

# Extra Credit: The Science behind Avatar

**Background:** The producer of “Avatar” is fond of saying that writer and director James Cameron does not write science fiction, he writes science fact. From the reclining, cup-holdered seat of a local multiplex, that seems a generous statement. Neither mountains floating in midair or fauna that lights up like the Las Vegas Strip at night would seem to have the slightest foundation in reality.....and yet they do.

To be sure, Mr. Cameron likes to bring his fair share of Hollywood to the cosmos, painting his scenes with the brush of fantasy. But beneath some of his most outlandish visions is often a kernel of scientific possibility.



**Directions:** After viewing the movie “Avatar”, you will discuss both the “good” and “bad” science in relation to one of the topics below. Use the concepts you have learned throughout the year to support your hypothesis. You may also want to do some research online.

Your paper must be a minimum **500 words in length**. It may be typed or hand-written. It must also include at least **three references**. These can be from the web; books, magazines, etc. (**Include a bibliography in order to receive credit**). **Essay is worth 20 extra credit points.**

## TOPICS:

- Describe what provided “fitness” to plants/animals on Pandora. Give specific examples.
  - multiple eyes
  - Type of flight (*number of wings, shape of wings, etc.*)
  - Number of legs on land animals (*why six legs?*)
  - Respiratory systems, etc.
- What type of selection process led to the evolution of animals/plants on Pandora (*directional, stabilizing, disruptive*) Give specific examples.
- Describe the composition of the atmosphere on Pandora (*“unconscious in 20 seconds, dead in four minutes”*) and relate this to adaptations on Pandora. Give specific examples.
- Is it possible for life to exist on a moon like Pandora orbiting another larger planet? (Is there any current evidence that this is possible)
- Describe the anatomy and physiology of the Na’Vi. How are they similar to humans and how do they differ? What environmental pressures may have led to these adaptations? Give specific examples
- What is “slow gravity”, as they called it on Pandora and what were the organism’s evolutionary responses? Give specific examples.
- What is bioluminescence and how is it exhibited by the life forms on Pandora. How might this have evolved and what was the function of the bioluminescence? Give specific examples.
- What is the Gaia hypothesis and how does it relate to “Awa”?
- Similarities and differences between plant-life on Pandora compared to Earth. What were environmental pressures that molded these traits?
- Describe the abiotic and/or biotic factors that may have driven evolution on Pandora. Give specific examples.
- Describe a food chain or food web on Pandora. Discuss the methods producers use to produce energy and include a pyramid of numbers and a biomass pyramid.
- Science topic of your choice as related to the movie.