Physics 4A
Fall 2025

Name _____

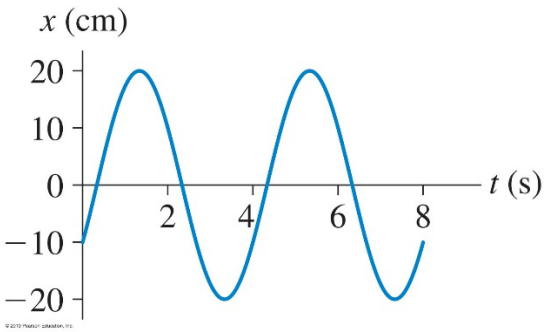
Lab: 8:00 am 11:20 am 2:40 pm (circle one)

Quiz #10: Oscillations

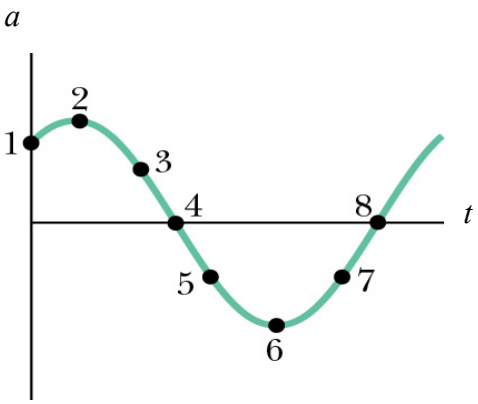
Problem 1 (1.5 points)
A simple pendulum of length L and mass M has frequency f. To increase its frequency to 2f:

a) increase its length to 4L
b) increase its length to 2L
c) decrease its length to L/2
d) decrease its length to L/4
e) none of the above

Problem 2 (1.5 points)
The figure below is the position versus time graph for an object undergoing simple harmonic motion. What is the phase constant? *Justify your answer.*



Problem 3 (3 points)
The acceleration *a*(t) of a particle undergoing SHM is graphed in the figure below. **(a)** Which of the labeled points corresponds to the particle at -A? **(b)** At point 5, is the velocity of the particle positive, negative, or zero? **(c)** At point 7, is the particle at -A, at +A, at 0, between -A and 0, or between 0 and +A?



a)

b)

c)

Problem 4 (4 points)
A 525 g mass is attached to a horizontal spring (k = 175 N/m) on a frictionless surface. It is at rest at the equilibrium position. At t = 0 s, the mass is struck by a hammer, which gives it an initial speed of 2.75 m/s. Determine **(a)** the frequency of motion, **(b)** the amplitude, **(c)** the maximum acceleration, and **(d)** the total energy.