BOĞAZİÇİ UNIVERSITY

Physics Department

Fall '26

Duration: 30 minutes

PHYL101 Applied Exam 2
AE.2: THE SIMPLE PENDULUM

Name & Surname: _____ **Student ID:** _____

Lab Section: _____ **Table #:** _____ **Date:** _____

ATTENTION: Complete this exam YOURSELF! Correct answers without valid calculations get **NO** credit. Be careful about units and significant figures. Use only a scientific calculator.

REFERENCE FORMULAS:

- Period of a pendulum: $T = 2\pi\sqrt{\frac{L}{g}}$
- Gravitational acceleration: $g = \frac{4\pi^2 L}{T^2}$
- One Period: $T = \frac{t}{10}$

Q-1) Data-Taking (2.0 pts): *Choose an initial length* ≥ 120.0 *cm. Set into oscillation (max amplitude* $< 10°$*). Measure time* t *for 10 oscillations. Repeat for 4 additional lengths.* ***Maintain 4 significant figures for all measurements!***

Length of Pendulum L **(cm)**	**Time for 10 oscillations** t **(s)**	**One Period** T **(s)**	**Acceleration** g **(cm/s^2)**

Q-2) Calculate the Average Gravitational Acceleration (1.0 pt):

Determine the average g *from all your measurements above. Write your final answer inside the box using CGS units with proper significant figures.*

Average g **=**

TOTAL SCORE

/ 6

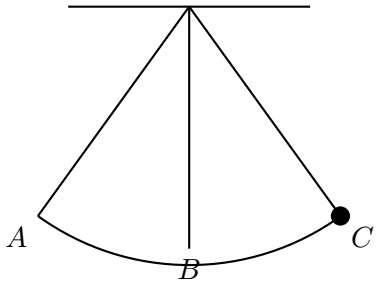
PHYL101 Applied Exam 2: THE SIMPLE PENDULUM
QUESTIONS & EXTRA CALCULATION SHEET

Spring '26

Name & Surname: _____ **Student ID:** _____
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Q-3) Compare the average g value obtained in this experiment with the standard value $g = 980.3$ cm/s^2. Calculate the percentage error (1.0 pts):

% Error =



Q-4) At what point of its swing does the ball have its maximum velocity? Maximum acceleration? (1.0 pts):

V_{max} is at point:

a_{max} is at point:

Q-5) Assume that your pendulum passes through its equilibrium point every second (1.0 pt):

(a) What is the period of this pendulum? **Period =**

(b) What must the length of this pendulum be? **Length =**

Q-6) BONUS! Extra credit (overall score cannot exceed 6) (0.5 pt):
In an experiment, the length of a pendulum is 120.0 *cm with an uncertainty of* $\Delta L = 0.1$ *cm, and the time for 10 complete oscillations is* 22.0 *s with an uncertainty of* $\Delta t = 0.2$ *s. The period is defined by* $T = t/10$*. Based on this information, calculate the absolute uncertainty in g (denoted as* Δg*) using appropriate error propagation techniques.*

$\Delta g =$

NOTE: Use the space below for your algebraic derivations and numerical calculations.
NO points will be awarded for final answers in the boxes above lacking valid supporting calculations below.

Space for Derivations & Numerical Calculations (Show all steps clearly):