Research question: How is mechanical energy conserve in an oscillating spring-mass system?

Introduction:

When a body of mass m is suspended on a coil spring with spring constant k, and if the spring is stretched or compressed from its equilibrium position through a displacement s, the spring exerts on the body a force that is proportional to the displacement and given by Hooke's law:

$$F = -ks \text{ which magnutide is } F = ks$$

We call F a restoring force. The negative sign indicates that the force direction is opposite to the direction of the displacement. If the spring is hung vertically, when the body is stationary, according to Newton's First Law we know that

$$F = mg$$

So when we combine equation (1) and (2), we get:

$$ks = mg$$

The material that I need for this experiment shows as follow.

Material: spring mass system (which include different kinds of mass, spring and sticks), accelerometer.