

# Science and Technology

## The Threat and the Promise

*Technical innovation has transformed life in the modern era.  
Have the benefits outweighed the costs?*



## *Debating* the DOCUMENTS

Interpreting Alternative Viewpoints  
in Primary Source Documents

# Science and Technology The Threat and the Promise

The 2017 World History Course and Exam Description of the College Board Advanced Placement Program\* lists five themes that it urges teachers to use in organizing their teaching. Each World History *Debating the Documents* booklet focuses on one or two of these five themes.

### *The Five Themes*

- 1. Interaction between humans and the environment.** (demography and disease; migration; patterns of settlement; technology)
- 2. Development and interaction of cultures.** (religions; belief systems, philosophies, and ideologies; science and technology; the arts and architecture)
- 3. State-building, expansion, and conflict.** (political structures and forms of governance; empires; nations and nationalism; revolts and revolutions; regional, transregional, and global structures and organizations)
- 4. Creation, expansion, and interaction of economic systems.** (agricultural and pastoral production; trade and commerce; labor systems; industrialization; capitalism and socialism)
- 5. Development and transformation of social structures.** (gender roles and relations; family and kinship; racial and ethnic constructions; social and economic classes)

### *This Booklet's Main Themes:*

- 2** Development and interaction of cultures.
- 4** Creation, expansion, and interaction of economic systems.

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# Teacher Introduction

## ★ Using Primary Sources

Primary sources are called “primary” because they are first-hand records of a past era or historical event. They are the raw materials, or the evidence, on which historians base their “secondary” accounts of the past.

A rapidly growing number of history teachers today are using primary sources. Why? Perhaps it's because primary sources give students a better sense of what history is and what historians do. Such sources also help students see the past from a variety of viewpoints. Moreover, primary sources make history vivid and bring it to life.

However, primary sources are not easy to use. They can be confusing. They can be biased. They rarely all agree. Primary sources must be interpreted and set in context. To do this, students need historical background knowledge. *Debating the Documents* helps students handle such challenges by giving them a useful framework for analyzing sources that conflict with one another.



*“Multiple,  
conflicting  
perspectives are  
among the truths  
of history.  
No single  
objective or  
universal account  
could ever put an  
end to this endless  
creative dialogue  
within and  
between the past  
and the present.”*

From the 2011 Statement on Standards  
of Professional Conduct of the Council of  
the American Historical Association.



## ★ *The Debating the Documents Series*

Each *Debating the Documents* booklet includes the same sequence of reproducible worksheets. If students use several booklets over time, they will get regular practice at interpreting and comparing conflicting sources. In this way, they can learn the skills and habits needed to get the most out of primary sources.

### **Each *Debating the Documents* Booklet Includes**

- **Suggestions for the Student and an Introductory Essay.** The student gets instructions and a one-page essay providing background on the booklet's topic. A time line on the topic is also included.
- **Two Groups of Contrasting Primary Source Documents.** In most of the booklets, students get one pair of visual sources and one pair of written sources. In some cases, more than two are provided for each. Background is provided on each source. *Within each group, the sources clash in a very clear way.* (The sources are not always exact opposites, but they do always differ in some obvious way.)
- **Three Worksheets for Each Document Group.** Students use the first two worksheets to take notes on the sources. The third worksheet asks which source the student thinks would be most useful to a historian.
- **One DBQ.** On page 20, a document-based question (DBQ) asks students to write an effective essay using all of the booklet's primary sources.

## ★ *How to Use This Booklet*

### **1. Have students read “Suggestions for the Student” and the Introductory Essay.**

Give them copies of pages 5–7. Ask them to read the instructions and then read the introductory essay on the topic. The time line gives them additional information on that topic. This reading could be done in class or as a homework assignment.

### **2. Have students do the worksheets.**

Make copies of the worksheets and the pages with the sources. Ask students to study the background information on each source and the source itself. Then have them take notes on the sources using the worksheets. If students have access to a computer, have them review the primary sources digitally.

NOTE: If you are using these materials with an AP world history class, an honors class, or some other group of advanced and/or more knowledgeable students, you may want to make more written sources available to them on this topic. Do a basic Internet search for sources that provide additional perspectives and then add to the sources provided here.

### **3. “Debate the documents” as a class.**

Have students use their worksheet notes to debate the primary source documents as a class. Urge students to follow these ground rules:

- Use your worksheets as a guide for the discussion or debate.
- Try to reach agreement about the main ideas and the significance of each primary source document.
- Look for points of agreement as well as disagreement between the primary sources.
- Listen closely to all points of view about each primary source.
- Focus on the usefulness of each source to the historian, not merely on whether you agree or disagree with that source’s point of view.

### **4. Have students do the final DBQ.**

A DBQ is an essay question about a set of primary source documents. To answer the DBQ, students write essays using evidence from the sources and their own background knowledge of the historical era. (See the next page for a DBQ scoring guide to use in evaluating these essays.)

The DBQ assignment on page 20 includes guidelines for writing a DBQ essay. Here are some additional points to make with students about preparing to write this kind of essay.

#### **The DBQ for this Booklet (see page 20):**

Describe the overall impact of science and technology in the twentieth century, and explain why you see that impact as primarily positive or primarily negative.

- Analyze the question carefully.
- Use your background knowledge to set sources in their historical context.
- Question and interpret sources actively. Do not accept them at face value.
- Use sources meaningfully to support your essay’s thesis.
- Pay attention to the overall organization of your essay.



## ★ *Complete DBQ Scoring Guide*

Use this guide in evaluating the DBQ for this booklet. Use this scoring guide with students who are already familiar with using primary sources and writing DBQ essays.

### **Excellent Essay**

- Offers a clear answer or thesis explicitly addressing all aspects of the essay question.
- Does a careful job of interpreting many or most of the documents and relating them clearly to the thesis and the DBQ. Deals with conflicting documents effectively.
- Uses details and examples effectively to support the thesis and other main ideas. Explains the significance of those details and examples well.
- Uses background knowledge and the documents in a balanced way.
- Is well written; clear transitions make the essay easy to follow from point to point. Only a few minor writing errors or errors of fact.

### **Good Essay**

- Offers a reasonable thesis addressing the essential points of the essay question.
- Adequately interprets at least some of the documents and relates them to the thesis and the DBQ.
- Usually relates details and examples meaningfully to the thesis or other main ideas.
- Includes some relevant background knowledge.
- May have some writing errors or errors of fact, as long as these do not invalidate the essay's overall argument or point of view.

### **Fair Essay**

- Offers at least a partly developed thesis addressing the essay question.
- Adequately interprets at least a few of the documents.
- Relates only a few of the details and examples to the thesis or other main ideas.
- Includes some background knowledge.
- Has several writing errors or errors of fact that make it harder to understand the essay's overall argument or point of view.

### **Poor Essay**

- Offers no clear thesis or answer addressing the DBQ.
- Uses few documents effectively other than referring to them in “laundry list” style, with no meaningful relationship to a thesis or any main point.
- Uses details and examples unrelated to the thesis or other main ideas. Does not explain the significance of these details and examples.
- Is not clearly written, with some major writing errors or errors of fact.

# Suggestions to the Student

## ★ *Using Primary Sources*

A primary source is any record of evidence from the past. Many things are primary sources: letters, diary entries, official documents, photos, cartoons, wills, maps, charts, etc. They are called “primary” because they are first-hand records of a past event or time period. This *Debating the Documents* lesson is based on two groups of primary source documents. Within each group, the sources conflict with one another. That is, they express different or even opposed points of view. You need to decide which source is more reliable, more useful, or more typical of the time period. This is what historians do all the time. Usually, you will be able to learn something about the past from each source, even when the sources clash with one another in dramatic ways.

## ★ *How to Use This Booklet*

### 1. Read the one-page introductory essay.

This gives you background information that will help you analyze the primary source documents and do the exercises for this *Debating the Documents* lesson. The time line gives you additional information you will find helpful.



### 2. Study the primary source documents for this lesson.

For this lesson, you get two groups of sources. The sources within each group conflict with one another. Some of these sources are visuals, others are written sources. With visual sources, pay attention not only to the image’s “content” (its subject matter) but also to its artistic style, shading, composition, camera angle, symbols, and other features that add to the image’s meaning. With written sources, notice the writing style, bias, even what the source leaves out or does not talk about. Think about each source’s author, that author’s reasons for writing, and the likely audience for the source. These considerations give you clues as to the source’s historical value.

### 3. Use the worksheets to analyze each group of primary source documents.

For each group of sources, you get three worksheets. Use the “Study the Document” worksheets to take notes on each source. Use the “Comparing the Documents” worksheet to decide which of the sources would be most useful to a historian.

### 4. As a class, debate the documents.

Use your worksheet notes to help you take part in this debate.

### 5. Do the final DBQ.

“DBQ” means “document-based question.” A DBQ is a question along with several primary source documents. To answer the DBQ, write an essay using evidence from the documents and your own background history knowledge.

## Science and Technology

Imagine a person born in a village in Italy during the Roman Empire. Such a person transported to a village in the year 1800 would have found very little to be shocked or confused about. To go from 1800 to 1900 would have been slightly more of a change, but only slightly. The village would be larger; a nearby railroad might provoke wonder. Somewhere in town, someone might be operating a telegraph. Perhaps even a telephone or two could be found. Horse-drawn vehicles, dirt roads, simple houses would all be very similar, except for a few new household implements—perhaps a sewing machine, some canned food, or a kerosene-fueled lamp or stove. The town's wealthiest resident might be tinkering with a bicycle or new-fangled automobile, but he could quickly explain its workings. Adjusting would not be particularly hard for this time traveler.

Obviously, in some cities (mostly in Europe and North America), the changes brought by nineteenth-century industrialization would be more startling, with streetcars, steel, electric lighting, cash registers, elevators, telephones, moving pictures. Nevertheless, it would not take long to learn to live with and use these things.

The twentieth century would be different: A time-traveler from 1900 could not hardly begin to fathom the world of the year 2000. Being thrust into it would be a mind-boggling disorienting experience. Radio, television, airplanes, helicopters, radar, frozen food, plastics, penicillin, kidney dialysis machines, along with mass-produced automobiles, refrigerators, central heating systems, air conditioning, and hundreds of other appliances and gadgets all appeared before 1950. So did also the theory of relativity, quantum mechanics, and the atomic bomb.

After 1950, the innovations and changes become even more astounding and bewildering: intercontinental ballistic missiles, the moon landing, the Mars rovers, nuclear power plants, microwave ovens, the hydrogen bomb, credit cards, personal computers and the Internet, fax machines and cell phones, the discovery

of DNA, genetically engineered crops, cloning, oral contraceptives, organ transplants, artificial hearts, MRIs and CAT scans, and thousands of new medicines, to name but a few.

Three themes regarding all of this stand out:

In the first place, these amazing advances have added enormously to humans' well-being. Average life expectancy shot up in the twentieth century from about 47 years to 67 years. Income levels have risen in all but the very poorest nations on earth. In addition, a better and richer understanding of the universe, the natural environment, and the human condition has made life more meaningful for millions.

Second, the technical knowledge behind these innovations has become increasingly specialized and mysterious to all but a few highly trained experts. Even though knowledge has expanded enormously, few of us have much real understanding of the scientific principles and techniques behind most of what we use daily. In a way, the technical world appears to us almost as a sort of magic. We know it is based on science, but is our own thinking as rational, or scientific, as we think it is? And if not, what does this imply about the role of informed citizens in the future?

Third, many (if not all) of these advances can be used in harmful as well as helpful ways. As C. S. Lewis noted (see Written Source 3 for this lesson), each increase in man's power over nature is also an increase in the power of some men over others. In the case of nuclear weaponry, biological or chemical warfare, or genetic engineering, the issue has already alarmed and disturbed many. The moral questions raised are only likely to grow more challenging in the future.

The sources for this lesson should help you discuss and explore further all three of these aspects of the threat and promise of science and technology in the twentieth century.

# Science and Technology Time Line

1903

• • •

The mechanically inclined Wright brothers make the first successful pilot-controlled flight in a powered airplane.

1905

• • •

Albert Einstein publishes his Special Theory of Relativity, which links space and time in a startling new mathematical analysis of the basic structure of the universe. Einstein's discoveries will guide the study of the farthest reaches of outer space, as well as of the strange laws governing the behavior of sub-atomic particles. They also lead to the unleashing of nuclear power and will have an impact on cultural attitudes far removed from the science itself.

1927

• • •

Philo Taylor Farnsworth describes the basic operating principles of television and in 1927 is the first to transmit an image of 60 horizontal lines.

1928

• • •

Scottish scientist Alexander Fleming discovers that penicillin kills bacteria. By the late 1930s, other scientists find out how to use penicillin to fight infections and save millions of lives.

1932–1945

• • •

The world's first particle accelerator is used to split the nucleus of an atom (lithium). In 1938, scientists in Nazi Germany split a uranium atom, annihilating some of its mass in the process. This releases energy in huge amounts in accord with Einstein's famous formula  $E=mc^2$ . The possibility soon becomes clear of creating a rapid "chain reaction" of atom-splitting, thereby triggering a huge explosion. At the urging of Einstein and other scientists, the U.S. launches an effort to build a nuclear bomb ahead of the Nazis. In 1945, the U.S. successfully tests the bomb, and then uses two to destroy two cities and end the war with Japan. Thus, the atomic age is born.

1946

• • •

Based on earlier mathematical theorizing, scientists invent the Electronic Numerical Integrator and Computer (ENIAC), the first electronic digital computer.

1953

• • •

Francis Crick and James Watson discover the structure of DNA and determine how it carries the information needed for living organisms to develop. In 1992, a map is made of the human genome, the arrangement of all the DNA in human genes. In 1997, a British scientist clones a sheep from a single cell.

1957

• • •

The Soviet Union launches *Sputnik*, the first man-made satellite to orbit the Earth. In the space race that follows, the U.S. will land a man on the moon in 1969.

1967

• • •

Dr Christiaan Barnard performs the first heart transplant in South Africa, a landmark achievement after more than a decade of successes by others in performing deceased-donor organ transplants of many sorts.

1969

• • •

The U.S. Department of Defense establishes the Advanced Research Projects Agency Networks (ARPANET), a way of sharing information among geographically dispersed defense computers. This leads ultimately to the development of the Internet.

1978

• • •

In-vitro fertilization results in the first "test-tube baby."

1989–1991

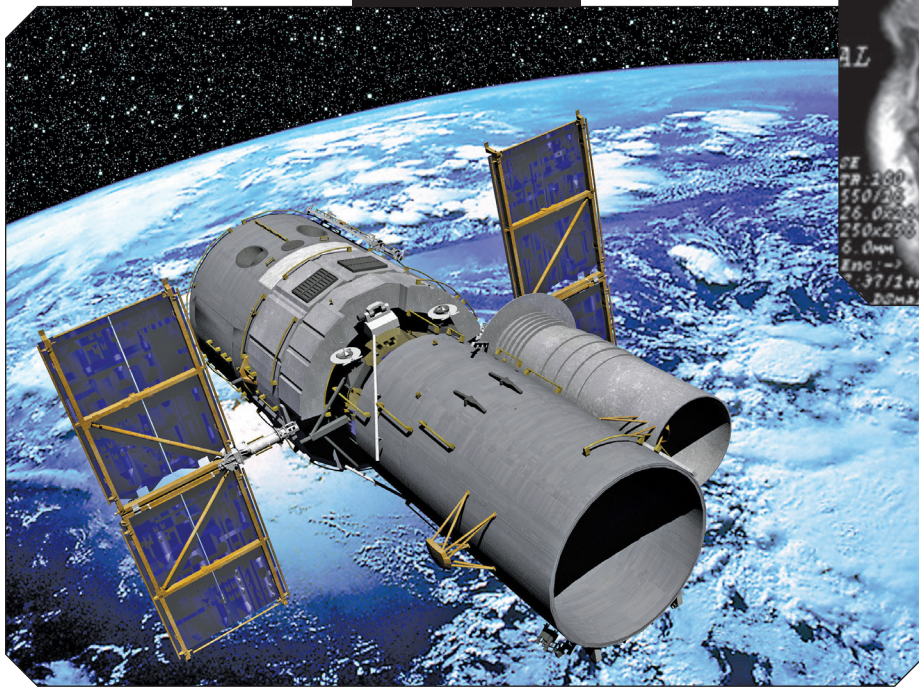
• • •

Tim Berners-Lee and others lead the way in developing the computer languages and techniques needed to create the World Wide Web.



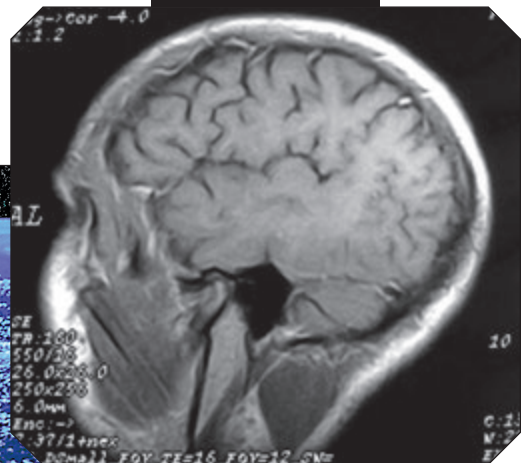
## Visual Primary Source Documents 1 & 2

Document 1



Neo Edmund, Shutterstock Inc.

Document 2



Dale Mitchell, Shutterstock Inc.

### Information on Documents 1 & 2

**Document 1** shows the Hubble Space Telescope in high orbit around the Earth. Named for influential American astronomer Edwin P. Hubble, this device has revolutionized our understanding of the universe. It has given us amazingly clear views of space all the way out to the most remote galaxies which formed soon after the “Big Bang,” which began the universe some 13.7 billion years ago.

**Document 2** is a scan of a human brain. “Neuroimaging” is the term for the various techniques researchers now

use to uncover the mysteries of the structure and functioning of the human brain. This particular image is of an MRI (Magnetic Resonance Imaging) scan. MRI machines use magnetic fields and radio waves to create detailed images of soft tissue and physiological processes as they occur, something that conventional X-ray machines cannot do. This area of technological development makes use of amazing advances in electronics and computer science to further knowledge in biological sciences and medicine, as well as to promote health and healing.

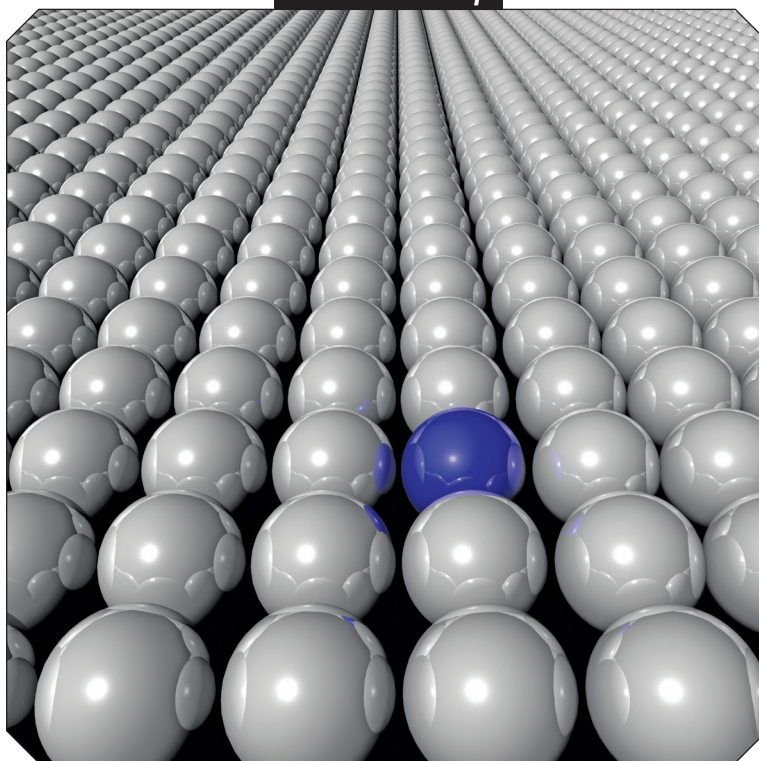
## Visual Primary Source Documents 3 & 4

*Document 3*



Library of Congress, Prints and Photographs Division,  
LC-USZ62-36452

*Document 4*



Alex Anstey, Shutterstock Inc.

### *Information on Documents 3 & 4*

**Document 3.** The discoveries of Albert Einstein and other great twentieth-century scientists have revolutionized our understanding of physics. They have also enabled us to build nuclear weapons. The U.S. used two of these terrifying devices against the Japanese cities of Hiroshima and Nagasaki in August 1945. Together, these bombs killed more than two hundred thousand people and led Japan's leaders to surrender unconditionally, ending World War II. This photo is of the mushroom cloud created by the Nagasaki bombing.

**Document 4.** This abstract image shows one blue ball among many white ones. It could be seen as expressing a major fear or anxiety felt by many in the modern age. In an age of mass production and consumption, huge impersonal organizations, powerful government bureaucracies, even mass education and entertainment, is there room left for the individual? Independent individuals or citizens, after all, have always been seen as necessary to preserve liberty and make democratic societies work.



## **Study the Documents: Visual Sources 1 & 2**

*Instructions:* Take notes on these questions. Use your notes to discuss the documents and answer the DBQ.

### **1 Background—Doc. 1** \_\_\_\_\_

Write a brief paragraph explaining what you know about the U.S. space program and the benefits it has provided over the years.

### **2 Background—Doc. 2** \_\_\_\_\_

What advantages do imaging techniques such as the one that produced this illustration have over X-ray machines?

### **3 What Else Can You Infer?** \_\_\_\_\_

What is implied or suggested by these images? For instance, list some of the key scientific and technical breakthroughs of the twentieth century that had to take place before the accomplishments shown in these two illustrations could have occurred.

## **Study the Documents: Visual Sources 3 & 4**

*Instructions:* Take notes on these questions. Use your notes to discuss the documents and answer the DBQ.

### **1 Background Knowledge**

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Explain what you know about the decision to build and use the atomic bomb. Do you think Einstein was right to join other scientists in urging the U.S. to develop this weapon? Why or why not?

### **2 Interpreting Meanings**

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Read the description accompanying Visual Source Document 4. Do you see this as a plausible interpretation of this image? Do you agree that this description highlights a harmful effect of the scientific and technological developments of the past century?

### **3 Compare & Contrast**

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Do Visual Source Documents 1–4 adequately sum up the idea of the “threat and promise” of science and technology in the twentieth century? What sorts of other images might add to this theme in important ways?

# Comparing the Documents

## ★ *The Visual Sources*

Answer the question by checking one box below. Then complete the statements on the Comparison Essay worksheet. Use all your notes to help you take part in an all-class debate about these documents—and to answer the final DBQ for the lesson.

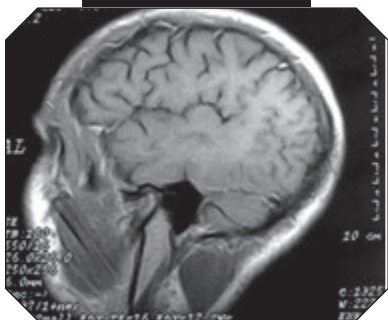
**Which of these primary source documents would be most useful to a historian trying to understand the impact of science and technology in the twentieth century?**

*Document 1*



Neo Edmund, Shutterstock Inc.

*Document 2*



Dale Mitchell, Shutterstock Inc.

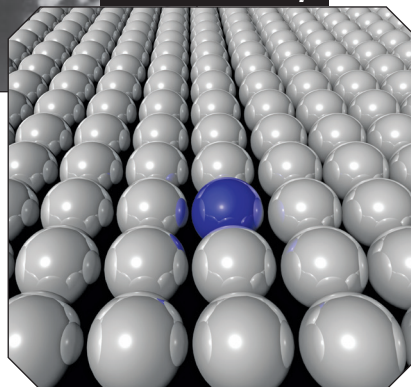
*Documents 1 & 2* ☐

*Document 3*



Library of Congress, Prints and Photographs Division,  
LC-USZ62-36452

*Document 4*



Alex Anstey, Shutterstock Inc.

*Documents 3 & 4* ☐

# Comparison Essay

*I chose Documents \_\_\_\_\_ because:*

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*I did **not** choose Documents \_\_\_\_\_.*

*However, a historian still might use the documents in the following way:*

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**Keep this in mind:** Some sources are very biased. A biased source is one that shows you only one side of an issue. That is, it takes a clear stand or expresses a very strong opinion about something. A biased source may be one-sided, but it can still help you to understand its time period. For example, a biased editorial cartoon may show how people felt about an issue at the time. The usefulness of a source depends most of all on what questions you ask about that time in the past.

## Written Primary Source Documents 1 & 2

### Information on Documents 1 & 2

**Document 1** is a passage from *The 20th Century: 100 Years of Scientific Creativity* (1999), from the Web site of the Office of Public Education, a branch of the United Nations Educational, Scientific and Cultural Organization (UNESCO).

**Document 2** is a short passage by British Prime Minister Winston Churchill from a 1953 speech to the House of Commons.

### Document 1

*There may be public apprehension about where science and technology (S&T) are taking us, but few would want to return to life in 1900. Even in sub-Saharan Africa, despite deepening poverty, a recent increase in civil conflicts across the region, and an upturn in endemic diseases including malaria, tuberculosis, and AIDS, several development indicators reflect the positive impact of S&T in recent decades:*

*Average life expectancy increased from 39.9 years to 49.9 years between 1960 and 1994; the infant mortality rate dropped by over 40% in the same period... The percentage of the population with access to safe water has almost doubled in the past two decades, rising from 24% in the period 1975–80 to*

*42% in the period 1990–96; real GNP per capita has grown from US \$990 in 1960 to US \$1377 in 1994 . . .*

*In the past 30 years, the rise of the microcomputer has enabled spectacular progress in many aspects of society, with computing power now almost doubling every 18 months. Cellular phones and cheap computers are beginning to bring Internet to even rural areas of developing countries, with major implications for distance learning and democratisation. Alongside the microchip, the emergence of genetic engineering and biotechnology must be the most revolutionary development in the second half of the last century. And in its wake comes a series of possibilities that link science and ethics more than ever before.*

### Document 2

*These fearful scientific discoveries cast their shadow on every thoughtful mind, but nevertheless I believe that we are justified in feeling that there has been a diminution of tension and that the probabilities of another world war have diminished, or at least become more remote.*

*I say this in spite of the continual growth of weapons of destruction such as have never fallen before into the hands of human beings. Indeed, I have sometimes the odd thought that the annihilating character of these agencies may bring an utterly unforeseeable security to mankind.*

## Written Primary Source Document 3

### Information on Document 3

This is a brief passage from *The Abolition of Man* (1947) by C. S. Lewis, pp. 71–72.

### Document 3

*Each new power won by man is a power over man as well. Each advance leaves him weaker as well as stronger. In every victory, besides being the general who triumphs, he is also the prisoner who follows the triumphal car.*

*I am not yet considering whether the total result of such ambivalent victories is a good thing or bad. I am only making clear what Man's conquest of Nature really means and especially that final stage in the conquest, which, perhaps, is not that far off. The final stage is come when Man by eugenics, by pre-natal conditioning, and by an education and propaganda based on a perfect*

*applied psychology, has obtained full control over himself. Human nature will be the last part of Nature to surrender to Man. The battle will then be won. We shall have "taken the thread of life out of the hand of Clotho\*" and be henceforth free to make our species whatever we wish it to be. The battle will indeed be won. But who, precisely, will have won it?*

*For the power of Man to make himself what he pleases means, as we have seen, the power of some men to make other men what they please.*

\* Clotho is one of the three Fates in Greek mythology. The thread she spins represents human destiny.



## **Study the Documents: Written Sources 1 & 2**

*Instructions:* Take notes on these questions. Use your notes to discuss the documents and answer the DBQ.

### **1 Main Idea or Topic** \_\_\_\_\_

Written Source Document 1 seems to say that science and technology aid even the poorest and least modernized societies, not just the advanced ones. Sum up how the source makes this case.

### **2 Interpreting Meanings** \_\_\_\_\_

Written Source Document 1 claims that, “Alongside the microchip, the emergence of genetic engineering and biotechnology must be the most revolutionary development in the second half of the last century.” Why might these two innovations be so important for the poorer nations on the planet?

### **3 Making Judgments** \_\_\_\_\_

In Written Source Document 2, explain what Churchill means when he says these “fearful scientific discoveries” may have given us “an utterly unforeseeable security.” Based on your knowledge of history since 1953, do you agree with him? Why or why not?

## Study the Document: Written Source 3

*Instructions:* Take notes on these questions. Use your notes to discuss the documents and answer the DBQ.

### 1 Main Idea or Topic

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Write a brief paragraph of your own summing up the key point C. S. Lewis makes in this passage.

### 2 Interpreting Meanings

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Lewis uses the metaphor of an ancient battle. Specifically, he says that with each new power man wins over nature, “besides being the general who triumphs, he is also the prisoner who follows the triumphal car.” What does he mean by this, and why do you think he chose this particular metaphor?

### 3 Compare & Contrast

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What do you think Churchill (Written Source Document 2) might have thought about Lewis’s concerns here? How might Lewis have responded? Also, what might Lewis have said about the passage from the UNESCO report (Written Source Document 1)?

# Comparing the Documents

## ★ *The Written Sources*

Answer the question by checking one box below. Then complete the statements on the Comparison Essay worksheet. Use all your notes to help you take part in an all-class debate about these documents—and to answer the final DBQ for the lesson.

**Which of these primary source documents would be most useful to a historian trying to understand the impact of science and technology in the twentieth century?**

*A passage from a UNESCO report, and a short passage from a 1953 speech by Winston Churchill*

*Documents 1 & 2* ☐

*A brief passage from The Abolition of Man, by C. S. Lewis*

*Document 3* ☐

## Comparison Essay

*I chose Documents \_\_\_\_\_ because:*

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*I did **not** choose Documents \_\_\_\_\_.*

*However, a historian still might use the documents in the following way:*

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**Keep this in mind:** Some sources are very biased. A biased source is one that shows you only one side of an issue. That is, it takes a clear stand or expresses a very strong opinion about something. A biased source may be one-sided, but it can still help you to understand its time period. For example, a biased editorial cartoon may show how people felt about an issue at the time. The usefulness of a source depends most of all on what questions you ask about that time in the past.

# Document-Based Question

Your task is to answer a document-based question (DBQ) on the impact of science and technology. In a DBQ, you use your analysis of primary source documents and your knowledge of history to write a brief essay answering the question. Using all four sets of documents, answer this question. Below are two DBQs. The first is somewhat less demanding than the second. Use whichever DBQ your teacher assigns.

## Document-Based Question

1

**Describe the overall impact of science and technology in the twentieth century, and explain why you see that impact as primarily positive or primarily negative.**

OR

2

**In speaking of science and technology in the twentieth century, C.S. Lewis says, “Each new power won by man is a power over man as well.” Defend or reject this statement, in whole or in part, using the sources provided here.**

Below is a checklist of key suggestions for writing a DBQ essay. Next to each item, jot down a few notes to guide you in writing the DBQ. Use extra sheets to write a four- or five-paragraph essay.

- ***Introductory Paragraph***  
Does the paragraph clarify the DBQ itself? Does it present a clear thesis, or overall answer, to that DBQ?
- ***The Internal Paragraphs—1***  
Are these paragraphs organized around main points with details supporting those main ideas? Do all these main ideas support the thesis in the introductory paragraph?
- ***The Internal Paragraphs—2***  
Are all of your main ideas and key points linked in a logical way? That is, does each idea follow clearly from those that went before? Does it add something new and helpful in clarifying your thesis?
- ***Use of Primary Source Documents***  
Are they simply mentioned in a “laundry list” fashion? Or are they used thoughtfully to support main ideas and the thesis?
- ***Concluding Paragraph***  
Does it restate the DBQ and thesis in a way that sums up the main ideas without repeating old information or going into new details?

# Worksheet Answers and Guidelines

Some worksheet questions call for specific answers to factual questions. In these cases, correct answers are provided here. Most worksheet questions are open-ended and call on students to offer their own interpretations and personal reactions. In those cases, we offer suggestions based on the purpose of the question and the sort of interpretive activity it calls for.

## Worksheet 1

### *Visual Sources 1 & 2*

1. Lists will vary. Share several of them in a class discussion.
2. They show soft tissue and physiological processes, not just hard skeletal outlines.
3. Lists might include computer technology, electronics, rocketry, materials highly resistant to heat and cold, radar, knowledge of the structure of the universe and the nature of various forms of electromagnetic radiation from it, etc.

## Worksheet 2

### *Visual Sources 3 & 4*

1. Answers will vary, especially on the question calling for a value judgment.
2. Answers will vary and should be discussed in class.
3. Again, lists may vary greatly and could be discussed in class.

## Worksheet 3

### *Written Sources 1 & 2*

1. It points to general trends in life expectancy, infant mortality, and average income (per capita GNP, or gross national product) in both poor and rich nations as reflecting advances in science and technology.
2. Perhaps because the first innovation has resulted in every device that uses a computer to process and regulate information, while the other innovation results in new, high-yield genetically engineered crops, etc.
3. Churchill means that nuclear weapons, by being seen as too terrible to actually use, may have a deterrent power to keep nations from going to war in the first place.

## Worksheet 4

### *Written Source 3*

1. Answers will vary, but should note in some way that Lewis sees the negative side of new scientific power as an inherent component of each benefit it may yield.
2. He is alluding to the older practice of giving a successful military leader a parade in which important captives (including the shackled leader of the opposing army) follow behind the vehicle he rides in. He implies that a scientific discovery is a sort of battle of science vs. the unknown, in which victory brings both benefits and detriments.
3. These questions all call for interpretations which will vary.



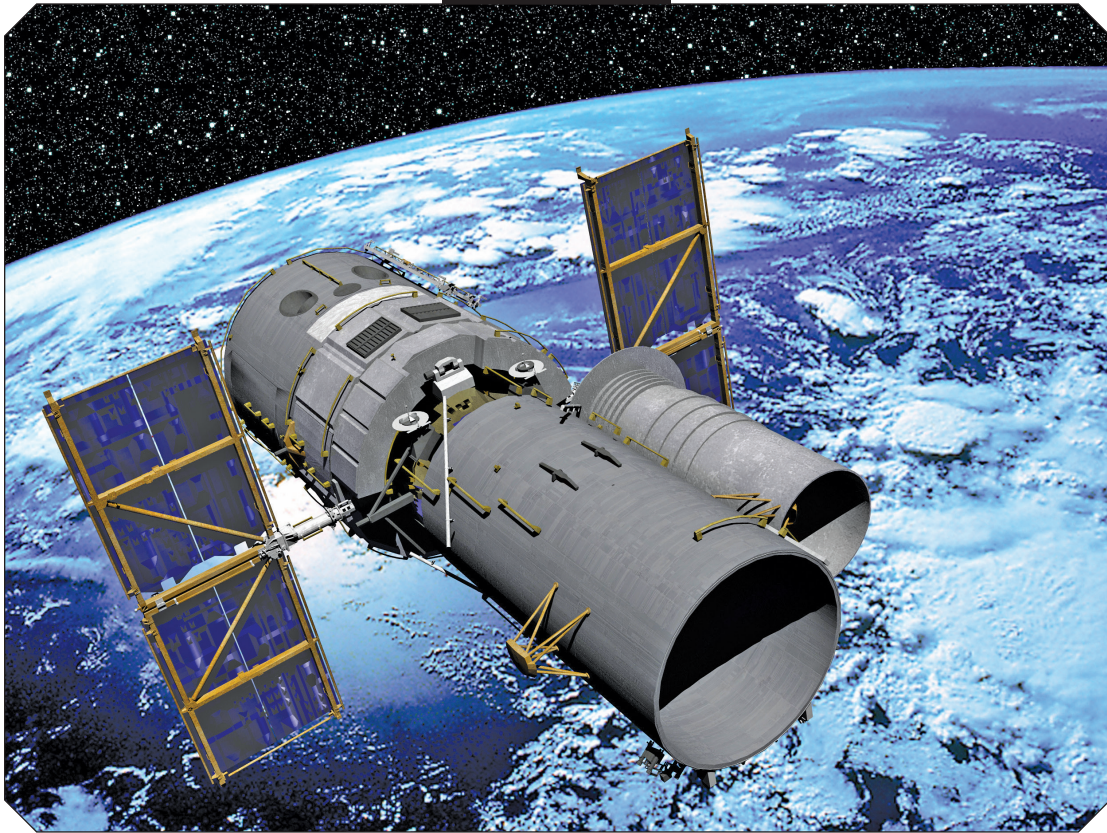


# **Visual Primary Sources**



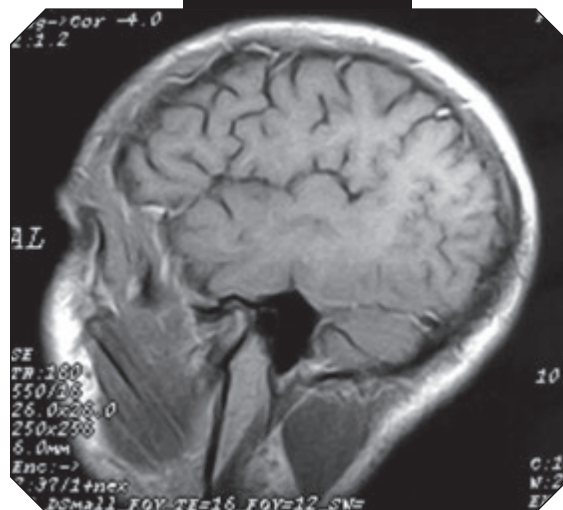
## First Group—Documents 1 & 2

Document 1



Neo Edmund, Shutterstock Inc.

Document 2



Dale Mitchell, Shutterstock Inc.

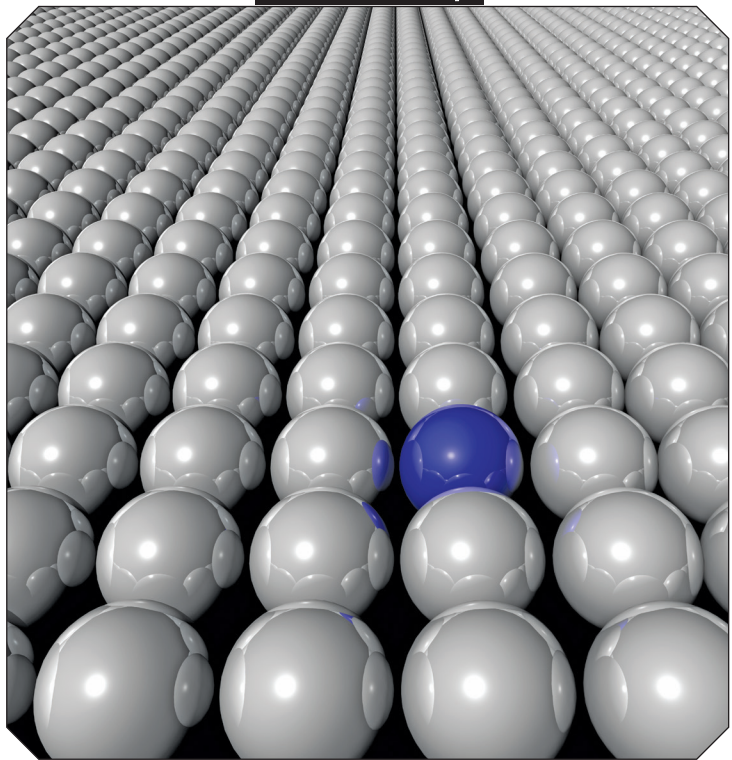
## First Group—Documents 3 & 4

*Document 3*



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*Document 4*



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