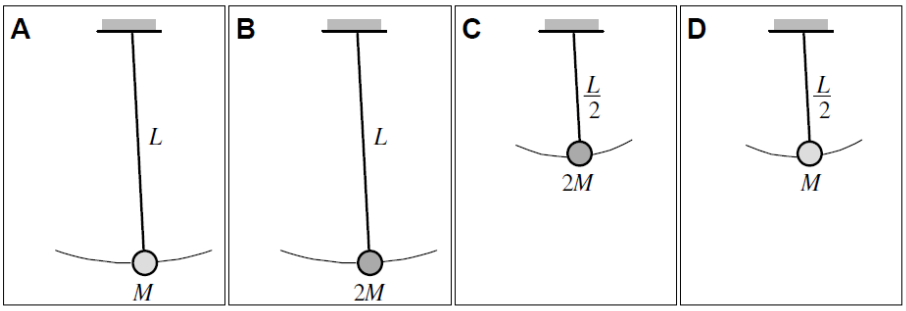
Name _____ Period _____ Date _____

Simple Harmonic Motion Worksheet

B7-RT02: SWINGING SIMPLE PENDULA—OSCILLATION FREQUENCY

The simple pendulum shown in Case A consists of a mass M attached to a massless string of length L. If the mass is pulled to one side a small distance and released, it will swing back and forth. Cases B, C, and D are variations of this system.



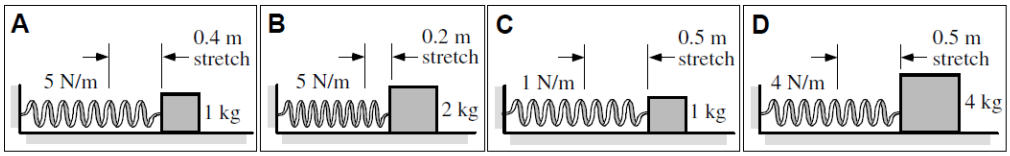
Rank the oscillation frequency of the masses.

☐ 1 Greatest ☐ 2 ☐ 3 ☐ 4 Least OR ☐ All the same ☐ Cannot determine

Explain your reasoning.

B7-RT04: MASS ON HORIZONTAL SPRING SYSTEMS II—PERIOD OF OSCILLATING MASS

A block rests on a frictionless surface and is attached to the end of a spring. The other end of the spring is attached to a wall. Four block–spring systems are considered. The springs are stretched to the right by the distances shown in the figures and then released from rest. The blocks oscillate back and forth. The mass and force constant of the spring are given for each case.

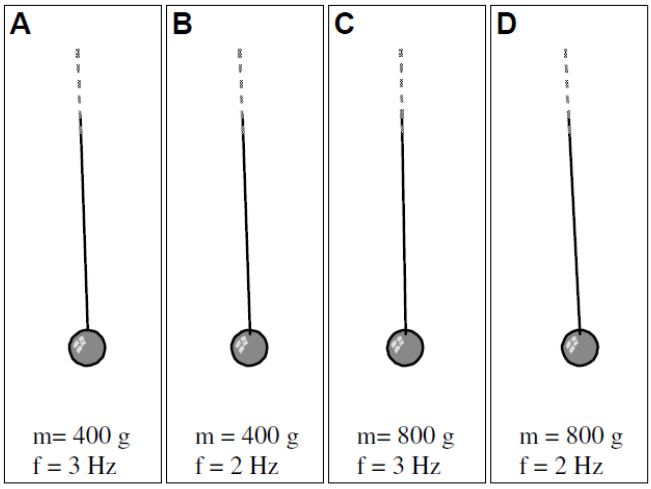


Rank the period (the time it takes the block to complete one cycle) of the oscillatory motion of the block.

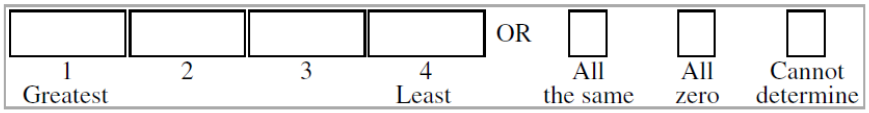
☐ 1 Greatest ☐ 2 ☐ 3 ☐ 4 Least OR ☐ All the same ☐ All zero ☐ Cannot determine

Explain your reasoning.

Metal spheres are hung on the ends of long strings. The spheres have been pulled to the side and released so that they are swinging back and forth. The mass of the sphere and the frequency of the swing are given in each case.



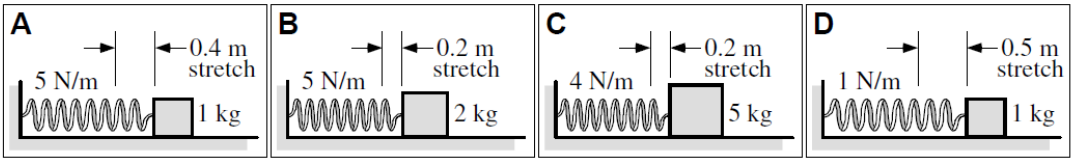
Rank the time it takes to make one complete swing.



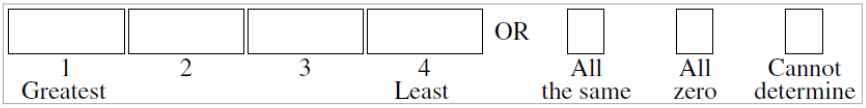
Explain your reasoning.

B7-RT01: Mass on Horizontal Spring Systems I—Oscillation Frequency

A block rests on a frictionless surface and is attached to the end of a spring. The other end of the spring is attached to a wall. Four block–spring systems are considered. The springs are stretched to the right by the distances shown in the figures and then released from rest. The blocks oscillate back and forth. The mass and force constant of the spring are given for each case.



Rank the frequency of the oscillatory motion of the block.



Explain your reasoning.

1. A pinball machine uses a spring that is compressed 4.0 cm to launch a ball. If the spring constant is 13 N/m, what is the force on the ball at the moment the spring is released?

2. A child swings on a playground with a 2.5m long chain.

a) What is the period of the child's motion
b) What is the frequency of vibration?

3. A 0.75 kg mass is attached to a vertical springs stretches the spring 0.3m.

a) What is the spring constant?
b) The mass-spring system is now placed on a horizontal surface and set vibrating. What is the period of the vibration?

4. A 0.250 kg mass attached to the end of a spring complete one oscillation every 1.5 s. Find the spring constant.

5. Ganymede, the largest of Jupiter's moons, is also the largest satellite in the solar system. Find the acceleration of gravity on Ganymede if a simple pendulum with a length of 1.00 m as a period of 10.5 seconds on the surface.

6. In 1986, a 35,000 kg watch was demonstrated in Canada. Suppose this watch is placed on a huge trailer that rests on a lightweight platform, and the oscillations equal to 0.71 Hz are induced. Find the trailer's mass if the platform acts like a spring scale with spring constant equal to 1.0×10^6 N/m.

7. The largest meteorite of lunar origin reportedly has a mass of 19 grams. If the meteorite is placed on a scale whose spring constant is 83 N/m, what is the compression of the spring?