

Planet of the Apes

1. The film opens with astronaut George Taylor completing his final report before returning to Earth. While he and his crew have aged only six months, their ship's computer indicates that hundreds of years have elapsed on Earth because the ship was traveling at nearly the speed of light. At the conclusion of his message, Taylor gives himself an injection and straps himself into a sleep chamber like those occupied by the other three astronauts. Exactly, how many years have elapse on Earth, according to the Computer?
2. The spaceship lands on an unknown planet, in an area that resembles the Grand Canyon. It looks like the spaceship is coming in really fast, and when it crashes into a lake , would you expect everyone, and anything loose in the ship, to go flying due to their inertia? However, due the crew members show any indication of experiencing a deceleration? Explain.
3. The sleep chambers open, and three of the four astronauts emerge. The fourth astronaut, the only woman in the group, has died because of a malfunction in her suspended animation tube. We assume this happened because she starved to death, but she looks like a mummy. This seems to imply that she aged hundreds (or two thousand years). In the ship, 18 months have gone by. Will everyone on the ship experience 18 months of time? Even the dead person?
{Note: The 2000 years of Earth time are a different frame of reference and irrelevant to the time passage in the ship's frame}
4. The ships computer indicates that the year is now 3978 on Earth. "Planet of the Apes" must be commended for giving special relativity a shot. (Interestingly, they refer to it as Dr. Halstein's theory of space and time instead of Einstein's theory of special relativity).
 - a) The entire premise of the movie hinges upon the concept of time dilation. Let's look at the facts. The ship leaves earth sometime around 1973. After the crash landing we find out the crew has been in suspended animation for about a year and a half, while the "earth time" clock reads 3978. Therefore, how many years have elapsed on Earth?
 - b) It's a classic example of the "twin paradox". If you leave Earth on a round trip traveling at velocities close to the speed of light, when you return, more time will have elapsed on Earth than in your (the spaceship's) frame of reference. Based on

the data, estimate the approximate speed of the spaceship: [Use the time dilation equation]

$$T = \frac{T_0}{\sqrt{1 - \frac{v^2}{c^2}}}$$

with T being the time elapsed on Earth #4a; and T_0 the time elapse on the ship; and c is the speed of light constant 3.0×10^8 m/s: Solve for v

- c) How does #4b compare with the speed of light? How close?
- d) Do you think that they were able to achieve that back in 1973? {Maybe it is a military secret} Explain.

- e) Ignoring the obstacles regarding the fuel requirements for accelerating a ship to that speed, calculate the distance traveled by the ship in the Earth's frame of reference. [Use $L_0 = v T$] Remember to convert seconds to years.

- f) Convert your meters to Light-years:

5. The three astronauts escape on a lifeboat as water floods the cabin of the spaceship. As they approach the shore, the spaceship sinks. After some discussion, they conclude that they do not know where they are. What were they able to carry from the spaceship?
6. They explore the area for food and civilization, but encounter only a dangerous avalanche. By this time they have only 8 oz of water, and there is no sign of rain, although they see lightning and hear thunder. Suddenly, they discover life. Describe what they first discover:
7. Their hope renewed, the men continue searching through the night and on the following day they notice people looking at them from atop a hill. What do these people turn out to be?
8. Beyond the hill they find a waterfall. They bathe and drink, but when they return, what do they discover?
9. In the distance they see a tribe of primitive people. It appears that these people are unable to speak. When the tribe sees the astronauts, how do they react?
10. Suddenly, gunshots are fired by horsemen. The astronauts are shocked when they realize that the gunmen are actually human-sized apes. The apes beat and capture many of the humans. In the process one of the astronauts is mistaken for a primitive human and is killed by the apes. Taylor, shot in the throat, is captured along with the third astronaut. Taylor is surprised to see the apes taking pictures. Why did this surprise him?
11. Taylor is placed in a cell in a research institute. Later a young woman is also put into Taylor's cell. What name does he call her?
12. Taylor surmises that evolution has taken a different course on this planet. Humans cannot talk. They can be taught a few tricks but are basically wild and untamed. The apes regard humans as a nuisance. What does Dr. Zaius, the simian Minister of Science, tell his colleagues, about solving the human scavenger problem?
13. Dr. Zira, a researcher, and her fiancé, Dr. Cornelius, an archaeologist, discover that Taylor is different than other humans. Why can't Taylor just talk with them? Why does he have to write a note? What does the note say?

14. Why is Cornelius so excited about what Taylor says about the forbidden zone?
15. When Zaius learns of Taylor's verbal abilities, he puts him on trial to dispose of him and threatens to accuse Zira and Cornelius of scientific heresy if they aid in Taylor's defense. In the course of the trial Taylor discovers something about the third astronaut. What happened to the third astronaut? Why?
16. Secretly Zira and Cornelius help Taylor to flee to the excavation site. When Zaius goes there, he is confronted by one of their findings---What was it? What does it mean to Zaius?
17. Zaius asks, " Why, if man were superior, did he not survive?" How and when does Taylor and Nova answer this question? What were Taylor's last words?
18. Practice thinking about how natural selection operates by describing how modern giraffes, which have long necks and feed on the leaves of trees, could have evolved from population of ancestors with shorter necks. Try next to formulate a scenario in which chimpanzees could have evolved as depicted in *Planet of the Planets*. Use the internet or other sources to help.
19. A mass extinction of organisms, including the dinosaurs, occurred about 65 million years ago. One theory for how this extinction came about proposes that a giant asteroid

crashed into the Earth and it's impact raised a dust cloud that obliterated so much sunlight that the plant growth was drastically diminished and resulted in the extinctions. Compare this kind of sudden alteration in the environment with that suggested in the film. Is it plausible for the catastrophe to have advance the chimps and done the opposite to humans?

20. What human characteristics do you think are most important in supporting the human dominance of Earth? Defend your choices.

21. *Planet of the Apes* takes place in the year 3978 or roughly 2,000 years from the present. Is that amount of time long enough for humans and chimps to have changed as depicted in the film? [Note: The first hominoids appear in the fossil record about 20-23 million years ago. About 6-10 million years ago the first hominids emerged. The earliest hominids belonged to the genus *Australopithecus*, which is now extinct. Modern humans arose around 300,000 years ago. In formulating your response, take into account also the experience of artificial selection by humans. The breeding of cattle, dogs and cats. Use the internet]

22. Chimpanzee's finger are longer in proportion to their thumbs than are humans'. Is this difference likely to hinder chimps in attempting activities that humans perform easily? Make a list of 10 activities that require the use of your hands and evaluate whether they require precision or power. Do the same thing for chimpanzees.

23. Dr. Zaius says that he considers Taylor a mutant and expresses his concern that since one mutant has appeared, there are bound to be many others. Without considering whether or not he actually believe his statement, evaluate the likelihood of such a situation. Does evolution proceed with the generation of similar mutations? Could Taylor be, as he is called at one point, a “missing link?”
24. Explain what happened 2,000 years earlier in the Forbidden Zone. Why was the ancient taboo established?
25. What advance capabilities have the apes attained in their culture? Which ones are missing?
26. Is it reasonable and probable that the events that changed humans and apes would have been regressive only for the humans and progressive for all of the various types of ape? Defend your answer.
27. Researchers trying to discover the similarities and limitations of chimpanzees, pygmy chimpanzees (bonobos), and other apes and monkeys find that their capabilities have been underestimated heretofore. In the book “Shadows of Forgotten Ancestors, Carl Sagan and Ann Druyan recount the results of research that demonstrates around contemporary primates “friendship, altruism, love fidelity, courage, intelligence, invention, curiosity, forethought, and a host of other characteristics” that are usually attributed especially, sometimes solely, to humans. They suggest that , “Perhaps our uniqueness is only this: an enhancement of well established, preexisting talents for

invention, forethought, language and general intelligence---enough to cross a threshold in our capacity to understand and change the world.” What interpretations of the evolutionary events in *Planet of the Apes* become more probable if the findings are correct?

28. In humans the brain region that is comparatively much larger than that of an ape is the cerebrum. Using neoteny as a mechanism, explain what would happen to chimp's brain during development to make it more like a human's.