Lab Exam Prep – 2026

NAME:
SID:

QUESTION ONE (40 marks)

The table below presents the results from an experiment to determine the force constant of a spring. Use these results to plot a graph with T^2 on the y-axis and mass on the x-axis. The quality of your work will be judged on the following criteria:

- Informative graph title **(10)**
- Correctly labelled axes, with units **(6)**
- Well chosen axes scales, filling whole page without using awkward multiples **(6)**
- Points drawn in correctly, appropriate size of points **(4)**
- Line drawn correctly, nestled in midst of points, not necessarily exactly through origin **(4)**
- Calculation of slope **(10)**

Slope =

mass(kg)	T(s)	$T^2(s^2)$
0.400	0.352	0.124
0.600	0.415	0.172
0.800	0.469	0.220
1.000	0.516	0.266
1.200	0.559	0.312
1.400	0.600	0.357
1.600	0.635	0.403

QUESTION TWO (20 marks)

Perform the following unit conversions:

97mm converted into metres = (5 marks)

$23cm^3$ converted into Litres = (5 marks)

181g converted into kg = (5 marks)

$1050cm^2$ converted into m^2 = (5 marks)

QUESTION THREE **(20 marks)**

Make ONE pair of measurements from the Spring Constant experiment for mass and extension. Substitute these into the equation below to yield a value for the spring constant.

$$\mathbf{F = mg = ke}$$

where g = 9.81ms^{-2} and e is the elongation (change in length with and without load mass, m)

initial length (m) =	mass = 0.500kg
final length (m) =	mass = 0.700kg
extension (m) =	
value for k(N/m) =	

QUESTION FOUR **(20 marks)**

Make ONE pair of measurements from the Simple Pendulum experiment. In determining the periodic time, measure the time for 20 oscillations and divide by 20 to determine the periodic time. Substitute these into the equation below to yield a value for 'g', the acceleration due to Earth's gravity.

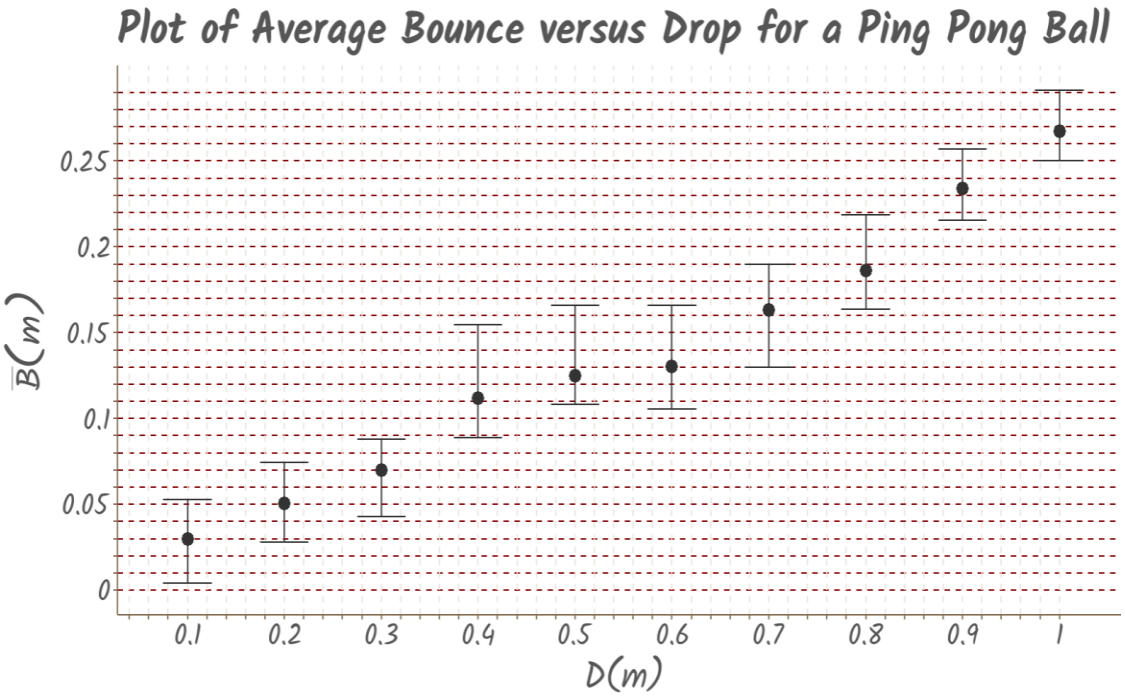
$$\mathbf{T^2 = 4\pi^2 L/g}$$

where T is the time for one oscillation and L is the pendulum length.

T(s) =
L(m) =
value for g(m/s^2) =

QUESTION FIVE **(25 marks)**

From the graph below, draw best fit, maximum slope, and minimum slope lines. Calculate the slopes of all three lines and use these three slopes to calculate the best value for COR, the COR_{max}, and the COR_{min} using the equation: $COR = \sqrt{slope}$



QUESTION SIX **(10 marks)**

A graph of velocity versus radius squared for the experiment on viscosity produces a slope of 5620 $m^{-1}s^{-1}$. Use the equation $v = \frac{2}{9}\frac{g(\rho-\sigma)}{\eta}r^2$ and this slope to find the viscosity, η. ρ = 7800kg/m^3, σ = 1800kg/m^3, and g = 9.81m/s^2.

QUESTION SEVEN (30 marks)

Drop the table tennis ball from a height of at 1.5m. Record the bounce height. Repeat this five times. Take an average. Use the equation for coefficient of restitution to calculate the COR.

Drop Height (m)	$Bounce_1$(m)	B_2(m)	B_3(m)	B_4(m)	B_5(m)	Average(m)

Calculation of COR using:

$$COR = \sqrt{\frac{bounce\ height}{drop\ height}}$$

QUESTION EIGHT (20 marks)

Focal Length of a Lens Experiment – light source and screen

Set the apparatus up with the light source, lens, and screen all lined up. Focus the image on the screen. You are required to adjust the position of the lens and of the screen to get the image in sharp focus. At that point call the supervisor over to verify the set-up and to check the first box below. Then carry out the subsequent measurements and calculation. All measurements and results must be quoted in centimetres.

Image in focus: (5 marks)

Value for u: **27.0cm** Value for v: (5 marks)

Calculation of focal length (use 1/f = 1/u + 1/v), f:

(10 marks)