Measurement of the density of solids

Practical question — PH3 2013 Task A1

Total	/8

INSTRUCTIONS

Candidates will make measurements on glass marbles.

Test 1

- 5 × marbles
- 2 blocks of wood of sufficient length to accommodate 5 marbles placed side by side
- 1 × ruler with 1 mm scale, e.g. 1/2 metre ruler (± 1 mm)
- Card with the mean mass of a marble ± 0.2 g given. Card should be worded:
- Mean mass of marble = x.x ± 0.2 g*

* Determine by weighing a set of 5 marbles

Test 2

The apparatus is as for Test 1 except that steel ball bearings should be used instead of marbles.

TASK A1

Your task is to determine a value for the density of a glass marble.

1. Determine the mean **radius**, r, of the marbles. [2]

2. Calculate the **percentage** uncertainty in your answer. [2]

3. Calculate the mean volume of a marble along with its **percentage** uncertainty. [2]

4. Use the information on the mean mass of a marble to calculate the density of the glass from which the marbles are made. State your results along with its **absolute** uncertainty. [2]

MARK SCHEME

Question		Marks available
1.	Diameter of greater than 4 marbles measured (1) Average diameter correctly calculated with unit (1)	2
2.	Resolution = ± 1 mm (accept 0.5 mm) (1) % uncertainty calculated correctly (1) Allow e.c.f. from **1.**	2
3.	Volume correct with unit (1) % uncertainty = 3×**2.** (1) e.c.f.	2
4.	Density correct with unit (1) allow e.c.f. from **3.** Absolute uncertainty correct (1) allow e.c.f. from **3.**	2