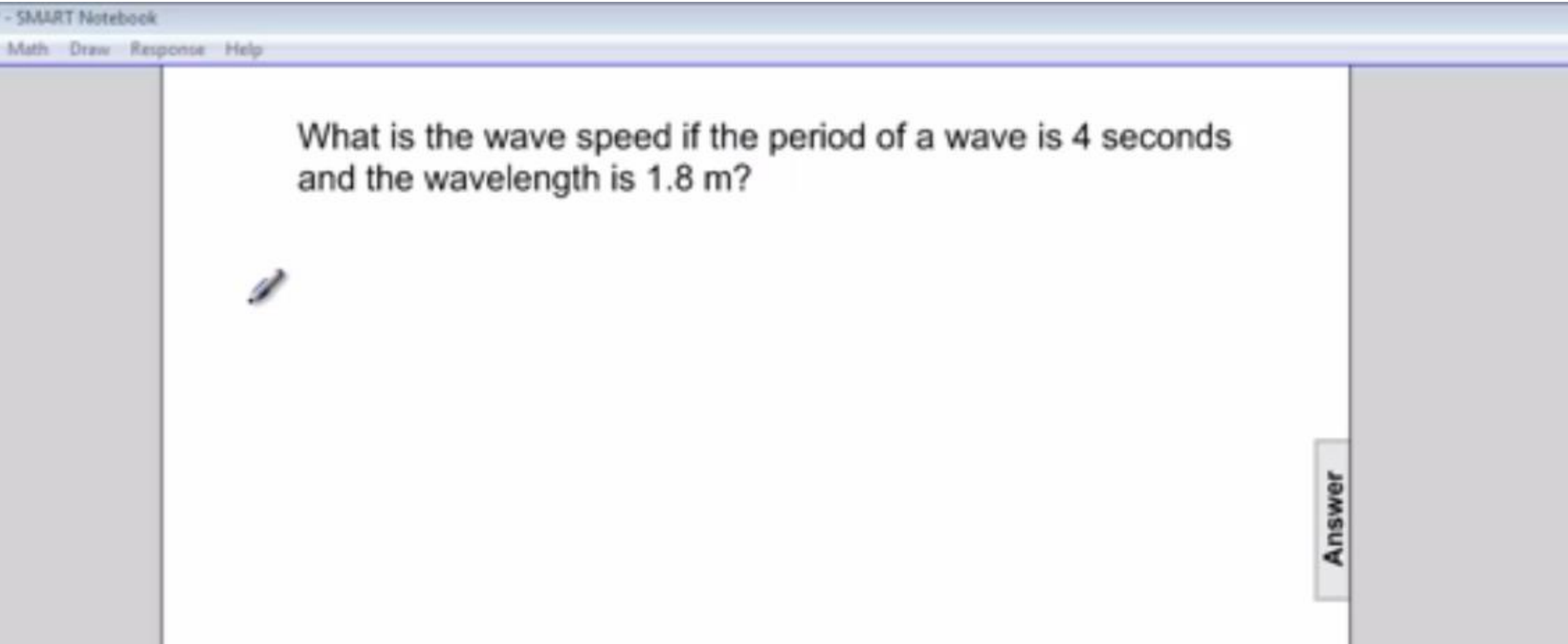
# Y2: Waves and Sound

Strings and Standing Waves

# Problem


- SMART Notebook
Math Draw Response Help
What is the wave speed if the period of a wave is 4 seconds and the wavelength is 1.8 m?
Answer

# Problem

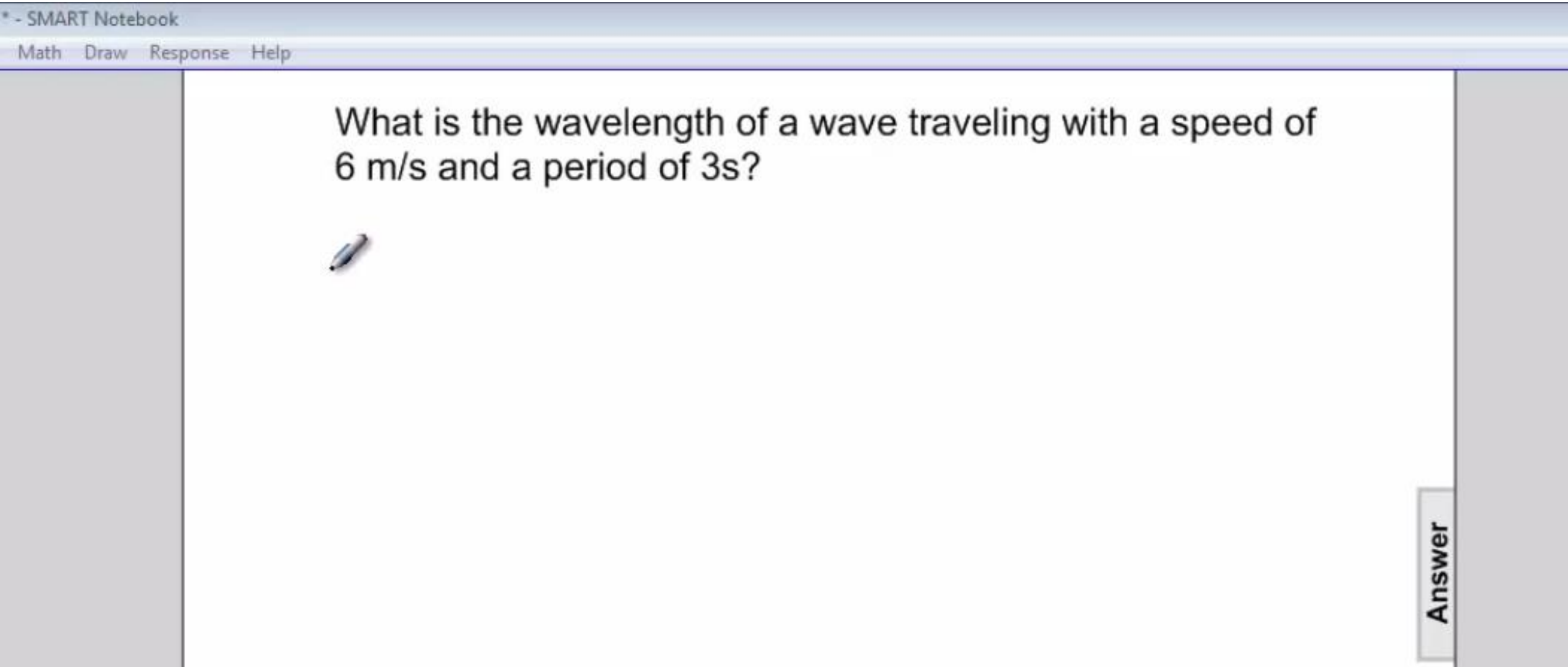
ves - Wave Motion Q02

Format Math Draw Response Help

A fisherman noticed that a float makes 30 oscillations in 15 seconds. The distance between to consecutive crests is 2 m. What is the wave speed?

Answer

# Problem


* - SMART Notebook
Math Draw Response Help
What is the wavelength of a wave traveling with a speed of 6 m/s and a period of 3s?
Answer

# Velocity of a wave on a string.

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## Wave Motion

The velocity of a wave depends on the medium through which it is traveling.

The velocity of a wave on a stretch string is related to the tension force in the string and the mass per unit length of the string.

$$v = \sqrt{\frac{F_t}{\mu}}$$

Where $F_T$ is the tension in the string and $\mu$ is the mass per unit length (m/L).

# Problem

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ew Insert Format Math Draw Response Help

What happens to the speed of a wave on a string if the tension of the string is increased by a factor of nine?

A It is decreased by a factor of 3.

B It is decreased by a factor of 9.

C It is increased by a factor of 3.

D It is increased by a factor of 9.

V

Answer

# Problem

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What happens to the speed of a wave on a string if the mass per unit length of the string is increased by a factor of nine?

A It is decreased by a factor of 3.

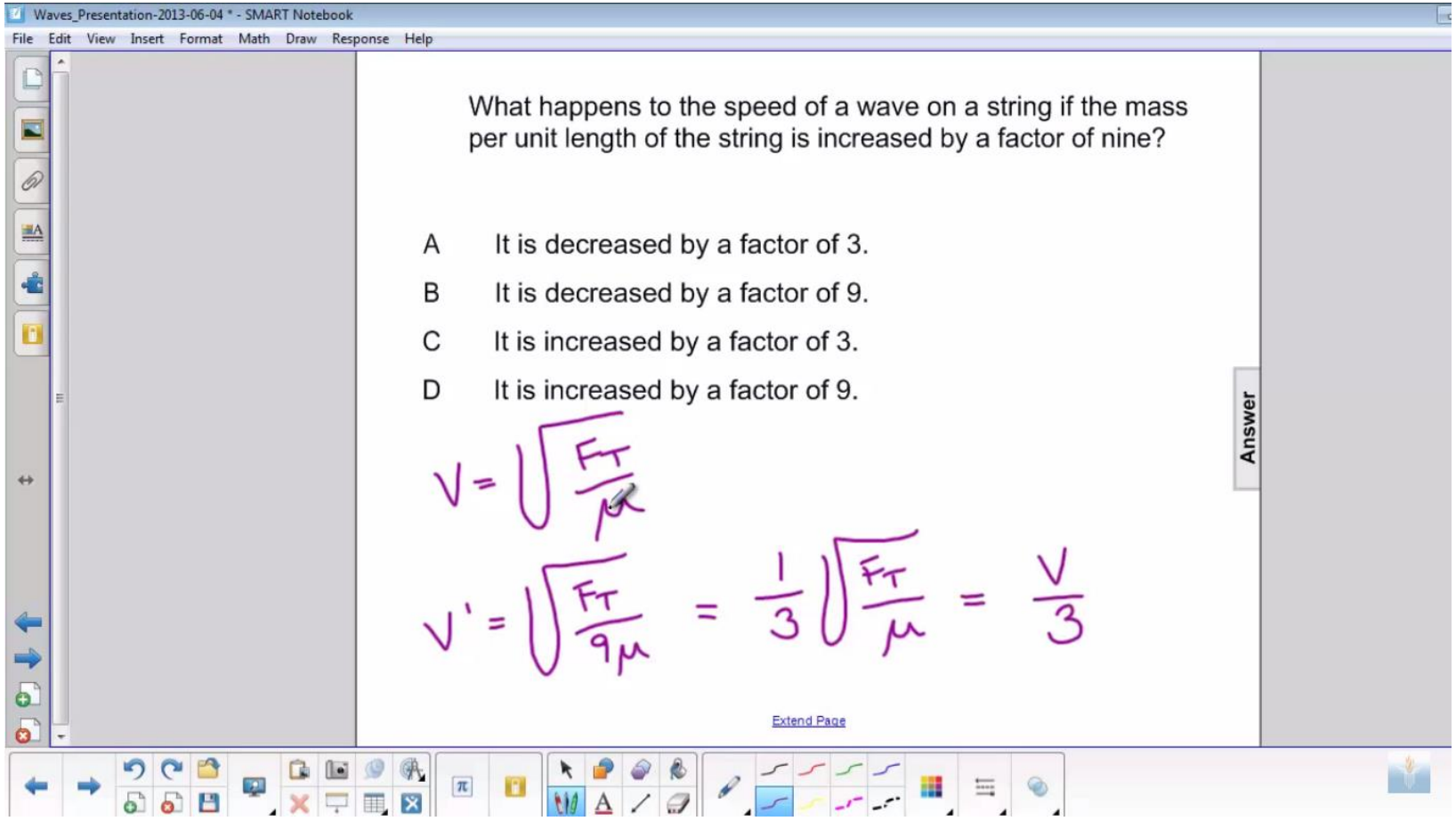
B It is decreased by a factor of 9.

C It is increased by a factor of 3.

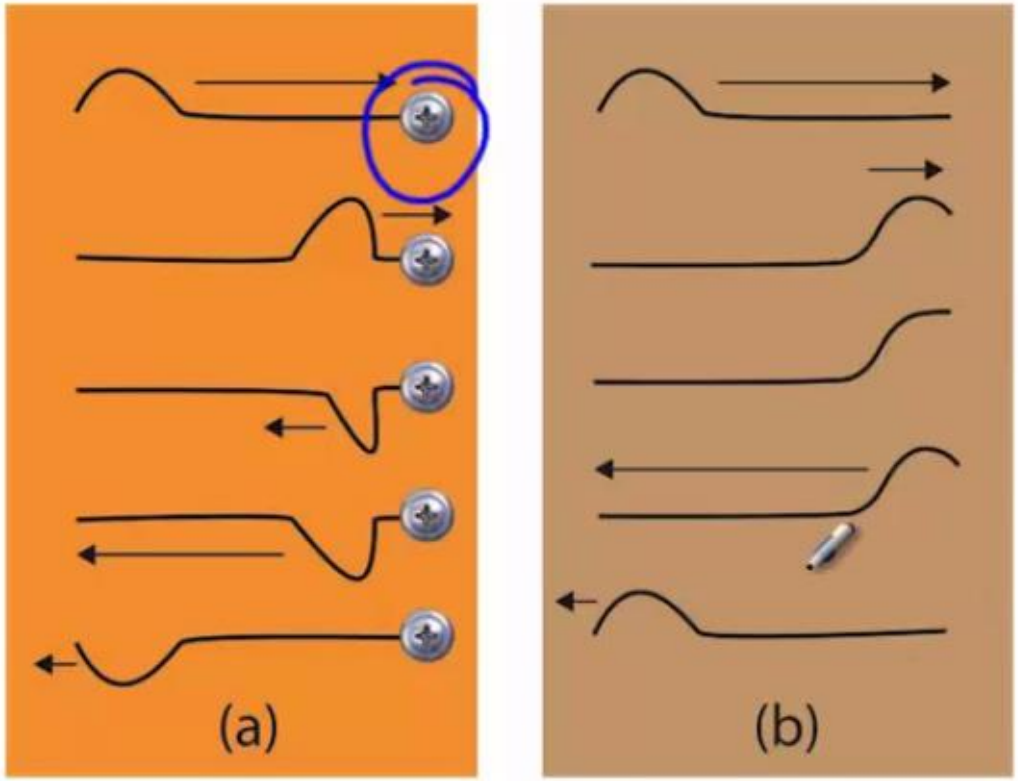
D It is increased by a factor of 9.

Answer

# Solution


Waves_Presentation-2013-06-04 * - SMART Notebook
File Edit View Insert Format Math Draw Response Help
What happens to the speed of a wave on a string if the mass per unit length of the string is increased by a factor of nine?
A It is decreased by a factor of 3.
B It is decreased by a factor of 9.
C It is increased by a factor of 3.
D It is increased by a factor of 9.
$V = \sqrt{\frac{F_T}{\mu}}$
$V' = \sqrt{\frac{F_T}{9\mu}} = \frac{1}{3}\sqrt{\frac{F_T}{\mu}} = \frac{V}{3}$
Answer
Extend Page

# Reflection and Transmission of Waves




A wave reaching the end of its medium, but where the medium is still free to move, will be reflected (b), and its reflection will be upright.

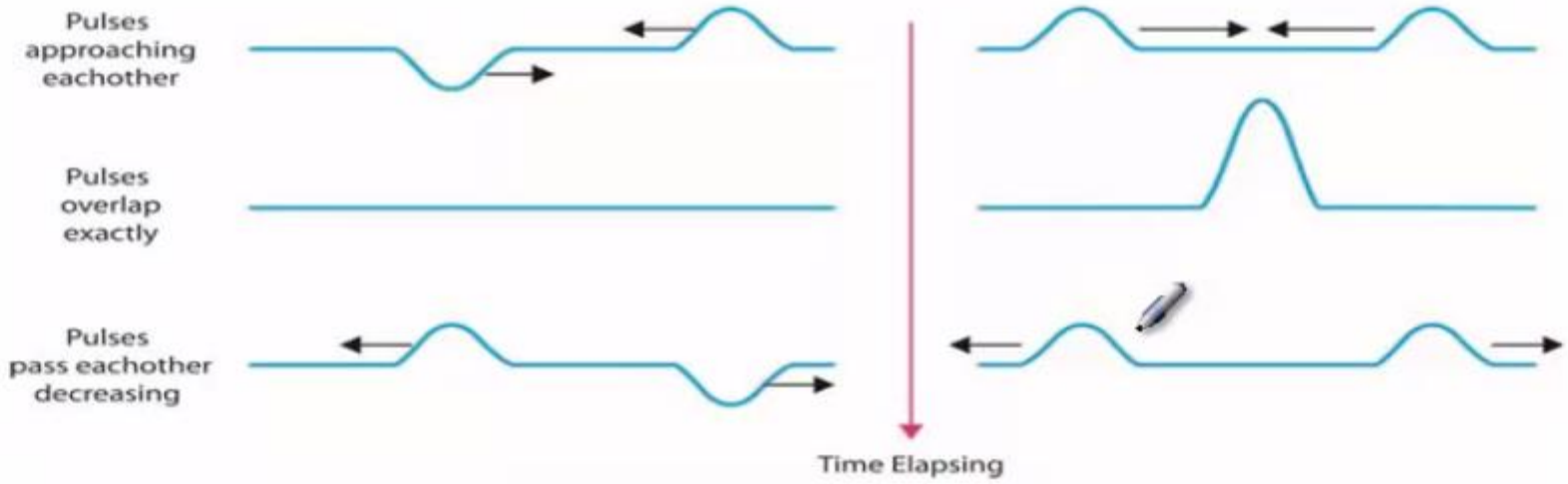
A wave hitting an obstacle will be reflected (a), and its reflection will be inverted.

Extend Page

# Interference; Principle of Superposition

The superposition principle says that when two waves pass through the same point, the displacement is the arithmetic sum of the individual displacements.

In the figure below, (a) exhibits destructive interference and (b) exhibits constructive interference.

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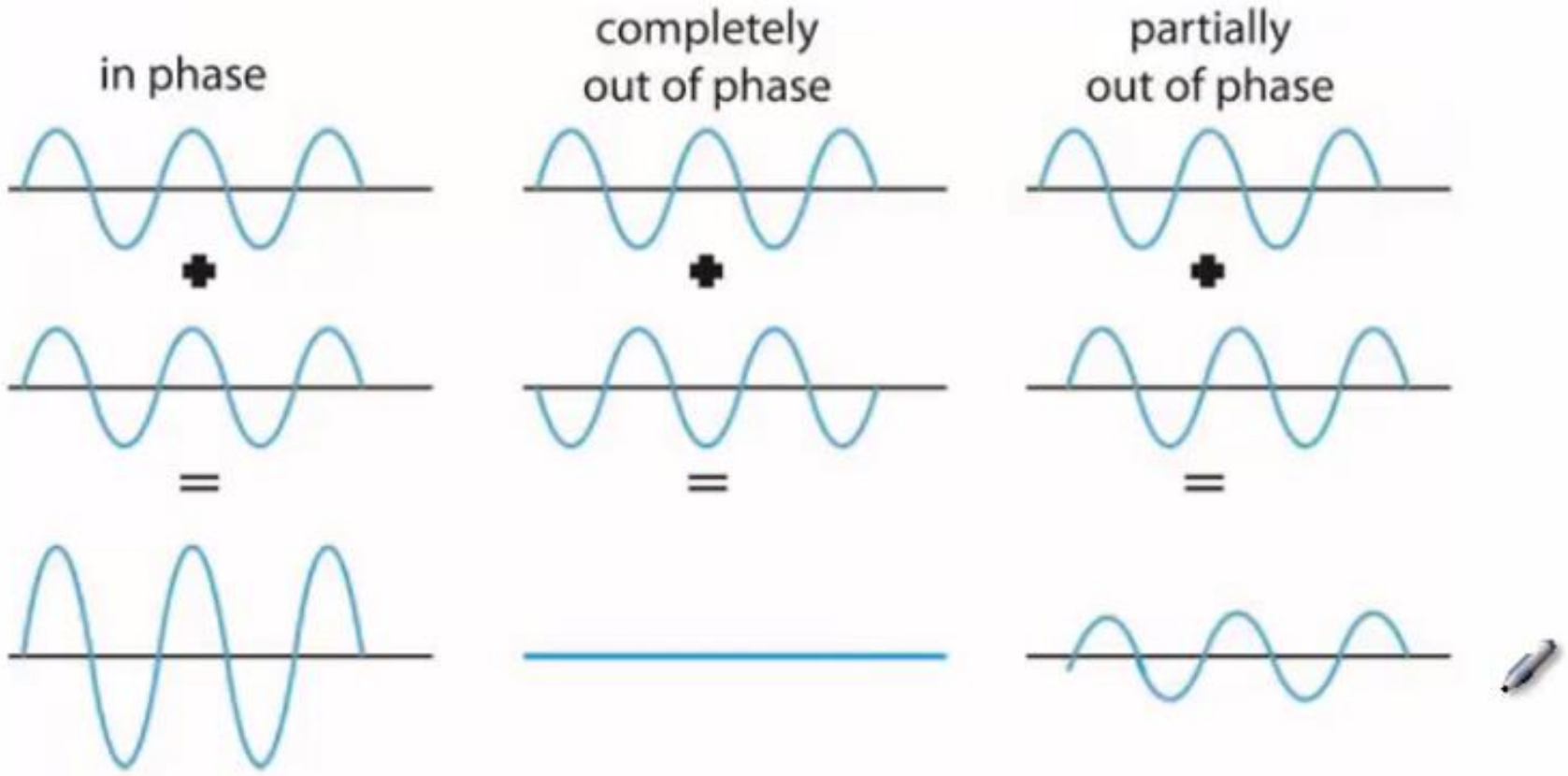
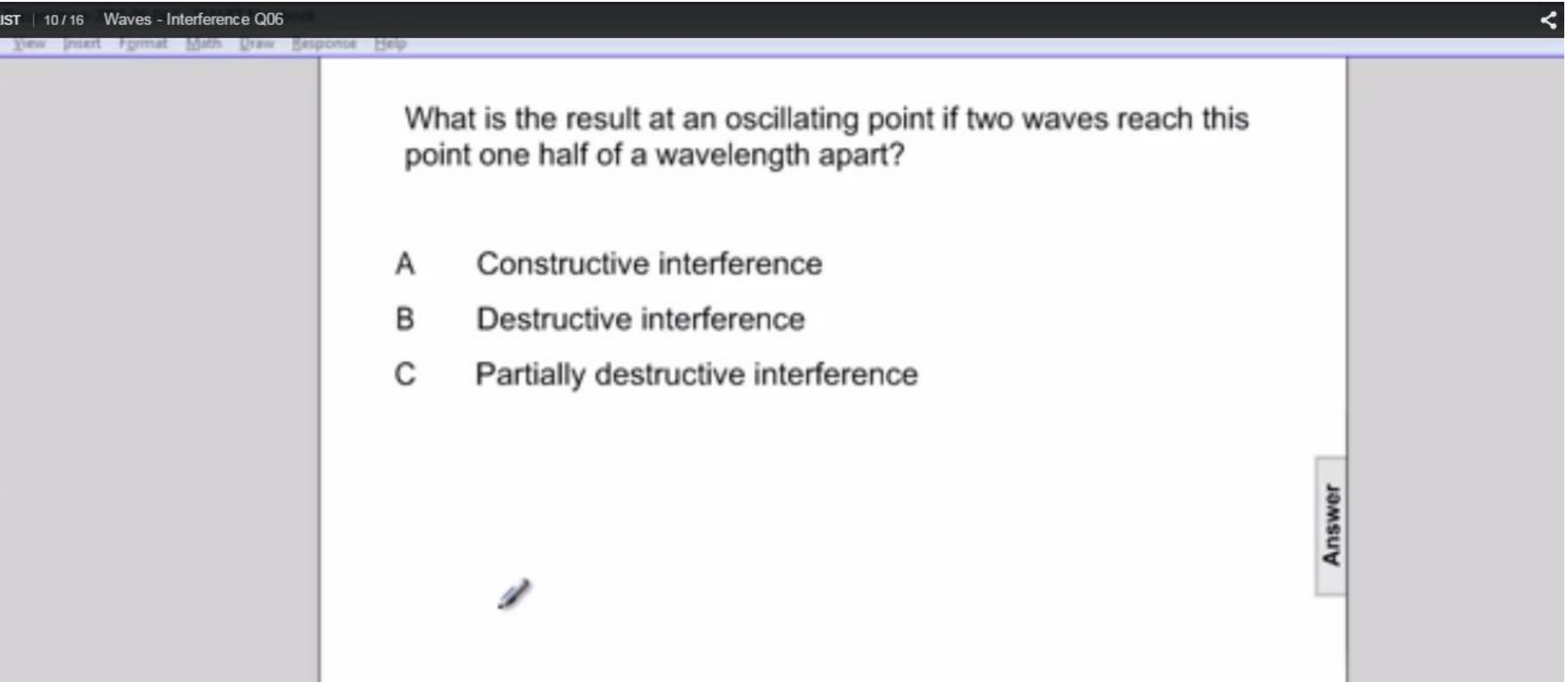
# Interference; Principle of Superposition

These figures show the sum of two waves. In (a) they add constructively; in (b) they add destructively; and in (c) they add partially destructively.



# Problem


IST | 10 / 16 Waves - Interference Q06
View Insert Format Math Draw Response Help
What is the result at an oscillating point if two waves reach this point one half of a wavelength apart?
A Constructive interference
B Destructive interference
C Partially destructive interference
Answer

# Problem

16 Waves - Interference Q08

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What is the result at an oscillating point if two waves reach this point one quarter of a wavelength apart?

A Constructive interference

B Destructive interference

C Partially destructive interference

Answer

# Standing Waves

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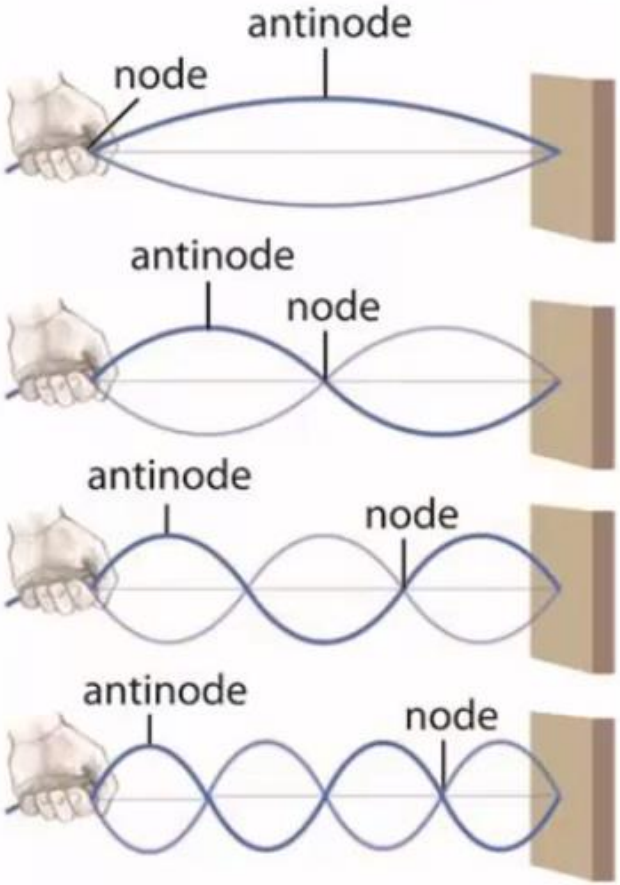
## Standing Waves; Resonance




Standing waves occur when both ends of a string are fixed. In that case, only waves which are motionless at the ends of the string can persist.

There are nodes, where the amplitude is always zero, and antinodes, where the amplitude varies from zero to the maximum value.

# Standing Waves on a String (not tubes)

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## Standing Waves; Resonance

The wavelengths and frequencies of standing waves are:

$$\lambda_n = \frac{2L}{n}$$

$v = \lambda f$

$$f_n = \frac{v}{\lambda_n} = \frac{v}{\frac{2L}{n}} = n\frac{v}{2L} = nf_1$$

$$n = 1, 2, 3, \ldots$$

# Problem

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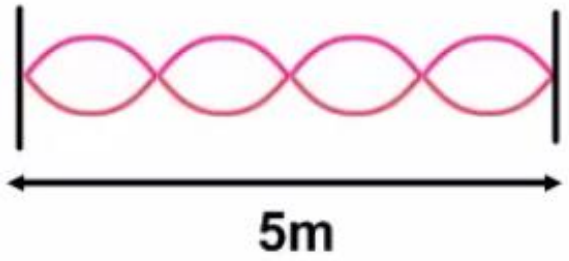
Wave is the wavelength of the wave shown below?

$L = 5m$

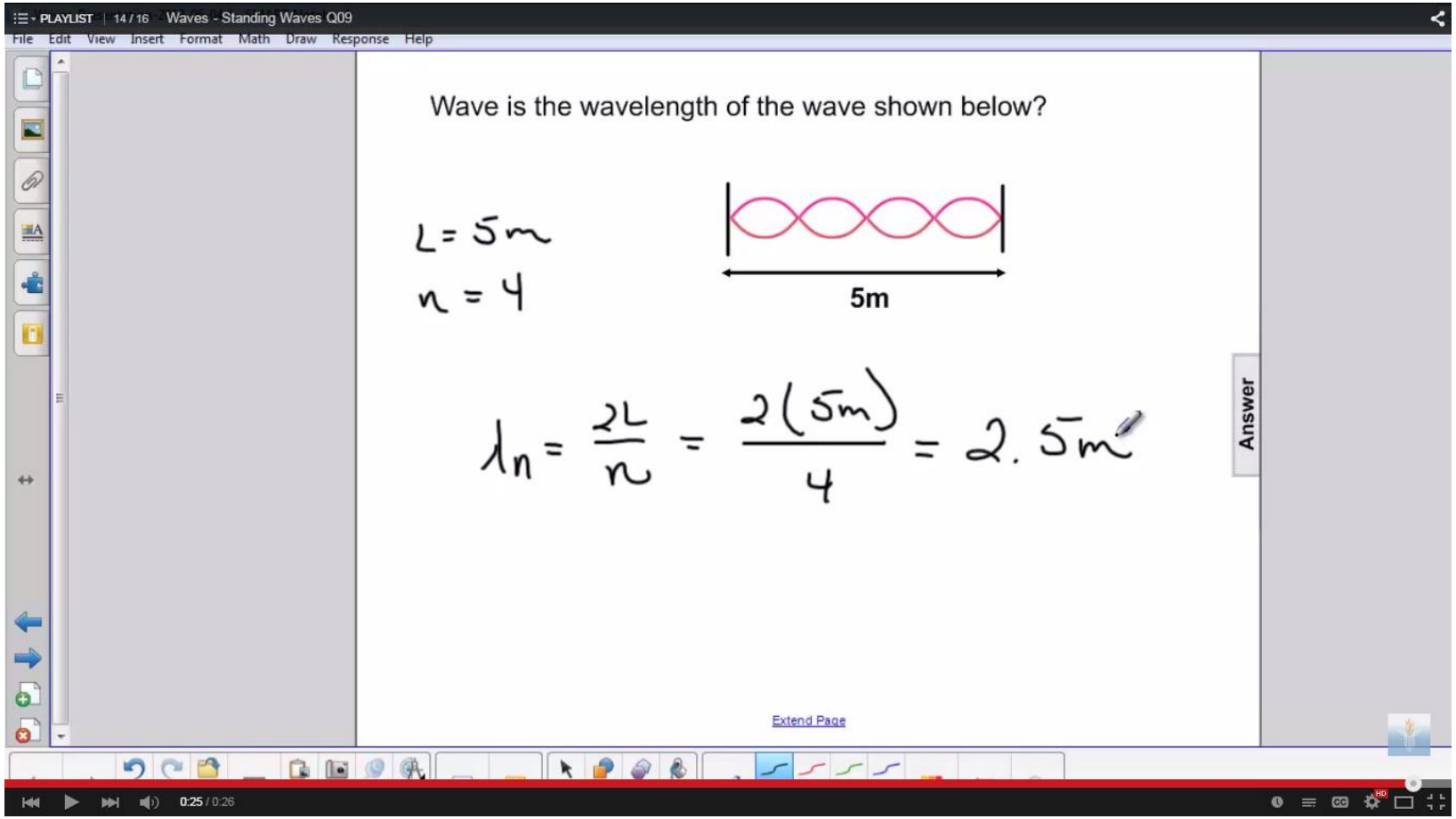
$n = 4$



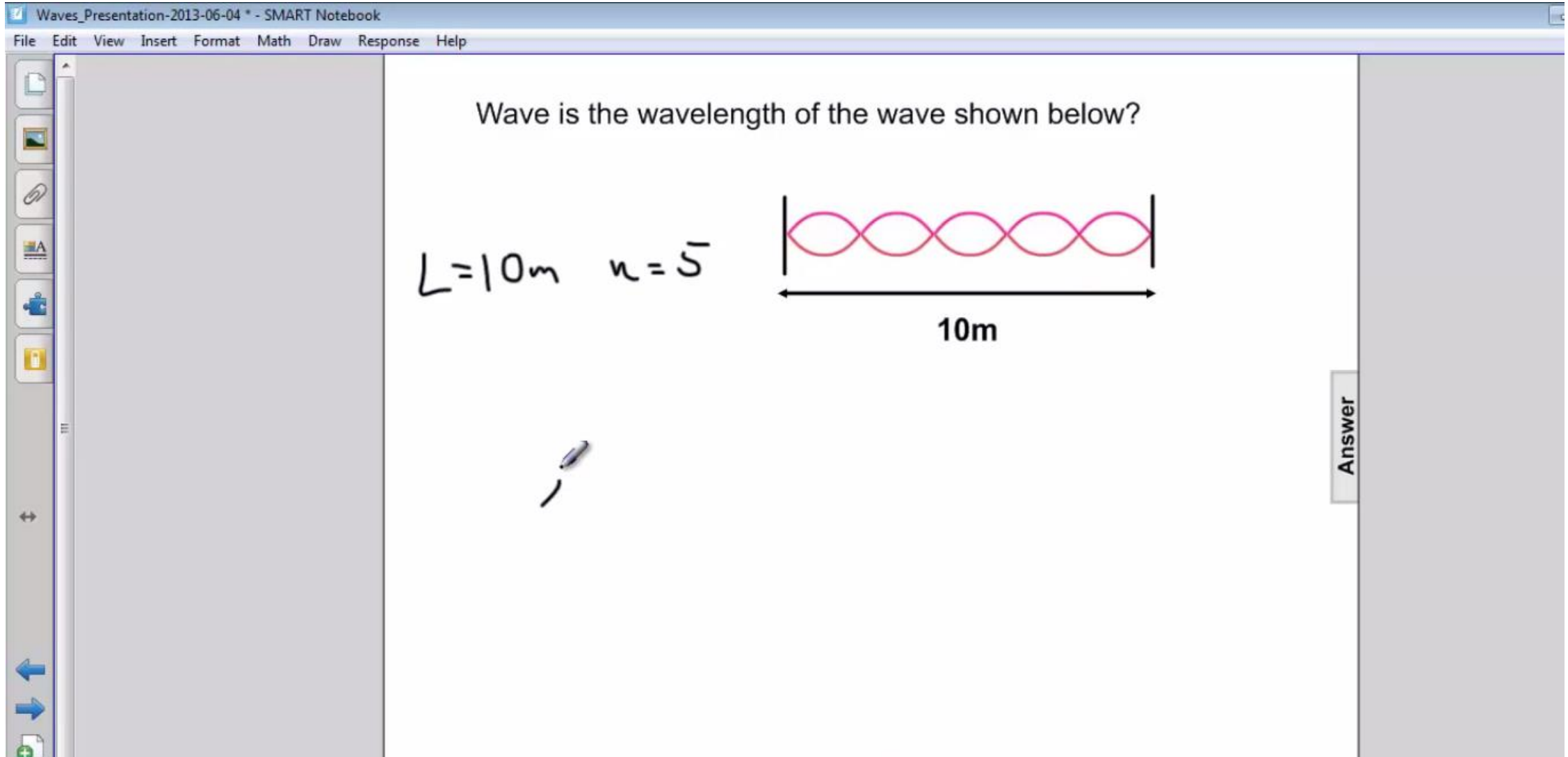

$\lambda_n =$

Answer

# Solution


PLAYLIST | 14 / 16 Waves - Standing Waves Q09
File Edit View Insert Format Math Draw Response Help
Wave is the wavelength of the wave shown below?
L = 5m
n = 4
5m
$\lambda_n = \frac{2L}{n} = \frac{2(5m)}{4} = 2.5m$
Answer
Extend Page
0:25 / 0:26

# Problem


Waves_Presentation-2013-06-04 * - SMART Notebook
File Edit View Insert Format Math Draw Response Help
Wave is the wavelength of the wave shown below?
L=10m n=5
10m
Answer

# Problem

ntation-2013-06-04 * - SMART Notebook

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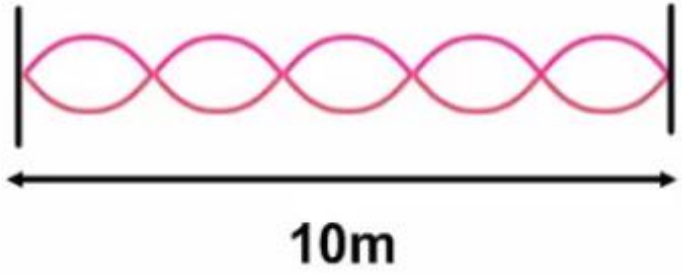
If the speed of the wave is 8m/s, what is the frequency of this wave?

$\lambda = 4m \quad v = 8 \frac{m}{s}$




Answer

# Problem

n-2013-06-04 * - SMART Notebook

ert Format Math Draw Response Help

What is the result at an oscillating point if two waves reach this point two full wavelengths apart?

A Constructive interference

B Destructive interference

C Partially destructive interference

Answer