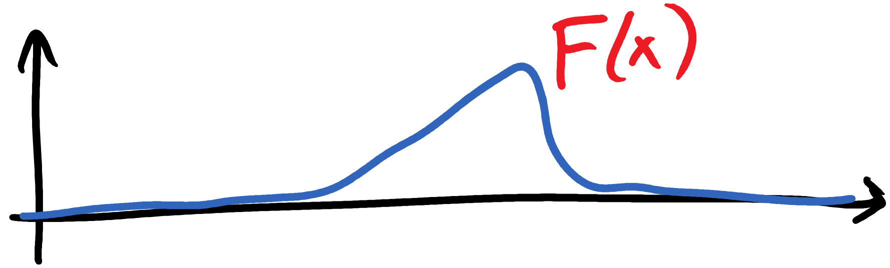
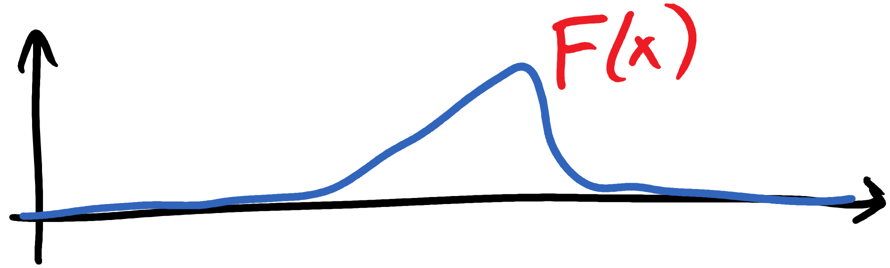


A wave at t=0 is described by the displacement function F(x) graphed above. If the pulse moves a distance A to the right, the wave will be described by a displacement function

A) F(x + A)
B) F(x – A)
C) F(x) + A
D) F(x) – A
E) still F(x)

Suppose the pulse is travelling to the right at speed v. What is the displacement function after a time t? How does your answer change if the motion is to the left?



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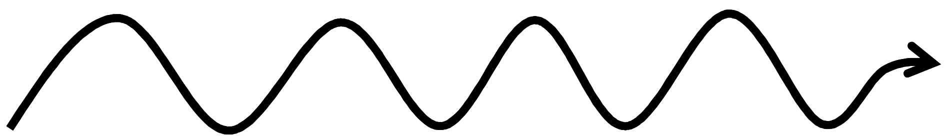
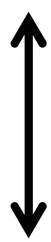
Suppose the pulse is travelling to the right at speed v. What is the displacement function after a time t? How does your answer change if the motion is to the left?

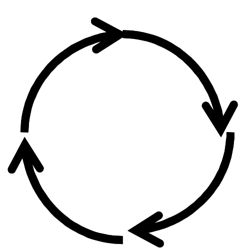
Sound from a flute is moving to the right. Which of the following pictures best represents the motion of an air molecule in the wave?

A) 

B) 

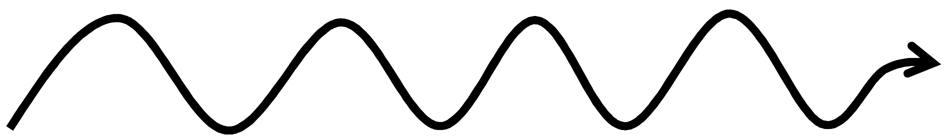
C) 

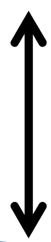
D) 

E) 

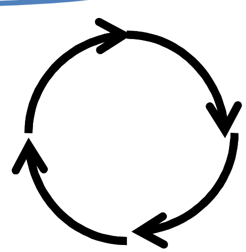
A sound wave is moving to the right. Which of the following pictures best represents the motion of an air molecule in the wave?

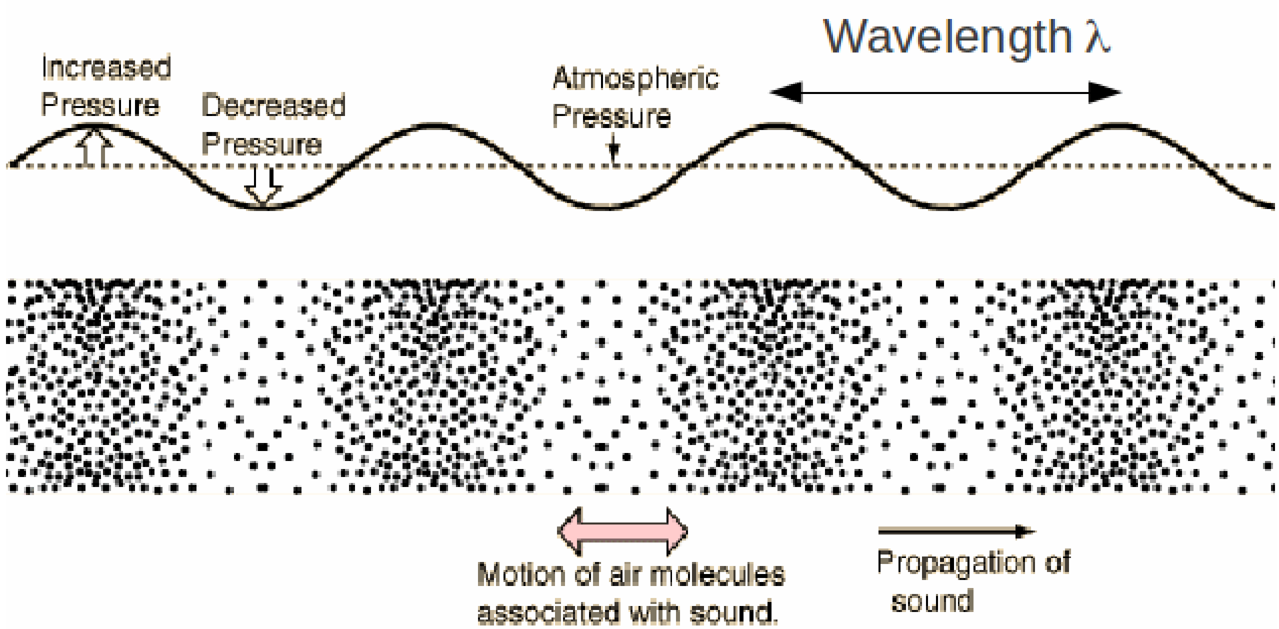
A) 

B) 

C) 

D) 

E) 


Wavelength λ
Increased Pressure
Decreased Pressure
Atmospheric Pressure
Motion of air molecules associated with sound.
Propagation of sound

https://www.youtube.com/watch?v=px3oVGXr4mo&t=1m46s

What distinguishes musical notes from other noise?

A) I definitely know the answer.

B) I think I know the answer, but I'm not sure.

C) I basically just have a wild guess.

D) I give up.

What distinguishes different notes from each other (e.g. high notes vs low notes)?

A) I definitely know the answer.

B) I think I know the answer, but I’m not sure.

C) I basically just have a wild guess.

D) I give up.

EXTRA: What determines how loud something sounds?

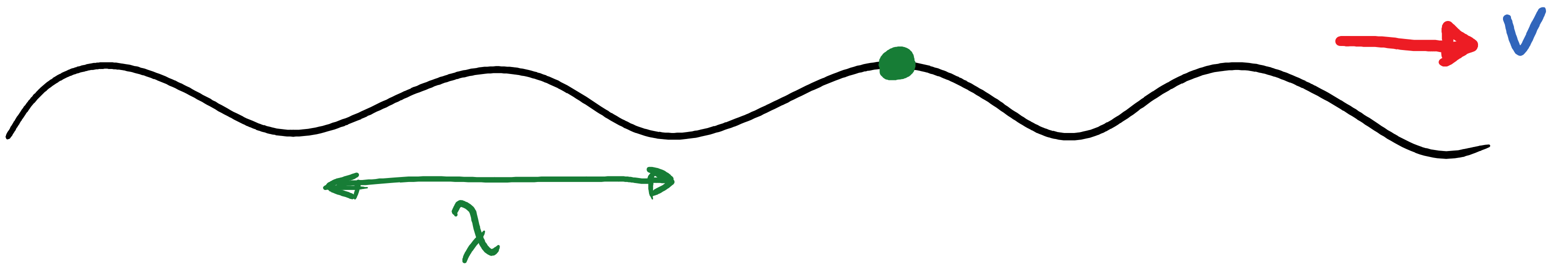
Load up the PHET “waves on a string” tutorial.

Choose “no end”, damping =0, tension = “high” and “oscillate”.
Start with amplitude = 50 and frequency = 50.

When we double the oscillation frequency, what happens to the wavelength and the wave velocity (use the ruler and timer if necessary)?

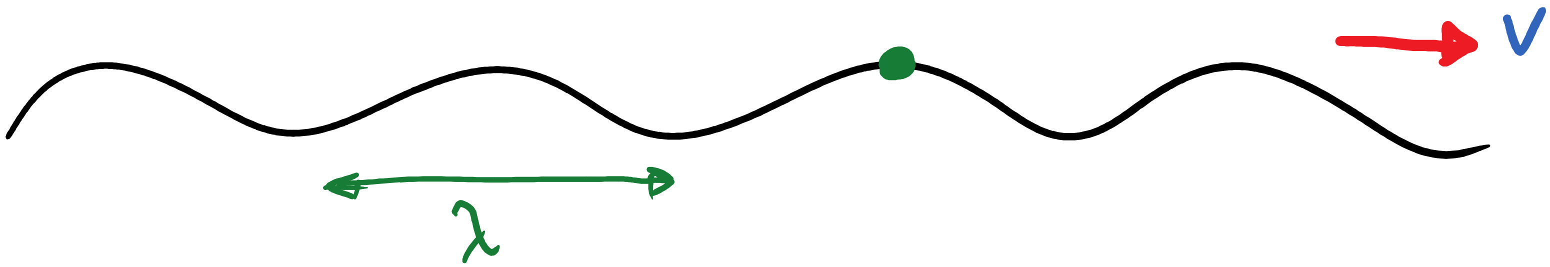
A) Wavelength doubles, velocity stays the same
B) Wavelength doubles, velocity doubles
C) Wavelength doubles, velocity halves
D) Wavelength halves, velocity doubles
E) Wavelength halves, velocity stays the same

EXTRAS: What happens if we take half the amplitude? What if the tension is lowered?



At what time will the green spot on the string next oscillate up to a maximum height?

A) λ v
B) λ / v
C) v λ
D) v / λ
E) cos(v λ)



At what time will the green spot on the string next oscillate up to a maximum height?

A) λ v
B) λ / v
C) v λ
D) **v / λ**
E) cos(v λ)

Why do different instruments sound different, even when playing the same note?

A) I definitely know the answer.

B) I think I know the answer, but I’m not sure.

C) I basically just have a wild guess.

D) I give up.

Two wave pulses are travelling towards each other as shown. When they meet, they will:

A) Bounce off each other and reflect backwards
B) Destroy each other, leaving a few random ripples going in either direction
C) Pass right through each other

Why do instruments only make specific tones (when the keys are in some specific configuration)?

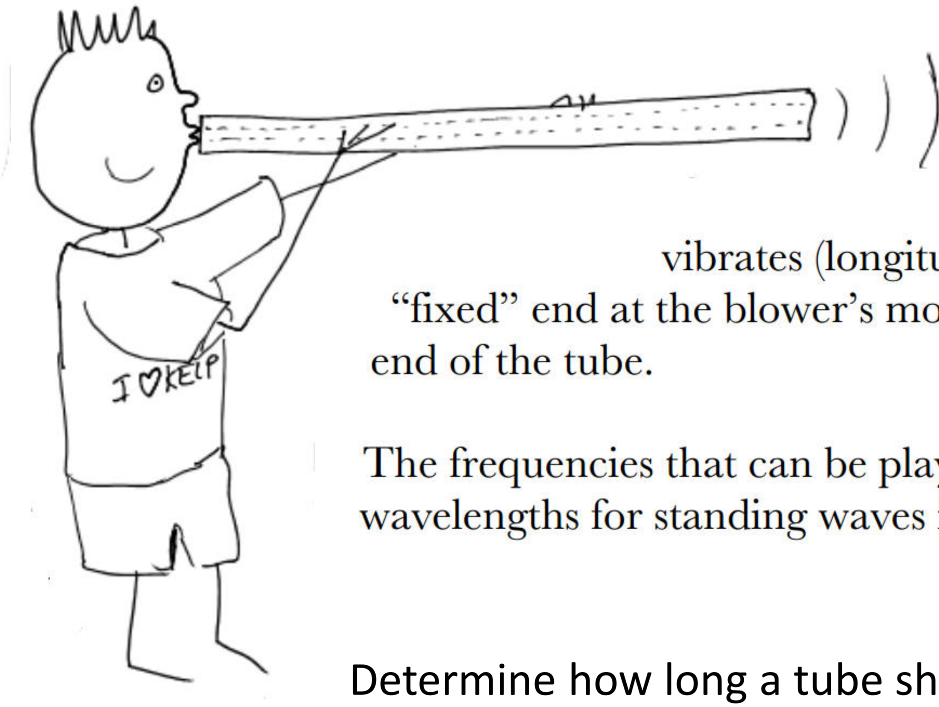
A) I definitely know the answer.

B) I think I know the answer, but I’m not sure.

C) I basically just have a wild guess.

D) I give up.

Hint:



When A piece of kelp (or other tube) is used as a musical instrument, the air in the tube vibrates (longitudinally) as a standing wave, with the “fixed” end at the blower’s mouth and the “free” end at the open end of the tube.

The frequencies that can be played are determined by the allowed wavelengths for standing waves in the tube, and the relation $f = v/\lambda$.

Determine how long a tube should be so that it will play middle C.

There is more than one answer! Try to find at least three different answers.

HINT: Choose the following settings in the PHET to help visualize things:

Now choose: fixed end, tension = high, damping = 2, amplitude = 50, frequency = 36.

Click the restart button and wait for a while for the glitches in the string to settle down.

Why do some notes sound good together?

A) I definitely know the answer.

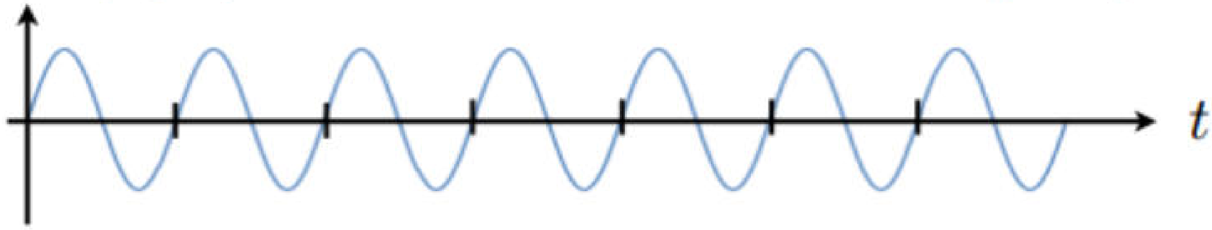
B) I think I know the answer, but I’m not sure.

C) I basically just have a wild guess.

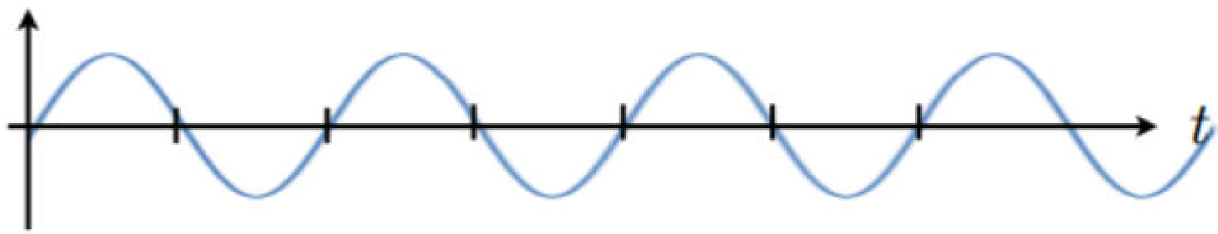
D) This is totally subjective and beyond the realm of physics.

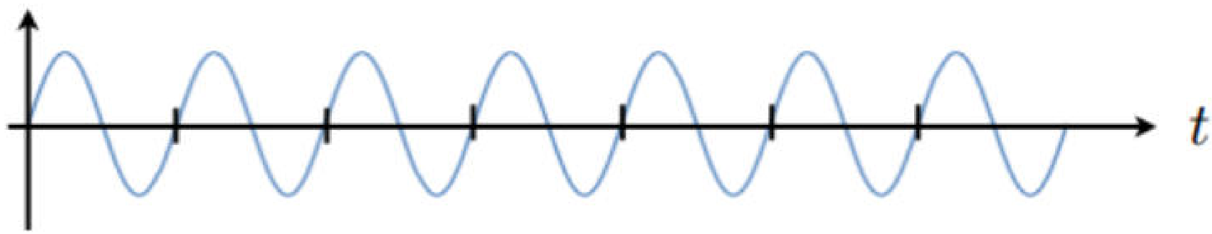
E) I give up.

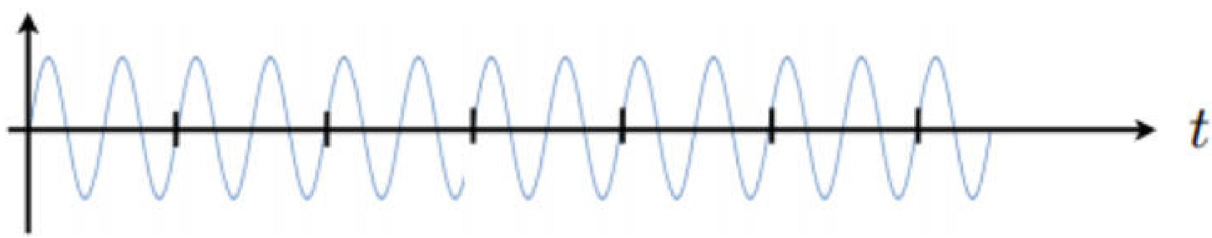
This is a history graph of a sinusoidal wave travelling at speed *v*:



What does the history graph look like if the wave speed is **doubled**.

A) 

B) 

C) 

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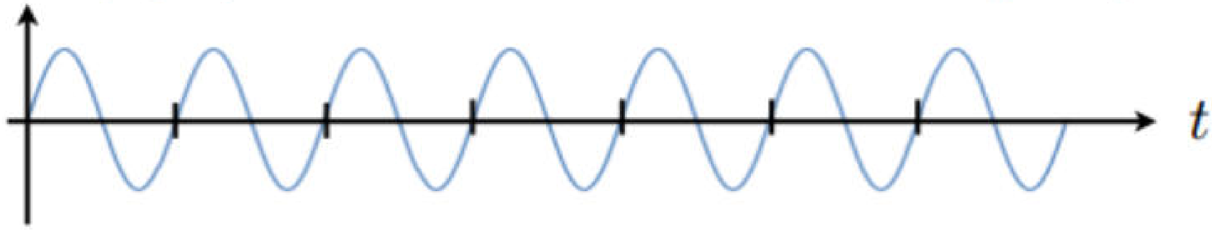

What does the history graph look like if the wave speed is **doubled**.

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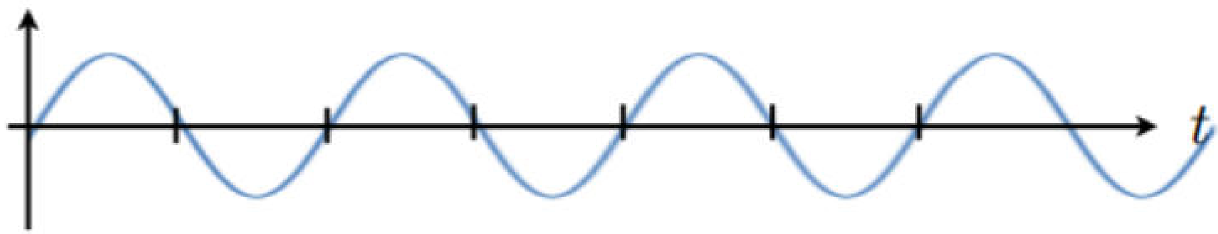
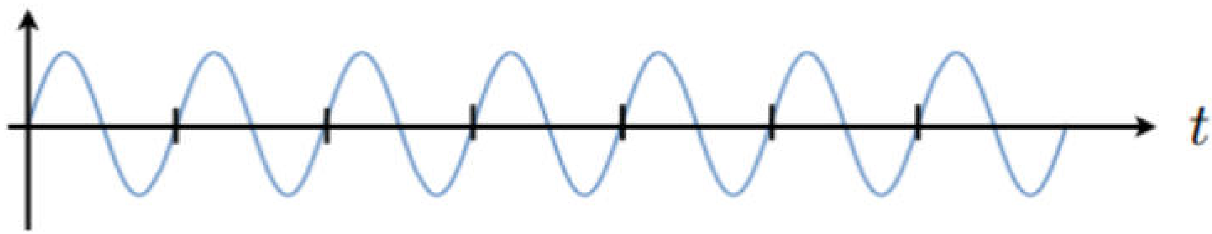


B)



C)