

First Name: _____

Last Name: _____

L13 - FQ - Pendulums

Q1: If a grandfather clock has a pendulum arm of length of 0.8m, what is its period?

- a. 0.56 s
- b. 1.25 s
- c. 1.79 s**
- d. 22.0 s

$$T = 2\pi\sqrt{\frac{L}{g}} = 2\pi\sqrt{\frac{0.8}{9.81}}$$

$$T = 1.79s$$

Use the following information to answer Q2:

An astronaut of mass 75kg wants to find out the gravitational field strength of a mysterious planet. She creates a pendulum of length 1m and discovers that the period is 6 seconds.

Q2: The gravitational field strength on the surface of the planet is ____ N/kg.

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

1	.	1	0
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$$T = 2\pi\sqrt{\frac{L}{g}}$$

$$6 = 2\pi\sqrt{\frac{1}{g}}$$

$$0.95493 = \sqrt{\frac{1}{g}}$$

$$0.91189 = \frac{1}{g}$$

$$g(0.91189) = 1$$

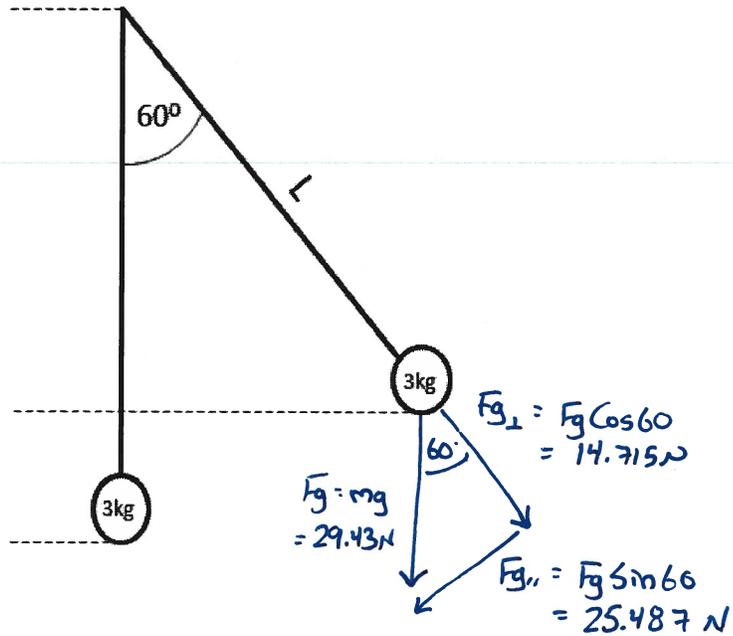
$$g = 1.0966 \text{ N/kg}$$

$$g \approx 1.10 \text{ N/kg}$$

Use the following information to answer Q3-Q4:

A 3.00 kg pendulum bob is attached to a string of unknown length. The string is raised 60.0° from the vertical and released. The period of the pendulum is measured to be 8.00 seconds.

NOTE: Diagram is *not* drawn to scale.



Q3: What is the restoring force experienced by the pendulum bob when it is initially released?

- a. 1.50 N
- b. 2.60 N
- c. 14.72 N
- d. 25.49 N

KEY

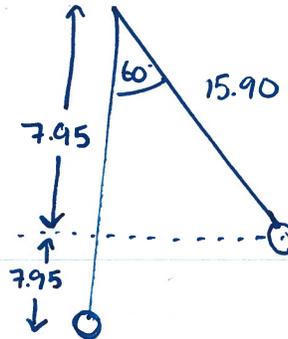
Q4: What is the maximum speed of the pendulum bob while oscillating? (3 marks)

$$T = 2\pi \sqrt{\frac{L}{g}}$$

$$8 = 2\pi \sqrt{\frac{L}{9.81}}$$

$$1.6211 = \frac{L}{9.81}$$

$$L = 15.90 \text{ m}$$



$$E_p \rightarrow E_k$$

$$mgh = \frac{1}{2}mv^2$$

$$(9.81)(7.95) = \frac{1}{2}v^2$$

$$v^2 = 155.979$$

$$v = 12.5 \text{ m/s}$$

MARKING:

Beginning	0	-	2.5
Progressing	3	-	4
Competent	4.5	-	5
Exemplary	5.5	-	6