

# PHYS 3200 - Fall 2025

## End of Topic Quiz 3

October 2nd, 2025

Name and ID #:

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### Instructions:

1. You may use:
  - A calculator that has no internet connection, and no stored reference material. Connecting to the internet or using reference material other than that provided on the equation sheet is cheating and you will fail the exam if you do so.
  - Notes.
  - Writing utensil: pencil and eraser are best.
2. Always start word problems with a drawing of the situation.
3. If you have a question about a problem (confused about the situation, need some missing piece of information, etc.), please raise your hand and ask!
4. Box your final answer for each part.
5. Credit will not be given if your answers are too messy or obscure to read. Remember - a grader who isn't squinting and spending extra time trying to decipher mysterious scratches is a happy grader.
6. This quiz must be turned in by the end of the class period.

1. A particle with mass,  $m$  and initial kinetic energy  $T_0$  is moving towards the right where it encounters an opposing conservative force  $F(x) = -kx + \frac{kx^3}{A^2}$  where  $k$  and  $A$  are positive constants.

(a.) Find the potential energy as a function of position.

(b.) Find the kinetic energy as a function of position.

(c.) Find the total energy as a function of position.

2. A particle of mass  $m$  is acted on by a force whose potential energy is  $U(x) = ax^2 - bx^3$ . What is the force acting on the particle?