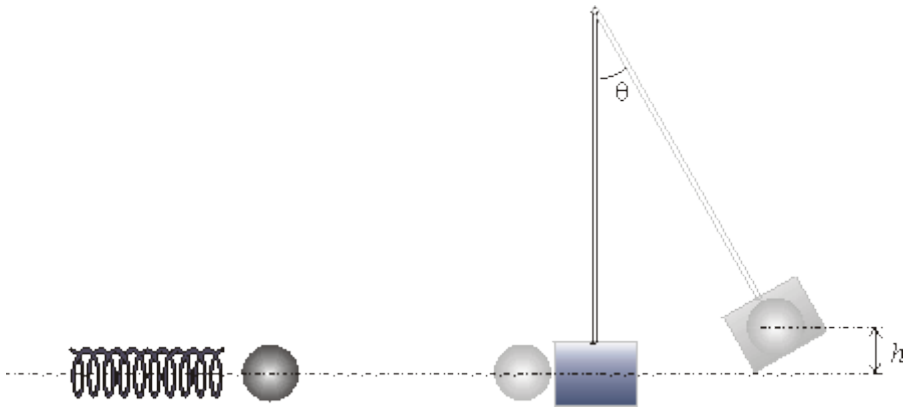
EXPERIMENTAL EXAMINATION

Experimental problem

Finding the functional relationship between physical quantities.

INTRODUCTION: A spring compressed by *x* launches a sphere. A ballistic pendulum catches it and rises to height *h*.



Assume the relation between *h* and *x* has the form:

$h = Ax^n$ (1)

Here *n* is an integer and A an unknown constant.

AIMS: Verify relation (1) experimentally and determine *n* and A.

APPARATUS: A spring lies along a shaft supported by two uprights on a wooden base. Pulling a rod compresses the spring, which a latch holds in place. A sphere is placed at the end of the spring shaft. The ballistic pendulum consists of a light rod with a cup at its lower end to catch the sphere. An upper pivot carries a protractor and movable pointer to measure deflection from the vertical. A millimetre ruler is provided.

PROCEDURE:

1. Before taking systematic measurements,
   we recommend:
   * familiarise yourself with the apparatus and measurement method.
   * check that the sphere and cup are aligned.
   * take care not to detach the protractor or angular scale from the apparatus.

2. Compress the spring and secure its holder in a notch.

3. Use the paper strip beneath the spring and the pointer to find the compression in each case.
4. Measure the deflection angle θ with the protractor and deduce h.

EXERCISES:

1. Tabulate values of x, θ, h and their uncertainties. Use the first 6 notches.
2. Plot suitable graphs to check the proposed relation (1) and use them to find n and A. Estimate the uncertainty in A.

3. From these results, write the relation between h and x obtained in your experiment.

Note: State how you estimated or obtained each variable uncertainty.