

DISCUSSION:

Archimedes developed an experiment to determine the density of an unknown mass around 250BC. In the following experiment, you are asked to create a similar type of experiment but rather than determining the density of the mass you will determine the density of the fluid.

THE EXPERIMENT:

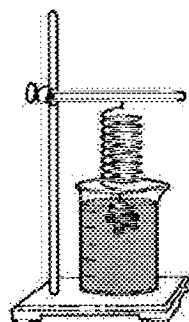
In the laboratory, you are given a cylindrical beaker containing a fluid and you are asked to determine the density ρ of the fluid. You are to use a spring of negligible mass and unknown spring constant k attached to a stand. A regularly shaped object of known mass m and density $D \gg \rho$ hangs from the spring. Please check any of the following you have chosen to use in addition to the given materials.

___ Stopwatches

___ Rulers

___ String

1. Explain how you could experimentally determine the spring constant k .



2. The spring-object system is now arranged so that the object (but none of the spring) is immersed in the unknown fluid, as shown above. Describe any changes that are observed in the spring-object system and explain why they occur.
3. Explain how you could experimentally determine the density of the fluid.
4. Show explicitly, using equations, how you will use your measurements to calculate the fluid density ρ . Start by identifying any symbols you use in your equations.

ANALYSIS:

In addition to any necessary data, measurements and calculations from the experiment itself, include the following in your lab report.

1. Determine the spring constant, k .
2. Perform your experiment just as you described and determine the density of your fluid.
3. How would you change your experiment based on your observations of your group and others?