

# Teachers' Guide for Cobblestone

April 2013: Building the Bomb

By Debbie Vilardi

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Goal: To learn about development and effects of atomic weaponry.

\*Always have a parent or trusted adult help with web research.

Before Beginning:

Read the Editor's Note following the Table of Contents. Consider the reasons for and the effects of the Manhattan Project.

"Battle Over History" by Eric Arnesen (Pages 2-4)

Vocabulary: revisionist, perpetrators, condemned

Comprehension:

1. What is the Enola Gay?
2. Why did the Smithsonian decide to bring it out of storage?
3. Why did it spark controversy?
4. What arguments did veterans' groups make?
5. What happened when the exhibit text was changed?
6. Why was the exhibit cancelled?
7. What concerns did scientists express about constructing an atomic bomb?
8. What happened when the plane was displayed in 2003?

Writing Activity: Consider some of the arguments made by each side. Do you think the Smithsonian did the right thing in displaying parts of the plane with little text? Do you think it would be possible to write a fair and balanced description for the exhibit?

Research Topics: Enola Gay, National Air and Space Museum, Edward J. Drea, Air Force Association, American Legion, Physicians for Social Responsibility, Organization of American Historians

"Great Minds" by Marcia Amidon Lusted (Pages 5-7)

Vocabulary: quantum physics, mass, racial cleansing, fission, U-235, intellectuals

Comprehension:

1. What scientific discovery led to the field of quantum physics?
2. What discoveries did Rutherford and Bohr make?
3. What caused many Jews to flee Europe?
4. What was Szilard's theory?
5. What element results from a chain reaction using radioactive uranium?
6. What did Meitner and Frisch confirm?
7. What impact did the discovery have on Szilard?
8. Why might it be important to control the fission reaction?

Discussion Activity: It is said that one scientist's work builds on another's. How do the discoveries in this article demonstrate that?

Research: atomic energy, quantum physics, J. J. Thompson, Ernest Rutherford, Niels Bohr, James Chadwick, Leo Szilard, Enrico Fermi, Ida Noddack, Otto Hahn, Fritz Strassman, Lise Meitner, Otto Robert Frisch, Rudolf Peierls

"Dear Mr. President" by Rebecca Lowen (Page 8-9)

Comprehension:

1. What was Szilard's fear?
2. What evidence of possible German bomb plans did the scientists present to President Franklin D. Roosevelt?
3. What did Roosevelt do in response to this warning?
4. What made the race for a bomb seem more important to the United States?
5. How did Szilard's views change as the war progressed?

Research: Adolph Hitler, Edward Teller, Eugene Wigner, Albert Einstein, President Franklin D. Roosevelt, the Advisory Committee on Uranium, Arthur H. Compton, Office of Scientific Research and Development, U.S. Army Corps of Engineers

"Top Secret Places" by Rebecca Lowen (Pages 10-13)

"The British Mission" by Andrew Matthews (Page 13)

Vocabulary: isotope, accelerated, cyclotron, calutron, plutonium, nuclear reactor

Comprehension:

1. What role did university laboratories play in learning how to harness atomic energy?
2. What changes did General Groves institute?
3. What were the responsibilities of scientists at each of the three secret sites?
4. Why was Site X located near the Tennessee Valley Authority dam?
5. Describe the three methods for separating U-235 from U-238.
6. How did the Army solve the problem of the copper shortage?
7. What was innovative about the Manhattan Project?
8. How did British research help the American efforts?

Writing Activity: The project was kept secret from the American people. Do you agree it was necessary to do this? Do you think the government should still keep secrets from the people? Explain your answers.

Research: the Manhattan Project, Brigadier General Leslie R. Groves, Dr. J. Robert Oppenheimer, Los Alamos Scientific Laboratory, Clinton Engineer Works, Ernest O. Lawrence, Nobel Prize in Physics, Hanford Engineer Works, Military Application of Uranium Detonation

"Life at Los Alamos" by Sharon L. Reith (Pages 15-17)

"Still Going Strong" by Sharon L. Reith (Page 17)

Comprehension:

1. What were General Groves' requirements for the site of the main facility?
2. Why did the town's population grow beyond the thirty scientists predicted?
3. How did this town differ from other towns?
4. Why might the scientists have refused to join the Army?
5. What were conditions like in the town?
6. What are some of the current activities at the laboratory?

Writing Activities: The government paid people to move in order to set up their sites. Do you think people would accept this type of relocation today? Why might they have accepted it during World War II?

You are a young employee at Los Alamos. Write a letter home that won't be stopped by the censors but still contains a sense of your daily life and your feelings. Consider whether using some of the code words mentioned in the article will get your letter censored.

"The Test" by Craig E. Blohm (Pages 18-19)

Vocabulary: ground zero, TNT, implosion,

Comprehension:

1. What significant event happened July 16, 1945?
2. What uncertainties preceded the test?

Writing Activity: Study the images that accompany the article. Reread the text. Describe your emotions as you do so.

Research: Alamogordo Bombing and Gunnery Range

"Ground Zero: Japan" by Chrisinda Lynch and Andrew Matthews (Pages 20-23)

Vocabulary: embargo, leukemia

Comprehension:

1. How did the war efforts in Europe and the Pacific differ by 1945?
2. Why had Japan invaded China in 1937?
3. What was the United States response?
4. How did the Japanese distract the U.S. government from the planned attack on Pearl Harbor?
5. Who were the Allied and Axis Powers?
6. What was the Allied strategy in the Pacific?
7. How did the strategy change in 1942?
8. What happened as Japanese forces became more desperate?
9. What cultural attitudes about war prevailed in Japan?
10. How did President Truman justify the use of the atomic bomb?
11. What were the immediate results of the bombs?
12. What were some lasting effects?

Research: Japanese history, Pearl Harbor, Battle of the Coral Sea, Battle of Midway, Battle of Iwo Jima, Battle of Okinawa, President Harry S. Truman, Emperor Hirohito

"Father of the Atomic Bomb" by Eric Arnesen (Page 26-28)

Vocabulary: theoretical, leftist, Atomic Energy Commission

Comprehension:

1. Why did some consider Oppenheimer a poor choice to lead the Manhattan Project?
2. What made Oppenheimer successful?
3. What were Oppenheimer's views about the use of atomic weapons after the test at Los Alamos?
4. Why was he stripped of his government security clearance?
5. What events marked his later career?

Research: Atomic Energy Commission, Henry L. Stimson, I. I. Rabi

"Officer in Charge" by Eric Arnesen (Page 29)

Comprehension:

1. What educational preparation did General Groves have before becoming supervisor of the Manhattan Project?
2. What other project had he worked on?
3. What were his feelings about the war?

"Spies" by Eric Arnesen (Pages 30-32)

Vocabulary: unconditional, infiltrated

Comprehension:

1. What news did Truman receive while at the Potsdam Conference?
2. In what year did Stalin receive word of the Manhattan Project?
3. Why were the Soviets suspicious of the Americans?
4. Why did Klaus Fuchs pass information to the Soviet Union?
5. How did Fuchs infiltrate the Manhattan Project?
6. How was he discovered?
7. What impact did the Soviet spy network have?

Research: Potsdam Conference, Joseph Stalin, Klaus Fuchs, George Koval, David Greenglass

"Dawn of a New Age" by Doug Rossinow (Pages 34-36)

Vocabulary: Cold War, retaliate, proliferation, thermonuclear

Comprehension:

1. What reactions at Los Alamos were common after the first bomb was used?
2. How did this change after the second one?
3. Why were scientists concerned about nuclear weapons?
4. What were some of the differing views expressed at the time?
5. Which side did the government take?
6. What was the result?
7. How did the existence of nuclear weapons change warfare?

Discussion: Niels Bohr said that nuclear weapons could be "a perpetual menace to human security." (Page 34) Has this happened?

Research: Cold War, Dwight D. Eisenhower, nuclear power

"The Super" by Steve Miller and Marcia Amidon Lusted (Page 37)

Vocabulary: fusion, atoll, deuterium

Comprehension:

1. How does a hydrogen bomb differ from an atomic bomb?
2. Who opposed its development?
3. Who supported its development?

"Peace Instead of Bombs" by Marcia Amidon Lusted (Pages 40-41)

Vocabulary: disarmament, non-proliferation

Comprehension: Describe how and why each person mentioned in the article opposed nuclear proliferation.

Research: Nobel Peace Prize, Philip Noel-Baker, League of Nations, United Nations, World Disarmament Conference, Eisaku Sato, 1968 Non- Proliferation Treaty, Alva Myrdal, Alfonso Garcia Robles, Treaty of Tlatelolco

Activity for the Entire Issue: The opening article for this issue states, "History – the interpretation and understanding of the past – matters." (Page 4) Evaluate this statement in terms of what you have learned from the issue. Consider how history may have been different if the bombs had never been developed or if the scientists who opposed further development had been listened to by their governments. Also consider whether knowing this history changes your opinions of current events and appropriate governmental reactions, including those discussed in writing and discussion activities for individual articles.