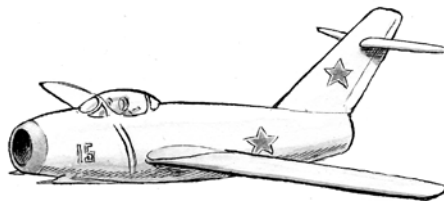


Missing in MiG Alley

PROGRAM OVERVIEW

NOVA explores the world's first jet war, comparing the U.S. Sabre and the North Korean MiG fighter planes and revealing a number of stories regarding pilots who went missing during the Korean War.



The program:

- recounts how the conflict began and how U.S. forces became involved in the Korean War.
- states that initially there was no Korean air defense until the Russians supplied Koreans with the MiG-15s.
- explains that the majority of air fighting took place in a region of airspace known as MiG Alley along the Chinese-North Korean border.
- notes that the newly developed fighter jets had swept wings that enabled pilots to move at much higher speeds.
- suggests that the MiG-15 owed its success in part to its Rolls Royce engine, given to the Soviet Union by the British in 1946 as a gesture of friendship to a wartime ally.
- follows the efforts of families and the U.S. government to find more than 30 missing Sabre pilots.
- reports that the MiG-15s were being flown by Russian pilots, a fact kept secret by both the United States and Russia to avoid the conflict from escalating into a third world war.
- interviews surviving pilots who were involved in the conflict, some of whom were captured and interrogated by Koreans, Russians, and Chinese.
- suggests that the Korean War came down to a competition between the MiG, with more firepower that could climb higher and faster, and the Sabre that could fly farther, with greater control, and was more user-friendly.
- describes some of the strategies and advantages that the United States had, including the G-suit, radar-ranging gun sight, the four-plane flight formation, and superior training and experience.
- explains that an American Sabre jet was captured by the Soviets, allowing them to study it and create radar.
- recounts the end of the war and Russian president Boris Yeltsin's promise 40 years later to return any prisoners of war back to the United States, giving the families of missing pilots renewed hope.

Taping Rights: Can be used up to one year after program is recorded off the air.

BEFORE WATCHING

- 1 Discuss with students some of the events that led up to the Korean War, what the conflict was about, who was involved, and why the United States became involved. Have students locate Korea on a map, and note its proximity to the United States.
- 2 Organize students into six groups. Have each group create a time line for when the following wars began and ended: World War I, World War II, Cold War, Korean War, Vietnam Conflict, and the Persian Gulf War. As a class create a large time line listing each war.
- 3 As students watch the program, assign three groups to take notes on the following topics (one topic per group): design features of the MiG-15, design features of the Sabre, and efforts to find missing soldiers.

AFTER WATCHING

- 1 Have students who took notes on the same topic meet, discuss their notes, and present what they learned to the class. How did the use of aircraft evolve over the course of the war? What were the main similarities and differences between the MiG-15 and the Sabre? What were the main advantages of each? How do family members' find out what happened to their loved ones?
- 2 Check with your local Department of Veterans Affairs office to find out if any veterans of foreign wars live in your area. If so, ask them for recommendations so that students can arrange to either conduct an interview or invite a veteran to the classroom.

CLASSROOM ACTIVITY

Activity Summary

Students research technological advances, tactical strategies, and roles aircraft have played in the United States' five major international conflicts of the 20th century.

Materials for Teacher

- copy of "Historian Fact Sheet" handout

Materials for Each Team

- copies of "The Changing Face of War" student handout
- sheets of white drawing paper
- white poster paper
- assorted colored pencils, pens, and markers
- glue sticks or tape
- access to print and Internet resources

Background

During the 20th century, the United States was involved in five major international conflicts (not including the Cold War): World War I, World War II, the Korean War, the Vietnam Conflict, and the Persian Gulf War. The outcome of each one of those wars depended on a number of factors, including the combatants involved, the number of armed forces engaged, the technologies employed, the campaign strategies applied, and the politics and policies of the time.

In this activity, students explore the details of each war and consider how changing technology has impacted how wars have been fought over time.

LEARNING OBJECTIVES

Students will be able to:

- search for and locate information related to wars of the 20th century.
- report on technological advances and tactical strategies used in wars of the 20th century.

STANDARDS CONNECTION

The "The Changing Face of War" activity aligns with the following National Science Education Standards (see books.nap.edu/html/nses).

GRADES 5–8

Science and Technology

- Abilities of technological design

GRADES 9–12

Science and Technology

- Abilities of technological design

*Video is not required
for this activity.*

CLASSROOM ACTIVITY (CONT.)

Procedure

- 1 Organize students into five teams, one for each of the wars listed below:
 - World War I
 - World War II
 - Korean War
 - Vietnam Conflict
 - Persian Gulf War
- 2 Distribute the student handout and other materials (cut up the teacher handout that lists the statistics for each war and provide each group with the statistics for its war). Review the student handout with the class and explain the roles for the completion of the classroom project. Assign or have team members choose roles.
- 3 Have students conduct research in each of their assigned roles: historian, technologist, airplane specialist, and operational methods specialist. Each team member should create a poster containing research learned about his or her role for the war he or she has been assigned.
- 4 Have each team member present a poster about his or her role, either presenting by role across the five wars or having each role presented for one war before moving onto the next war.
- 5 After all teams have presented, have a class discussion to compare and contrast technologies across all of the wars and to consider the impact technology has had on how wars are fought. What were the most striking technological developments? How did these changes affect tactical strategies? What technologies helped cut down on human casualties? How has the role of aircraft changed over the course of the five wars?
- 6 As an extension, have students research and create posters on everyday technologies that resulted from technological innovations that occurred during wartime.

Classroom Activity Author

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ACTIVITY ANSWER

Historians

Students will create bar charts using supplied statistics, and provide basic facts about each war.

Technologists

The following is a partial list of major technologies introduced or refined by each war:

World War I: aircraft (used mainly for reconnaissance and to adjust artillery fire), heavy artillery, poison gas (i.e., phosgene and mustard), submarine warfare, battlefield tanks, field telephone and radio

World War II: combat aircraft (used in strategic bombing of targets), transport aircraft, airborne warfare (paratroopers, gliders, and aircraft carriers), mechanized warfare (armored and mechanized divisions on suitable terrain), nuclear weapons, cruise missiles and ballistic missiles (V-1 and V-2), radar, sonar, electronic computers (most importantly for code breaking), antibiotics, napalm, radios and movies (for public information and propaganda)

Korean War: helicopters (for casualty evacuation and combat rescue), jet aircraft

Vietnam Conflict: helicopters, guided missiles, bio-chemical warfare (Agent Orange), television (for public information and propaganda)

Persian Gulf War: smart bombs, global positioning system, stealth aircraft, satellite communications

Airplane Specialists

Soon after the beginning of the 20th century, many nations used aircraft for reconnaissance. The technical advancement generated by World War I led to the development of specialized reconnaissance aircraft, and later fighters and bombers. World War II witnessed the development of strategic bombing and of the earliest jet fighters. The Korean War pitted American and Soviet pilots in history's first jet-vs.-jet war, while helicopters were deployed to evacuate the wounded and rescue downed pilots. During the Vietnam Conflict, aerial bombing was used to put diplomatic pressure on the enemy, to interdict the flow of supplies, and to provide close support to ground troops. In the first Persian Gulf War, fighters (especially the stealth fighter) were used as first-strike weapons before ground troops entered the combat zone. This strategy sought to break Iraqi resistance before infantry invaded.

Over time, as aircraft attained higher speeds and armament proved more powerful, aerial engagements rapidly changed from close-in dogfights to long-range missile duels. The advent of computer-guided missiles in the 1950s allowed pilots to be more selective in their targets. Modern

ACTIVITY ANSWER (CONT.)

laser-guided bombs use the accuracy of the global positioning system to guide weapons to within a few feet of their targets.

The introduction of radar bombing systems during World War II made night bombing more accurate, and steady improvements in the 1950s and 1960s permitted precision radar bombing. The introduction of radar and infrared guided air-to-air missiles in the 1960s allowed for long-range missile engagements. At the same time, the adoption of laser- and television-guided bombs permitted unprecedented bombing accuracy. With the advent of guidance systems using remote inputs from global positioning system satellites in the 1990s, this accuracy could be achieved without visual contact with the target. The following table lists some of the airplanes used in each war.

War/Conflict	Aircraft*	Nation	Speed (mph)
World War I	Sopwith Camel (1917)	Great Britain	118
	Royal Aircraft Factory S.E. 5 (1917)	Great Britain	138
	Fokker DR.I Triplane (1917)	Germany	103
	Fokker D.VII (1918)	Germany	118
	Albatros D.III (1917)	Germany	109
	Nieuport XVII (1916)	France	110
	Spad S.XIII (1917)	France	138
World War II	Messerschmitt Bf 109 (1935)	Germany	358
	Focke-Wulf Fw 190 (1941)	Germany	426
	Messerschmitt Me 262 (1944)	Germany	540
	North American P-51 (1940)	USA	437
	Grumman F6F (1943)	USA	380
	Lockheed P-38 (1939)	USA	414
	Mikoyan-Gurevich MiG-3 (1941)	USSR	398
	Yakovlev Yak-9 (1943)	USSR	434
	Mitsubishi A6M Zero-Sen (1942)	Japan	354
	Supermarine Spitfire (1938)	Great Britain	369
	Hawker Hurricane Mk. I (1937)	Great Britain	318
Korean War	North American F-86 Sabre (1949)	USA	690
	MiG-15 (1947)	USSR	668
Vietnam Conflict	F-4 Phantom (1962)	USA	1,485
	MiG-21 (1960)	North Vietnam	1,353
	F-105 (1961)	USA	1,390
Persian Gulf War	F-15 (1975)	USA	1,875
	F-117 (1982)	USA	646
	MiG-25 (1972)	Iraq	1,848

*Dates indicate initial year of service for aircraft.

ACTIVITY ANSWER (CONT.)

Operational Methods

War	Strategy	Strategy Defined	Nation
World War I	Schlieffen Plan	attack plan to encircle Paris through Belgium; was implemented and failed; abandoned in 1914	Germany
	attrition and trench warfare	forcing opponent to expend lives for small gains	embraced by Germany in 1915, then by other industrialized nations
	total war involving civilian populations	destruction of non-military and non-strategic positions; destruction of resources, human and economic	embraced by totalitarian powers
	alliances and coalitions	Triple Entente and Triple Alliance (alliances that dominated Western European diplomatic history until World War I)	successfully adopted by German Chancellor Otto von Bismarck, but misuse led to catastrophe in August 1914
World War II	island hopping	bypassing key Japanese Pacific strongholds (1942–45)	United States
	massed tank formations	large-scale armor-only attacks with infantry support	heavily used by Germans
	air superiority	use of fighter aircraft to secure control of the air for reconnaissance, bombardment, and ground attack	fighter aircraft first invented by French in 1915, and adopted by the Germans and other warring powers in subsequent wars
	terror bombing of cities	use of massed bombing formations to sow terror	used by Germans and Japanese in the 1930s
	strategic high-altitude precision bombardment	destruction of selected industrial and military targets by massed formations of high-altitude bombers	developed by United States in the 1920s; applied in World War II
	night bombardment of cities	use of darkness to protect bombers from fighter attack	used first by the Germans against Britain, then by the British against Germany, and finally the United States against Japan
	lightning war, aka blitzkrieg	coordinated combined arms attacks using tanks and mechanized infantry and artillery with air support	first used by the Germans in 1939–40; later adopted by Western allies
	wolf packs	submarines working as large teams for massed attacks	adopted by the Germans in World War II
	kamikaze	aerial suicide attacks against primarily naval targets	Japan
Korean War	containment	checking spread of communism by intervention	American policy to limit the scope of the conflict to the peninsula
	human wave	massed infantry attacks in close formation against defenses	China
Vietnam Conflict	Americanization	U.S. assumption of the primary military role in March 1965	introduction of U.S. ground troops on March 8, 1965
	defoliation	use of chemical agents to selectively destroy ground cover (to deny cover for ambushes) and to destroy crops	United States in Vietnam from 1962–71
	carpet bombing	high-tonnage bomb drops, in waves, on small areas, typically to pave the way for the advance of ground forces	used by the Americans against the North Vietnamese
Persian Gulf War	envelopment	encirclement of enemy to create an indefensible “pocket”	American tactic to avoid most fixed defenses
	“Hail Mary” sweep	high-speed end-around maneuver by armored divisions	formulated by American general Norman Schwarzkopf

ACTIVITY ANSWER (CONT.)

LINKS AND BOOKS

Links

NOVA—Missing in MiG Alley

www.pbs.org/nova/warplanes

Learn about G forces, find out how the United States looks for missing war personnel, compare the MiG and Sabre, and outfit a fighter pilot in this companion Web site.

American War and Military Operations Casualties: Lists and Statistics

www.fas.org/sgp/crs/natsec/RL32492.pdf

Presents a comprehensive list of military personnel serving in, and casualties reported for, major wars and selected military operations waged by the United States.

History of Warplanes

Techcenter.Davidson.kiz.nc.us/fallo3/1stgroup/index.htm

Outlines the planes used in major conflicts, with photos, statistics, and time lines.

Statistical Summary: America's Major Wars

www.cwc.lsu.edu/cwc/other/stats/warcost.htm

Compares the vital statistics of all major American conflicts, including number of troops, casualties, and financial costs.

Wars & World History-Homework Center-Multnomah County Library

www.multcolib.org/homework/warwldhc.html

Offers a search portal on wars, with information on technology, statistics, and time lines.

Books

Air Power in the Age of Total War

by John Buckley.

Indiana University Press, 1999.
Analyzes the changing military role of air power in the 20th century and examines the impact of World War I, the theories and planning in the interwar period, the air arms race, World War II in Europe and the Far East, and the post-war period.

MiG Alley: Sabres vs. MiGs over Korea

by Warren E. Thompson and David R. McLaren.

Speciality Press, 2002.
Includes several in-depth interviews with F-86 pilots, who explain their tactics and the details of air combat against MiG pilots.

Sabres Over MiG Alley

by Kenneth P. Werrell.

Naval Institute Press, 2005.
Provides a comprehensive analysis of the F-86 and how UN pilots, initially outnumbered, redefined aerial strategies and won a decisive victory.

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Historian Fact Sheet

Historians are not in agreement on many figures.

The column titled “Number Killed” shows only battle deaths and does not take into account civilian casualties, which are even more subject to debate.

Not all combatants are listed for all wars.

War/Conflict	Theater	Combatant	Number Killed
World War I: 1914–1918	Europe, Middle East	Austria-Hungary	1,200,000
		British Empire	908,400
		Bulgaria	87,500
		France	1,357,800
		Germany	1,773,700
		Italy	650,000
		Russia (USSR born in 1922)	1,700,000
		Turkey	325,000
		United States	116,500

World War II: 1939–1945	Europe, Asia, Pacific	China	2,200,000
		France	210,700
		Germany	3,500,000
		Great Britain	329,200
		Italy	77,500
		Japan	1,219,000
		Soviet Union	7,500,000
		United States	405,400

Korean War: 1950–1953	Korea	China	460,000
		North Korea	316,600
		Other United Nations Forces	3,200
		South Korea	58,100
		United States	36,500

Vietnam Conflict: 1965–1973	South Vietnam, North Vietnam, Laos, Cambodia	North Vietnam/Viet Cong	1,000,000
		South Vietnam	224,000
		United States	58,200

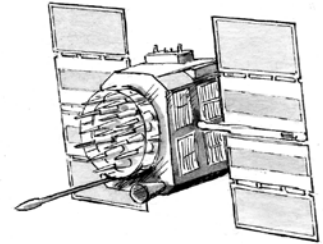
Persian Gulf War: 1990–1991	Iraq	Coalition Troops	345
		Iraq	25,000

The Changing Face of War

The United States was involved in five major international conflicts during the 20th century. Each one of those wars was defined by the combatants involved, the number of armed forces engaged, the technologies employed, and the campaign strategies applied. In this activity, you will explore each of these aspects for the five major campaigns.

Procedure

- 1 The class will be organized into five teams. Each team will be assigned one of the following major wars of the 20th century:
 - World War I
 - World War II
 - Korean War
 - Vietnam Conflict
 - Persian Gulf War
- 2 Each team member will be responsible for one of the following roles: historian, technologist, airplane specialist, or operational methods specialist. Each team member is responsible for gathering the information listed for each role.
- 3 Team members will conduct research in their assigned areas. Each team member should create a poster containing information about his or her assigned area. Posters should include a mix of text and visuals related to the assigned topic.
- 4 After team members have completed their posters, they will share what they learned with the class.



Historians

You will be given information on the combatants and number killed in your war. Create a bar chart for your war showing the number killed for each combatant nation. Develop a fact file for the war assigned to your team that includes how your war was started and how it was resolved.

Technologists

Gather information about what technologies were either introduced or refined during the war you are assigned, considering advancements in such areas as chemical, biological, or nuclear warfare, types of military arsenal (such as tanks or artillery), or communications technologies (such as sonar or the global positioning system).

Airplane Specialists

Describe the combat airplanes that were used in your assigned war and which country introduced them, detail how they were used, and specify at what speed they flew. Include images of at least two of the major combat aircraft used in your conflict.

Operational Methods Specialists

Create two maps showing the battle plans for two separate major engagements or campaigns during the war you are assigned. Include any special terms and tactical strategies that were made famous during the conflict. Define each strategy.

