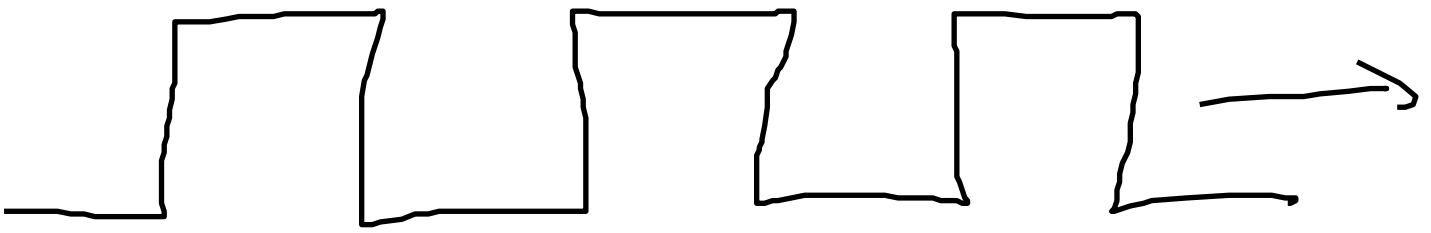
Pulse - disturbance that travels through a medium at a definite speed v

Wave - series of pulses which occur at regular time intervals

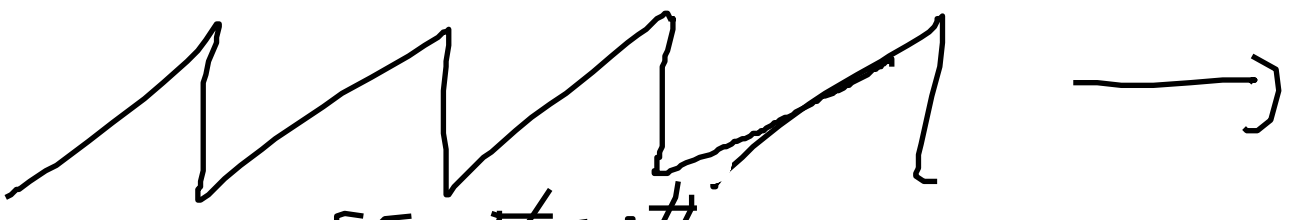
period T: time per pulse

frequency $f = \frac{1}{T}$: # pulses per time



Square wave

triangular

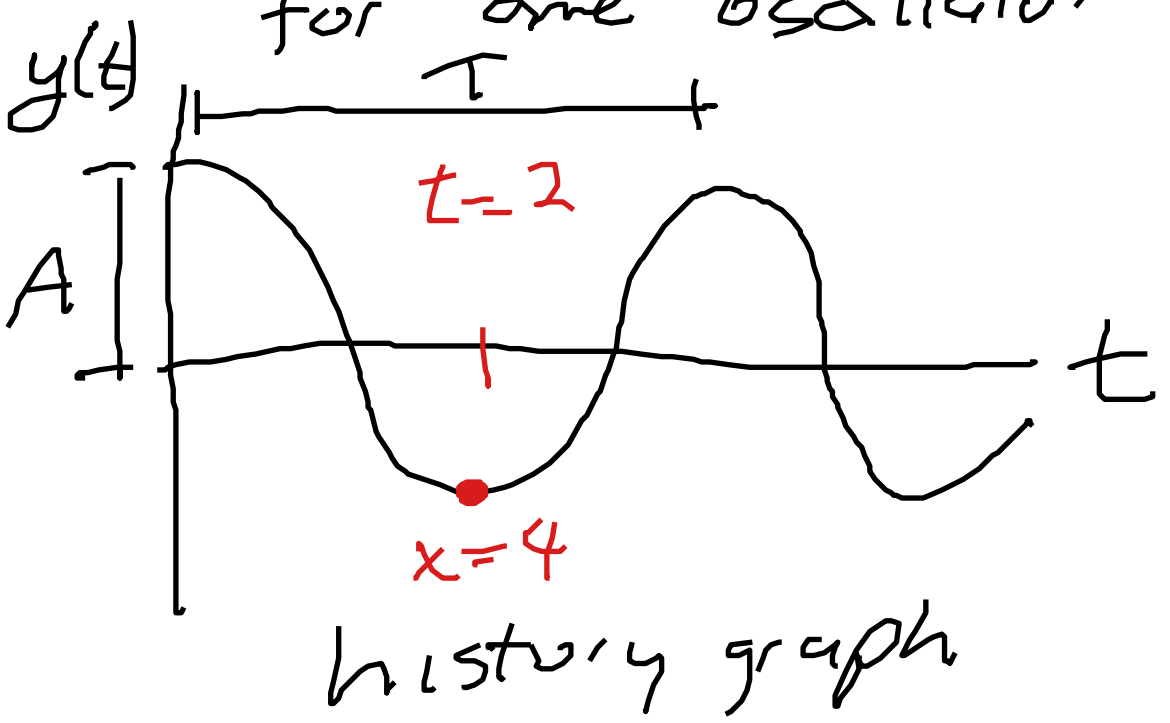


sawtooth

Sinusoidal wave

Medium is made up of oscillators

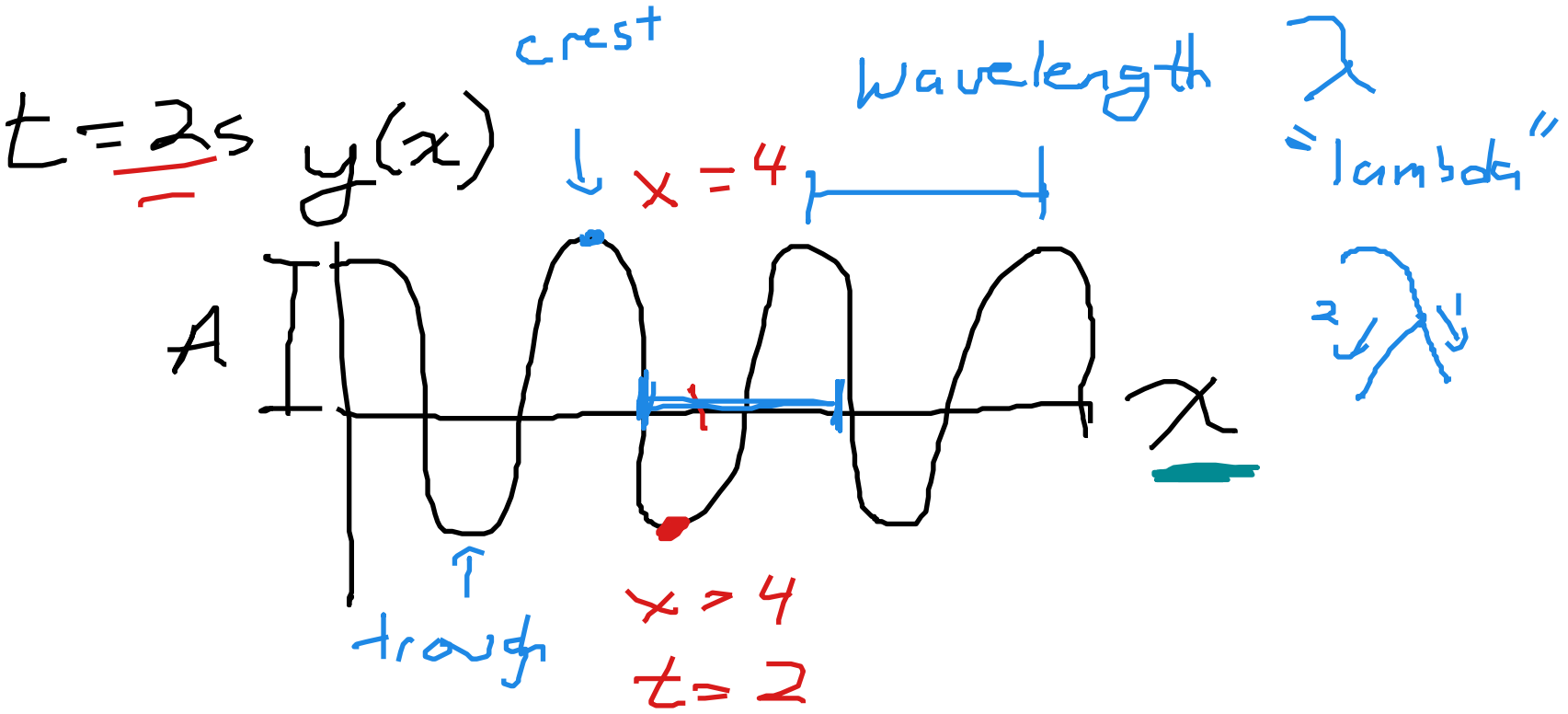
Frequency of wave = Frequency of oscillators as the wave passes by



history graph

Snapshot Graph

for one particular moment in time



$y(x,t)$

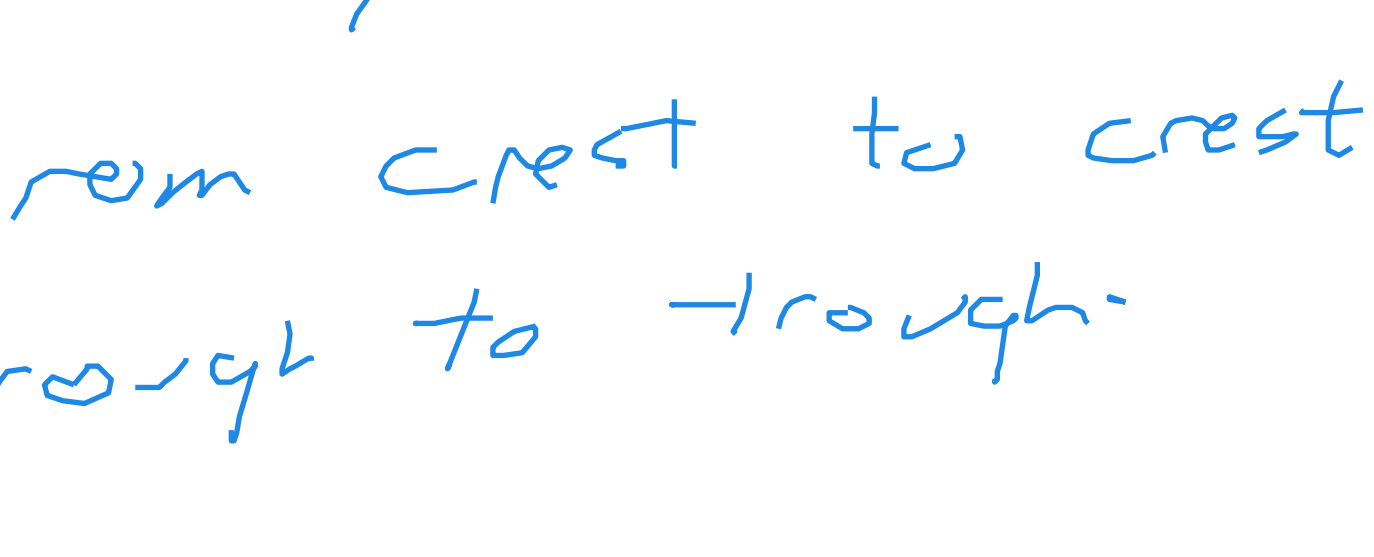
A: amplitude of wave = amplitude of oscillators

Wavelength is distance from crest to crest, trough to trough.

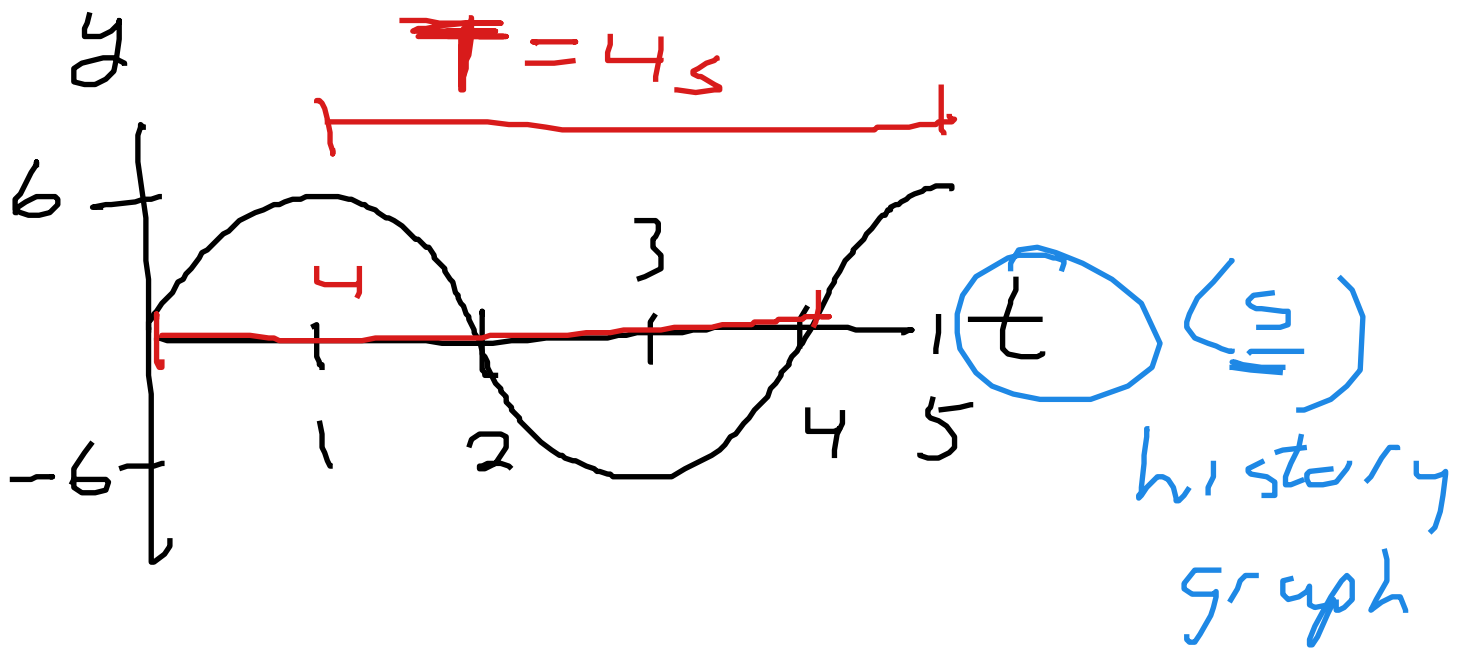
Want T? Check history graph (y vs t)

Want λ? Check snapshot graph (y vs x)

Q



$\lambda = 5m$



amplitude A

- measured on vertical axis
- either history or snapshot
- units: usually m but can vary

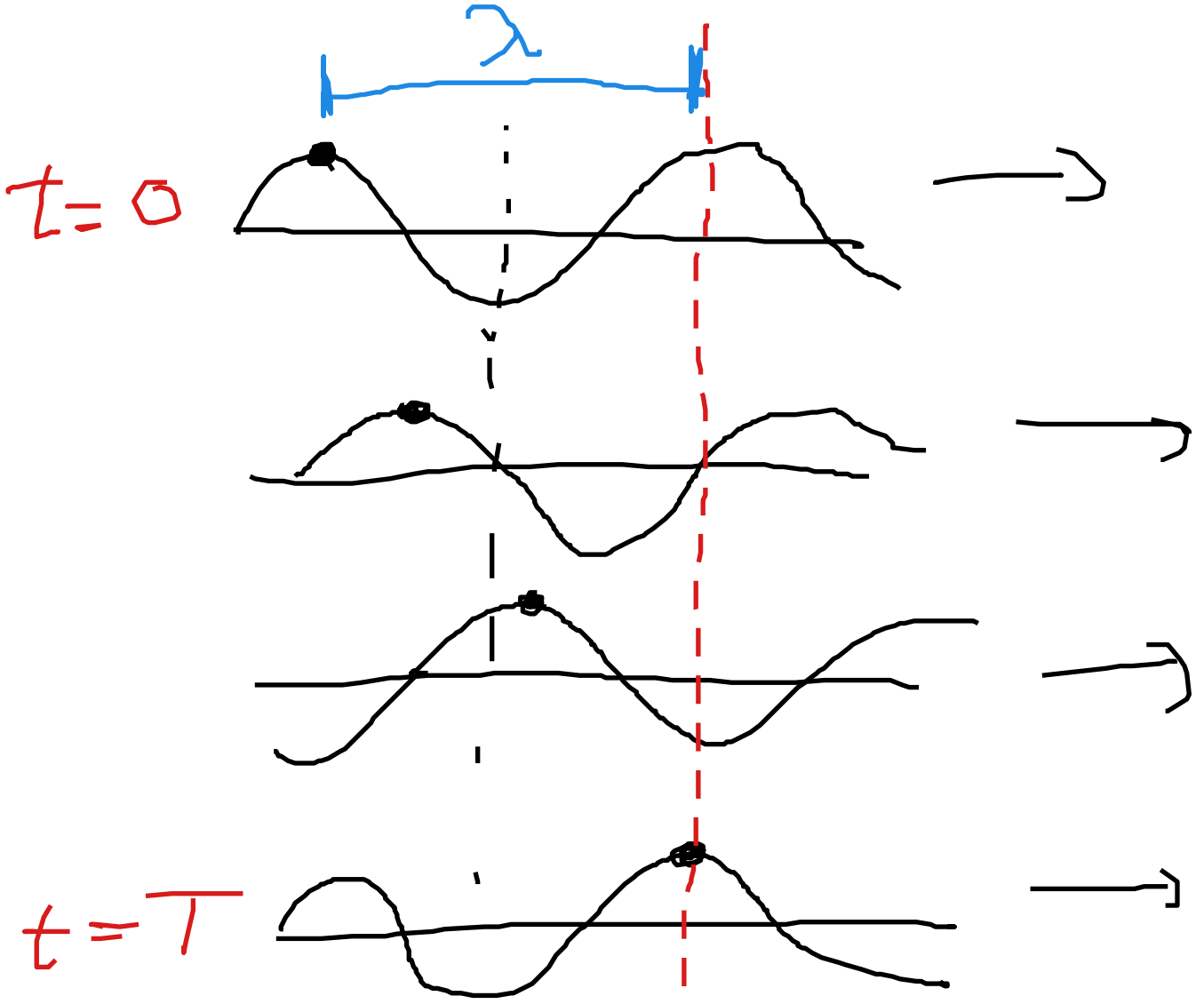
period T

- measured on horizontal, history
- units: seconds

frequency $f = \frac{1}{T}$ calculated from T

wavelength λ

- measured on horizontal, snapshot
- units: meters



↑ this oscillator has gone through one complete cycle, which takes time T.

Crest moves one wavelength during this time.

How fast is wave moving?

$$v = \frac{\text{distance}}{\text{time}} = \frac{\lambda}{T}$$

$$v = \frac{\lambda}{T}$$

$$= \lambda \frac{1}{T}$$

$$v = \lambda f$$

Wave equation

$$\lambda = \frac{v}{f}$$

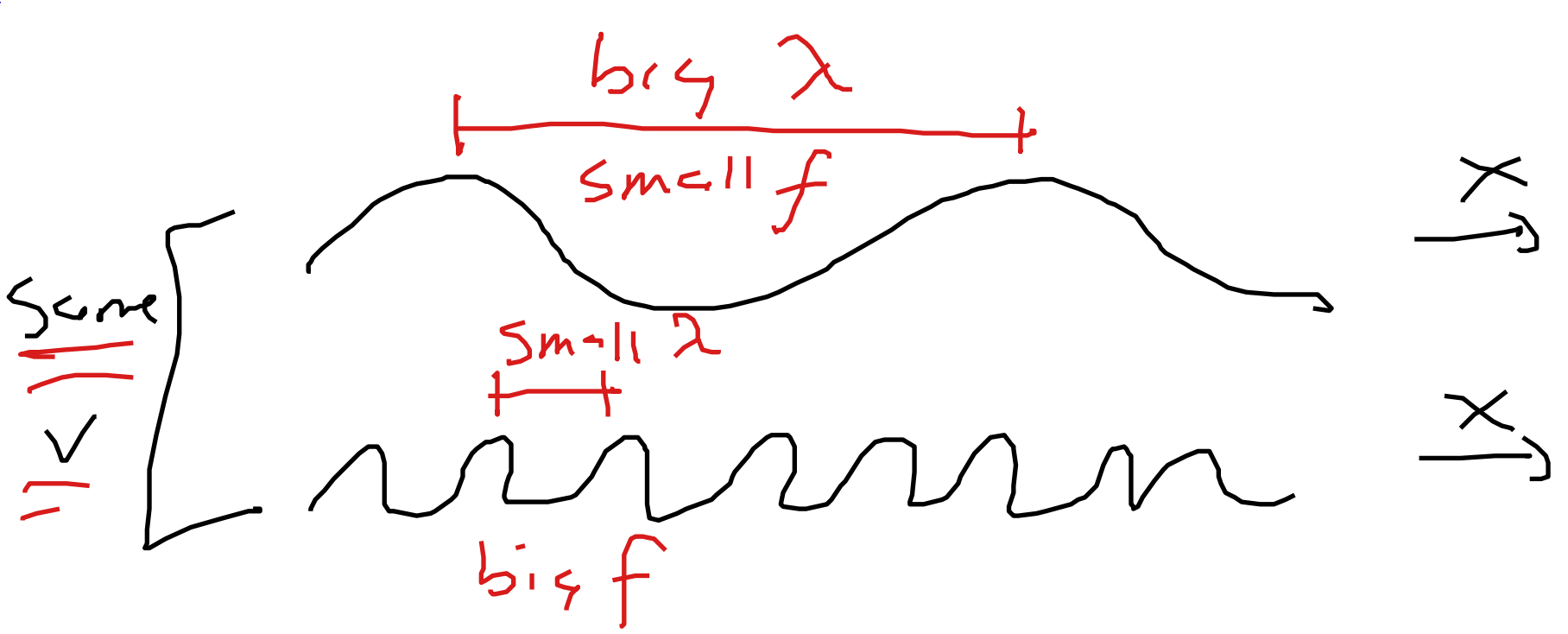
$$f = \frac{v}{\lambda}$$

Speed of a wave depends on the medium, not the wave.

(Usually assume speed is constant for a given example, unless the medium changes.)

$$v = \lambda f$$

const dec↓ inc.↑


big λ
small f
Some
small λ
V
big f
X
X