

PHYS 2C

Discussion Section – 1/15

TA: Bharat Kambalur

Email: bkambalu@ucsd.edu

Before we Begin:

- Try and **sit next to a student you don't know**
- Introduce yourselves and find out where the other student is from
- We will work through 3 Problems today,
in groups of two students first and then discuss the solution

Discussion Problem 1

Buoyancy – Iceberg Problem

What fraction of the volume of an Iceberg ($\rho_{iceberg} = 917 \text{ kg/m}^3$) would be visible if the iceberg floats in:

- a) The Ocean (Saltwater, $\rho_{saltwater} = 1024 \text{ kg/m}^3$)
- b) A River (Fresh water, $\rho_{freshwater} = 998 \text{ kg/m}^3$)

Give your answer as a percentage of the total volume of the iceberg

Note: When saltwater freezes to form ice, the salt is excluded. So, an iceberg is made up of (mostly) freshwater.

Discussion Problem 1 - Solution

Buoyancy – Iceberg Problem

What fraction of the volume of an Iceberg ($\rho_{iceberg} = 917 \text{ kg/m}^3$) would be visible if the iceberg floats in:

a) The Ocean (Saltwater, $\rho_{saltwater} = 1024 \text{ kg/m}^3$)

10.4%

b) A River (Fresh water, $\rho_{freshwater} = 998 \text{ kg/m}^3$)

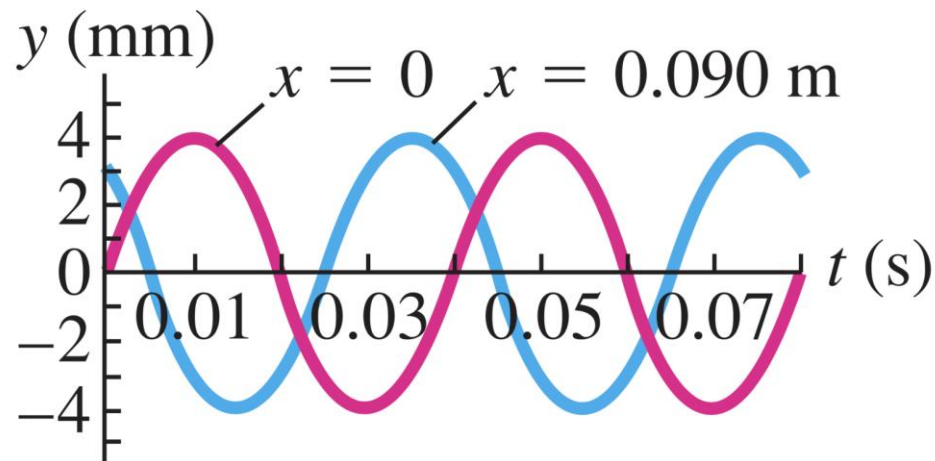
8.1%

Give your answer as a percentage of the total volume of the iceberg

Discussion Problem 2 – Part 1

Sinusoidal Wave (Past Practice Exam Question)

A sinusoidal wave is propagating along a stretched string that lies along the x -axis. The displacement of the string as a function of time is graphed below for particles at $x = 0$ and at $x = 0.090$ m:

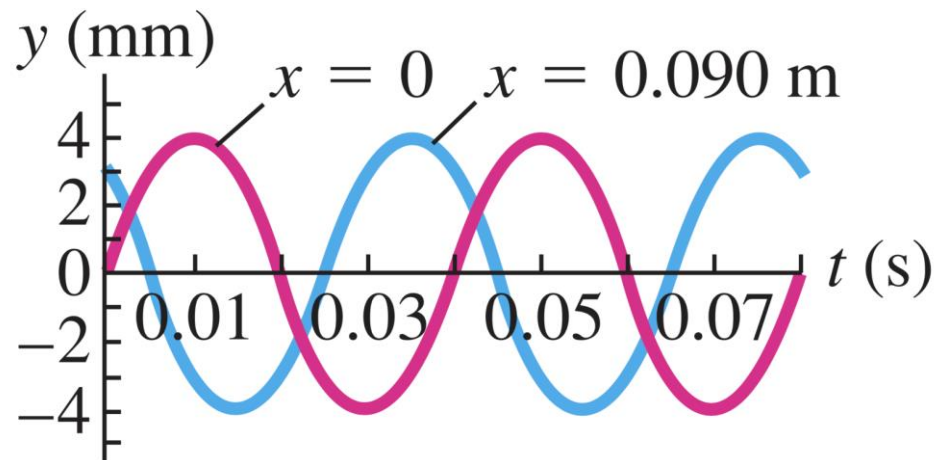


(a) What is the amplitude of the wave? What is the period of the wave?

Discussion Problem 2 – Part 1- Solution

Sinusoidal Wave (Past Practice Exam Question)

A sinusoidal wave is propagating along a stretched string that lies along the x -axis. The displacement of the string as a function of time is graphed below for particles at $x = 0$ and at $x = 0.090$ m:



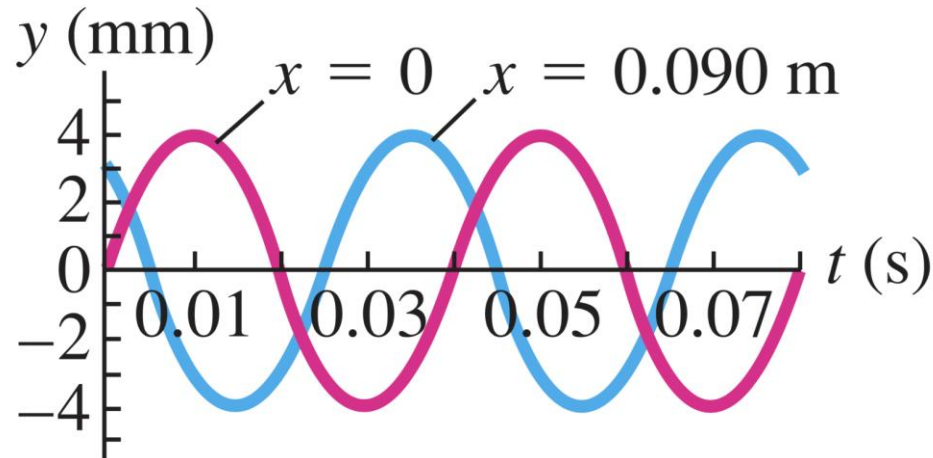
- (a) What is the amplitude of the wave? What is the period of the wave?

$A = 4\text{mm}$

$T = 0.04\text{s}$

Discussion Problem 2 – Part 2

Sinusoidal Wave (Past Practice Exam Question)

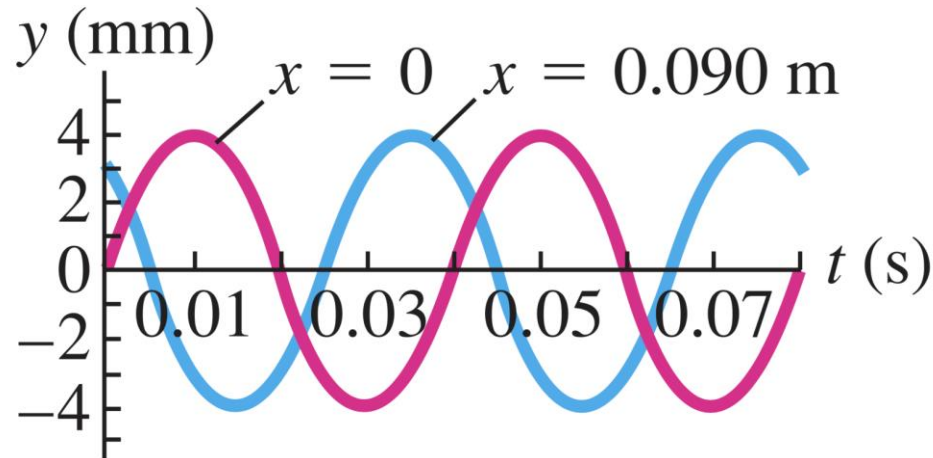


(b) You are told that the two points $x = 0$ and $x = 0.0900 \text{ m}$ are within one wavelength of each other. If the wave is moving in the $-\hat{x}$ direction, determine the wavelength and the wave speed.

(c) Give an equation $y(x; t)$ for this wave valid for all x and all t . Have your equation be of the form $y(x, t) = A \sin(kx \pm \omega t + \phi_0)$, where the phase $\phi_0 \in [0, 2\pi)$

Discussion Problem 2 – Part 2 - Solution

Sinusoidal Wave (Past Practice Exam Question)



(b) You are told that the two points $x = 0$ and $x = 0.0900$ m are within one wavelength of each other. If the wave is moving in the $-\hat{x}$ direction, determine the wavelength and the wave speed (in SI Units).

$$\lambda = 0.24 \text{ m and } v = 6 \text{ m/s}$$

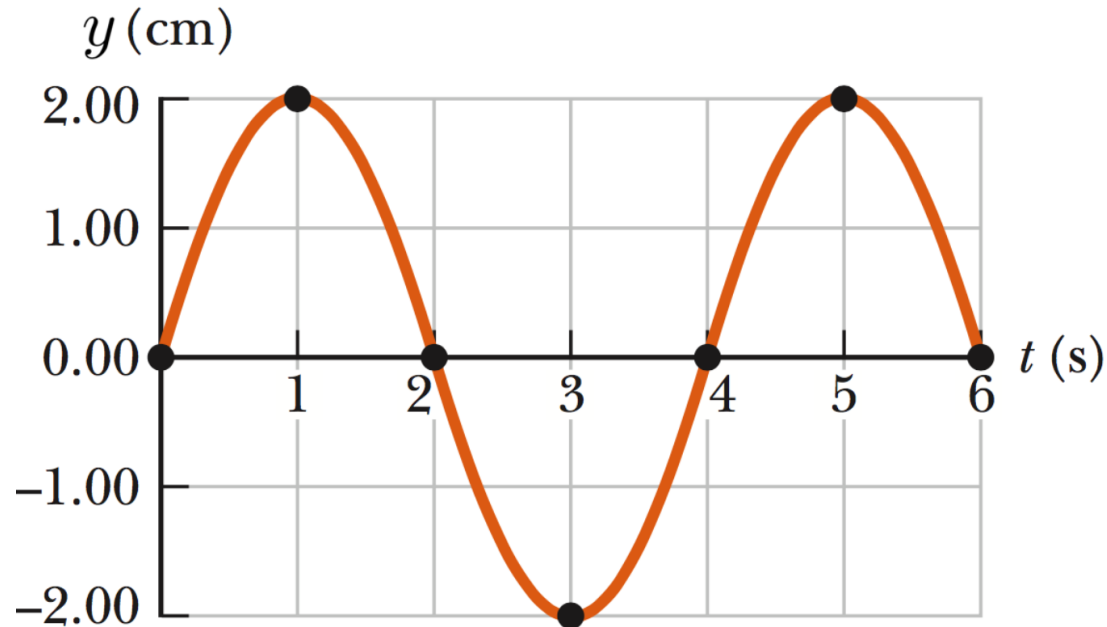
(c) Give an equation $y(x; t)$ for this wave valid for all x and all t . Have your equation be of the form $y(x, t) = A \sin(kx \pm \omega t + \phi_0)$, where the phase $\phi_0 \in [0, 2\pi)$

$$y(x, t) = (4 \text{ mm}) \sin \left[\left(\frac{25\pi}{3} \frac{\text{rad}}{\text{m}} \right) x + \left(50\pi \frac{\text{rad}}{\text{s}} \right) t \right]$$

Discussion Problem 3

Maximum particle speed in a particle

The figure below shows the maximum displacement $y(x=0, t)$ for a transverse wave on a string. To one significant figure, what is the maximum speed that particles on the string move?

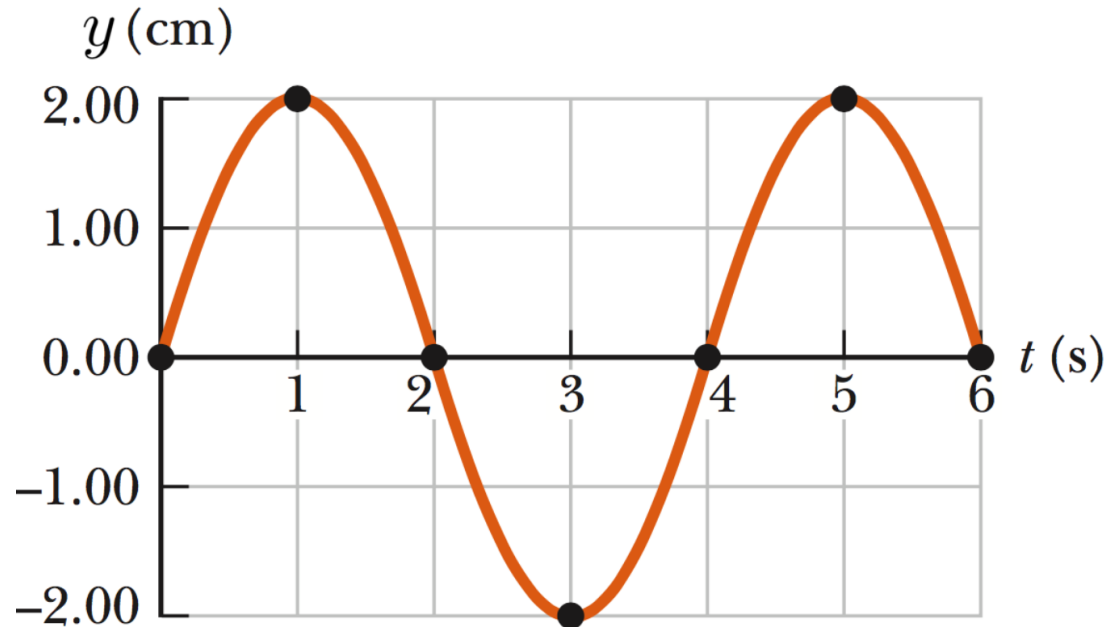


- a) 1cm/s
- b) 2cm/s
- c) 3cm/s
- d) 4cm/s
- e) 5cm/s

Discussion Problem 3 - Solution

Maximum particle speed in a particle

The figure below shows the maximum displacement $y(x=0, t)$ for a transverse wave on a string. To one significant figure, what is the maximum speed that particles on the string move?



- a) 1cm/s
- b) 2cm/s
- c) 3cm/s**
- d) 4cm/s
- e) 5cm/s