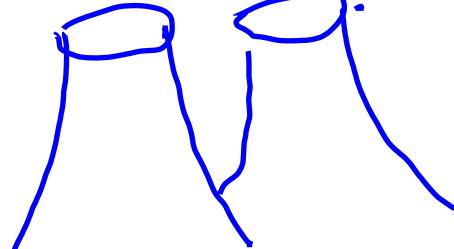


What do you think of when
you talk about nuclear
technology?

3 clouds radioactive?



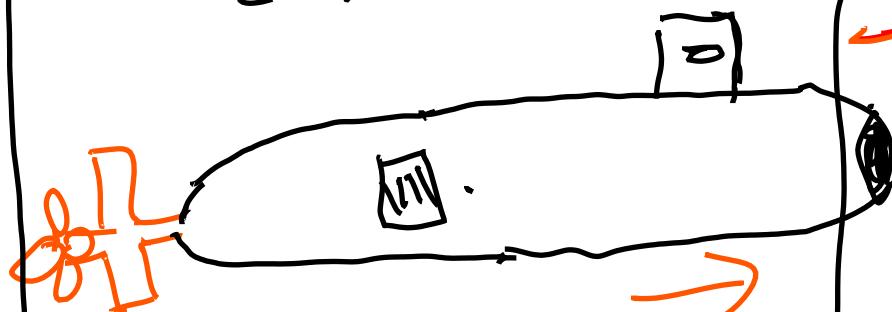
Picture 1



Picture 2

- Gen Y
- Red Alert 2
 - Yuri's Range
 - C & C
 - ↳ Generals
 - ↳ Tiberium Wars

Cold War



Picture 3

- Starcraft II
- Dune Part II
 - ↳ Atomics

))))

Sonar

What's in the cold war?

- Nuclear tests

↳ USA

↳ Castle Bravo

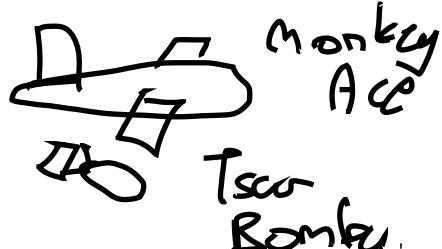
↳ Ivy Mike

↳ ~~Operation~~ Baker (Bikini Atoll)

↳ Russia

↳ Tsar Bomba.

Bloons TDB.



↳ China

↳ India

↳ France

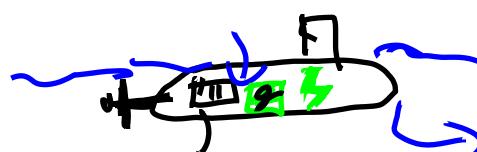
↳ UK.

Submarines

↳ reactors

↳ mobile missile sites (SLBMs)

U-boats.



Petrol/Diesel

above
water
speed >

Underwater
speed.

Nuclear Submarine mias.

U-571

↳ Hunt for the Red October

↳ Crimson Tide

Pop culture

- Nuclear is dangerous

- Nuclear → scary

- Nuclear is exotic

Nuclear accidents.

↳ Three Mile Island

↳ Chernobyl

↳ Fukushima Daiichi?

↳ check spelling

Nuclear safety.

For next lecture

① Accidents + pop culture

↳ BBC's Chernobyl.

② Nuclear security & cold war
arms race

③ Outline of technical stuff.

Cold War

1945

2x atomic bombs
plane

1945 - 1949 " US → major nuclear power

1949

USSR → explodes 1st atomic bomb.



drop bombs on
cities

Counter-force
drop bombs to
kill opponents nuclear
capability



Red Alert
Red Alert 2



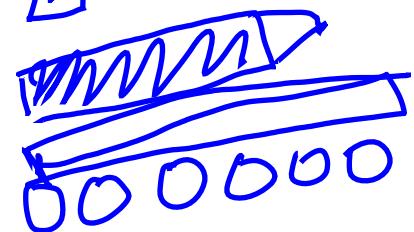
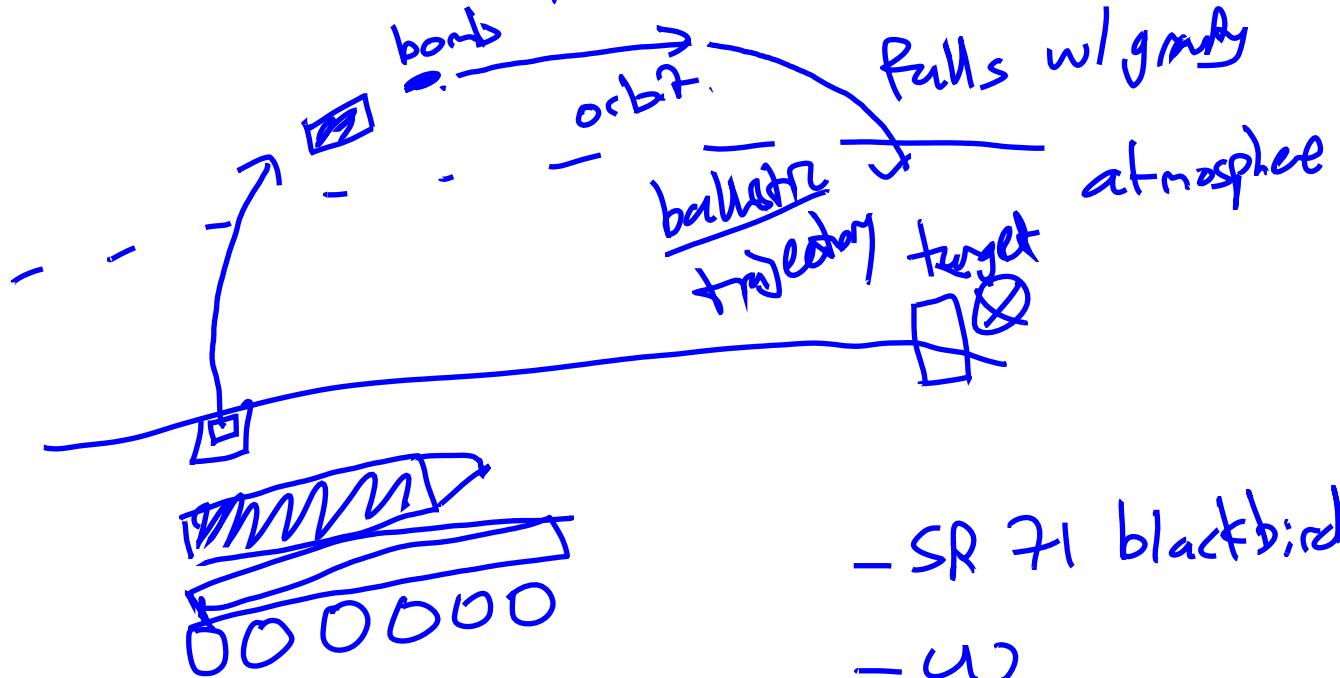
ICBMs



Intercontinental

Ballistic
missile

(ICBMs)



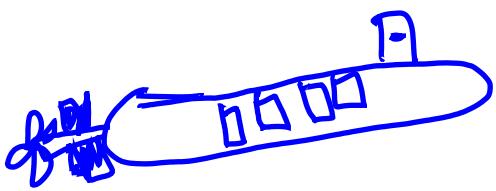
- SR 71 blackbird
- U2

mobile ICBM

nuclear
deterrence

mutually
assured
destruction

MAP



Submarine launched
ballistic missiles
(SLBMs)

accuracy \rightarrow a

~~big~~ problem

for SLBMs.

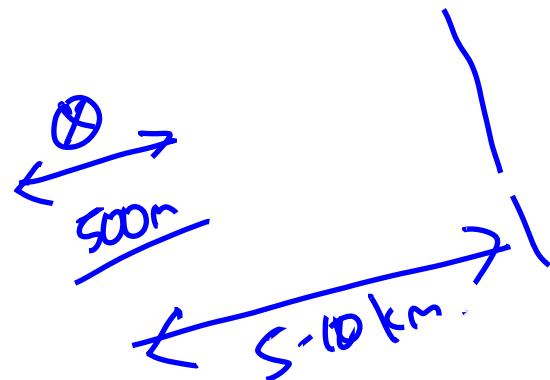
① stay underwater very long



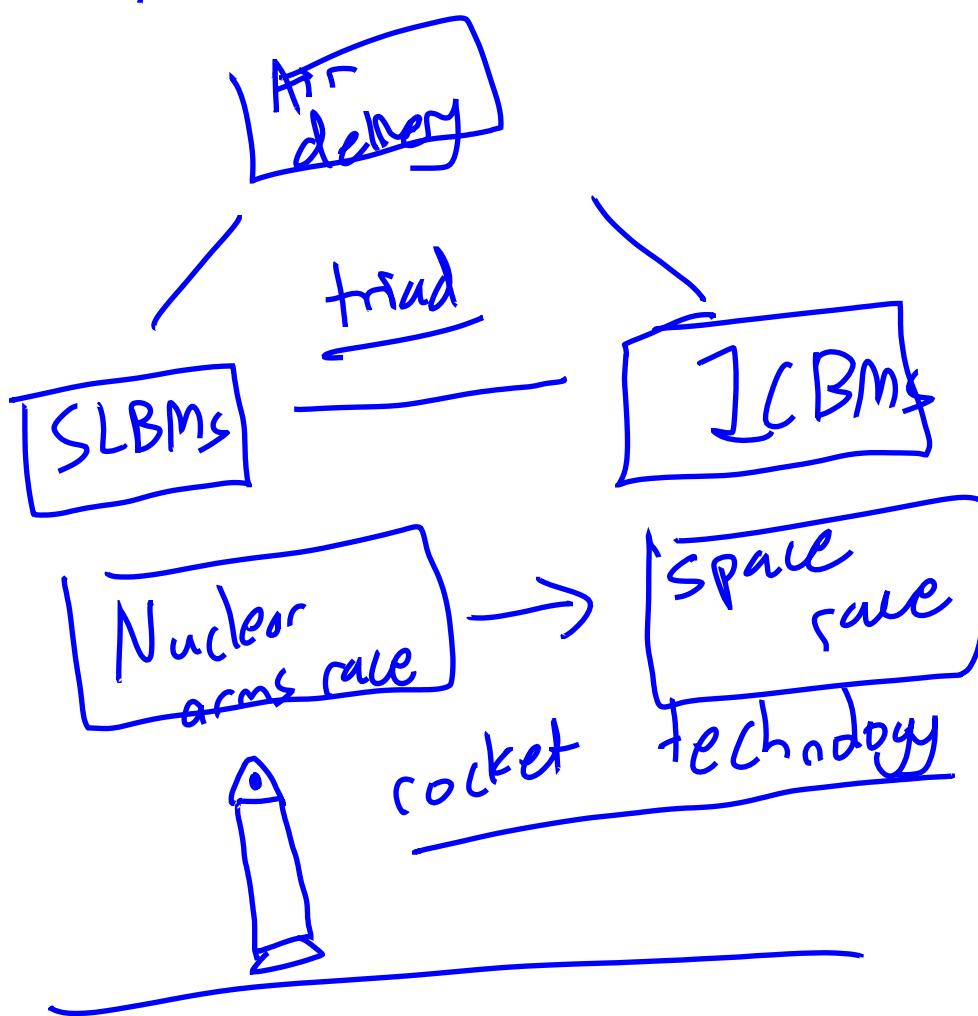
② Big big explosions,
much bigger than Hiroshima.



↑
tech.



nuclear triad.



- GPS
- Lunar explorations
- Communications networks → SpaceX
- Telescopes → Hubble space telescope
- Advanced science & technology

Lecture 3

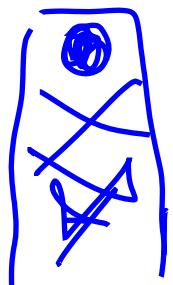
Manhattan project.

1942

* Oppenheimer
cooked

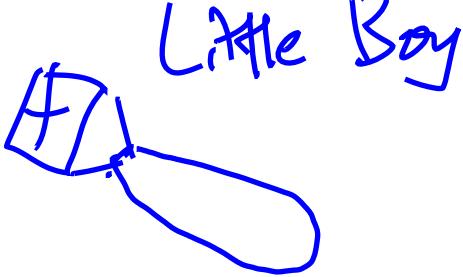
Nazi Germany

trinity



Pu-239

New Mexico



Little Boy

Hiroshima
Bomb

U-235



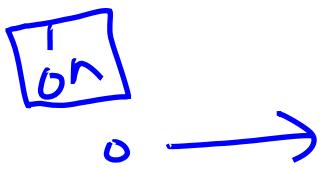
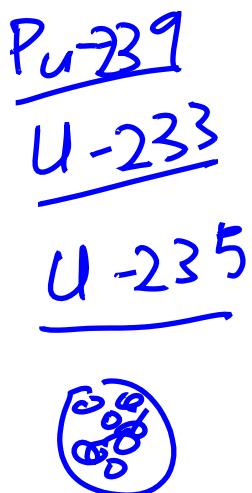
Fat man

Nagasaki:

Pu-239

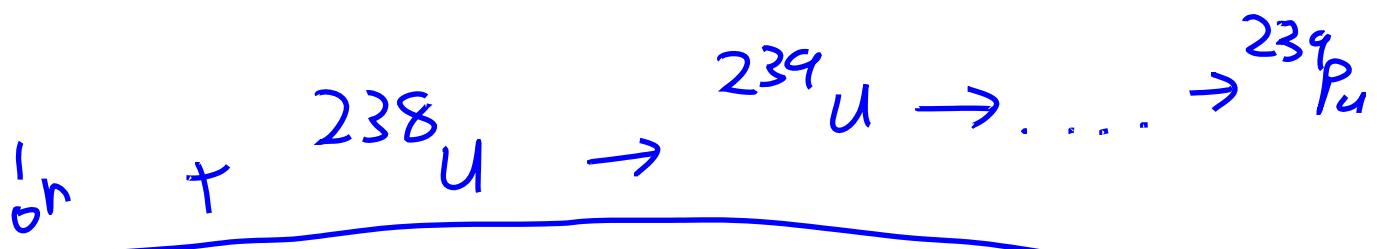
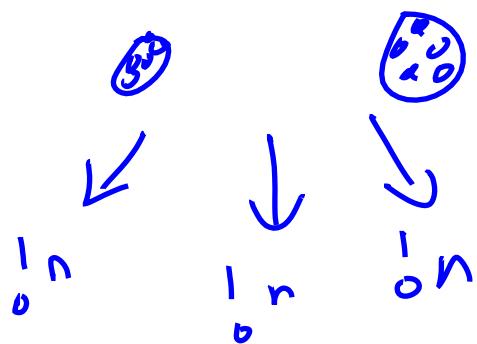
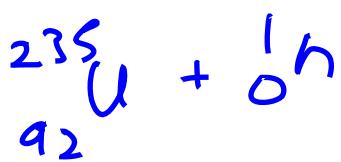
Concepts w/ as little mathematics as possible

Physics



↓ fission

A (total no. of neutrons + protons)
 $\frac{235}{92} U$
Z (proton number)



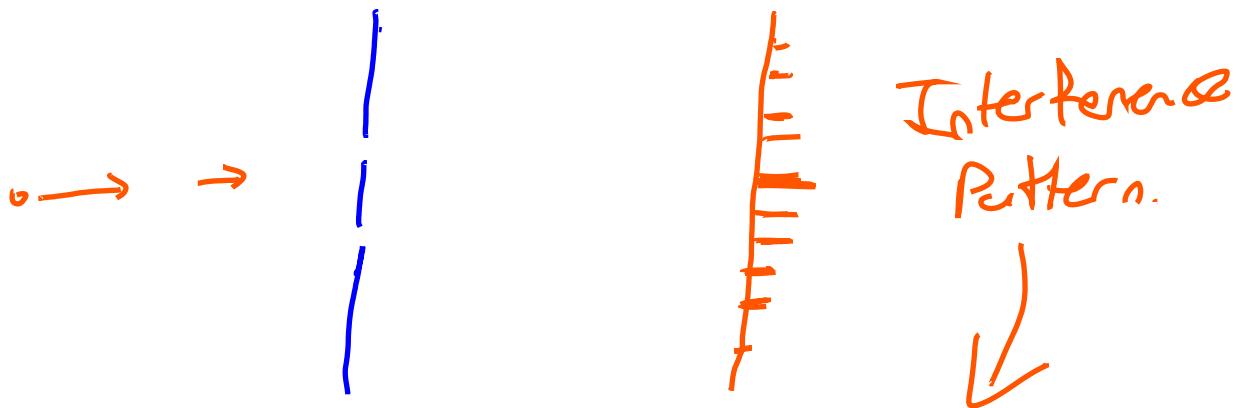
Quantum Physics

key Idea of Quantum Physics.

matter (protons, neutrons, electrons)

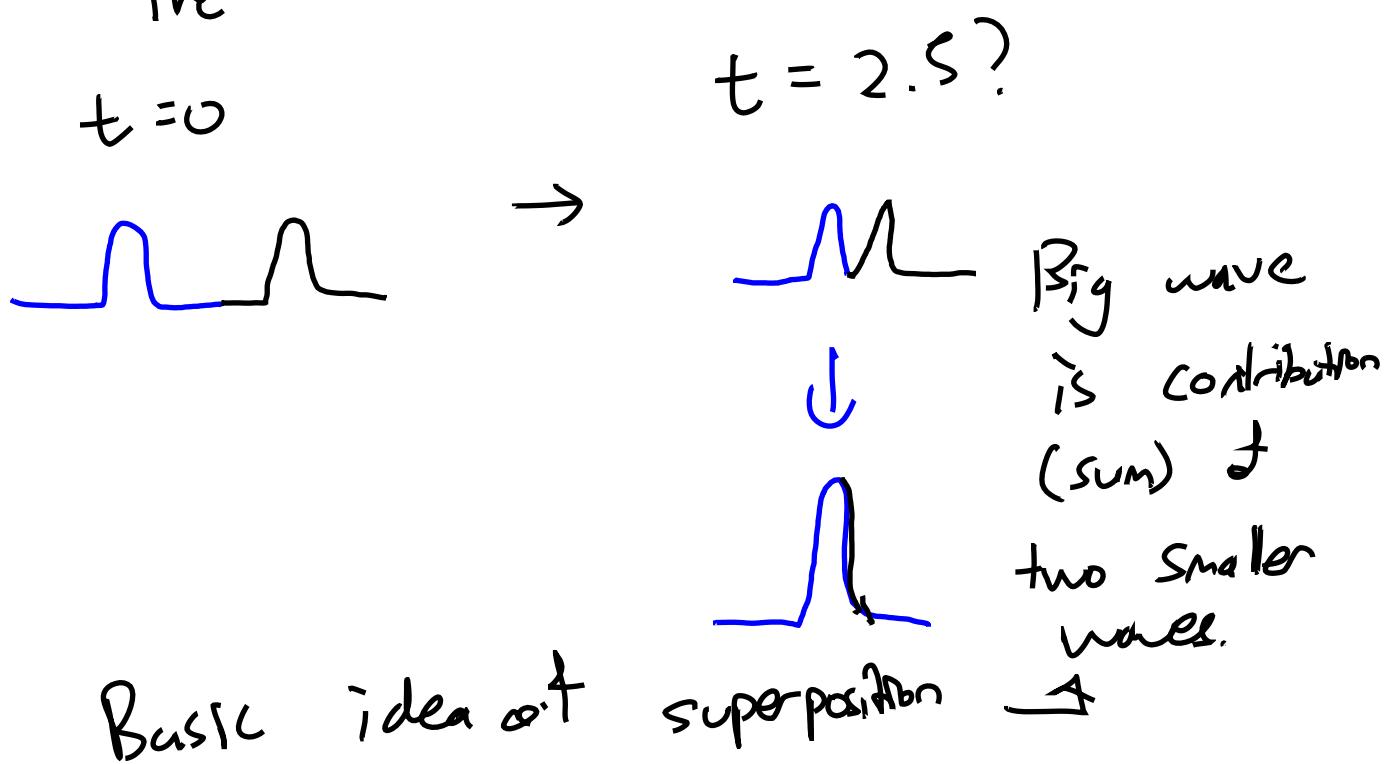
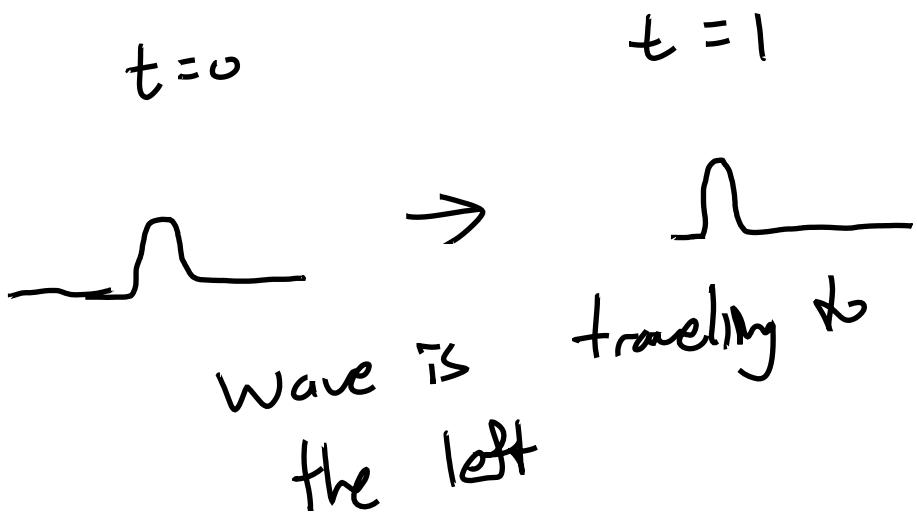
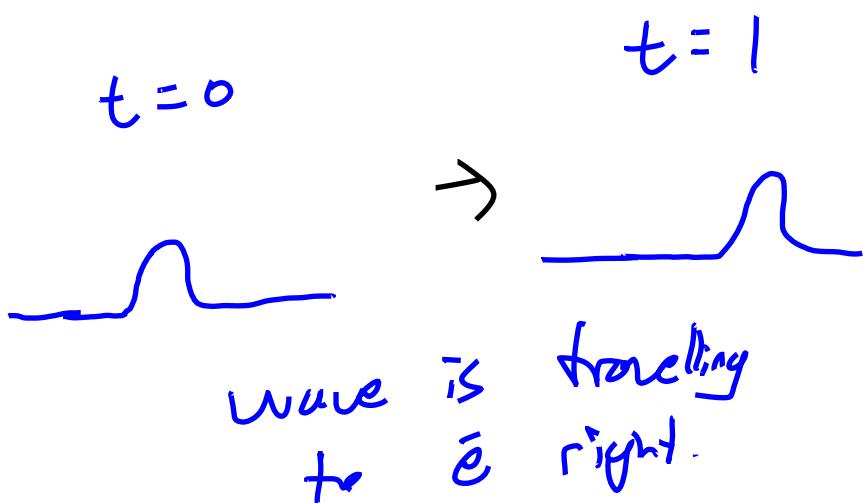
• particle "billiard balls."
— wave

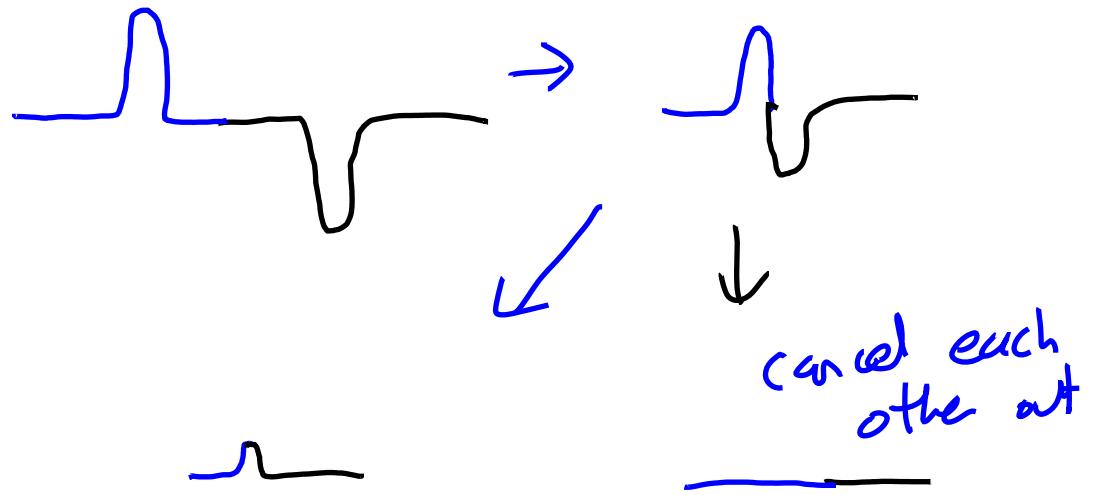
Young's Double slit experiment.



Light \rightarrow electromagnetic wave

Waves & Superposition





① when waves build on each other → constructive interference

② when waves cancel each other out → destructive interference.

