

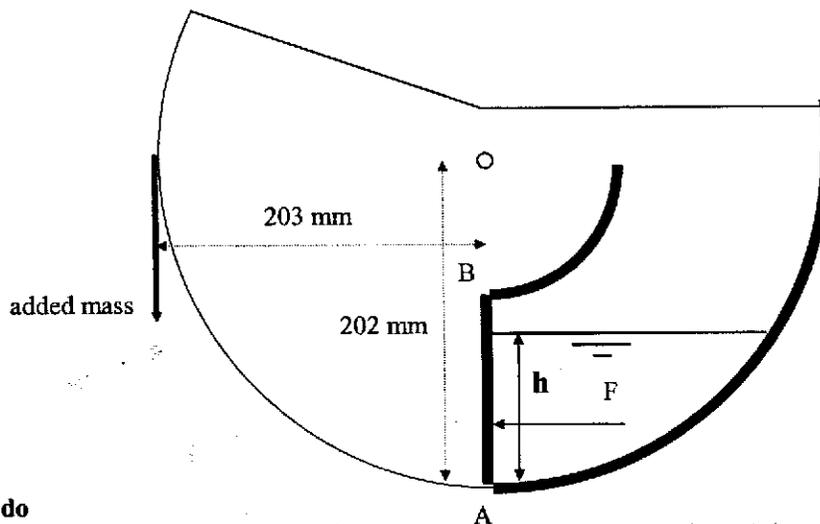
205/206BE - Lab classes

Safety Only use equipment as instructed by the academic member of staff supervising the class. Do not turn electrical power on or off at a plug socket. Be careful of any wetness on the floor, and report any spillage of water. Be careful of equipment placed on the floor.

This sheet explains what to do in the lab. The assignment (what to do with the results) will be given after the topic has been covered in the lectures. N (below) is the number in your group. For 'repeat N times' or 'for N different flows' each member of the group must take ownership of one set of results and work with them later. Some results must be presented during the lab class.

4. Hydrostatic force

The circular device is free to rock on a smooth surface. Water is added as shown, and the hydrostatic force on the vertical surface AB exerts a clockwise moment. Mass is added as shown to restore to the original position (AB vertical).



What to do

Start with no water in the container. Add mass to the hanger so that AB is vertical. Add water as shown, measure h, and record the mass added to restore the position. Study N water surface levels below B and N levels above B.

Things to think about

The water also exerts a force on the curved (bottom) surface. Does that exert a moment about the centre?

Other data Width of water container 75 mm.

5. Weir

$$Q = C_d \frac{2}{3} \sqrt{2g} b H^{1.5}$$

Q is flow-rate (m³/s), H is height of water surface above the weir crest, b is width of notch, 50 mm

What to do Measure the flow-rate by timing the volume entering the collection tank. The volume in the collection tank is indicated by the tube at the front of the equipment. Measure the height of the water surface above the weir crest. Determine C_d. **Carry out the calculations and present the answer in the lab.**

Other data Width of weir notch 50 mm.

6. Pipe friction

What to do

Mark the level of water in the vertical perspex tube when there is no flow.

For N different flows (adjusted using the valve):

mark the level of water in the vertical perspex tube (and measure the distance below the mark for no flow) measure the flow-rate

Flow measurement: With a small amount of water in the measuring tank (but flow diverted away from it) set the point gauge to zero at the water level. Divert the water into the measuring tank for a timed period, then divert away. When the water has settled, measure the new water level with the point gauge. Let water out of the tank using the outlet valve.

Other data Diameter of pipe 56.5 mm; plan area of flow measurement tank 755 mm by 600 mm.

Time 30secs Original height 148.5 cm
length of pipe 8.77

ΔH