

Part II: Questions for Lecture Videos

The lecture video questions are designed to help you identify important points made by the videos and to help you take notes on their content. You do not need to turn in answers to the questions, but answering them will help you study for exam questions over the lecture videos.

Lecture Video #1

Why Physics?

1. How does the video characterize the study of physics?
2. What are some of the situations, circumstances, and locations in which the study of physics is discussed?
3. How is the study of physics relevant to your life?

Lecture Video #2

Ring of Truth: Change

1. How does the title, "Change," related to topics discussed in class? What "changes" are discussed in the video?
2. List some of the energy transformations that took place in the large sealed plastic box.
3. List some energy transformations involved in bicyclists competing in the Tour de France.
4. Considering food as a source of energy for a bicyclist, what is that energy used for? What fraction of a bicyclist's energy from food ends up generating heat, overcoming friction or wind resistance, or providing energy for accelerating or riding uphill?
5. What one factor made the most difference in bettering an international speed record for bicycle racing? Is that factor relevant for competitors in the Tour de France?
6. Considering the concept that mass is a form of energy, do you think the mass of the clear plastic box mentioned early in the video actually did change?

Lecture Video #3

Nova: The Light Stuff

1. What are some of the major landmarks in the history of human-powered flight?
2. How do the forces of lift, weight, thrust, and drag influence flight?
3. Approximately how far is the northern coast of Crete to the nearest Greek island?
4. About how long would it take to fly that distance in a human-powered aircraft?
5. How do designers manage to make the aircraft strong, yet lightweight?
6. What is the approximate wingspan of Daedulus? What is its weight?
7. What types of materials were used to construct Daedulus?
8. What caused Daedulus '87 to crash?
9. How do pilots prepare for their flight? What is the significance of their diet?
10. What energy transformations are involved in human-powered flight?
11. Did Daedulus make a successful flight across the Aegean Sea?
12. Do you think money should be spent on efforts such as the Daedulus Project? Why or why not? Do such projects benefit society?

Lecture Video #4

Nova: The Hidden City

1. To what elements of New York City's infrastructure does the "hidden city" refer?
2. How much trash and sewage is produced by New York City in a given period of time?
3. What sources of energy does New York City use to generate electricity? What are the advantages and disadvantages of each source?
4. In what ways have the city's electric generating system changed over the past 30 years?
5. What one event triggered a major change in the electric generating system?
6. What methods are used to control the quality of New York City's water supply?
7. Where does New York City's water come from, and how is it transported to the city?
8. How are water main leaks fixed?
9. How are New York City's sewer pipes inspected?
10. How is sewage treated? What ultimately happens to the sewage?
11. What problems are associated with disposing of New York City's trash?
12. What is done with the trash?
13. What steps could reduce the amount of solid waste to be disposed of?

Lecture Video #5

Edison's Miracle of Light

1. When did Thomas Edison's experiments with the electric light bulb take place?
2. What did people use to illuminate their homes and streets before the light bulb?
3. Why was there such an interest in *electric* lights?
4. Edison was a prolific inventor. What else did he invent besides the light bulb?
5. According to the video, what was the significance of Menlo Park?
6. What were the obstacles to inventing a workable light bulb?
7. What was used as a filament in early light bulbs? What is used today?
8. Once invented, was the light bulb an instant commercial success? Why or why not?
9. What did Edison need to do to sell his invention to the public?
10. Did Edison's electrical utilities rely on alternating current (AC) or direct current (DC)?
11. What are the advantages and disadvantages of AC and DC?
12. Were Edison's utilities an unqualified success a decade after their introduction? Why or why not?
13. What type of system (AC or DC) did Westinghouse and Tesla propose?
14. Did Edison ultimately resolve his differences with Westinghouse, Tesla, and J.P. Morgan?

Lecture Video #6

Scientific American Frontiers: Future Car

1. According to the video, has the fundamental design of the automobile changed much since it was first developed 100 years ago? If so, how?
2. What powers the GM "Autonomy" concept car (or the "Highwire"—one version of the "Autonomy")? What is the "skateboard" portion of the car?
3. The video demonstrates two kinds of hybrid cars. For each type, what are the two sources that power the car?
4. How can a hybrid car save energy when going downhill or braking?
5. What are some advantages and disadvantages of a diesel engine?
6. What are some advantages and disadvantages of an electric car?
7. What is another type of car than uses hydrogen but does not use a fuel cell?
8. What is a fuel cell and how does it work?
9. What are 3 ways discussed in the video in which hydrogen can be stored in a car? Can a fuel cell use something other than pure hydrogen as the source of hydrogen for the reaction?
10. How did the expert in Iceland propose that they could generate hydrogen there?
11. Do the experts foresee a difficulty in transporting hydrogen to service stations?

Lecture Video #7

Newton's Apple/Climate Change/Earth in the Hot Seat

1. **Newton's Apple** discusses the Glenn Canyon Dam on the Colorado River. How do hydroelectric power plants use moving water to generate electrical energy? What areas rely on this dam for electricity and this river for water? How do electrical energy demands influence the water level of the river on a daily basis?
2. How did the Glen Canyon dam change the landscape along the river and the fish and plants which live in and along the river?
3. **Climate Change** discusses some of the negative effects that could accompany global warming. What are some of the effects discussed? What are the three things that experts agree on concerning climate change?
4. According to former Vice President Al Gore, will global warming occur? Does he believe global warming is caused by human activity?
5. What human activity is believed to enhance the greenhouse effect? How do atmospheric carbon dioxide levels correlate to mean global temperatures?
6. The melting of which two ice sheets could cause a rise in sea levels? How long might it take for these ice sheets to melt? By how much could sea levels rise? What countries, states and cities would be underwater if sea levels rose by this amount? How many people would be displaced by an inundation of coastal areas by rising sea levels?
7. What other problems could result from global warming? How hopeful were the experts interviewed in this video that these problems can be successfully addressed?
8. **Earth in the Hot Seat** featured Lonnie and Ellyn Mosley Thompson. Where is the Byrd Polar Research Center? What is the goal of the research being done there?
9. What was the significance of the Cori Kalis glacier in the Andes mountains of Peru?
10. What are the techniques and equipment used in gathering and analyzing ice cores? How is it possible to gather ice cores from tropical latitudes? What are the significant findings resulting from this research?
11. Dr. Ellen Mosley Thompson and Dr. Lonnie Thompson point out that scientists talk in terms of probabilities of events occurring. Waiting until events are 100% certain might be too late. Explain.

Lecture Video #8

Hydrogen Hopes / Power Shift

1. What two ways could a car be designed to run on hydrogen fuel? What are benefits to the use of hydrogen-powered vehicles? What are obstacles to widespread use of such vehicles? What are Stan and Iris Ovshinsky developing?
2. How does Iceland plan to become the "first hydrogen economy?" What would be the source of energy for hydrogen production and how would hydrogen get to the fuel stations where cars fill up?
3. What kind of new photovoltaic solar panels are being developed and what are their benefits?
4. What research is being done at MIT to reduce emissions from the smokestacks of factories while producing a product that can be used to produce hydrogen? Does this process remove or produce greenhouse gasses or do both?
5. What are some reasons, stated in Power Shift, to use renewable resources? Is there enough potential solar available to meet the needs of the Earth's population?
6. What is meant by the following phrases: "Design buildings like trees." "Cradle to cradle," and "Power shift?"
7. Does renewable energy currently account for much of the electricity production in the U.S.? Is there enough potential solar and wind power available to meet the needs of the population of the U.S.?
8. What can you do to conserve energy and help effect a shift to renewable energy?