

■ **1937, Jul 7:** Japan invades China. Ultra-nationalist military leaders justify plan to occupy China, Manchuria and Korea under pretext of *Hakko Ichiu* – ancient *Shinto* concept of “all the world under one roof”, ruled by Japan’s divine Emperor.

Invasion sets Japan on course for World War Two

Emperor Hirohito (right). Believed to have opposed Japan’s drift to war



■ **1938:** German scientists **Otto Hahn** and **Fritz Strassman** demonstrate nuclear fission – splitting the nucleus of a uranium atom and converting some of its mass to energy.

Japanese atom bomb project begins under direction of physicist Yoshio Nishina (right). Japan purchases cyclotron – to enrich uranium – from University of California



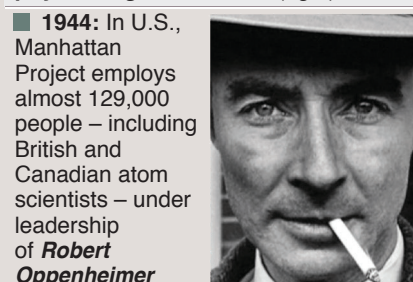
■ **1939:** Germany starts project to build atom bomb. Rival teams led by physicists **Kurt Diebner** and **Werner Heisenberg** (left) explore uranium and plutonium devices



■ **Dec 7:** Japan attacks Pearl Harbour, bringing U.S. into war



■ **1942:** Soviet leader **Joseph Stalin** (above left) learns of U.S. and German A-bomb projects. Soviet atomic weapons programme begins under leadership of physicist **Igor Kurchatov** (right)

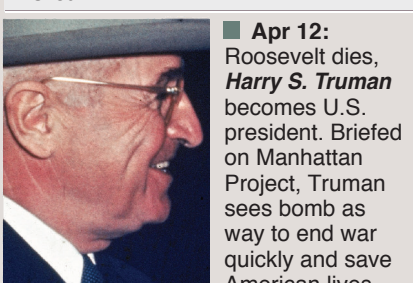


■ **1944:** In U.S., Manhattan Project employs almost 129,000 people – including British and Canadian atom scientists – under leadership of **Robert Oppenheimer**



RAIN OF STEEL

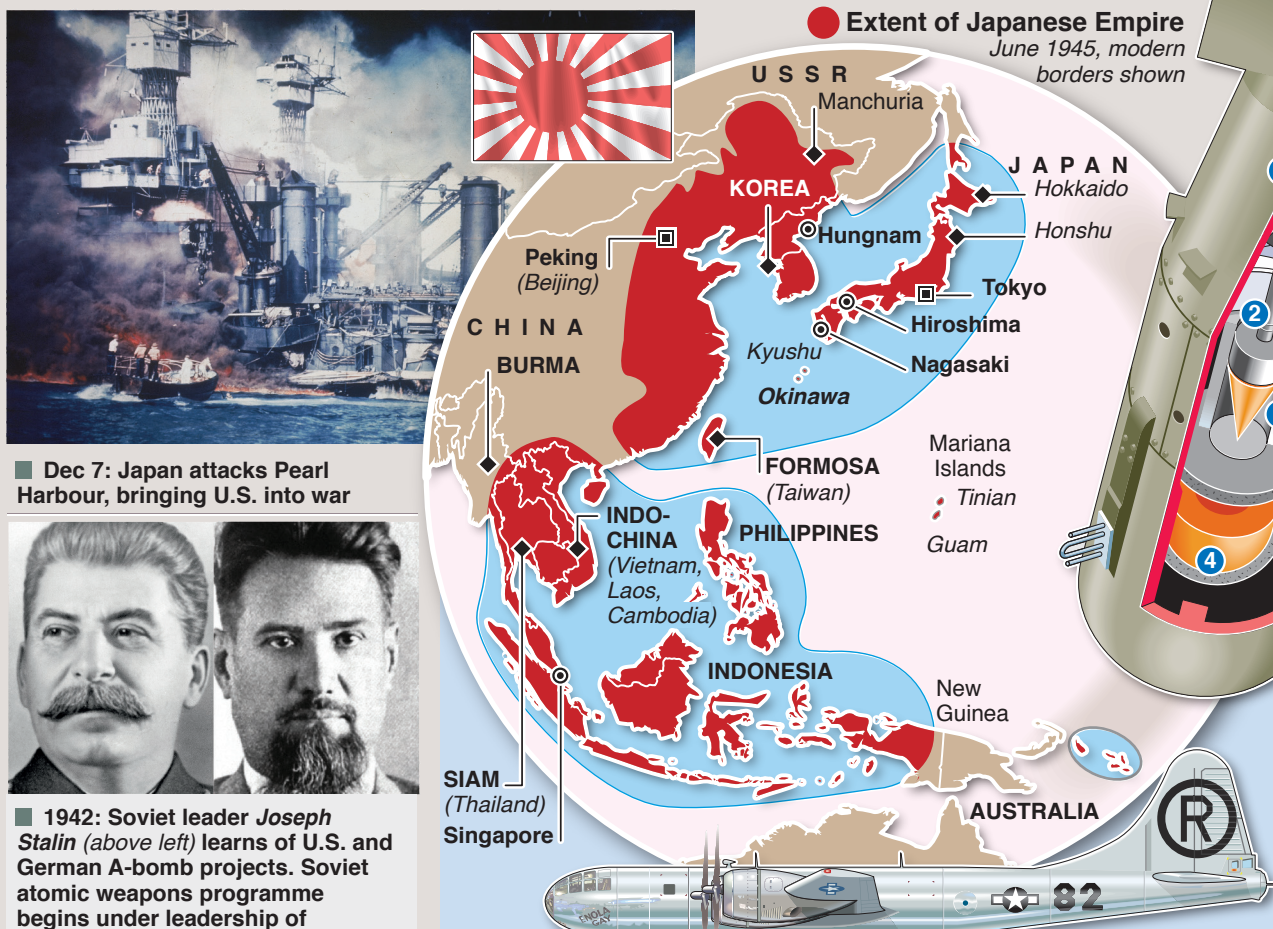
■ **1945, Apr 1:** U.S. invades Okinawa – last stepping stone on road to Japan – 81-day battle claims more than 110,000 Japanese and 14,000 American lives. U.S. firebombing of Japanese cities forces Tokyo’s A-bomb project to be moved to **Hungnam**, in what is now North Korea



■ **Apr 12:** Roosevelt dies, **Harry S. Truman** becomes U.S. president. Briefed on Manhattan Project, Truman sees bomb as way to end war quickly and save American lives

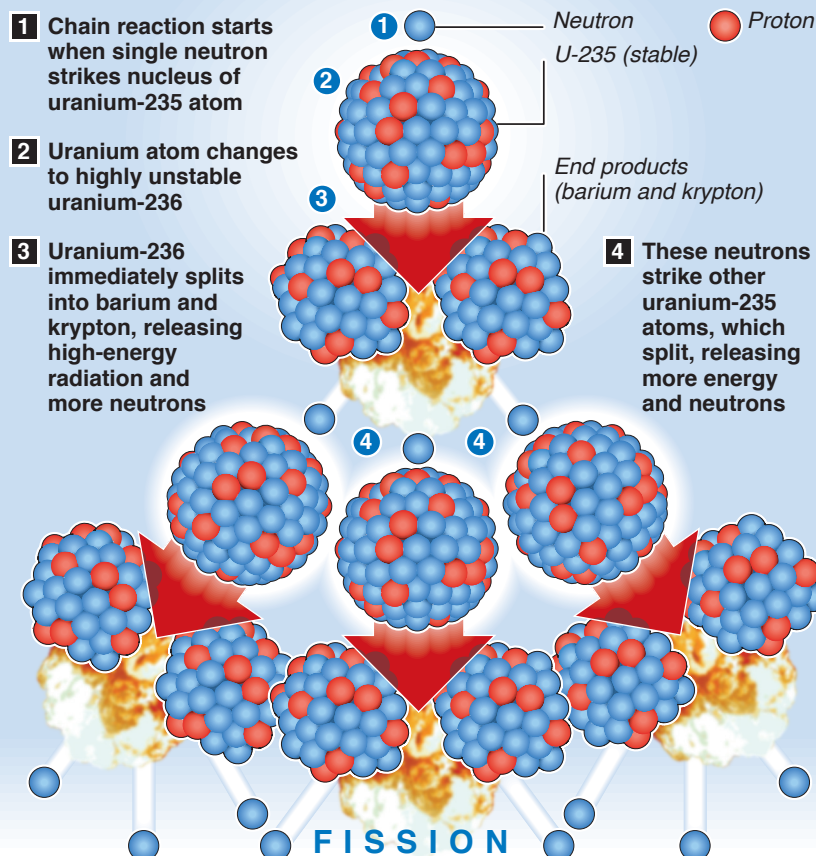
■ **May 7:** Allied Armies accept unconditional surrender of Nazi Germany – Pacific war continues

On August 6, 1945, the United States dropped an atomic bomb on the Japanese city of Hiroshima. Tens of thousands of people died instantly. Three days later Nagasaki met the same fate. The bombs killed more than 200,000 people



● **Extent of Japanese Empire**
June 1945, modern borders shown

CHAIN REACTION: The power of an atom bomb comes from the release of energy holding together each individual atom of uranium. When sufficient fuel is brought together a chain reaction occurs – energy released is a hundred million times greater than that from a chemical reaction



Little Boy uranium bomb

Length: 3 metres
Weight: 4,400kg
Yield: 15 kilotons

1. Barometric safety switch operates when bomb is just 1,500m above target

2. Proximity fuze fires explosive charge

3. Wedge of uranium-235 is fired at large target of U-235

4. Force of impact welds two pieces together, creating super-critical mass of uranium drenched in neutrons. Chain reaction accelerates and atomic blast follows

■ **Jun 18, 1945:** Truman approves plan to invade and occupy Japan. Invasion will employ 2.7 million U.S. troops

■ **Jul 16, Trinity Test:** After \$2 billion of research (\$28.6bn in current value), prototype plutonium device is detonated in New Mexico desert.

Test yields four times more energy than scientists expect.

Oppenheimer quotes Hindu Bhagavad Gita: “*I am become Death, the destroyer of worlds*”

■ **Jul 26, Potsdam Declaration:** U.S., Britain and China demand Japanese surrender or face “*prompt and utter destruction*.” Japan ignores declaration

■ **Jul 29 and Aug 2:** Two atomic bombs – uranium-fuelled *Little Boy* and plutonium-fuelled *Fat Man* – arrive on *Tinian* island

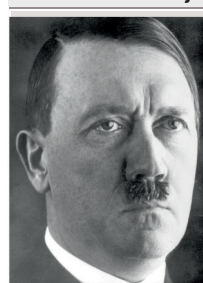
■ **Aug 6, 8:15am:** B-29 bomber *Enola Gay*, flying at 9,150 metres, drops atomic bomb on Hiroshima, killing almost everyone within 1,000m of ground zero



■ **Aug 9, 11:02am:** U.S. drops plutonium bomb on Nagasaki, killing 40,000 people instantly

■ **Aug 14:** Japan surrenders

■ **Aug:** Scientists led by **Albert Einstein** (left) write to U.S. President **Franklin D. Roosevelt** (right), warning of Nazi Germany’s A-bomb project. Letter recommends that U.S. develops its own atom bomb – *Manhattan Project* is born



BLITZKRIEG

■ **Sep:** Adolf Hitler invades Poland. Britain and France declare war on Germany. Britain begins *GEN75* project to build atom bomb

■ **1940:** Heisenberg’s protégé **Carl Friedrich Freiherr von Weizsäcker** proposes use of *eka-rhenium* as nuclear explosive. Eka-rhenium – now called *neptunium* – decays into plutonium

■ **1941:** Heisenberg’s team files patent for plutonium bomb in Germany