

Questions to Guide Readings
History of Technology HIST 3715 R.F. Hirsh

As you do the assigned readings, you may find the questions below helpful. You should be able to answer each of these questions on the basis of the reading. Some of these questions may show up in one form or another on examinations.

Washburn, "Tools and Human Evolution."

1. How have tools affected the evolution of humankind?
2. What is the significance of bipedalism?
3. What was the importance of "self-domestication"?

Drucker, "The First Technological Revolution and Its Lessons."

1. Why was the age of irrigation civilization an age of technological innovation?
2. When and why did the individual "emerge"?

Wendorf, et. al., "An Ancient Harvest on the Nile."

1. What are the old assumptions about the origin of agriculture?
2. How did the research described in the article challenge the traditional views of the origin of agriculture?
3. How did the article define "domestication," and what is the heretical view of domestication?

Childe, *Man Makes Himself* excerpt.

1. Describe some neolithic industries.
2. What devices were used for textile making?

Maddin, "How the Iron Age Began."

1. How, why, and when did iron replace bronze?
2. Describe the steps in making iron and steel? What are the advantages and disadvantages of steel?
3. What is quenching?

MacLaughlan, "The World of Greece and Rome."

1. Why was iron viewed as a democratic metal?
2. What were Aristotle's four elements of nature. What were they based upon? How did his system solve the problem of change?
3. What was the basic principle of astronomy for about 2000 years?
4. What was the theoretical goal of alchemists?

Landels, *Engineering in the Ancient World* excerpt.

1. What kinds of power sources were used in classical antiquity for different jobs?
2. Describe different types of water wheels and their advantages.
3. How much were wind and steam sources used? Why?

Smith, "Roman Hydraulic Technology."

1. Why did the Romans build aqueducts?
2. What special techniques and materials did they use?
3. How sophisticated was Roman hydraulic technology? Did others emulate it?

Foley and Soedel, "Ancient Oared Warships."

1. Describe the evolution of the trireme.
2. What were some of the sophisticated design techniques used by the Greeks in building ships?
3. What scientific principles did the Greeks consciously employ?

Young, *The Machinery of War* chapter, "The Dark and Middle Ages."

1. What happened to the military arts after the fall of the Roman empire?
2. What was the answer to the power of heavy cavalry?
3. What was the significance of the Swiss Pike Phalanx?
4. Describe offensive and defensive tactics of siegecraft.

Cardwell excerpt, "The Printing Press."

1. What were the distinct stages of Gutenbergs's "solution"?
2. What two inventions still determine the course of daily life?
3. Why is the perpetual motion machine considered important in the history of technology?

Pacey, "Social Ideals in Technical Change."

1. In what terms should we understand the rapid development of mining between 1450 and 1630, according to Pacey?
2. What was the demand for mined metals?
3. What was the role of bankers in developing new mines and techniques?
4. Who was Agricola and what were his theories on the social status of mining? Why was his view important?

Dibner/Agricola

1. How did miners ventilate shafts and get water out of them in medieval times?

Casson, "Godliness and Work."

1. How much did the Romans and Greeks exploit mechanical power?
2. How detrimental was slavery to technological innovation in the Roman Era? In the Middle Ages?
3. What prejudices did the Greeks and Romans have concerning work?
4. What impact did Christianity have on technological innovation?

White, "Medieval Uses of Air."

1. What was the relationship between science and technology before the 19th century? Did scientific understanding always (or often) precede development of new technologies?
2. What was probably the first use of air for practical purposes--going back as far as Neolithic times?
3. What was the significance of using air in bellows?
4. Describe the use of suction pumps? What was the scientific basis for their development?
5. What were the four most important uses of air in medieval times? What uses of air were imagined but not realized in the middle ages?

Cardwell excerpt, "Galileo"

1. How did people think of machines before Galileo?
2. How did Galileo's work lead to the quantification of power?
3. Describe Galileo's science of the strength of materials.

Gimpel Book

1. What were some of the major features accompanying the first industrial revolution? What makes them so remarkable?
2. Why were monasteries significant in the history of medieval technology?
3. What are the contents of the Domesday report?
4. What does the use of tidal mills represent?
5. What impact did the climate have on medieval agriculture?
6. What allowed horses to pull 6,400 kg?
7. What was the symbiotic relationship between horses and the medieval agricultural system?
8. What were the consequences of the heavy plow?
9. Describe the medieval diet.
10. Why was stone quarrying the most important mining industry in medieval Europe?
11. What was the significance of waterpower to the iron industry?
12. How and why did European industrialism play havoc on the environment? Provide examples.
13. Why were royal forests created?
14. What anti-pollution measures were taken in the Middle Ages?
15. Why did medieval society believe in progress?
16. What were the consequences of clocks striking equinoctial hours?
17. What important step did Charles V take?
18. What did the "rational outlook of life" refer to?
19. What important contributions did the Arabs make to western science?
20. What did Roger Bacon do for experimental science?
21. What effects, positive and negative, did the Black Death have?
22. What comparisons does Gimpel make between the Middle Ages and recent history?

Chamberlin, "Changes in English Agriculture"

1. What was the enclosure movement?
2. What advantages and disadvantages did it have?
3. How did the movement support the industrial revolution?

Stearns, "Population Growth"

1. Why was "the massive expansion of Europe's population...the most important disruptive force in the 18th century?"
2. What caused the population explosion?
3. How did population growth affect commercialization?

Ferguson, "Origins of the Steam Engine"

1. What were some of the impacts of the Newcomen engine?
2. Describe the major features of the Newcomen & Watt engines. What similarities and differences existed between them?
3. What does Ferguson mean by the "genius of James Watt"?

Letter from Boulton to Darwin about Watt's engine

1. What advantages does the Watt engine have over the Newcomen engine and water wheels?

Cardwell "The Origins of Modern Technology"

1. What are the four basic processes in making textiles?
2. What had England's wealth traditionally depended on?
3. When and how did the mechanization of weaving occur?
4. Why was it important that spinning and weaving be efficiently mechanized in the late 18th century?

5. What was unusual in John Smeaton's approach to water wheels?

Cardwell "Arkwright and his Contemporaries"

1. Why did Samuel Crompton call his invention a mule?
2. What further inventions became necessary after the invention of the waterframe, spinning jenny and mule?
3. What does cotton spinning have to do with the way in which people work?

Cotton Statistics

1. When did cotton production in the US gain a large share of the world market? What countries consumed the most cotton?
2. How much of US exports in the early 19th century were of cotton (and other agricultural products)? How much did the US export in manufactured goods? What do these figures say about the nature of the US economy?

Harris, "Rise of Coal Technology"

1. Why did coal become a major fuel in England before the industrial revolution?
2. According the article, what were the revolutionary advances in British technology that occurred during the first decade of the 18th century?
3. Why didn't coal technology transfer easily to the Continent?

Vialls "Cast Iron"

1. When did iron-making begin? How was it originally done?
2. Why did people smelt with charcoal?
3. What problems were there in smelting with coke? How were they overcome? Who was responsible for the initial success in using coke? Why?

Lewis "Iron and Steel in America"

1. What were the chief uses of iron in Colonial America?
2. What is a blast furnace used for? How does it work?
3. What is charcoal? pit iron? wrought iron? steel?

McNown, "Canals in America"

1. How much weight can a horse carry as a packhorse? drawing a wagon? pulling a barge?
2. Describe the first US canals? What were they used for? Why was the Erie canal built?
3. What impact did the success of the Erie canal have?
4. How did canals and railroad growth compare in the 1800s?

Tarkov, "Engineering the Erie Canal"

1. What kind of experience did the principal engineers of the Erie Canal have? What kind of local inventions were made to help construct the canal?
2. What were the most striking engineering problems that needed to be resolved?
3. What was the significance of the Erie Canal?

Boorstin chapters from *The Americans*

1. What kind of engine was used on steamboats on the Western rivers? Why?
2. What risks did people run in order to achieve the benefits of steamboats?
3. What effects did cultural attitudes towards "getting there first" have on the construction of railroads in America?

4. Why was the American opportunity to travel a great "equalizer?" Did US trains have different classes of service?

Blackford, "The Emergence of Big Business"

1. How did the technologies of railroads and telegraphs interact?
 2. What kind of managerial problems did railroads face?
- What organizational innovations helped railroads organize effectively?
3. How did railroad management contribute to the rise of big business?

Langer "The Social Question"

1. What was the underlying cause of the "pauperization" of much of the European population in the decades preceding 1848?
2. Who managed to live in relative comfort during this period?
3. Why did employers so often hire women and children?

McClellan and Dorn, "The Industrial Revolution"

1. What was the ecological stimulus to the industrial revolution in England?
2. What were the different techniques used by Smeaton and Watt for improving the Newcomen steam engine?
3. Describe the challenges and responses that led to technical innovations in the textile industry.
4. Describe the new energy sources and new ways to organize labor that occurred during the industrial revolution.
5. How did industrialization affect ideologies?
6. What was the relationship between science and technology during the industrial revolution? Did science come before technology?