

Reflective Essays

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Astronomy 1001: Exploring the Universe

Essay 1: Impacts Essay 2: Energy Sources Essay 3: Planetary Travel

Guidelines:

The Reflective Essays are short papers which discuss the interaction of humans with their environment on Earth. They should be 400 to 600 words in length (about two pages). You should spend about five hours on each one, two or three hours researching and then two or three hours writing. What you write must be consistent with current scientific thinking and cite sources appropriately. On matters of opinion, you are free and encouraged to take any position you choose. You will be graded on the coherence, clarity, accuracy, logic, and relevance of what you write.

You must list your sources in a references section; this should be complete enough that someone else could check all the facts that you state. You may use information from the lectures and labs, but you will also want to do some research either in the library or on the web to get enough information to write your essay. Specifically, you are required to cite at least three references for each paper, and top grades will be assigned only to essays that appropriately make use of and cite multiple references.

For each essay, you must follow closely the assigned questions, unless you have proposed an alternative format to your lab instructor and received explicit permission to use that format. For example, you could propose to provide the same scientific information by writing a fictional story about an asteroid hitting the Earth, instead of simply answering the assigned questions. The decision about what alternative formats are acceptable is up to your lab instructor.

The essays are due in lab during the weeks indicated.

We suggest, in the strongest possible terms, that you have a friend read a draft copy of your essay and give you feedback in order to make revisions before you submit your final and only essay. First drafts are unlikely to satisfactorily meet the grading criteria, and top grades will only be given if the essay is free of spelling and grammatical errors.

Topics : 1. Due in your lab section the week of Feb 17—Cosmic Impacts on Earth as a Threat to

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Civilization

In this essay, you will explore the question of how much, if any, economic effort should be devoted to the pre-detection of possible Earth impacts as well as development and implementation of collision prevention strategies. Your task is to present a thoughtful, well researched argument for a point of view. In order to address this issue in a compelling way, structure your essay according to the following outline:

- A. Write a short introduction stating your “thesis“ (the point you will argue), and then label each of the following sections appropriately.
- B. In one paragraph, summarize the key information we have about impacts between objects in the early solar system, including their origins and consequences.
- C. Summarize our current knowledge regarding the threat of impacts on the Earth now. Be sure to include how the probability of an impact depends on the size of the impacting object and how the expected level of destruction depends on that size, as well.
- D. Briefly describe serious efforts that are currently either underway or proposed to protect Earth from impact hazards.
- E. Propose and provide a rationale for how much money the U.S. should spend yearly on impact prevention efforts. To establish its priority, your argument must include a comparison with at least one other expenditure on a national level, and must be supported by the information you have presented above.

Some suggested references:

National Optical Astronomy Observatory Press Release, February 2003

Astronomy Magazine, February 2002, "Target Earth".

Australian Spaceguard Survey

Impacts and Defense Strategies (notes from an interesting organization called P.E.R.M.A.N.E.N.T.)

NASA Asteroid and Comet Summary Site (good list of current and planned missions)

Near Earth Asteroid Tracking (see FAQs for overview, plus other good links)

Near Earth Object Report (Task Force findings and recommendations for UK

2. Due in your lab section the week of March 10—Energy Sources

In this essay you will explore the feasibility of implementing and sustaining hydrogen fuel cells as a new energy resource. Your task is to present a thoughtful and well-researched argument for a point of view.

A. Write a short introduction stating your "thesis" (the point you will argue), and then label each of the following sections appropriately.

B. Summarize the key information about hydrogen fuel cells. Briefly explain what they are, what they may be used for (e.g. transportation), how we produce the needed hydrogen, where we will get the hydrogen, and how much energy it will take to produce it.

C. Discuss how fuel cells compare to other energy resources like natural gas, solar, wind, water, etc. Will fuel cells be a cost effective replacement for our country's energy needs?

Some suggested references:

HyWeb - Hydrogen Fuel Cell Energy Information

U.S. Department of Energy: Fuel Cells

Useful Hydrogen, Fuel Cell and Renewable Energy Links

Fuel Cell Vehicles

Department of Energy—Energy Information Administration

3. Due in your lab section the week of April 14 - Planetary Travel

In this essay, you will examine the issues of extra-solar planet detection and our environmental hazards. Your task is to present a thoughtful, well-researched argument for a point of view. In the end you will make and present an informed judgment on the need and feasibility of planetary travel.

A. Consider the state of planet Earth. There are many environmental issues that pose a threat to the ecology and welfare of our planet. Examine one of these issues and discuss how the problem began and how it impacts our environment.

B. If the hazard and problem described above were not solved, then the environment on Earth would be less hospitable to most (if not all) life. Given this dire scenario, humanity might want to find a new planet on which to live. In this context, discuss one method by which scientists are trying to detect planets outside of the Solar System.

C. Let's assume that we need to travel to one of those star systems. Pick a star system where scientists think an extra-solar planet exists. Make a note of its name and distance from Earth. If we design a spacecraft that can travel at a tenth of the speed of light, how long would such a journey take? Make sure to show to your work.

D. There are many issues that must be addressed prior to making the journey to the new planet. Is this a journey that is worth taking? In consideration of what you have written above, please include the following to support your argument:

1. Given the length of the journey to the extra-solar planet, what are some of the practical concerns that the travelers must address?
2. Suppose life already exists on that planet. What are the ethical considerations? How could we avoid taking the environmental problem that initiated this journey with us to the new planet?
3. What type of planets have we actually been detecting? What are the likely environmental conditions of this planet?

Some suggested references:

California & Carnegie Planet Search (site is sometimes down)

Thinkquest: Environmental Problems

Capabilities of Various Planet Detection Methods

A History of the Search for Extrasolar Planets

U.S. Environmental Protection Agency

Pressing Problems for Planet Earth

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