutionary theory is not prepared for either the absence or presence of its creators (McLean v. Arkansas Board of Education, 529 F. Supp. 1255, 50 (1982) U.S. Law Week, 1969) in 1987 in Edward v. Akilar. The U.S. Supreme Court has held an event. Louisiana's Creative Act is unconstitutional. This law prohibits teaching evolution in public schools, except when it comes with teaching in science creation. The court found that by developing a religious belief that the supernatural was created, humanity, which was embraced by science, creating an act that endorsed religion was impossible. In addition, the court found that the provision of comprehensive scientific studies was destroyed when the teaching of evolution was prohibited except when science was taught to create (Edward v. In 1990, in Webster v. The New Lennox District School, the Seventh Circuit Court of Appeals found that schools may prohibit teachers from teaching science, creating responsibility to ensure that the establishment of first amendments and religious schools will not be injected into religious schools. Teaching on the evolution and nature of science Washington, D.C.: National Press Agency: 10.17226/5787 ×. Schools may teach about the description of life on Earth as well as religion (e.g. creation). In comparative religions or social education classes. However, in the science class, they may present only a truly scientific critique or evidence for any explanation of life on Earth, but not religious critiques (beliefs that cannot be verified by scientific means). Schools may not refuse to teach evolutionary theory to avoid giving offence to religion, and they may avoid these rules by labeling them as articles of religious belief. Public schools must not be taught as scientific truths or theory of any religious doctrine, including the creation, even if any scientific evidence is truly for or against any explanation of life may be taught, just as they are not advance or inhibited. Teacher religious doctrine should not be ridiculed, for example, a student's religious description for life on Earth. 2. Excerpts from the Religious Brochure in Public Schools: Joint Statement of Current Law April 1995 Full Copy available by Religious Contacts in Public Schools, 15 East 84th Street, Suite 501, New York, NY 10028 or by World Wide Webww.ed.gov./Speeches/04-1995/prayer.html. Draft Committee: American Jewish Congress, Chair; American Civil Liberties Union American Jewish Commission American Muslim Council; Anti-Defamation League, Joint Baptist Board, Christian Law Society Seven-Day Adventurer's General Conference; National Association of Evangelicals; National Church Council People for the American way of life. Hebrew-American Congregational Union Accredited Organization: American Ethical Union, American Humanity Association Americans for Religious Freedom Americans united for the separation of the Church and the state. Be nai berit international Christian Science Church; Church of the Brotherhood, Washington Office; Church of Scientology International; Evangelical Lutheran Church in America, Lutheran Government Office; Confederate Reconstruction and Havurot; Fellow Commissioner on National Law Gurugobind Singh Foundation; The ZionIst Organization of The United States, an alliance of nations; National Jewish Community Relations Advisory Council (NJCRAC); National Ministry, American Baptist Church, United States; National Sikh Center; North American Council for Muslim Women; Presbyterian Church (U.S.); Structure the Church of Jesus Christ of Latter-day Saints The United Nations Church of Christ, the office for the church in society. Because science can only use natural and non-supernatural explanations, science teachers should not support any religious views on creating or supporting mention: that there is no possibility of supernatural influences navigating the universe we know. The court's ruling clarifies the issues surrounding the teaching, evolution and positivity of the order in which the creation science is taught when teaching evolution. The First Amendment to the Constitution requires that public institutions such as schools be religiously neutral because the creation of a special religious-specific view, it cannot support a valid scholarship in public schools. When Arkansas passed a law that required equal time for the creation and evolution of the law, it was challenged in federal district court. Opponents of the drafting include religious leaders of the United Nations, the Episcopalian, the United Nations, the United Nations, the United Nations Roman Catholic, African Episcopal, Presbyterian and Southern Baptist Churches and several educational organizations After a full trial, the judge ruled that the creation science was not qualified as a scientific theory (McLean v. Arkansas Board of Education, 529 F. Supp. 1255 (ED Ark. 1982). Other court decisions have upheld the county's right to teach evolution and not teach science- creation: (Webster v. Lennox New School#122, 917 F.2d 1003 (7th Cir. 1990); Peloza v. Capistrano Unified School District, 37 F.3d 517 (9th Cir. 1994)) Some legislators and policymakers are still trying to distort evolutionary teaching through a directive that requires teachers to evolve as only theories, or require textbooks or lessons about evolution to be preceded by disclaimers. Regardless of the legal status of these orders, they are poor education policies. Such policies have resulted in intimidation of teachers, which can result in loosening or ignoring evolution. The public is more confused about the peculiarity of scientific theory, and if learning evolves less by students, scientific knowledge will suffer. Project 1961 New York: Oxford University Publisher Daniel v. Waters 515 F.2d 485 (6th Cir., 1975) Edward v. Aguillard. In addition to Positivism and relativity: Theory, Methods and Evidence, Boulder, CO: Westview Press McLean v. Arkansas Board of Education 529 F. Supp. 1255 (D. Ark. 1982) National Research Council (NCPO) 1996 National Science Education Standard, Washington, D.C.: National Institute of Science The National Association of Science Teachers (NSTDA) 1996 Arlington High School Science Education Framework, VA: National Science Teachers Association NSTA. 1993. National Association of Science Teachers Peloza v. Capistrano School, United Nations 37 F.3d 517 (9th Cir. 1994) 1996, Michael, 1996, but is it a science? Philosophical questions in the controversial creation/evolution of Amherst, NY: Webster v. New Lennox School #122. 917 F.2d 1003 (7th Cir. 1990) Gerald Skoog, Chair, College of Education, Texas Tech University, Lubbock, Texas Randy C. Lane, Joseph Teres School, Winnipeg, Manitoba, Canada Linda Jordan, Science Consultant, Franklin, Tennessee Janis Lariviere, Westlake Alternative Learning Center, Austin, Texas Larry Scharmann, Kansas Manhattan, Kansas Eugenie Scott, National Center for Science Studies, Berkeley, California Page 7 Oosterman, M. and M. Schmidt, eds. Alexandria, VA: American Geological Institute, Raven PH and G.B Johnson 1992. Book Year, Inc. American Science. Life in the Universe: Special Issue 271 (Oct. J and .M Sen 1998 Science: Ed 2 New York Integrated Approach: John Wiley and Son Burra, T. 1990. Evolution and The Myth of Creativity: A Basic Guide to Facts in The Evolutionary Debate Stanford, California: Stanford University Claw, M., 1994. American Biology Teacher 56:409–415 Darwin C. 1934 Diary of Charles Darwin's Journey of H.M.S. Beagle, Nora Barlow, Ed. Cambridge, United Kingdom: University Press. Darwin C. 1859 about the origin of the species by natural selection method. London: J. 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This report has been reviewed by individuals selected for their diverse views and technical expertise, in accordance with the steps approved by the NRC's Review Board, the purpose of this independent review is to provide a straightforward and important opinion to help authors and the NRC in making their published reports as sound as possible and to ensure that the report meets institutional standards for evidence objections and response to educational costs. The contents of the review review and the draft manuscript remain confidential to protect the integrity of the deliberate process. 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