

Physics

Springs and Pendulums, Form: A

Name: _____

Date: _____

Period: _____

Primary Peer Reviewer: _____

+1	0	-1	Σ

Section 1. Multiple Choice

For Each question, chose the best answer.

Some Formulas:

$$F_s = -kx$$

$$U_s = \frac{1}{2}kx^2$$

$$U_g = mgh$$

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

$$T_s = 2\pi\sqrt{\frac{m}{k}}$$

$$T_p = 2\pi\sqrt{\frac{l}{g}}$$

- Which is the best definition of the spring constant (k)?
 - A quantity that measures how stiff a spring is.
 - Energy stored in a spring.
 - 9.81 m/s².
 - A quantity that measures how fast a spring is moving.
- Which of the following is the best definition of Elastic Potential Energy?
 - A quantity that measures how stiff a spring is.
 - Energy stored in a spring.
 - 9.81 m/s².
 - A quantity that measures how fast a spring is moving.
- A spring is stretched 0.05m, and stores an elastic potential energy of 5J. If the spring were stretched 0.15m, how much elastic potential energy would the spring store?
 - 10 J
 - 15 J
 - 45 J
 - 225 J
- A pendulum is made such that it has a period of exactly 1 second. The pendulum is then sent to the planet mars ($g_{mars} = 3.711m/s^2$). What would the period of the pendulum be there?
 - 0.248 s
 - 1 s
 - 1.626 s
 - The pendulum will not swing on mars.

5. A 2 kg mass is attached to a spring, and set in oscillatory motion such that the system has a period of 1 second. If the 2 kg mass were replaced with a 4 kg mass, what would the period of the system be?
- (a) 1 second
 - (b) $\sqrt{2}$ seconds
 - (c) 2 seconds
 - (d) 4 seconds

Section 2. Free Response

6. A spring has an elastic potential energy of 20J when it is stretched a distance of 0.25m.
- (a) What is the spring constant of the spring?
 - (b) What is the force that the spring is exerting?
 - (c) A 0.2 kg mass is attached to the spring and allowed to oscillate. What is the period of oscillation?
7. A pendulum has a length of 0.5 meters. A spring has a spring constant of 45 N/m. What mass would need to be attached to the spring in order for the period of oscillation of the spring to match the period of the pendulum?

Answer Key for Exam A

Section 1. Multiple Choice

For Each question, chose the best answer.

Some Formulas:

$$F_s = -kx$$

$$U_s = \frac{1}{2}kx^2$$

$$U_g = mgh$$

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

$$T_s = 2\pi\sqrt{\frac{m}{k}}$$

$$T_p = 2\pi\sqrt{\frac{l}{g}}$$

1. Which is the best definition of the spring constant (k)?
 - (a) A quantity that measures how stiff a spring is.
 - (b) Energy stored in a spring.
 - (c) 9.81 m/s².
 - (d) A quantity that measures how fast a spring is moving.
2. Which of the following is the best definition of Elastic Potential Energy?
 - (a) A quantity that measures how stiff a spring is.
 - (b) Energy stored in a spring.
 - (c) 9.81 m/s².
 - (d) A quantity that measures how fast a spring is moving.
3. A spring is stretched 0.05m, and stores an elastic potential energy of 5J. If the spring were stretched 0.15m, how much elastic potential energy would the spring store?
 - (a) 10 J
 - (b) 15 J
 - (c) 45 J
 - (d) 225 J
4. A pendulum is made such that it has a period of exactly 1 second. The pendulum is then sent to the planet mars ($g_{mars} = 3.711m/s^2$). What would the period of the pendulum be there?
 - (a) 0.248 s
 - (b) 1 s
 - (c) 1.626 s
 - (d) The pendulum will not swing on mars.

5. A 2 kg mass is attached to a spring, and set in oscillatory motion such that the system has a period of 1 second. If the 2 kg mass were replaced with a 4 kg mass, what would the period of the system be?
- (a) 1 second
 - (b) $\sqrt{2}$ seconds
 - (c) 2 seconds
 - (d) 4 seconds

Section 2. Free Response

6. A spring has an elastic potential energy of 20J when it is stretched a distance of 0.25m.
- (a) What is the spring constant of the spring?
 - (b) What is the force that the spring is exerting?
 - (c) A 0.2 kg mass is attached to the spring and allowed to oscillate. What is the period of oscillation?
7. A pendulum has a length of 0.5 meters. A spring has a spring constant of 45 N/m. What mass would need to be attached to the spring in order for the period of oscillation of the spring to match the period of the pendulum?