

Name \_\_\_\_\_

PHY2048C, Practice Quiz 5

**A- Read all the quiz once, or twice, before beginning to write. Make sure to comprehend all questions and start with those you feel most confident in.**

**B – Be clear and concise. There are no extra points for being verbose or writing extra.**

**C –Only use the white pages that I will provide. You have 60 minutes to answer the quiz.**

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**Problem 1**

A simple harmonic oscillator ( $k = 3 \text{ N/m}$ ) starts at  $t=0$  with a position of  $x = 10\text{m}$  and a velocity of  $2 \text{ cm/s}$ . What is the amplitude of the oscillator?

**Problem 2**

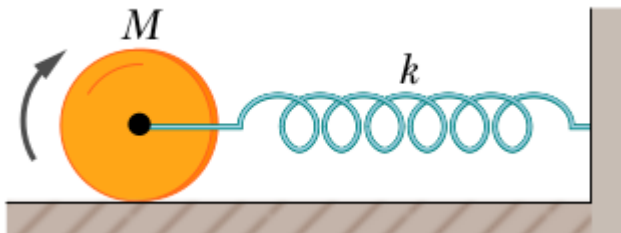
A damped oscillator with  $k=10 \text{ N/m}$  and  $\gamma = 2 \text{ N s/m}$  is released at  $x = 1\text{m}$ . In what time does it lose 50% of its energy?

**Problem 3**

Mr. Wu earned 40 cents from every magazine he sold. He earned an extra \$3 for every 30 magazines sold. How many magazines did he sell if he earned \$450 altogether?

**Problem 4 (Extra)**

In the figure, a solid cylinder attached to a horizontal spring ( $k = 3.00 \text{ N/m}$ ) rolls without slipping along a horizontal surface. If the system is released from rest when the spring is stretched by  $0.250 \text{ m}$ , find (a) the translational kinetic energy and (b) the rotational kinetic energy of the cylinder as it passes through the equilibrium position.



Key Concept from Ch 9 and 13:

- (a) Damped and Driven Oscillators equations of motion ( $F=ma$ )
- (b) Energy of an oscillator
- (c) Solutions to the harmonic oscillator problem (complex exponential and trigonometric functions)
- (d) Period and amplitude of an oscillator. Maximum velocity of an oscillator.