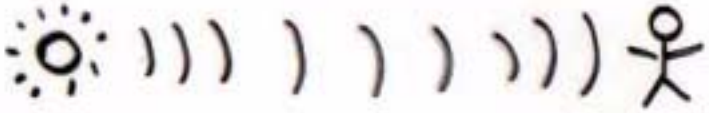
☐ WAVES AND OSCILLATIONS

EXAMPLES ... ALL THE SAME IDEA.

SOUND: 

VIBRATIONS IN THE AIR.
BRING ENERGY TO YOU (INFORMATION)

LIGHT: 

OSCILATIONS OF AN ELECTRIC FIELD BRING ENERGY + MOMENTUM.

WATER: 

WATER WAVES MAKE YOU GO UP & DOWN GIVE YOU ENERGY.

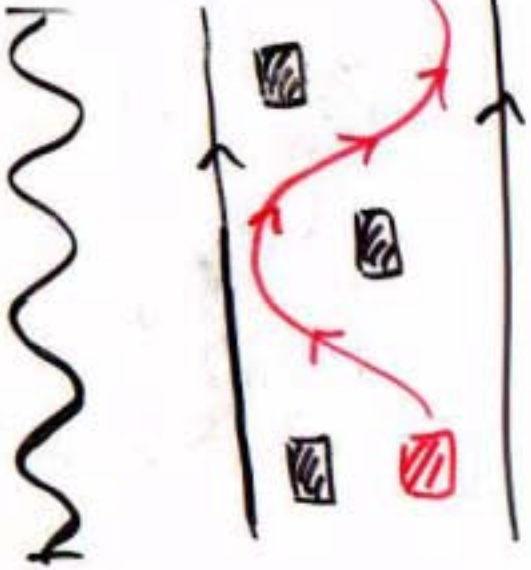
DOES AIR, (ELEC. FIELD) OR WATER MOVE MUCH? NO - DISTURBANCE TRAVELS.

NOT THE "WATER" "AIR" "? ELECTRICITY"

☐ TRANSVERSE AND LONGITUDINAL:

"TO THE SIDE"

"ALONG THE MOTION"



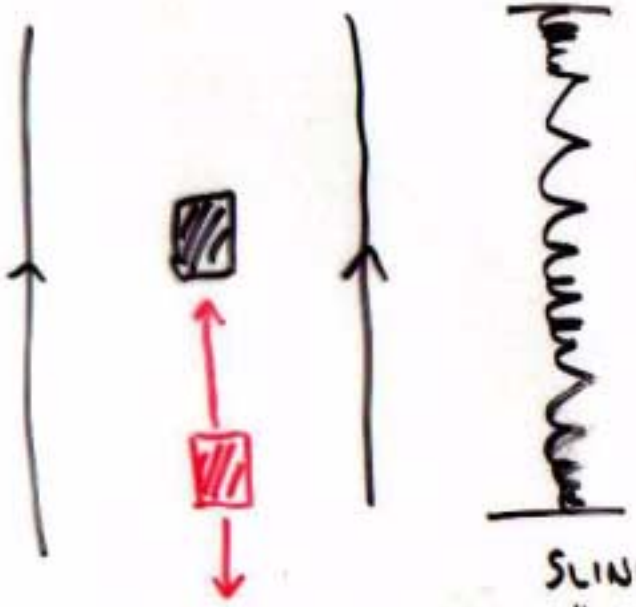
SLINKY WAVING "TO THE SIDE"

TRANSVERSE IS A CAR WEAVING IN + OUT OF TRAFFIC

WEAVES TO THE SIDES

WATER, LIGHT

ANALOGY



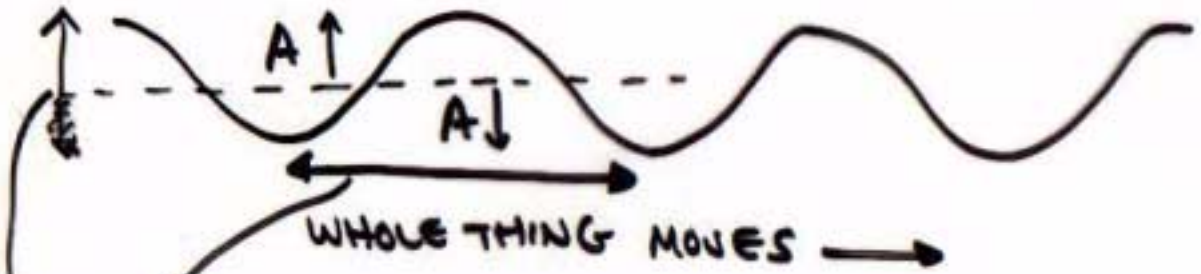
LONGITUDINAL IS TAILGATING + "BACKING OFF"

SOUND

SLINKY "BUNCHING UP" + "STRETCHING OUT"

☐ How to describe a wave

TRANSVERSE WAVE ON A STRING.

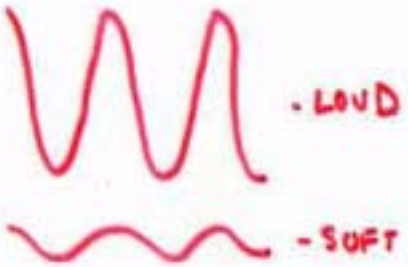


- "REGULAR"
"SINE-WAVE"

"How BIG IS THE WAVE"?

AMPLITUDE (MAKES THE WAVE "LOUD" OR "SOFT")

A

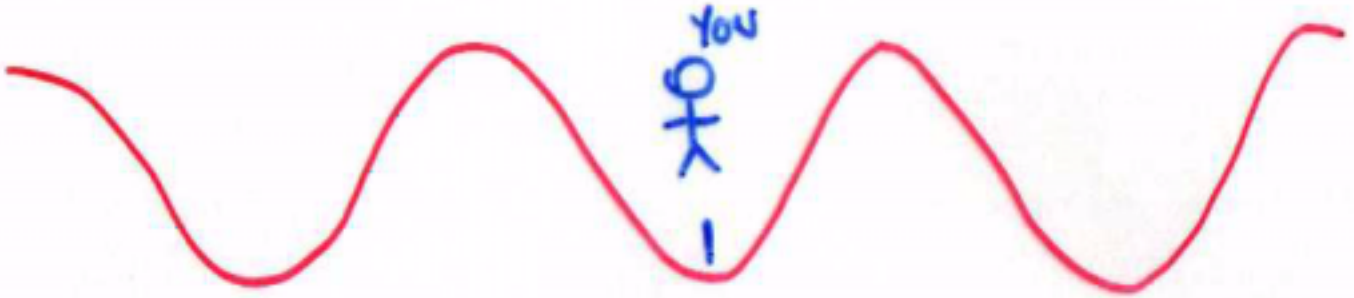


"How FAR FROM PEAK-TO-PEAK, OR VALLEY-TO-VALLEY'

WAVELENGTH "SIZE" OF THE WAVE ALONG ITS MOTION.

λ

☐ How to describe a wave



INITIAL STATE OF WAVE.

How MUCH TIME DOES IT TAKE FOR THE WAVE TO GO PEAK-TO-PEAK?

PERIOD OF THE WAVE. T SECONDS

FREQUENCY TELLS How MANY VALLEYS PASS BY YOU PER SECOND.

f

IF A VALLEY COMES BY EVERY T SECONDS,

$$\boxed{f = \frac{1}{T}}$$ VALLEYS COME BY IN 1 SEC

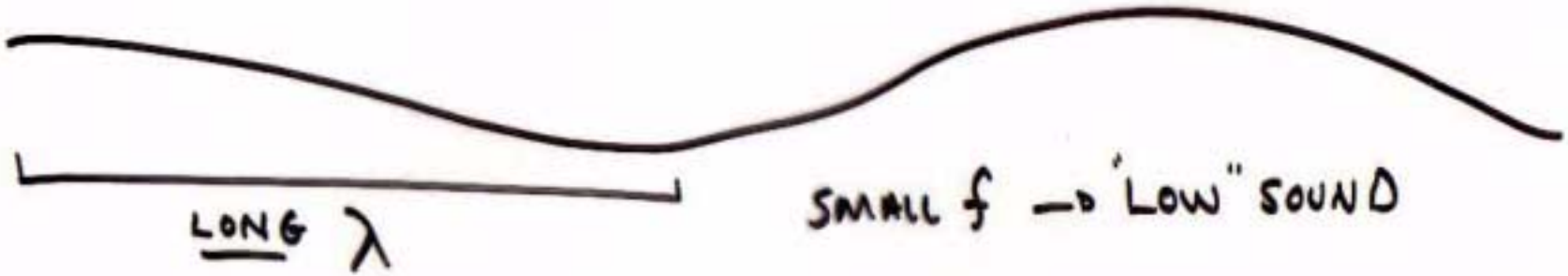
☐ FREQUENCY + SOUND

SPEED OF SOUND $\approx 300 \frac{\text{METERS}}{\text{SEC}}$: CONSTANT

- PRETTY MUCH! -

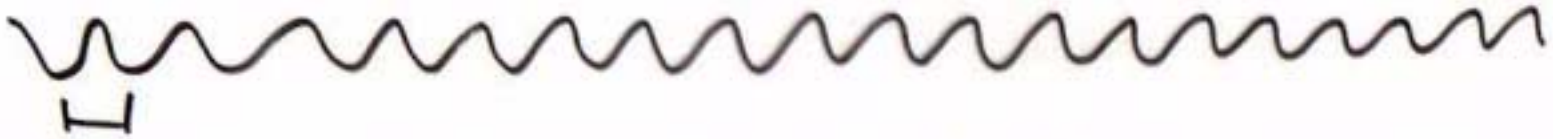
f TELLS YOU "HOW HIGH IS THE PITCH"

f_{LOW} : $V = \lambda \cdot f \rightarrow \lambda = \frac{V}{f}$ IF f IS SMALL, λ IS BIG.



LONG λ

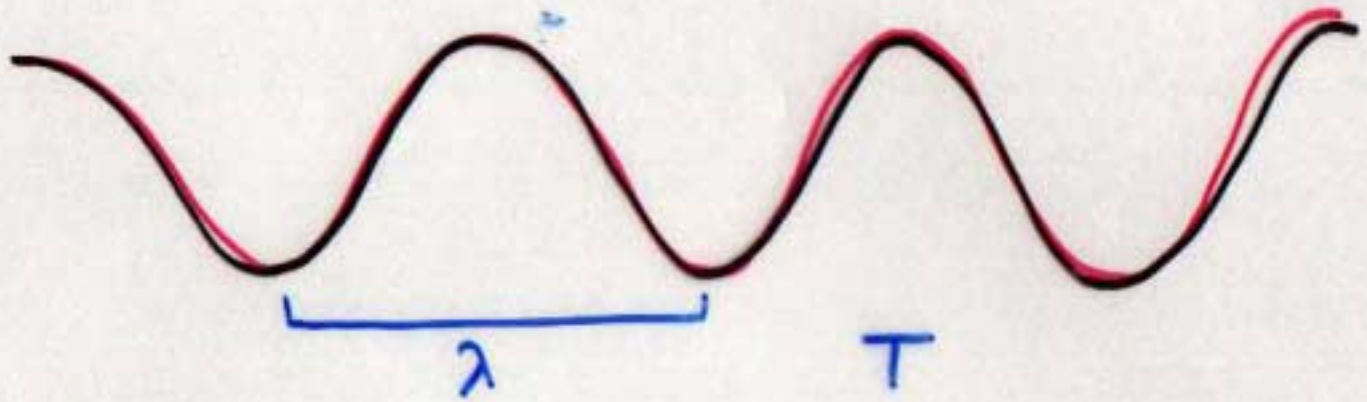
SMALL $f \rightarrow$ "LOW" SOUND



λ TINY

BIG f "HIGH" SOUND

☐ SPEED OF A WAVE



THE WAVE MOVES λ METERS IN A TIME T

λ: VALLEY-VALLEY DISTANCE

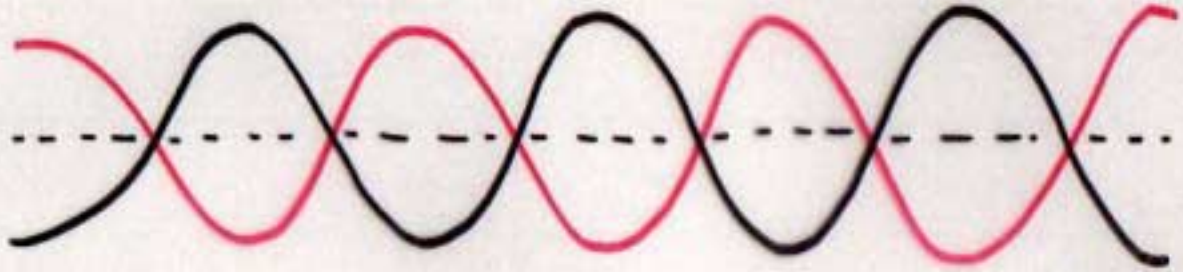
T: VALLEY-VALLEY TIME

IF YOU KNOW WAVE-LENGTH AND PERIOD, YOU KNOW SPEED.

$$V = \frac{\text{DIST}}{\text{TIME}} = \frac{\lambda}{T} = \lambda \cdot \frac{1}{T} = \boxed{\lambda \cdot f}$$

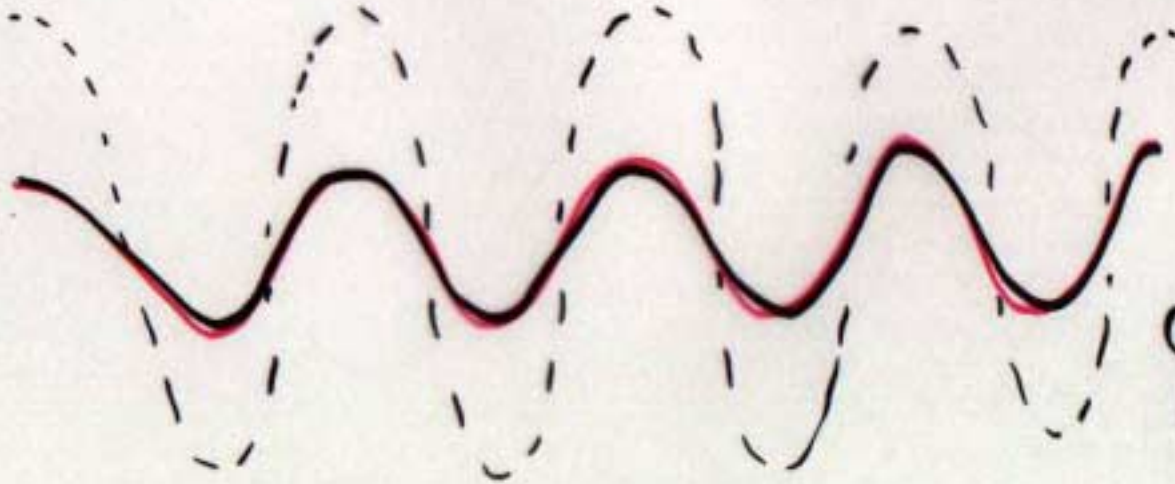
☐ WAVES AND SUPERPOSITION

ANY TWO WAVES CAN JUST "BE PUT "ON TOP" OF EACH OTHER (KIND OF LIKE VECTORS)



"ADD UP" TO ZERO

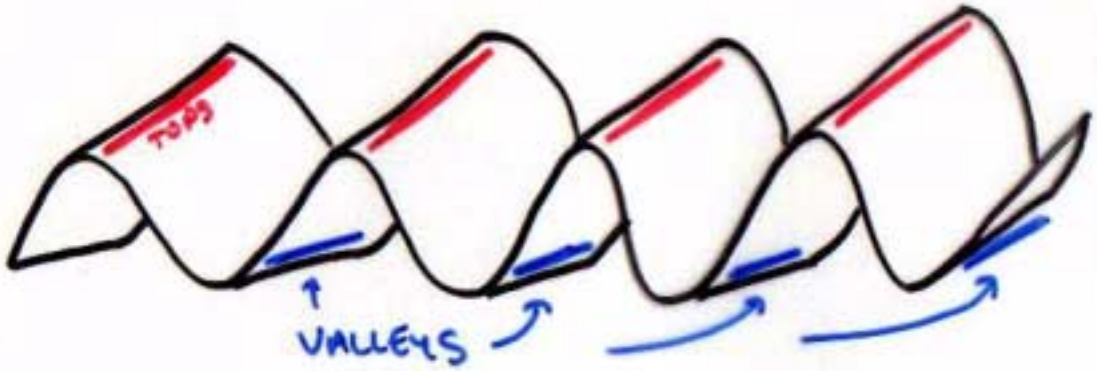
"CANCEL"
"DESTRUCTIVE INTERFERENCE"

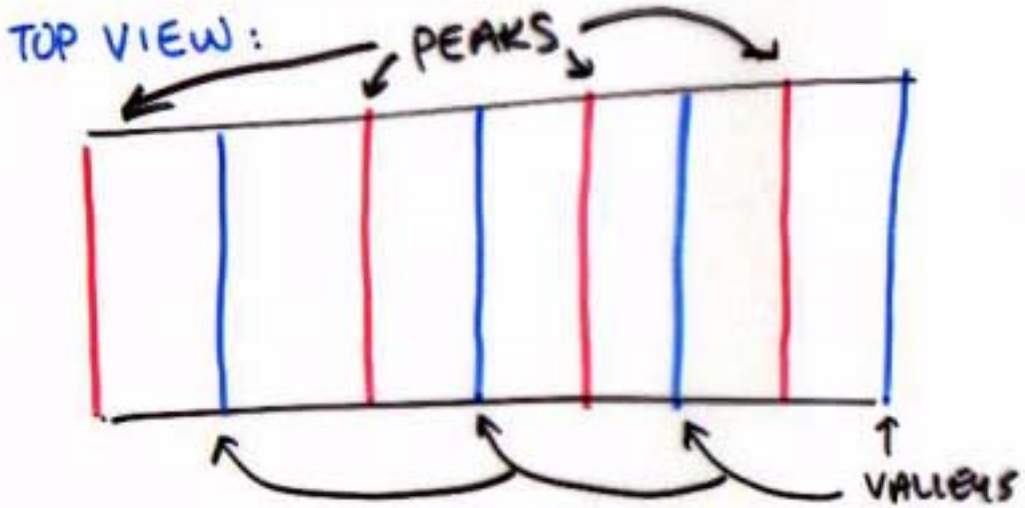


"ADD UP TO TWICE AS BIG"
CONSTRUCTIVE INTERFERENCE

WAVES CAN CANCEL OR ADD UP

☐ WHAT DOES A WAVE LOOK LIKE?



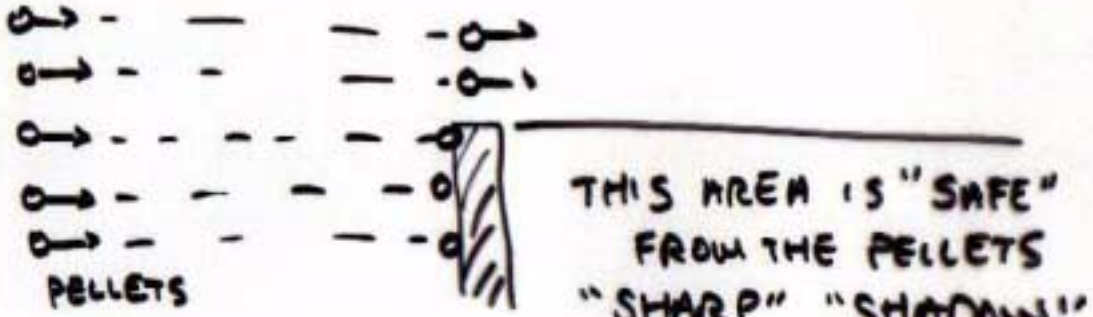


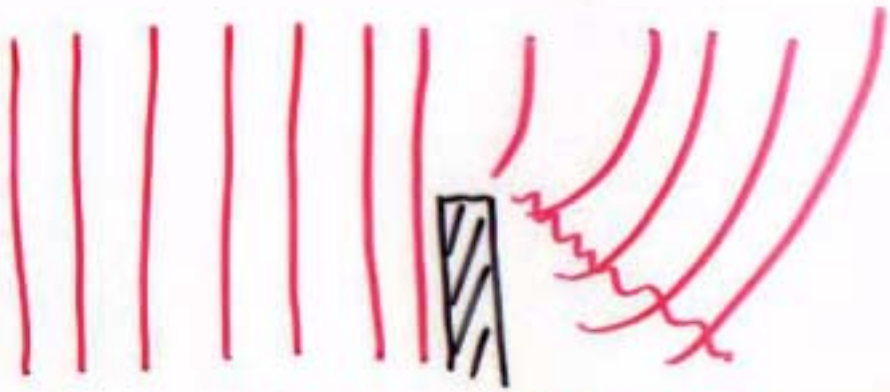
JUST A WAY OF VISUALIZING THE WAVES.

☐ STANDING WAVE

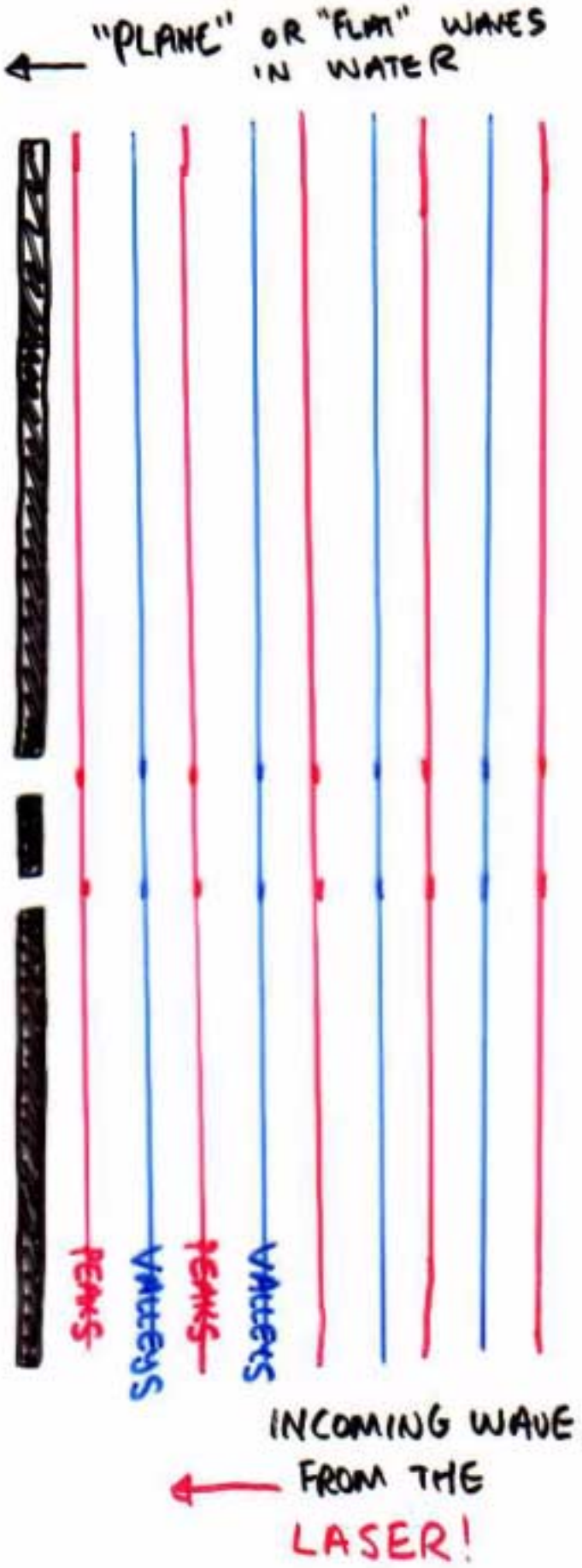
☐ DIFFRACTION:

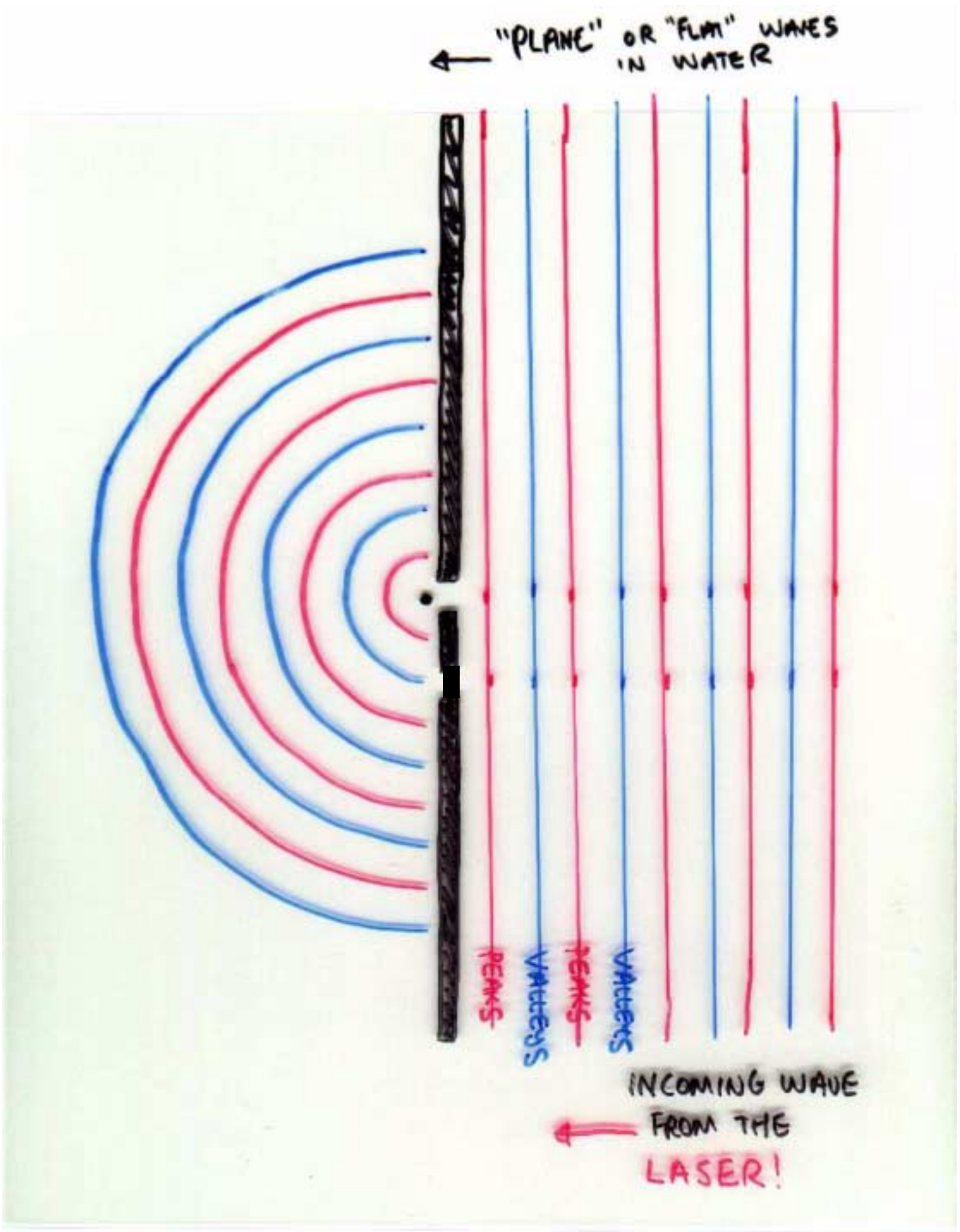
ONLY WAVES CAN DO IT... GO "AROUND" OBSTACLES:





CONTEXT OF THE [redacted]
LAB EXPERIMENT:
"HOW DOES LIGHT GO AROUND A CORNER?"


"PLANE" OR "FLAT" WAVES IN WATER
PEAKS
VALLEYS
PEAKS
VALLEYS
INCOMING WAVE FROM THE LASER!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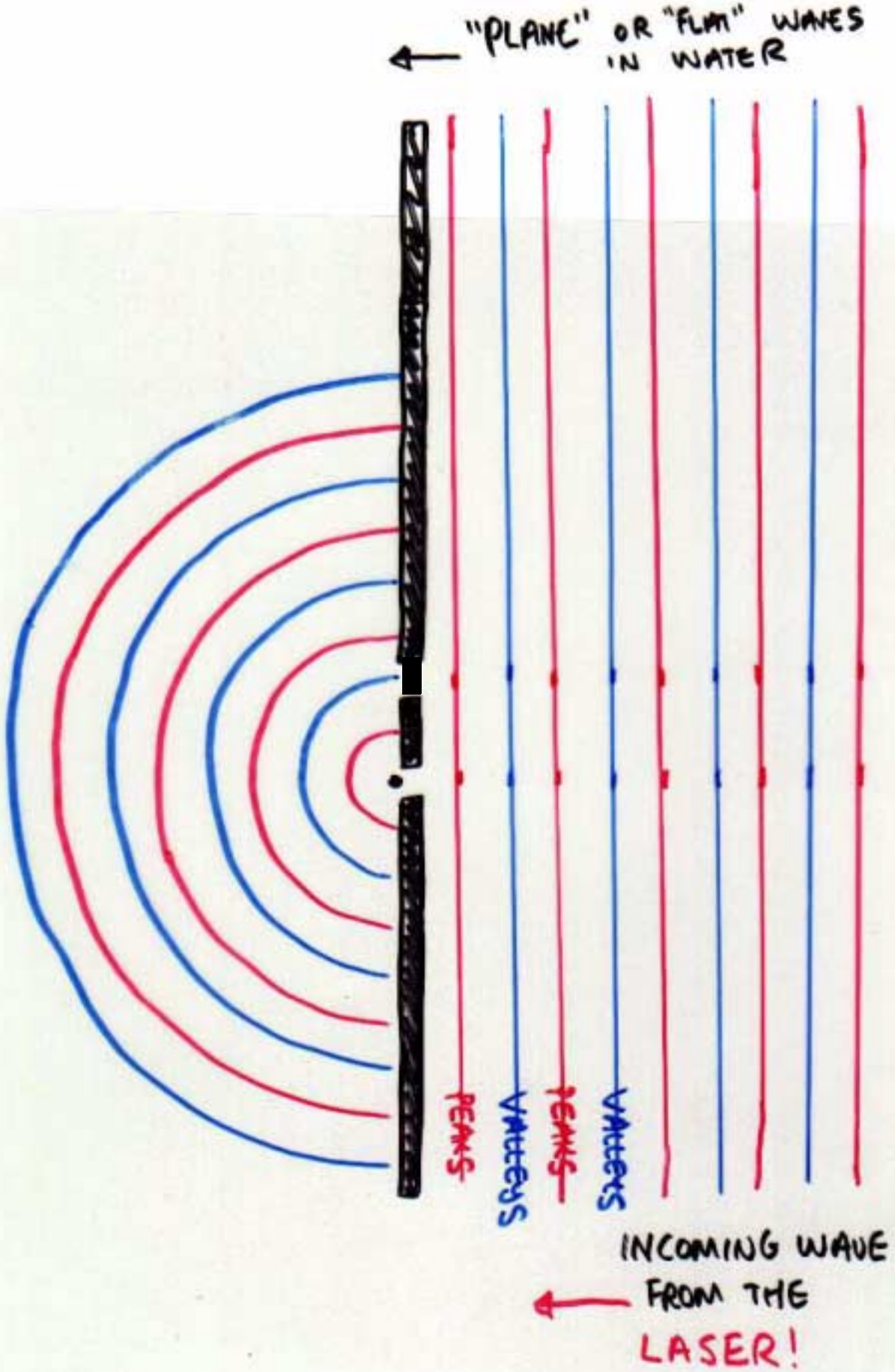
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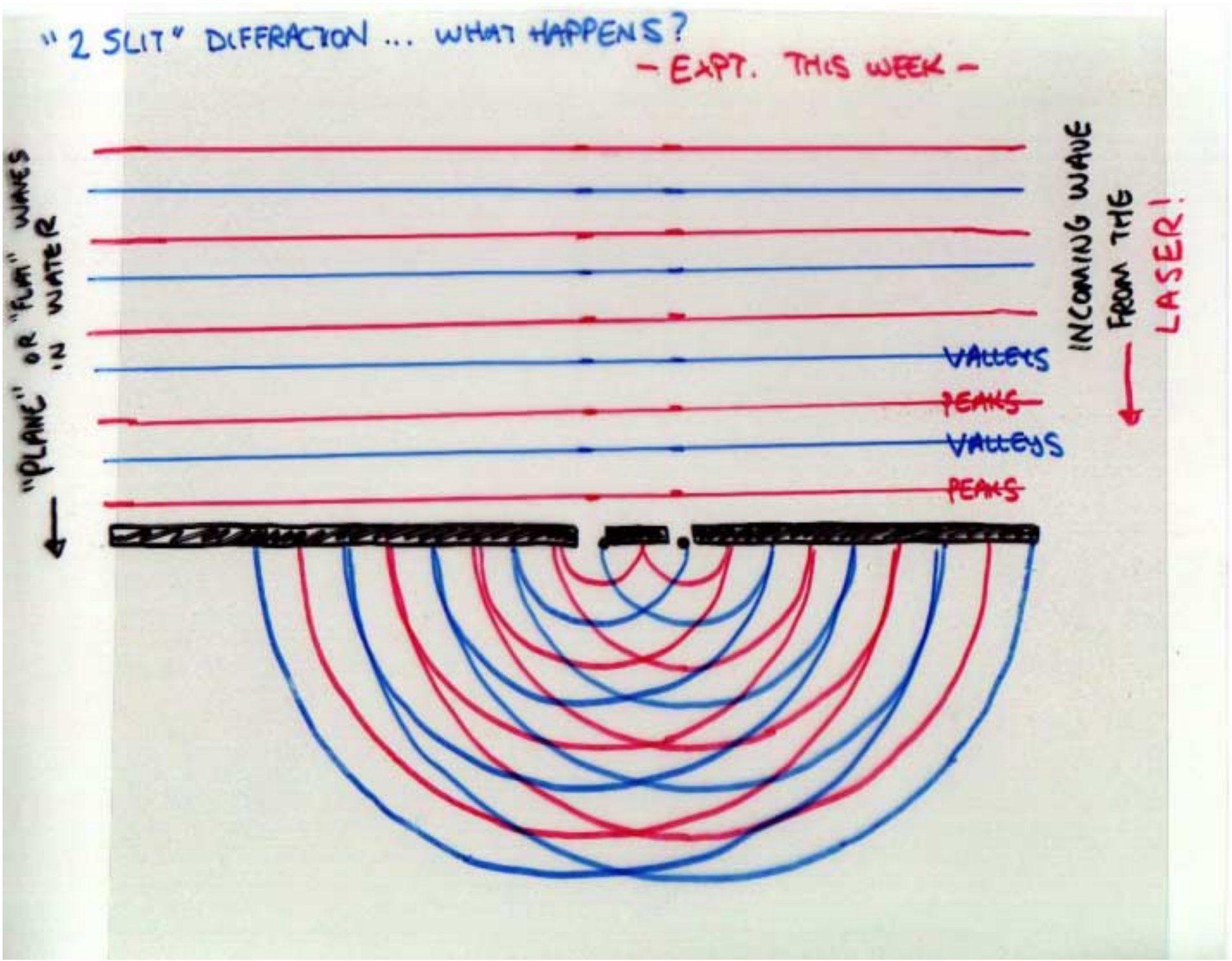
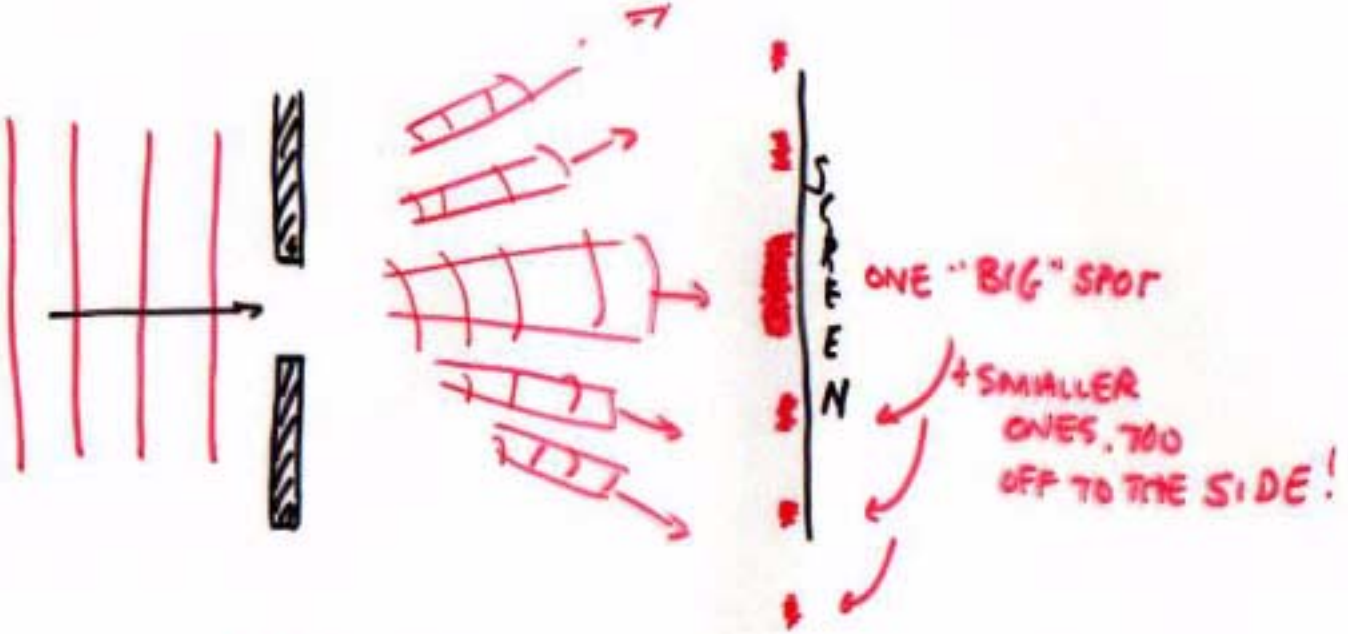
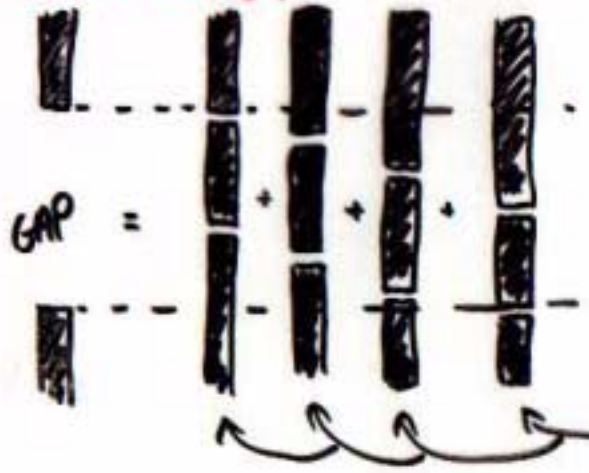

"2 SLIT" DIFFRACTION ... WHAT HAPPENS?
- EXPT. THIS WEEK -
"PLANE" OR "FLAT" WAVES IN WATER
INCOMING WAVE FROM THE LASER!
VALLEYS
PEAKS
VALLEYS
PEAKS

☐ So, WHY DO WE GET STRIPES WITH JUST ONE SLIT?!?



SUPERPOSITION IS THE ANSWER:

ON BIG SLIT ACTS LIKE A BUNCH OF SMALLER ONES!



EACH OF THE "PAIRS" OF SLITS MAKES STRIPES.
"ADD UP" THE STRIPES FROM EACH OF THESE, TO GET RESPONSE OF BIG SLIT.