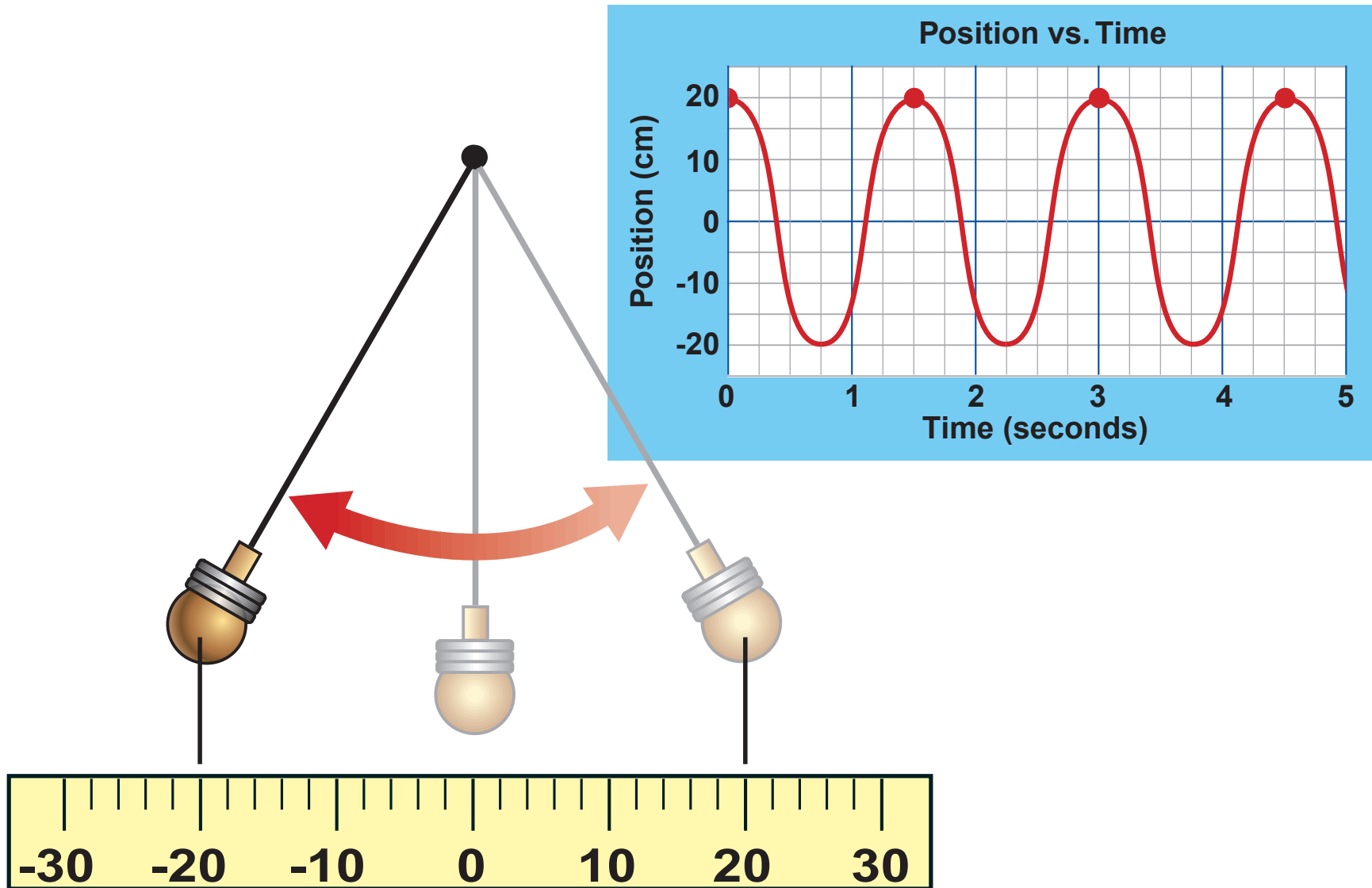


Harmonic Motion Graphs



Period and Frequency

Period and frequency

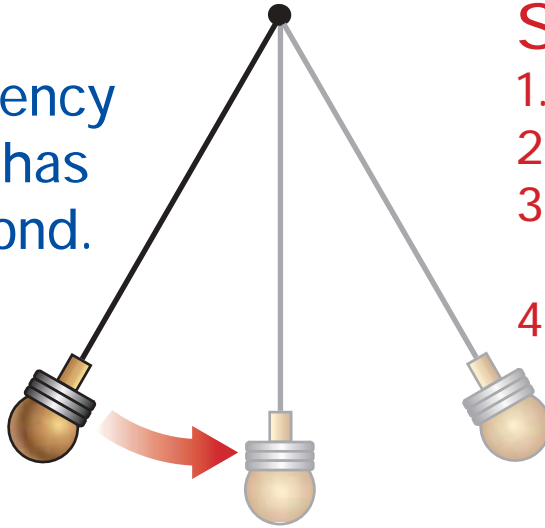
Period (seconds) ——— $T = \frac{1}{f}$

Frequency (hertz) ——— f

Frequency (hertz) ——— $f = \frac{1}{T}$ ——— Period (seconds)

Example:

Calculate the frequency of a pendulum that has a period of 1/4 second.



Solution:

1. You are asked for frequency.
2. You are given the period.
3. The relationship you need is:
 $f = 1/T$
4. Plug in numbers.

$$f = 1/(0.25 \text{ sec}) = 4 \text{ Hz}$$

Period and Frequency

Period and frequency

Period (seconds) — $T = \frac{1}{F}$

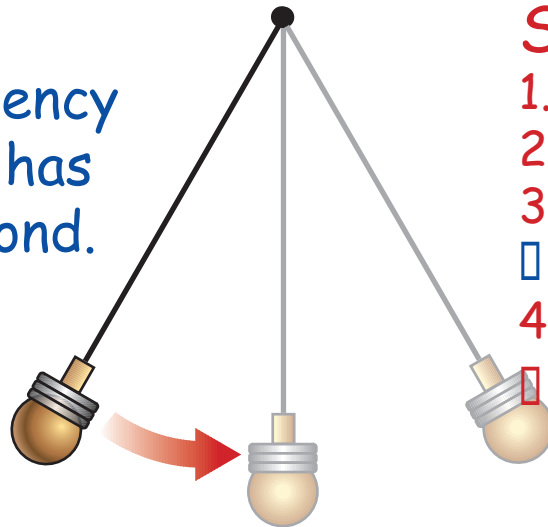
Frequency (hertz) —

Frequency (hertz) — $F = \frac{1}{T}$

Period (seconds) —

Example:

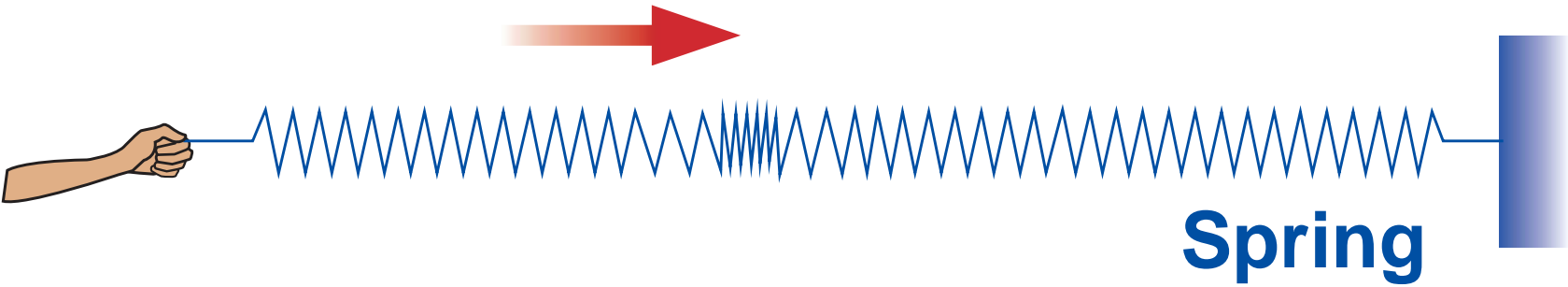
Calculate the frequency of a pendulum that has a period of 1/4 second.



Solution:

1. You are asked for frequency.
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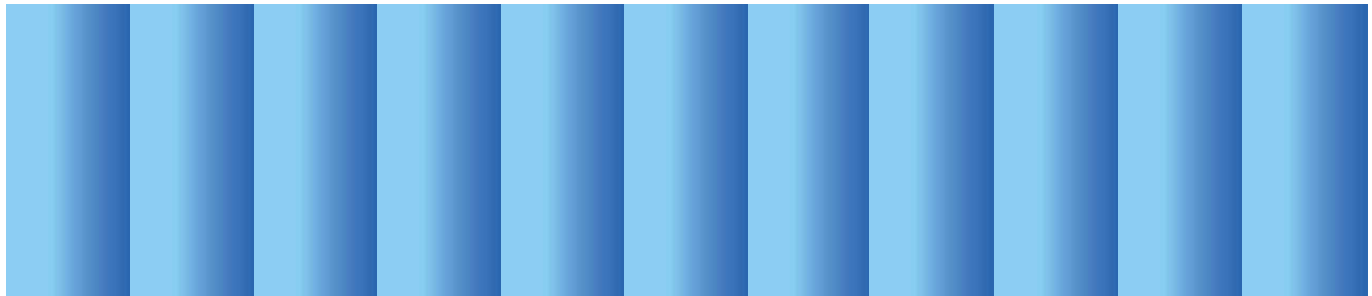
Longitudinal Waves



Oscillation



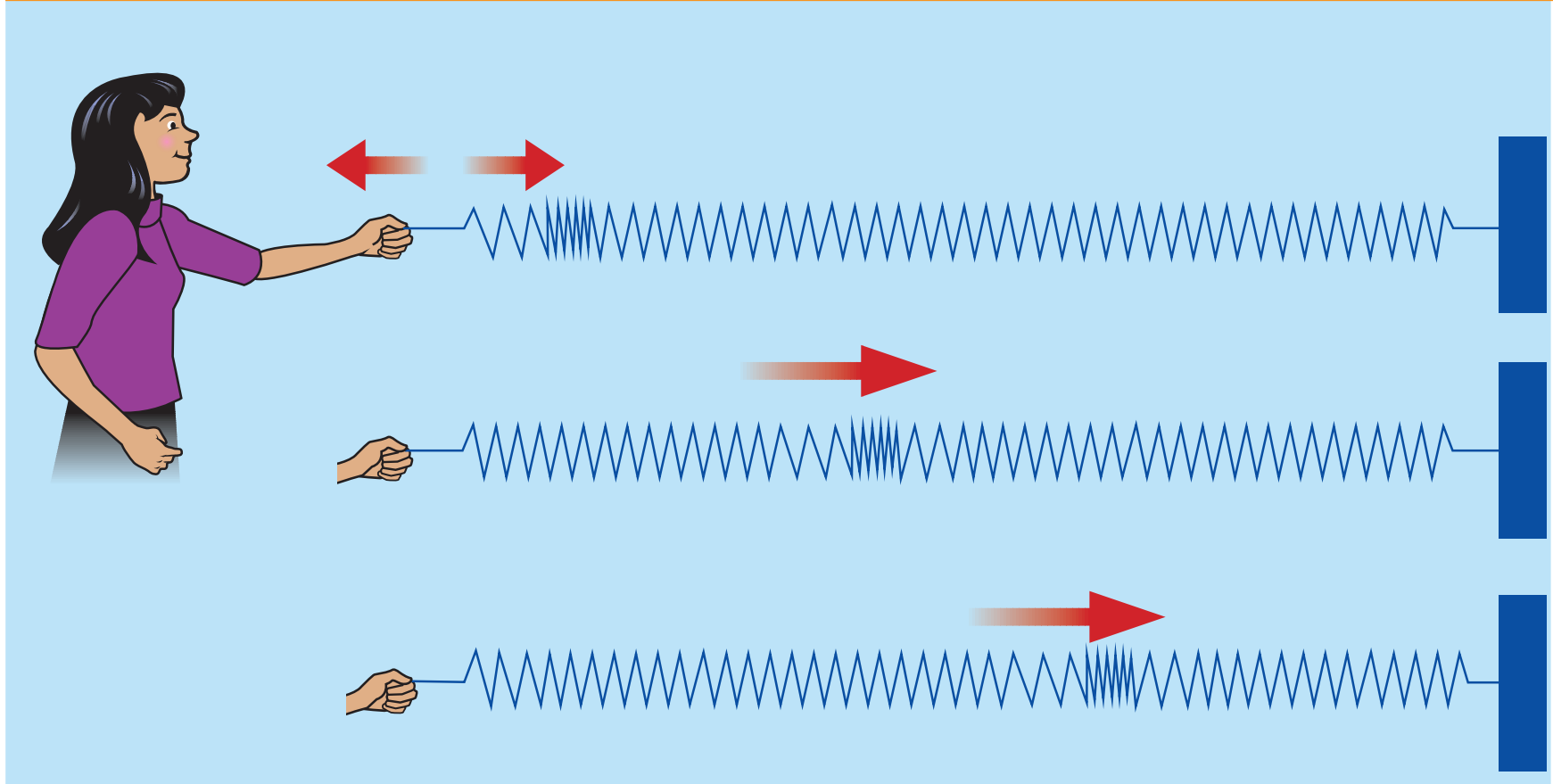
Motion



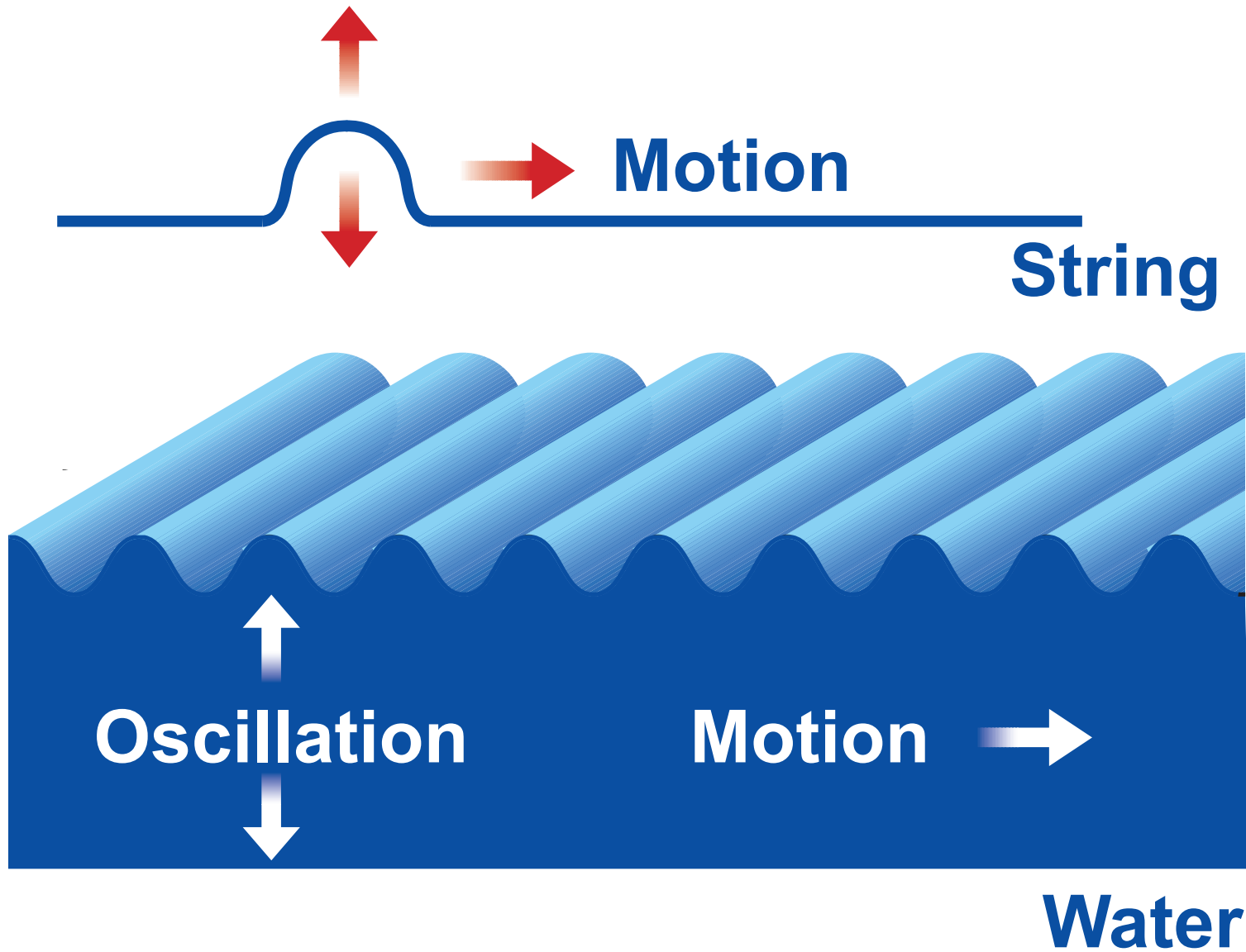
Sound

Longitudinal Waves

Making a longitudinal wave pulse

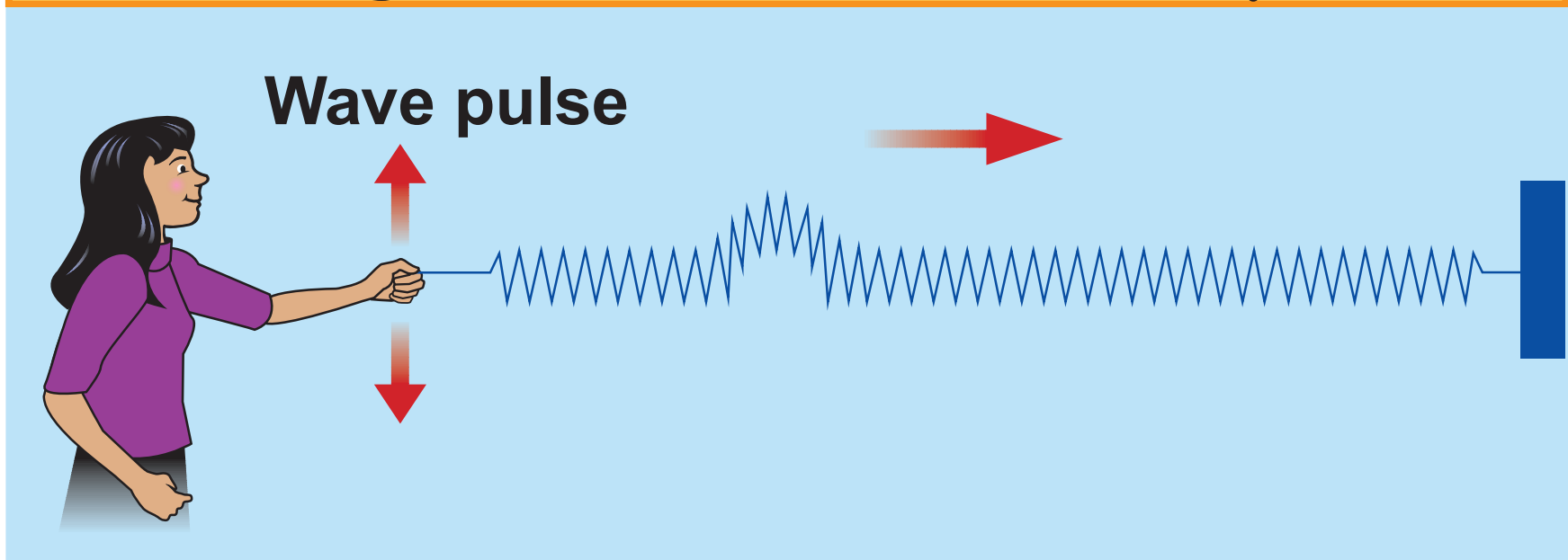


Transverse Waves



Transverse Waves

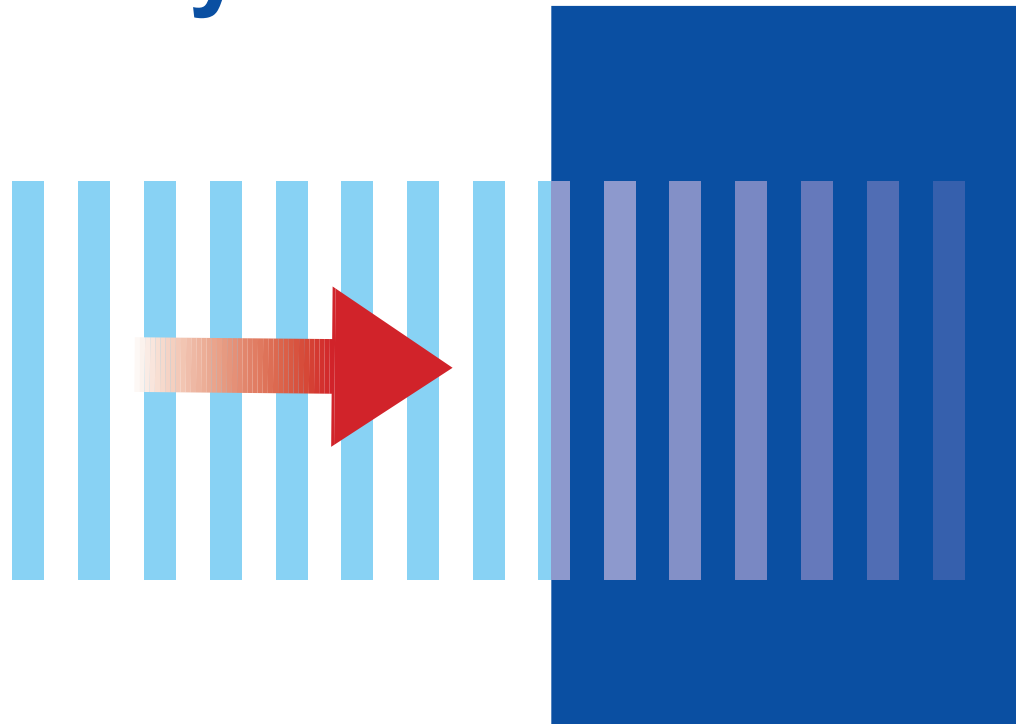
Making a transverse wave pulse



Wave Interactions

Absorption

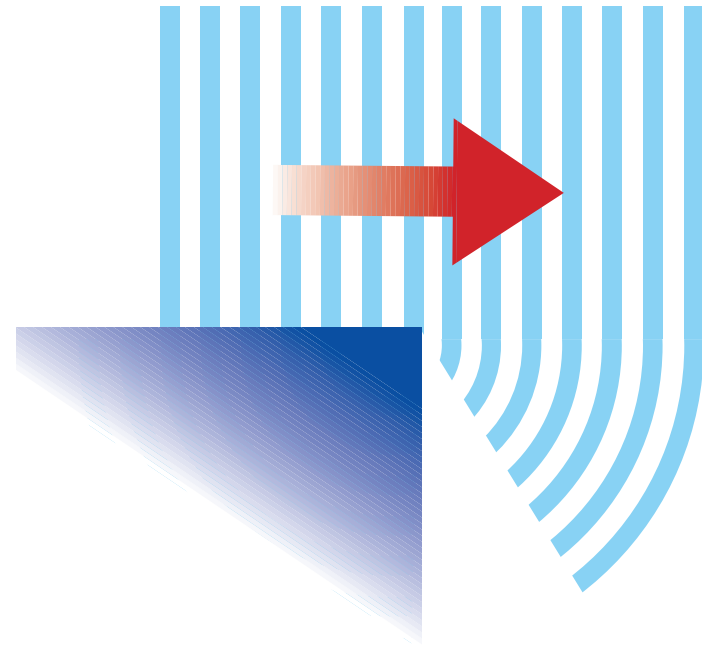
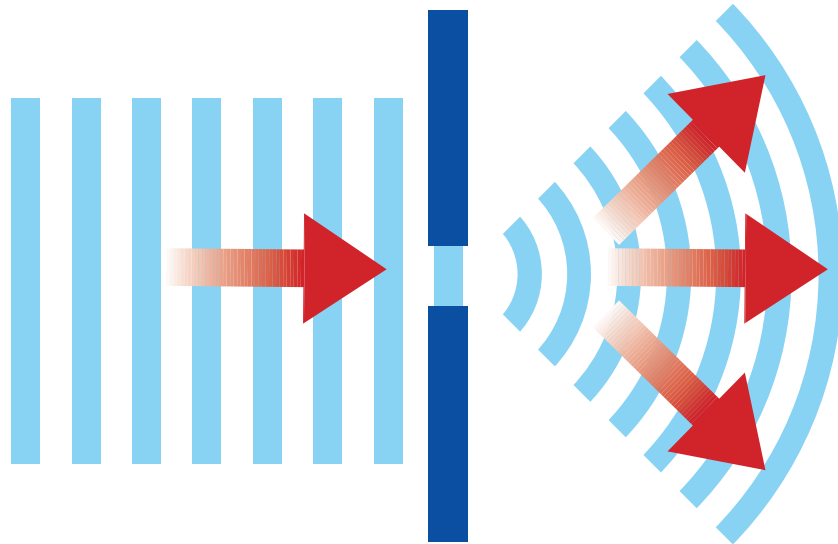
Wave is absorbed by a material and may disappear.



Wave Interactions

Diffraction

Wave bends around or goes through a hole in a material.

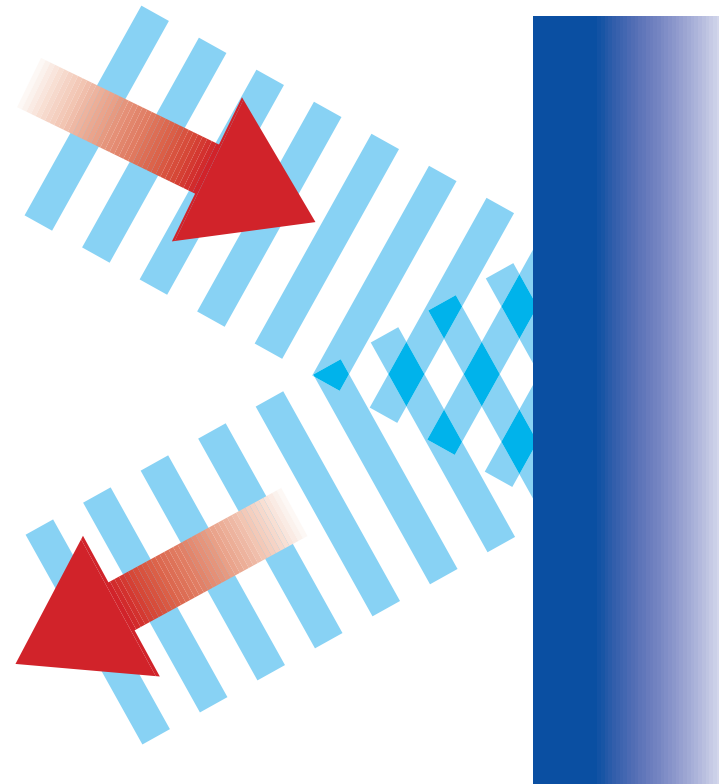


When plane waves go through a small hole, they become circular waves.

Wave Interactions

Reflection

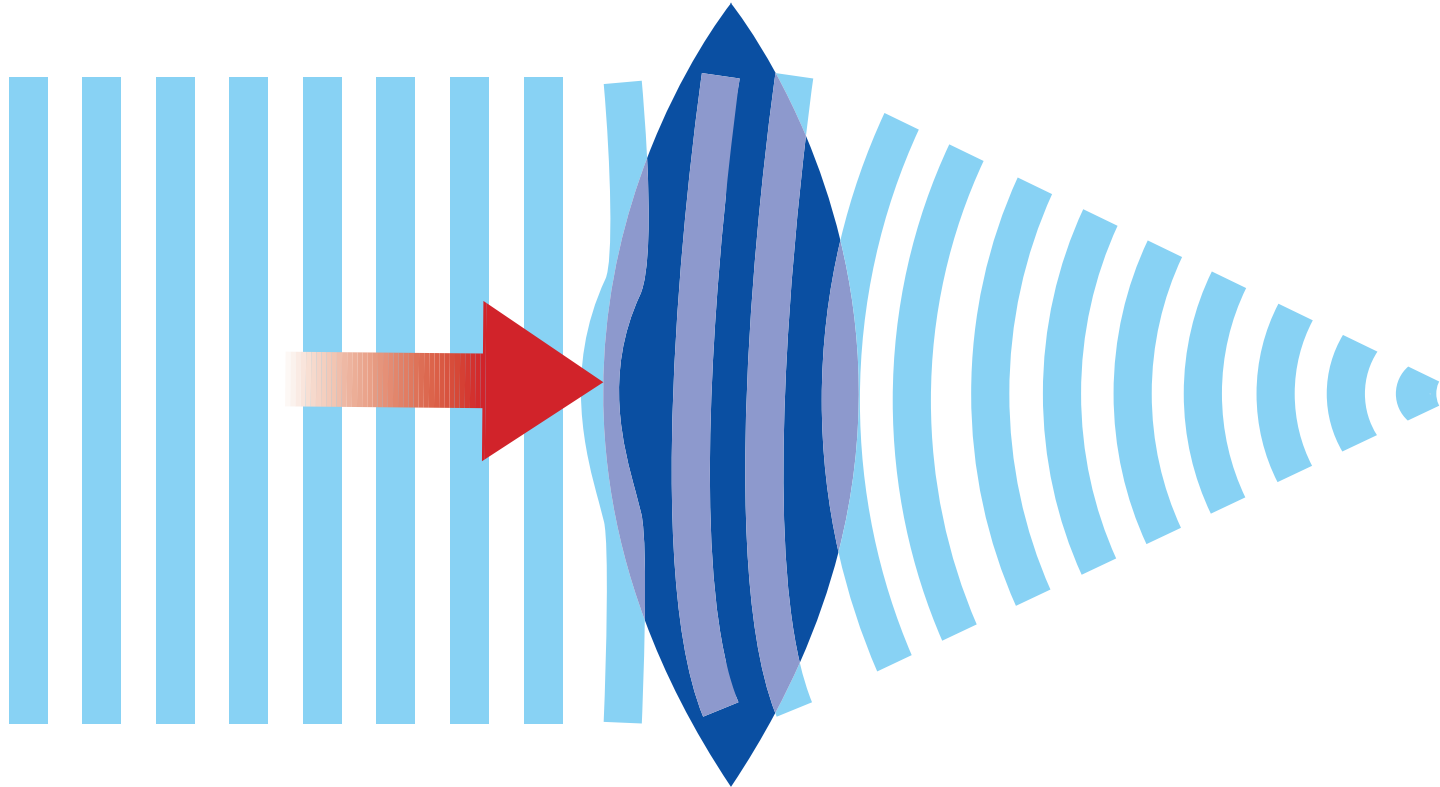
Wave bounces off a material and goes in a new direction.



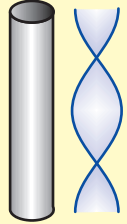
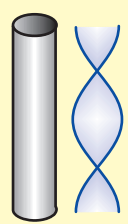
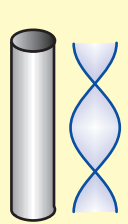
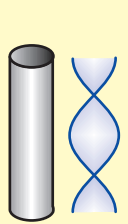
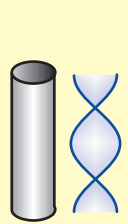
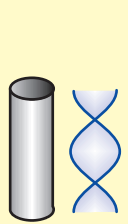
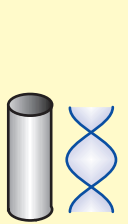
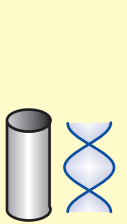







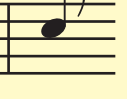
Wave Interactions

Refraction

Wave passes through a material and bends.



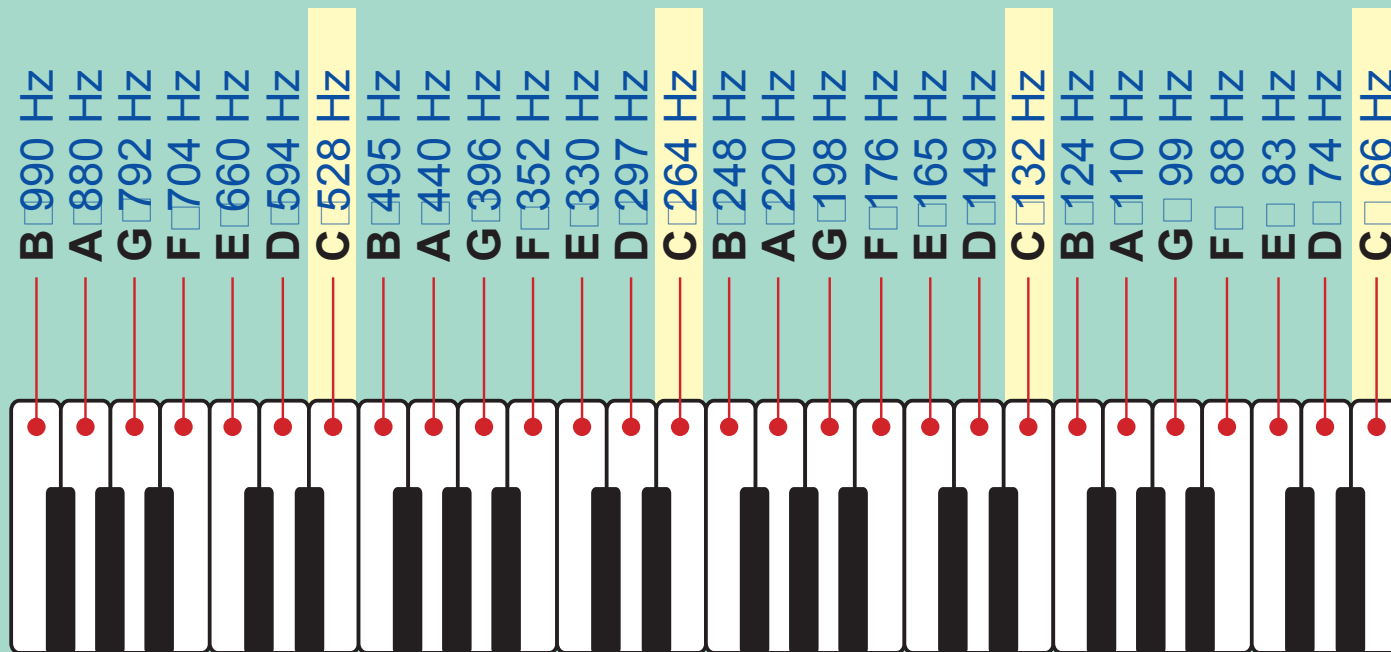
The C Major Musical Scale

C major scale								
								
Note	C	D	E	F	G	A	B	C
Frequency (Hz)	264	297	330	352	396	440	495	528
Ratio to C-264	1/1	9/8	5/4	4/3	3/2	5/3	15/8	2/1
	$\left(\frac{264}{264}\right)$	$\left(\frac{297}{264}\right)$	$\left(\frac{330}{264}\right)$	$\left(\frac{352}{264}\right)$	$\left(\frac{396}{264}\right)$	$\left(\frac{440}{264}\right)$	$\left(\frac{495}{264}\right)$	$\left(\frac{528}{264}\right)$

Frequencies of Notes



What patterns do you see in this series of frequencies?



Four octaves of notes tuned to a perfect C major scale

A grand piano has 88 keys and covers seven octaves.