ANCHORAGE MUSEUM

COLD WAR TO THE COSMOS: THE SPACE RACE

PRIMARY SOURCES LESSON PLAN

Through a set of primary sources, students will learn about the beginnings of the Cold War, the escalation of rocket technology and space technology development, and create and lauch a paper rocket.

STUDENTS WILL

- Demonstrate visual literacy to interpret photographs and artwork
- Understand the various contexts of the Space Race within the Cold War
- Think critically about the variables that affect rocket design

MATERIALS

- Pencil
- Tape
- Scissors
- Straw (plastic, paper, or metal)
- Meter stick or measuring tape
- Rocket template
- Data log

RECOMMENDED GRADE LEVEL

- Eighth grade and up

INQUIRY BASED METHODS AT THE ANCHORAGE MUSEUM

The Anchorage Museum uses an expanded inquiry-based approach rooted in constructivism (constructivist learning theory). Through facilitated conversations which may begin much like Visual Thinking Strategies (VTS), students are encouraged to bring their knowledge to look closely at an object or image. In addition to the VTS methodology, educators at the Anchorage Museum provide context and content. This may include information about an object's artist or maker, examination of materials, processes, or uses of an object as well as relevant cultural or historical information.

Examinations of objects create an open-ended dialogue. In dialogue, learner-driven questions and observations and facilitator-provided content drive the process of meaning making between all participants.

CONSTRUCTIVISM

Constructivism is a learning theory referring to the idea that knowledge is individually and socially constructed by the learners themselves. The learner actively constructs meaning using sensory input rather than passively accepting knowledge.

VISUAL THINKING STRATEGIES

Visual Thinking Strategies, or VTS, is an approach to teaching from visual materials, typically paintings, drawings and photographs. Developed by museum educators Philip Yenawine and Abigail Housen, this approach to teaching and learning is a learner-centered methodology that seeks to support close looking and communication skills.

The VTS teaching methodology centers around three questions:

What's going on in this picture?
What do you see that makes you say that?
What more can we find?

Educators use these open-ended questions to engage students in examination of images. Content or 'answers' are not provided, rather learners construct meaning individually and together. Educators reflect back what students respond and help facilitate the conversation moving forward.

VTS has been applied across disciplines. Extensive research on the strategy has demonstrated that students participating in multi-visit programs to museums using VTS techniques generated significantly more instances of critical thinking skills, said more, and were more likely to provide evidence for their thinking.

LEARN MORE: vtshome.org

WHAT IS VISUAL LITERACY?

We live in an increasingly visual world and fostering skills to decode today's visual world is more critical than ever. By looking closely at visual sources and works of art, students develop visual literacy, critical thinking, and communication skills.

Visual literacy is a set of abilities that enables an individual to effectively find, interpret, evaluate, use, and create images and visual media. Visual literacy skills equip a learner to understand and analyze the contextual, cultural, ethical, aesthetic, intellectual, and technical components involved in the production and use of visual materials. A visually literate individual is both a critical consumer of visual media and a competent contributor to a body of shared knowledge and culture.

- Association of College and Research Libraries

TIPS FOR OBJECT-BASED TEACHING

LOOK CLOSELY

Invite students to look closely for several minutes before sharing observations or beginning discussion. Take different perspectives: encourage getting up close and stepping back. Sketching or writing about what students see invites close looking and engages the students directly with the object.

ASK OPEN-ENDED QUESTIONS

Invite students to share observations and what they notice from initial observations. In lieu of asking questions that have a right/wrong answer (ex *What color is it? When was this made?* or *How was this used?*), ask questions that allow students to bring critical and creative thinking to bear (ex *What colors do you notice? What materials do you see have been used to make this object?* or *What clues to how this object might be used do you observe?*).

PROVIDE CONTENT

As questions or observations about an object arise in conversation, provide students with historical and cultural context or other relevant information. For example, if a student observes that a painting looks unfinished, you might share information that a painter was unable to complete his painting of Denali because his paints froze while painting en plein air.

GET HANDS-ON

Drawing and writing support students in looking closely and thinking creatively and critically. Prompts might include:

- *Sketch a detail. Sketch the object from multiple perspectives.*
- [For paintings, drawings, and photographs] *Sketch what you might imagine happened before this image. Sketch what you imagine might happen after.*
- [For objects] *Where do you imagine finding this object? Sketch an environment where this object might feel 'at home.' Sketch an environment where this object might feel 'out of place.'*
- *Write down a phrase that captures your emotion when you look at this work. Share with a partner. Are your reactions similar or different?*
- *Imagine the story behind the painting or photograph, or the story of how this object traveled from its original maker to the museum. Write a brief short story to capture your imaginings.*

Prelude to the Space Race

OBSERVE

Introduce the following images: Japanese equipment (anti aircraft gun) captured in the Aleutians – taking time to look closely.

S24 Japanese equipment captured in the Aleutians (anti aircraft gun)
Vern Brickley Collection; Anchorage Museum, B1998.014.1.9856

OBSERVE

Introduce the following image: Amchitka [soldiers loading cargo onto military airplane on runway, US Air Force airplane, after 1947] – taking time to look closely.

Amchitka [soldiers loading cargo onto military airplane on runway, US Air Force airplane, after 1947]
Vern Brickley Collection; Anchorage Museum, B1998.014.1.9856

4 mins

Invite students to describe what they see with a partner.

With each object: **ASK** *What do you see? What do you notice first? What details do you observe?*

30 mins

USE 20 Questions Deck for more group discussion questions about the two objects.

PROMPT students to compare and contrast the information they see. *Why do you think these photos were taken? What sounds or conversations might you hear if you could step into these photographs? How do these images make you feel?*

ASK FURTHER *What makes you say that? Why does that stand out to you?*

QUESTION Point out Alaska's location on a world map or a globe. Ask students to consider why Alaska's position may be of interest in terms of travel, trade, or geopolitics.

15 mins

Use the following list to provide vocabulary to students:

Ideology	*a system of ideas forming the basis for economic and political theory and policies*
Subjugation	*bringing someone or something under one's control*
Cold War	*the geopolitical and ideological rivalry between the United States and the Soviet Union in terms of military and technological might lasting from 1947-1991*
The Soviet Union	*a socialist country that existed from 1922-1991 that became a rival superpower to the United States after World War II*
Space Race	*the competition between the United States and the Soviet Union to make and improve rocket technology and space flight*
Propaganda	*intentional methods of communication designed to influence people's habits, opinions, and actions in order to promote or further a particular agenda*
Capitalism	*an ideology in which private individuals and businesses mostly control how to make, buy, and sell goods and services*
Socialism	*an ideology in which the public mostly controls how to make, buy, and sell goods and services*
Truman Doctrine	*US doctrine supporting democratic states facing potential subjugation*
Marshall Plan	*US plan to economically assist Western Europe after World War II*
Molotov Plan	*Soviet plan to economically assist Eastern Europe after World War II*
Brezhnev Doctrine	*Soviet policy to intervene in affairs involving socialist countries*
Iron Curtain	*The border separating the Soviet-influenced socialist European countries from democratic ones*
Eastern Bloc	*socialist countries aligned with the Soviet Union*

10 mins

As a class, discuss whether some of these terms are familiar and if they are aware of how they connect to World War II.

SHARE Invite students to share stories of family members and their experiences during the Cold War if any.

CONTEXT

LEARN MORE ABOUT *V-2 Missile*

READ Soviet Union's response to US aid under the Marshall Plan: *Soviet Union rejects Marshall Plan assistance*

LEARN more about the Space Race in this timeline: *Timeline of the Space Race, 1957–69*

When did the Cold War start?

In World War II (1939–1945), the United States, the Soviet Union, and allied nations such as France and t he United Kingdom fought against the Axis powers made up of Germany, Italy, and Japan. After the defeat of the Axis powers, the United States and

the Soviet Union emerged as the world's leading superpowers. Their differences in political and cultural ideology would lead to a global rivalry spanning decades. This long-lasting rivalry would be known as the Cold War.

Many historians mark the start of the Cold War with the Truman Doctrine of 1947. The Truman Doctrine pledged support to democratic nations at risk of being taken over by other nations. The support from the doctrine primarily meant economic assistance and programs aimed at fostering development. It also meant making sure these countries developed in ways that the United States approved. Likewise, the Soviet Union influenced Eastern European countries under the Molotov Plan, and later the Brezhnev Doctrine, by providing economic and military support to socialist-aligned countries. Relations between the United States and the Soviet Union declined after World War II, as competing geopolitical ambitions and ideological differences fueled tension, even though both nations sought to avoid direct military conflict. Despite this, both countries viewed one another with suspicion and sought ways to outdo each other.

REFLECT *Consider how this era might shape one's upbringing, views, and sense of the world Ask: How is it similar to our time?*

The Cold War Arms Race

The United States and the Soviet Union fought indirectly through displays of technological and military power. Both countries significantly increased funding for scientific and technological research, leading to major advancements and breakthroughs in stronger nuclear weaponry, long-range missiles, and space flight technology.

From 1945 to 1949, the United States was the only country with any kind of nuclear weapon capability, having developed and deployed the first atomic bomb during World War II. The Soviet Union successfully created and tested its own atomic bomb in 1949 – an event many historians regard as the start of the Cold War Arms Race.

As the premier world powers after World War II, both the United States and the Soviet Union wanted to improve their weapons as physicial symbols of military power. Both benefitted from Nazi research and researchers. Nazi Germany began most of the long-range rocketry research in World War II. In 1944, Nazi Germany produced the V-2 rocket. This rocket was the first long-range rocket and had a range of 200 miles. After the war, the Soviet Union took many of the former Nazi production plants, while the United States hired former Nazi scientists to work for the United States government's rocketry program.

American and Soviet interests in further developing rocketry resulted in spacecraft and weapons that could fly longer distances than the V-2 rocket. In 1957, the Soviet Union launched the R-7 rocket, which had a range of close to 5000 miles and could carry nuclear warheads.To respond to the threat of an advanced long-range missile, the United States launched SM-65 (Strategic Missile - 65) Atlas in 1959, a missile with a range of over 8000 miles. These types of long-range missiles would be called Intercontinental Ballistic Missiles, or ICBM for short.

The DEW Line

As both the United States and the Soviet Union developed long-range missiles capable of striking each other, each grew increasingly paranoid that the other might launch an attack. To counter potential threats, both countries developed ways to detect enemy missiles or aircraft. The Soviet Union created warning radars that would be called *Sistema Preduprezhdeniya o Raketnom Napadenii* (SPRN) or 'Missile Attack Warning System' whereas the United States partnered with Canada to create the The Distant Early Warning Line, also known as the DEW Line.

The DEW Line or Early Warning Line, was a system of radar stations in the Arctic to detect incoming Soviet bombers during the Cold War and provide early warning of any sea-and-land-invasion. Its construction was among the highest priorities in the 1950s. Advanced site preparation began in December 1954, and construction required a massive logistical operation that occurred mostly during the brief summers when the sites could be reached by ships. The 63-base DEW Line began operation in 1957. In 1985, as part of the "Shamrock Summit", the US and Canada agreed to transition DEW to a new system known as the North Warning System (NWS). By 1988, most of the original DEW stations were deactivated, while a small number were upgraded with all-new equipment. The official handover from DEW to NWS took place on July 15, 1993.

The Space Race

Alongside the Cold War Arms Race, the United States and the Soviet Union competed to advance space flight technology and capabilities. This competition would later be called the Space Race. The Space Race began when the Soviet Union launched a man-made object that stayed in orbit on October 4, 1957, as a contribution to the International Geophysical Year.

This man-made object, named Sputnik, was launched by a modified R-7 rocket and only carried a radio transmitter that emitted a beeping signal detectable by people around the world. A month later, on November 3, the Soviets launched Sputnik 2 — the

first spacecraft to have an animal on board. The United States government became worried that the Soviet Union would outpace them. Under authorization of the U.S. Army Ballistic Missile Agency, the Jet Propulsion Laboratory developed and launched Explorer 1 on January 31, 1958, less than three months after receiving the orders to send a rocket into space. The purpose of the launch was to measure Earth's radiation environment around its orbit. Later that year on July 29, the United States Congress passed the National Aeronautics and Space Act, creating NASA as a civilian agency overseeing non-military space activity.

The United States Military, Alaska, and the Soviet Union

The U.S. Military has played a role in Alaska since the Treaty of Cession in 1867, but the Second World War and Cold War led the Army—and later the Air Force—to increase their presences. Anchorage grew in concert with the expansion of Fort Richardson and Elmendorf Air Force Base. At the conclusion of the Cold War, the Base Realignment and Closure Commission (BRAC) issued a recommendation that some bases consolidate operations, including Fort Richardson and Elmendorf Air Force Base. In 2010, the two merged into what is known today as Joint Base Elmendorf Richardson (JBER). As geopolitical tensions rise in the Pacific and Europe, Alaska has taken on renewed strategic significance.

OBSERVE

20 mins

Introduce *Rectilinear Space Structure by Theodore Roszak. Look closely together.*

ASK *What do you see? What do you notice first?*

USE *20 Questions Deck for more discussion questions about the object.*

PROMPT FURTHER *What makes you say that? Why does that stand out to you? Paraphrase student observations.*

ENCOURAGE MORE CLOSE-LOOKING *What more can we find?*

INVITE students to share their thoughts on what they consider art.

ASK How much of the past influences on art affect our present views? Encourage students to discuss the social, economic, technological, etc. changes that they can remember and how it ties into art movements.

Rectilinear Space Construction, Theodore Roszak, Painted Wood, Wire, and Plastic
On loan from the High Museum, 2002.204

QUESTION

ASK *What memories, ideas, and experiences do you immediately recall when you think of the Space*

Race?

PROMPT FURTHER Invite students to write their reflections down. *What more do you want to know about the Space Race?*

Achievements and Aims of the Space Race

Massive investment into space flight and rocket technology from both the United States and the Soviet Union resulted in many scientific advancements. Within four years of launching Sputnik, the Soviet Union sent the first person into orbit on April 12, 1961. Further improvements and research led to the first multi-person spacecraft on October 12, 1964, the first spacewalk on March 18, 1965, and the first soft landing of a spacecraft on the moon on February 3, 1966. Though the United States lagged in development in the earlier part of the 1960s, the launch of the Apollo 8 on December 24, 1968 culminated in the first crewed flight around the moon. However, the event that most consider to be the turning point or end of the Space Race was the moon landing. On July 20, 1969, Neil Armstrong and Buzz Aldrin became the first people to set foot on the moon as part of the Apollo 11 spaceflight mission. The success of the moon landing was a key objective in the Space Race, solidifying the technological advantage of the United States over the Soviet Union.

Though the level of rivalry between the United States and the Soviet Union is evident in the Space Race, the advancements in science and their subsequent role in moving technology forward should not be understated. Technology from this era includes not only spacecraft, but also vast improvements on aircraft detection capabilities, long distance communication and travel, and the predecessors to the Internet in the forms of the United States' Advanced Research Projects Agency Network (ARPANET) and Soviet *Obshchegosudarstvennaya Avtomatizirovannaya Sistema Uchota i Obrabotki Informatsii* (OGAS). Without them, our world would look far different today.

FINAL PROJECTS

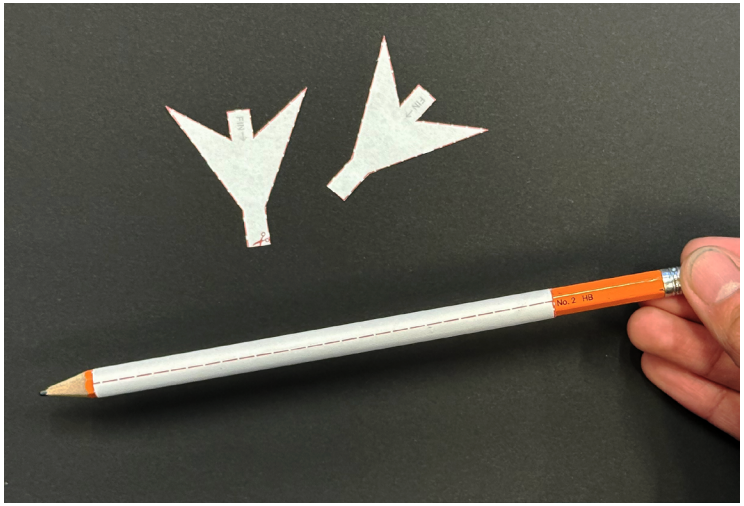
Materials

Pencil
Tape
Scissors
Straw (plastic, paper, or metal)
Meter stick or measuring tape
Rocket template
Data log

Time

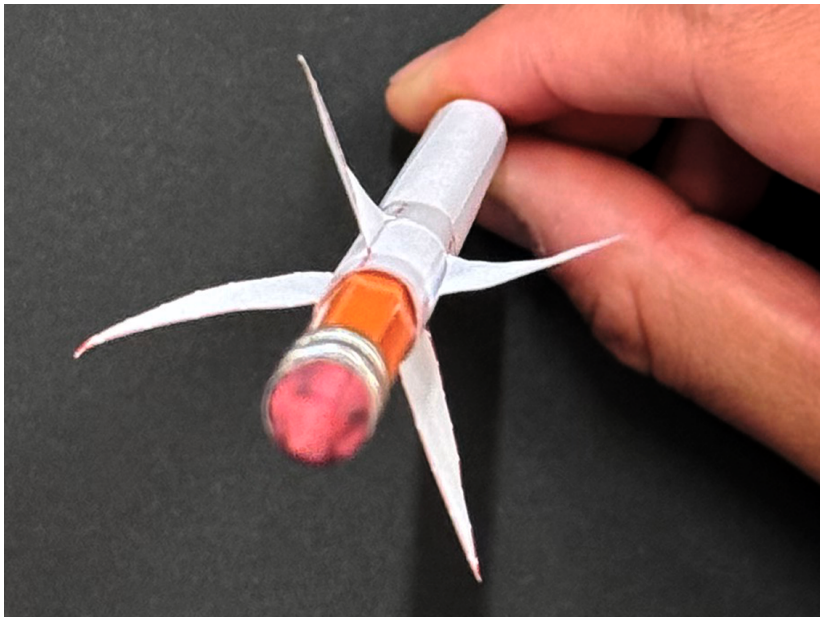
~30 mins

1. [5 mins] Have students begin cutting out the large rectangle from the rocket template. Wrap the cut-out rectangle around a pencil lengthwise and tape it closed to form a tube. This will be the body of the rocket.

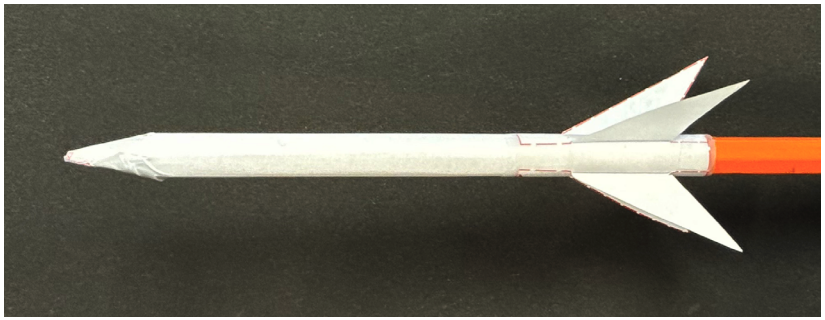


2. [5 mins] Students will carefully cut out the two fin units. Place both fin units across from each other. Line the middle rectangles of the fin with the bottom of the rocket body, then tape it to the rocket body. Nothing should stick out past the bottom of the rocket body.

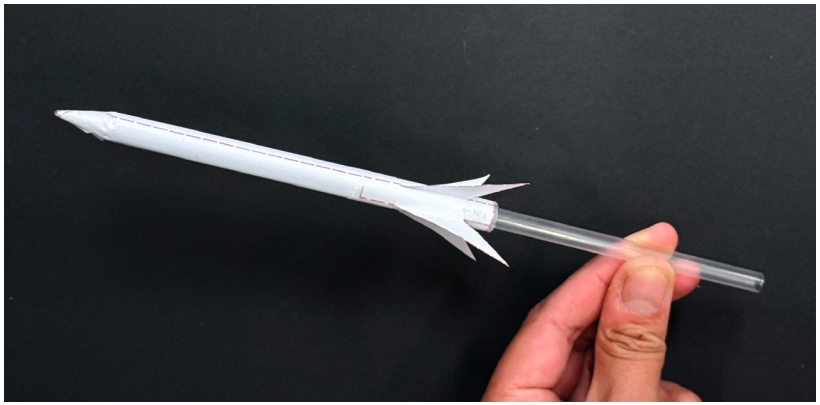
3. [2 mins] Bend the part of the fin that looks like a 90 degree triangle so that each fin is at a right angle to its neighboring fin. From the bottom of the rocket, the fins should look like a +.



4. [2 mins] To make the rocket's nose cone, students will twist and pinch the top of the rocket body around the tip of the pencil. Tape the nose cone to keep it from untwisting and prevent air from escaping.



5. [2 mins] Have students measure the length of the nose cone from its base (where it starts to narrow) to its tip, then have them record this measurement in their data log and on the rocket body itself. Invite students to think and jot down notes about design and function: **How do you think the shape and length of the nose cone will affect the rocket launch?**



6. [2 mins] Remove the pencil and replace it with a straw. Have students test the rocket launch with the three different types of straws. Ask: *Which straw type do you think will travel furthest? Why?* Discuss in pairs.

7. [2 mins] Before launching, be sure that the launch area is clear of people and other hazards. Mark the launch point with tape or an object. To launch the rocket, simply blow into the straw. Then using the measuring tape or meter stick, measure the distance the rocket traveled. Record the distance on the data log.

EXTENSION

[10 mins] Invite students to improve their designs with the following prompt: *Can you make your rocket launch further*? Students can continue improving their design and testing their rocket launch by altering the template. Encourage students to try different rocket body lengths, fin shapes, fin sizes, or fin angles. Repeat steps 5 through 7 for every launch. Record each design change and distance in the data log. Remind students to only make one change at a time, so they know which design changes result in performance changes.

BIBLIOGRAPHY

Bartley, R. H. (2001). The piper played to us all: orchestrating the cultural Cold War in the USA, Europe, and Latin America. International Journal of Politics, Culture, and Society, 571-619.

Berger, M. (1948). How the molotov plan works. The Antioch Review, 8(1), 17-25.

BBC Future. (2016, October 26). Why the forgotten Soviet internet was doomed from the start. BBC Future. https://www.bbc.com/future/article/20161026-why-the-forgotten-soviet-internet-was-doomed-from-the-start

Britannica. (n.d.). Brezhnev doctrine. Encyclopaedia Britannica. https://www.britannica.com/event/Brezhnev-Doctrine

Britannica. (n.d.). Comecon. Encyclopaedia Britannica. https://www.britannica.com/topic/Comecon

Britannica. (n.d.). Timeline of the space race. Encyclopaedia Britannica. https://www.britannica.com/story/timeline-of-the-space-race

Cernuschi, C. (1999). The Politics of Abstract Expressionism.

Clark, T. J. (1994). In Defense of Abstract Expressionism. October, 69, 23-48.

Cockcroft, E. (1974). Abstract expressionism, weapon of the Cold War. Artforum. 125-133.

de Hart Mathews, J. (1976). Art and Politics in Cold War America. The American Historical Review, 762-787.

Devezas, T., de Melo, F. C. L., Gregori, M. L., Salgado, M. C. V., Ribeiro, J. R., & Devezas, C. B. (2012). The struggle for space: Past and future of the space race. Technological Forecasting and Social Change, 79(5), 963-985.

EBSCO Information Services. (n.d.). First Soviet nuclear weapon test. EBSCO Research Starters. https://www.ebsco.com/research-starters/history/first-soviet-nuclear-weapon-test

Government of Canada. (2020, May 19). The Distant Early Warning line: An environmental legacy project. Government of Canada. https://www.canada.ca/en/department-national-defence/corporate/video/other/distant-early-warning-line-an-environmental-legacy-project.html

History.com Editors. (2020, July 2). Soviet Union rejects Marshall Plan assistance. History. https://www.history.com/this-day-in-history/july-2/soviet-union-rejects-marshall-plan-assistance

Kiddle. (n.d.). Iron curtain. Kiddle Encyclopedia. https://kids.kiddle.co/Iron_Curtain

KidsKonnect. (n.d.). Iron curtain. KidsKonnect. https://kidskonnect.com/history/iron-curtain/

Kozloff, M. (1973). American painting during the Cold War. Artforum. 1-14.

Kramer, M. (2010). Stalin, soviet policy, and the consolidation of a Communist bloc in Eastern Europe, 1944-1953. Divinatio, (31), 53-100.

NASA. (2021, July 17). Apollo-Soyuz Test Project. NASA. https://www.nasa.gov/apollo-soyuz-test-project

NASA. (2022, February 17). Explorer 1 overview. NASA. https://www.nasa.gov/history/explorer-1-overview/

NASA. (2022, July 29). 65 years ago, the National Aeronautics and Space Act of 1958 creates NASA. NASA. https://www.nasa.gov/history/65-years-ago-the-national-aeronautics-and-space-act-of-1958-creates-nasa

NASA. (2022, October 4). 65 years ago, Sputnik ushers in the space age. NASA. https://www.nasa.gov/history/65-years-ago-sputnik-ushers-in-the-space-age

National Park Service. (n.d.). Atlas ICBM. National Park Service. https://www.nps.gov/articles/atlas-icbm.htm

Roberts, G. (1994). Moscow and the Marshall plan: Politics, ideology and the onset of the cold war, 1947. Europe-Asia Studies, 46(8), 1371-1386.

Smithsonian National Air and Space Museum. (n.d.). The space race. Smithsonian Institution. https://airandspace.si.edu/explore/stories/space-race#:\~:text=Why%20did%20we%20care%20so,for%20spaceflight%20had%20further%20applications

Smithsonian National Air and Space Museum. (n.d.). V-2 missile. Smithsonian Institution. https://airandspace.si.edu/collection-objects/missile-surface-surface-v-2-4/nasm_A19600342000

Stanford University. (n.d.). History of distributed computing. Stanford University. https://cs.stanford.edu/people/eroberts/courses/soco/projects/distributed-computing/html/history.html

Truman, H. S. (1947, March). The truman doctrine. In Address, Joint Session of Congress, US Capitol.

U.S. Department of State. (n.d.). The Marshall Plan. U.S. Department of State, Diplomacy in Action. https://diplomacy.state.gov/online-exhibits/diplomacy-is-our-mission/development/the-marshall-plan/

Winston Churchill Hillsdale College. (n.d.). The origins of the Iron Curtain. Winston Churchill Hillsdale College. https://winstonchurchill.hillsdale.edu/iron-curtain-origins

Books below are available at the Atwood Resource Center, Anchorage Museum and Anchorage Public Library.

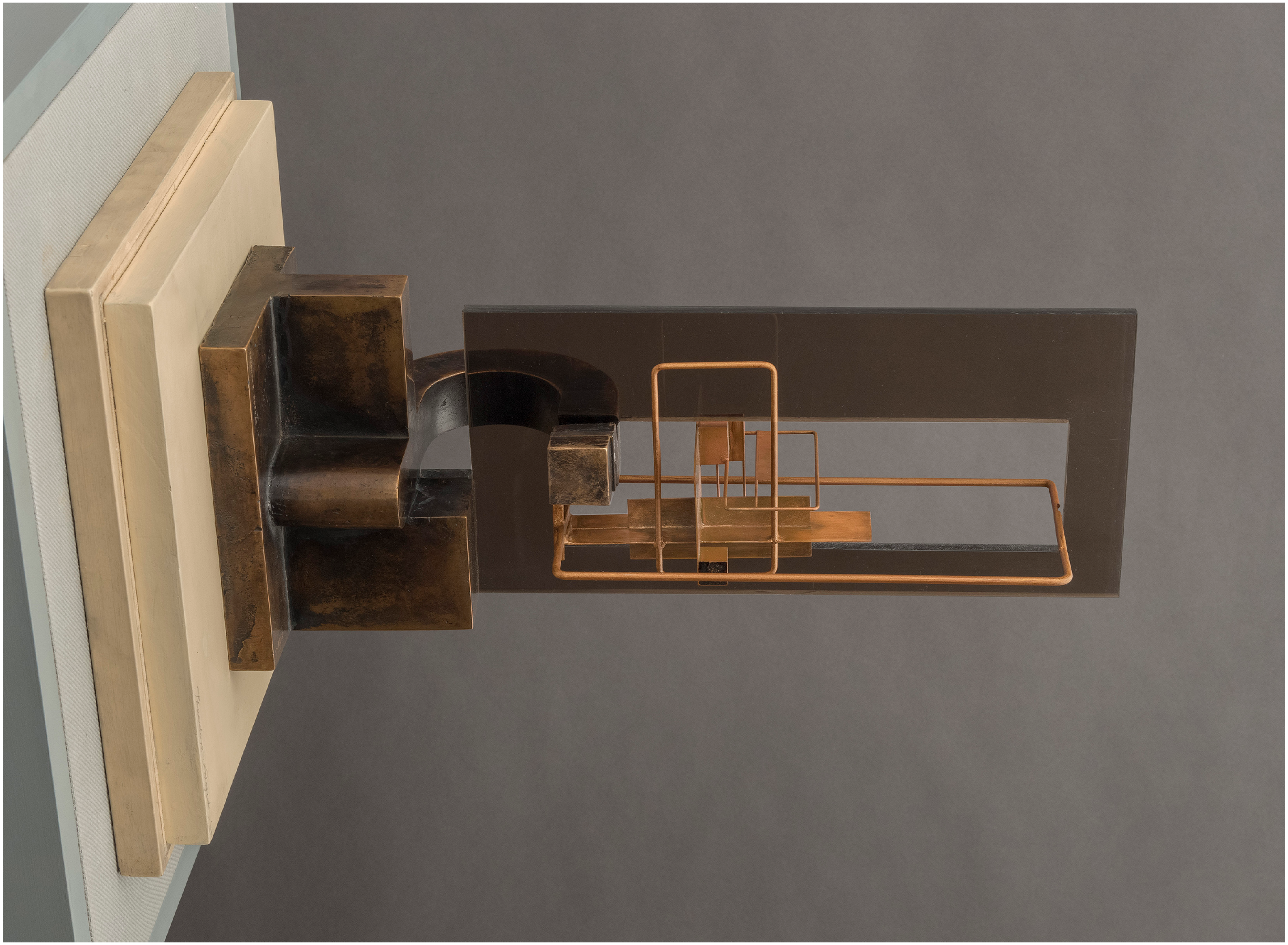
Burnham, Rika and Elliott Kai-Kee. Teaching in the Art Museum: Interpretation as Experience 1st Edition. Los Angeles: J. Paul Getty Museum, 2011.
Elkins, James. How to Use Your Eyes. New York: Routledge, 2000.
Leborg, Christian. Visual Grammar. New York: Princeton Architectural Press, 2004.

Aug. 10th 1915 Anchorage Alaska 5th Street. Pyatt
Alberta Pyatt, Pyatt Negative Collection; Anchorage Museum, B2009.057.3

What do you see?

S24 Japanese equipment captured in the Aleutians (anti aircraft gun)
Vern Brickley Collection; Anchorage Museum, B1998.014.1.9856

What do you see that makes you say that?



Rectilinear Space Construction, Theodore Roszak, Painted Wood, Wire, and Plastic
On loan from the High Museum of Art, 2002.204

What more can you find?