KEY

First Name:_____ Last Name:_____

L08 – FQ – Centripetal Acceleration and Force

Use the following information to answer Q1-Q3:

A rubber stopper of mass 0.05kg is attached to a string and swung around in a horizontal circle of radius 0.5m. The speed of the stopper is 1.5 m/s.

Q1: The rotational frequency of the rubber stopper is ____ Hz.

*(Record your **three digit** answer in the Numerical Response boxes below)*

0	.	4	8

$m = 0.05kg$
$r = 0.5m$
$v = 1.5 m/s$
$T = ?$
$f = ?$

$v = \frac{2\pi r}{T}$

$T = \frac{2\pi r}{v} = \frac{2\pi(0.5)}{(1.5)} = 2.094395\ldots s$

$f = \frac{1}{T} = \frac{1}{2.094\ldots} = 0.477\ Hz$

$f \approx 0.48\ Hz$

Q2: The centripetal acceleration of the rubber stopper is

a. 1.13 m/s^2
b. 2.25 m/s^2
c. 4.50 m/s^2
d. 6.00 m/s^2

$a_c = \frac{v^2}{r} = \frac{(1.5\ m/s)^2}{(0.5\ m)} = 4.5\ m/s^2$

Q3: The centripetal force acting on the rubber stopper is ***a.bc*** x 10^{-d} N, where ***a, b, c,*** and ***d*** are ___, ___, ___, and ___.

*(Record your **four digit** answer in the Numerical Response boxes below)*

2	2	5	1

$F_c = ma_c$
$= (0.05)(4.5)$
$= 0.225\ N$
$\approx 2.25 \times 10^{-1}\ N$

or

$F_c = \frac{mv^2}{r} = \frac{(0.05)(1.5)^2}{(0.5)}$
$= 0.225 N$

[redacted] KEY [redacted]

MARKING:

Beginning	0.0 – 1.0
Progressing	1.5 – 2.0
Competent	2.5
Exemplary	3.0