

TITAN MISSILE ACTIVITIES



TITAN MISSILE MUSEUM



TITAN MISSILE TOUR

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ARIZONA STATE ANCHOR STANDARDS

6TH GRADE- HIGH SCHOOL

SP4, G1, H2, H3

THE TITAN II MISSILE

History of the Titan II Missile

The Titan II was the largest ICBM (Intercontinental Ballistic Missile) ever deployed by the United States Air Force, carrying a bomb equivalent to 9 Megatons of TNT – the W-53. Compared to its predecessors, the Titan II's 6,000+ mile range made this missile an increased threat to the Soviet Union. The Titan II bomb could reach its target in only 30 minutes.

A series of factors made the Titan II particularly effective. First, the Titan II was always fueled; this meant that the missile could sit in the silo ready to be launched at any time and in under 1 minute. Second, the Titan II missile could be launched from within the silo, making launch procedures much easier and quicker. Third, the Titan II's propellants made the missile much more reliable than the predecessors, Titan I and Atlas. And finally, the Titan II missile could count on a more reliable guidance system.

The idea for the Titan II missile was proposed and built by Martin Marietta in 1958, and it was approved the following year. Construction of 54 missile sites began in 1960 and was completed in a little over two years, with the first site becoming operational on March 31, 1963. By December of 1963, all sites were operational. Three specific locations were chosen to host the Titan II missile operations. They were Davis-Monthan Air Force Base in Tucson, Arizona, Little Rock Air Force Base in Little Rock, Arkansas, and McConnell Air Force Base in Wichita, Kansas. Each location controlled 18 sites.

Each site was manned by a crew of 4 servicemembers – two officers and two enlisted. Crews were exclusive to men for most of the program's life, but beginning in 1978, women were allowed to join the crew. The four-person crew was assigned to 24-hour shifts, called "alerts", and each site was staffed 24/7, 365 days of the year.

The Titan II program was deactivated under the Presidency of Ronald Reagan, between 1982 and 1987, in favor of more advanced ICBM systems like the MX Peacekeeper. The 18 sites around Tucson were the first to be deactivated.

Titan II in Context: The Cold War

At the end of WWII in 1945, the world was a different place. With much of Europe and Asia in ruins, the United States and the Soviet Union emerged as two opposite spheres of influence. At the Potsdam Conference of 1945, the Allied powers settled on the partition of Germany into occupation zones. So, Germany was divided into American, Soviet, British, and French sectors. During this time, relations between the Soviet Union and the United States worsened, as the United States established itself as the leading global economic, military, and political power. The United States' pull was especially strong in the western hemisphere. Due to its geographic location, the Soviet Union established its sphere of influence in the eastern half of the world. During this time, new organizations and alliances were formed, such as NATO (North Atlantic Treaty Organization) (1949), and the United Nations (1945). As a response to NATO, the Soviet Union signed the Warsaw Pact in 1955. Like NATO, this pact bound the Soviet Union and the other soviet satellite states in an agreement of mutual defense.

Both powers competed for greater importance on the world stage, and tensions were high. This power struggle became known as the Cold War, a long period of difficult political and military relations between the United States and the Soviet Union. Despite some close calls like the Cuban Missile Crisis (1962), the Cold War never saw direct conflicts between the two countries; instead, the two powers tried to gain the upper hand through espionage, propaganda, military operations and coalitions, economic aid, and arms buildup.

In 1946, Winston Churchill declared that an "Iron Curtain" had formed across the European continent, symbolically cutting Europe in half. In 1961, the idea of a physical barrier between western and eastern Europe became reality with the construction of the Berlin Wall. This wall cut the German city in half and became one of the most famous symbols of the Cold War.

Because of the worsening diplomatic relations between the United States and the Soviet Union, both countries started to improve and expand their arsenal, starting the arms race. The United States prioritized the development of Intercontinental Ballistic Missiles (ICBM), like the Titan II, and nuclear testing. The United States used the idea of Mutually Assured Destruction (MAD) as a form of deterrence; the theory stated that if both sides had world-ending weapons, neither country would start the war. If they did, both sides would lose. In 1989, the Berlin Wall fell, leading to the reunification of Germany. The Cold War ended in 1991 with the fall of the Soviet Union, which had been in a state of crisis and decline since 1988.

FILL IN THE BLANK

FILL IN THE BLANKS USING THE INFORMATION PROVIDED IN THE READING.

1. The Titan II missile program was approved in _____.
2. Construction of the sites began in 1960 in Tucson, Arizona, _____, and Wichita, Kansas.
3. _____ and _____ were the predecessors to the Titan II missile.
4. A total of _____ Titan II sites were built across the continental United States.
5. Starting in _____, women were allowed to serve as crewmembers at the Titan II sites.
6. Historians link the end of the Cold War to the _____ in 1991.
7. _____ built the Titan II missiles.
8. All Titan II sites were completed by _____ (year only).
9. The first Titan II site was deactivated in _____ (year only), while the last one went offline in _____ (year only).
10. The _____ was built in 1961.
11. The idea that no country could win nuclear war is known as Mutually _____ Destruction (_____).
12. The Titan II could launch in under _____ and could reach its target in about _____ minutes.
13. In 1946, Winston Churchill declared that an _____ had formed across Europe.
14. The Titan II had a range of more than _____ miles.

TERM MATCHING

USING THE PROVIDED READING, MATCH EACH TERM TO THE CORRECT DEFINITION.

a) Iron Curtain	i. A period of tense relations between the United States and Soviet Union
b) Cold War	ii. The buildup of weapons and nuclear testing conducted by the United States and Soviet Union
c) Alert	iii. The largest ICBM ever deployed by the United States
d) Mutually Assured Destruction	iv. The bomb carried by the Titan II
e) Arms Race	v. The symbolic barrier between western and eastern Europe
f) Titan II	vi. The idea that no country could win a nuclear war
g) W-53	vii. A 24-hour shift at the Titan II sites

MAP OF THE COLD WAR

The Cold War developed due to differences in ideology. Drawing from external sources, color which countries fell under the United States' influence (blue), and which did not (red). Can you spot the Iron Curtain?



COLD WAR WRITING PROMPT

Using both the reading and external sources, think about the social and diplomatic developments that characterized the Cold War years. In your opinion, what key events helped create the reality of the Cold War?

ROCKET CHALLENGE

NASA is looking for creative ideas for launching heavy payloads into orbit. Payloads include parts and supplies for the International Space Station and spacecraft that will carry humans to the moon and Mars. NASA is also interested in rockets that can transport large fuel tanks that will be used to power deep space rockets. You are challenged to build the most efficient heavy-lift rocket from a set of materials. The team that is able to lift the greatest payload into space (the ceiling) is the winner. Use the space below to write or draw ideas and then use the mission report on the following page as you test your rocket designs.

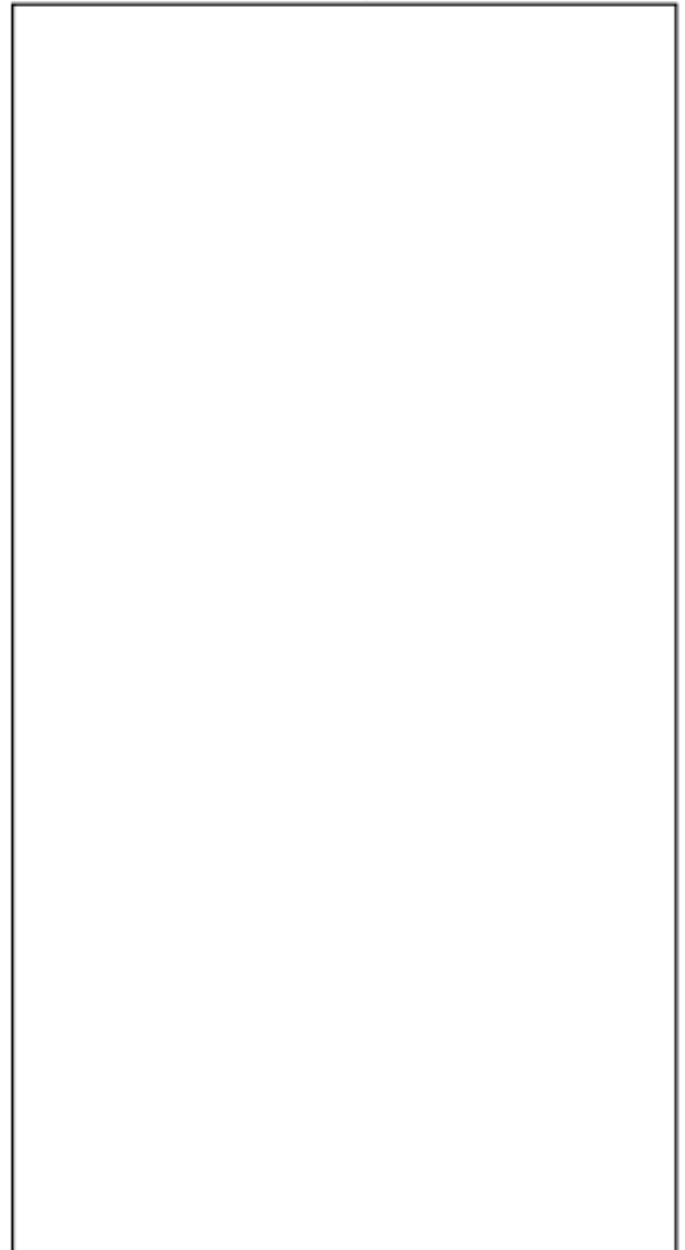
Heavy Lift Rocket Mission Report

Team _____
Member _____
Names: _____

Make a sketch of your best rocket

Flight Test	Predict How Much Mass Your Rocket Will Lift 1 paper clip = 2gm	Actual Mass Lifted
1.		
2.		
3.		
4.		
5.		

Describe your first rocket.



How did you change your rocket to make it carry more mass?

What other ways could you change your rocket to improve it?

TEACHER GUIDE

Fill in the Blank Answer Key

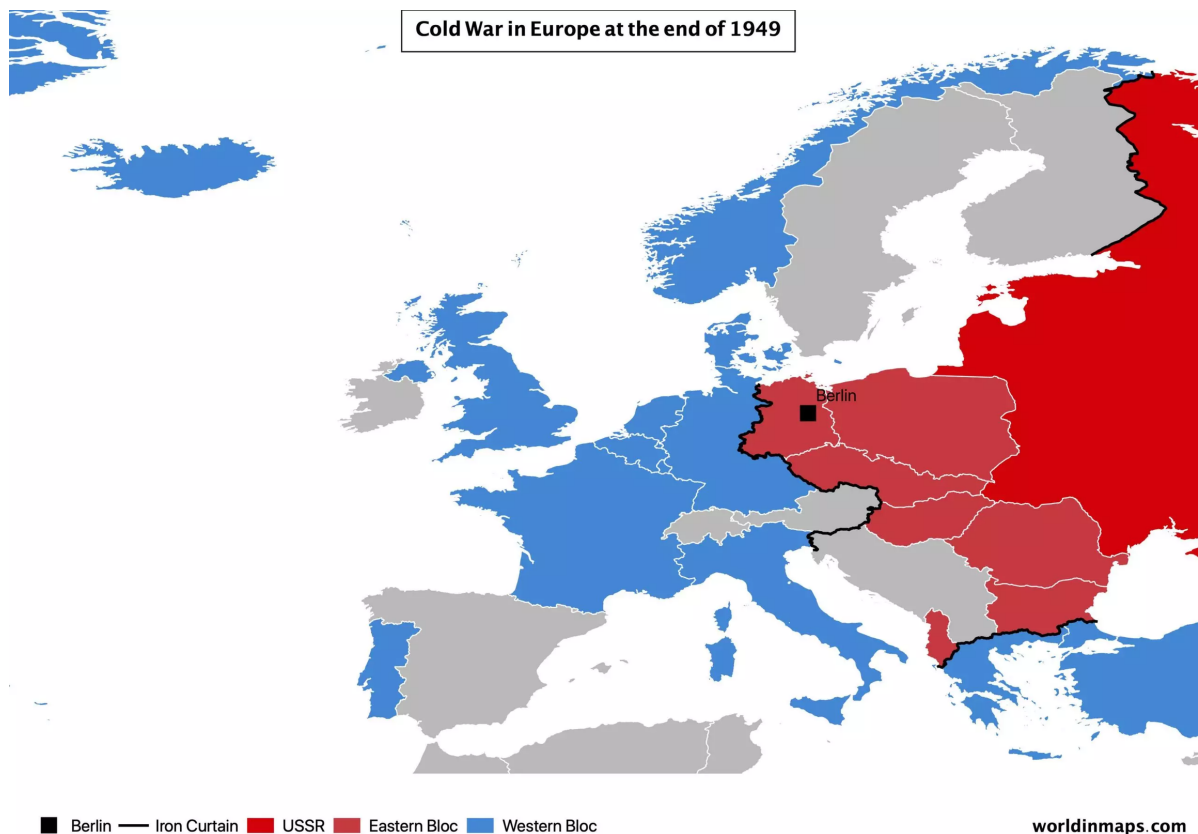
- 1.The Titan II missile program was approved in **1958**.
- 2.Construction of the sites began in 1960 in Tucson, Arizona, **Little Rock, Arkansas**, and Wichita, Kansas.
- 3.**Atlas** and **Titan I** were the predecessors to the Titan II missile.
- 4.A total of **54** Titan II sites were built across the continental United States.
- 5.Starting in **1978**, women were allowed to serve as crewmembers at the Titan II sites.
- 6.Historians link the end of the Cold War to the **Fall of the Soviet Union** in 1991.
- 7.**Martin Marietta** built the Titan II missiles.
- 8.All Titan II sites were completed by **1963** (year only).
- 9.The first Titan II site was deactivated in **1982** (year only), while the last one went offline in **1987** (year only).
- 10.The **Berlin Wall** was built in 1961.
- 11.The idea that no country could win nuclear war is known as Mutually **Assured** Destruction (**MAD**).
- 12.The Titan II could launch in under **1 minute** and could reach the target in about **30** minutes.
- 13.In 1946, Winston Churchill declared that an **Iron Curtain** had formed across Europe.
- 14.The Titan II had a range of more than **6000** miles.

TEACHER GUIDE

Term Matching Answer Key

- A-v.
- B-i.
- C-viii.
- D-vi.
- E-ii.
- F-iii.
- G-iv.

Map of the Cold War Answer Key



TEACHER GUIDE

Rocket Activity

Find more detailed directions and materials at:
<https://www.jpl.nasa.gov/edu/teach/activity/rocket-activity-heavy-lifting/>

Materials Needed:

- Large Binder Clips, one per launch pad (one per team)
- Fishing line OR smooth string
- Long balloons (“524” balloons), 3 per team, (Tip: Keep extra.)
- 3 oz. paper cups
- 50 small paperclips
- Sandwich-sized plastic bags
- Masking tape
- Worksheet (on webpage)
- A spacious room

Note: Do not give too much information to the students. Simply explain the activity, how to use the straws for stability, and tell them that they can use any or all the parts in their supply kits to build and fly their rockets. The supply kits contain three balloons. Remind students that they only get three balloons.

Set up the “launch pads” consisting of pieces of fishing line suspended from the ceiling. If your classroom has a suspended ceiling, use binder clips and attach them to the metal frame supporting the ceiling tiles. Tie the fishing line to the clip or pins. The line must be long enough to reach the floor.

Explain how the straw is used for guiding the rockets. The fishing line or string is fed through the straw and one or more balloons are attached to it with masking tape. When the balloon is released, the straw will ride up the line. Remind the students that it is very important that they hold the lower end of the line to the floor. If the line is not taut, the rocket will not get to the ceiling.

Keep a chart with each team’s results.

REFERENCES

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