

Current Status of Nuclear Weapons

8.S271

Class 12

Nuclear Weapons – History and Future
Prospects

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Reminder – 4th and Last Writing Assignment

Related to Classes 10, 11, and 12

**Posted on the Canvas site under “Files” and under
“Assignments”**

Due end of day Friday, May 6

Outline

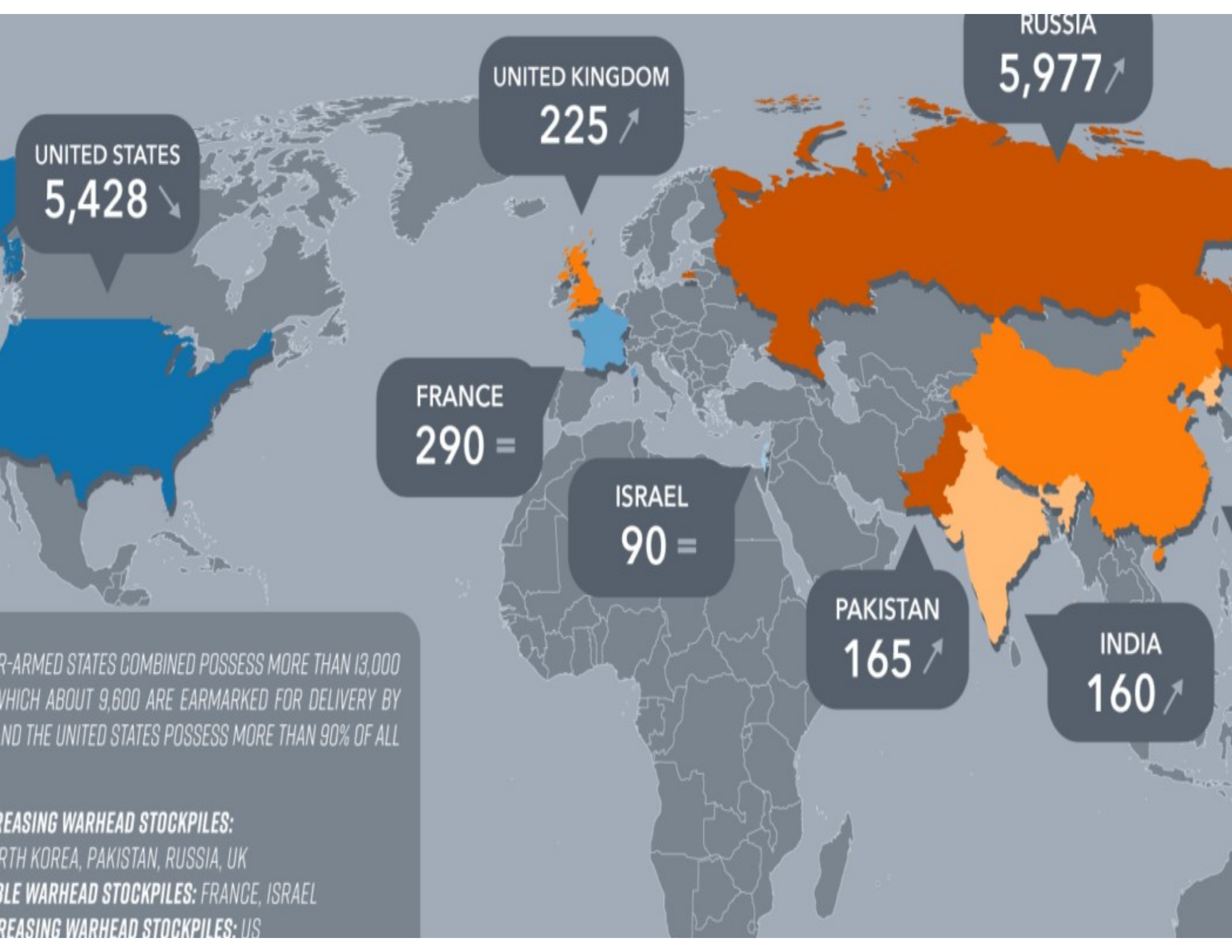
Nuclear Weapons in Each Stockpile

Types of Deployed Weapons

Defense Systems Issues

Status and Effectiveness of Treaties

Other Relevant Issues



UNITED STATES
5,428 ↓

UNITED KINGDOM
225 ↑

RUSSIA
5,977 ↑

FRANCE
290 =

ISRAEL
90 =

PAKISTAN
165 ↑

INDIA
160 ↑

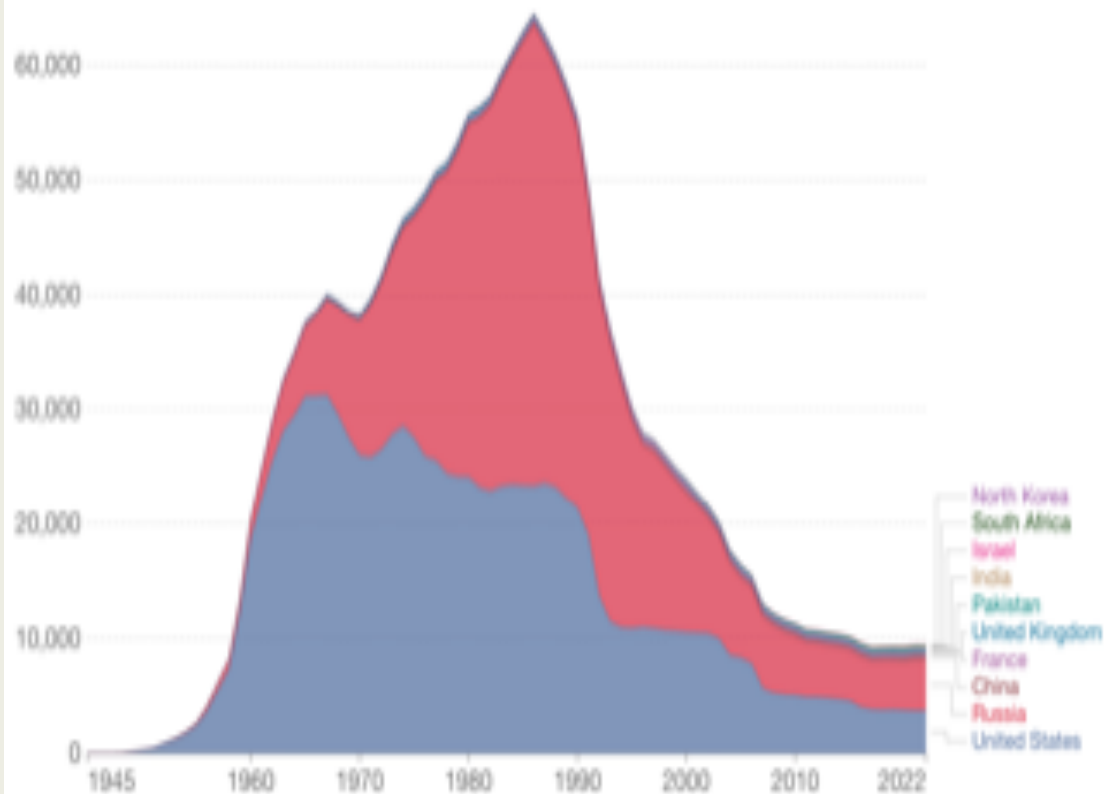
ARMED STATES COMBINED POSSESS MORE THAN 13,000
WHICH ABOUT 9,600 ARE EARMARKED FOR DELIVERY BY
AND THE UNITED STATES POSSESS MORE THAN 90% OF ALL

INCREASING WARHEAD STOCKPILES:
NORTH KOREA, PAKISTAN, RUSSIA, UK
STABLE WARHEAD STOCKPILES: FRANCE, ISRAEL
DECREASING WARHEAD STOCKPILES: US

Estimated nuclear warhead stockpiles, 1945 to 2022

Stockpiles include warheads assigned to military forces, but exclude warheads queued for dismantlement.

Our World
in Data



Source: Federation of American Scientists (2022)

OurWorldInData.org/nuclear-weapons/ - CC BY

Note: The exact number of countries' warheads is secret, and the estimates based on publicly available information, historical records, and occasional leaks. Warheads also vary substantially in their power.

Country	Strategic	Nonstrategic	Nondeployed	Stockpile	Total
Russia	1,588	0	2,889	4,477	5,477
United States	1,644	100	1,964	3,708	5,452
France	280	n.a.	10 ^l	290	290
China	0	?	350	350	350
United Kingdom	120	n.a.	60	180	180
India	0	n.a.	90	90	90
Pakistan	0	n.a.	165	165	165
North Korea	0	n.a.	160	160	160
North Korea	0	n.a.	20	20	20
Total:	~3,632	~100	~5,708	~9,440	~15,440

Category Definitions

**Deployed Strategic: ICBMs, Heavy Bomber Bases,
Submarine based**

**Deployed Nonstrategic: at bases with short-range
delivery systems**

Reserve/Nondeployed: in storage

Military Stockpile: sum of first three categories

**Total Inventory: Military stockpile plus retired
warheads in the queue for dismantlement**

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US Nuclear Warheads

- W78 – Intermediate Yield Strategic ICBM MIRV Warhead
Yield: 335 – 350 kT, Number in service about 200**
- W87 – Intermediate Yield Strategic ICBM MIRV Warhead
Yield: 300 kT, Number in service about 240**
- W76 – Intermediate Yield Strategic ICBM MIRV Warhead
Yield: 100 kT, Number in service about 760**
- W88 – Intermediate Yield Strategic SLBM MIRV Warhead
Yield: 475 kT, Number in service about 380**

US Nuclear Warheads (cont'd)

W80 – Intermediate Yield Strategic Cruise Missile Warhead

Yield: 5, 150 kT, Number in service about 200

B61 – Intermediate Yield Strategic and Tactical Thermonuclear Bomb

Yield: 0.3, 1.5, 60, 170 kT, Number in service about 50

B83 – High Yield Strategic Thermonuclear Bomb

Yield: Low kT to 1200 kT, Number in service about 50

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Missile Defense Issues

In class 9, Prof. Barletta discussed a number of aspects of defense systems against nuclear weapons.

Most of the missile defense systems that are deployed are directed toward ICBMs. This is because at least much of their trajectory can be predicted and interception is at least plausible.

Even so, the technical aspects of missile defense are very challenging.

Missile Defense Issues (cont'd)

One relevant issue that has long been considered is whether effective missile defense systems would make the world safer or less safe.

Questions for Discussion

Why do you think nuclear defense systems are apparently so ineffective?

Should nuclear defense systems be abandoned?

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Limited Test Ban Treaty –

- August 5, 1963
- United States, the United Kingdom, and the Soviet Union
- Prohibits all nuclear tests except those underground

Threshold Test Ban Treaty –

- July 1974
- United States, the United Kingdom, and the Soviet Union
- Prohibits all nuclear tests exceeding 150 kT

New START Treaty

A treaty between the USA and Russia to place verifiable limits on deployed intercontinental-range nuclear weapons.

The treaty entered into force in 2011.

Both the USA and Russia met the limits imposed by the treaty by the deadline of 2018.

The USA and Russia agreed in 2021 to extend the treaty until 2026.

A legally binding instrument to prohibit nuclear weapons, leading to their total elimination.

Adopted by United Nations in July 2017 and entered into force in January 2021.

Signed by 86 nations, the main exceptions being the 9 nations that possess nuclear weapons.

Question for Discussion

How should the world try to really implement the Treaty on the Prohibition of Nuclear Weapons?

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Upkeep and Upgrades of Nuclear Weapons

Nuclear Weapons do require regular upkeep to remain effective. In particular, tritium has a half-life of about 12 years and must be replaced regularly.

Tritium is produced in nuclear reactors built for that purpose.

The USA recently launched a program to upgrade and replace much of its nuclear arsenal. The cost is estimated to be more than \$600B over the next decade. The Biden administration has this under review.

Some Thoughts on Nuclear Reactors

Nuclear Reactors pose challenges with regard to safety and their possible use to facilitate nuclear weapons production, but they certainly do not represent the existential threat that nuclear weapons do.

Besides carbon-based fuels, the only system the world currently has to produce electricity that can be turned on or off at will is based on nuclear reactors.

Therefore if we do not want to continue to use nuclear reactors, we must either implement another system that can be turned on or off at will (hydrogen fuel?) or greatly improve electricity storage systems.

The Ukraine Situation

Obviously, it is a terrible situation independent of the danger of nuclear war.

The possibility of the use of nuclear weapons and escalation to WWIII is truly frightening to the world.

It is a very complicated set of issues for the US and NATO to handle.

Questions for Discussion

President Biden has declined to enforce a no-fly zone over Ukraine. Do you agree with this decision?

What other decisions are likely influenced by the danger of the use of nuclear weapons?

Suggested Takeaways

The existence and deployment of huge numbers of nuclear weapons poses by far the most serious existential threat to humanity and to the Earth.

We must work hard and consistently to convince the public and world leaders that all nuclear weapons must be eliminated.