**Density of aluminium s.h.c. cylinder**

A student attempts to measure the density of an aluminium cylinder, which is designed for measuring the specific heat capacity of aluminium.

Using Vernier Callipers, she measures the height of the cylinder to be 85.20 mm. Why is this result recorded to two decimal places, even though the second one is zero?

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She now takes two more readings and obtains the same result again. What is the absolute uncertainty in this reading?

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Calculate the percentage uncertainty in this measurement.

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The student now measures the diameter of the cylinder and obtains three readings of 75.32 mm, 75.34 mm and 75.52 mm. Calculate the average diameter and estimate the uncertainty in this reading. Use these values to calculate the percentage uncertainty in this measurement.

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Before attempting to calculate the volume of the cylinder, convert these measurements into a height and radius, both in metres.

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Use the formula V = π r2 h to calculate the volume of the cylinder in m3.

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What is the total percentage uncertainty in this measurement? (Hint: look at above formula.)

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Use this percentage uncertainty to calculate the absolute uncertainty in the volume of the cylinder.

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The cylinder has two small holes – one for the heater and one for the thermometer. The volume of the heater hole is 9.83 x 10-6 m3 and the percentage uncertainty in this measurement is 2.3%. Work out the absolute uncertainty in the volume of the hole.

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The volume of the thermometer hole is 3.05 x 10-6 m3 and the percentage uncertainty in this measurement is 1.2%. Work out the absolute uncertainty in the volume of this hole.

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Compare the absolute uncertainties of the volume of the cylinder and the 2 holes. From these measurements, decide whether we need to worry about the uncertainties in the hole measurements.

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Now subtract the volumes of the 2 holes to find the volume of aluminium.

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The mass of the block was 1.002 kg. Calculate the density of aluminium.

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