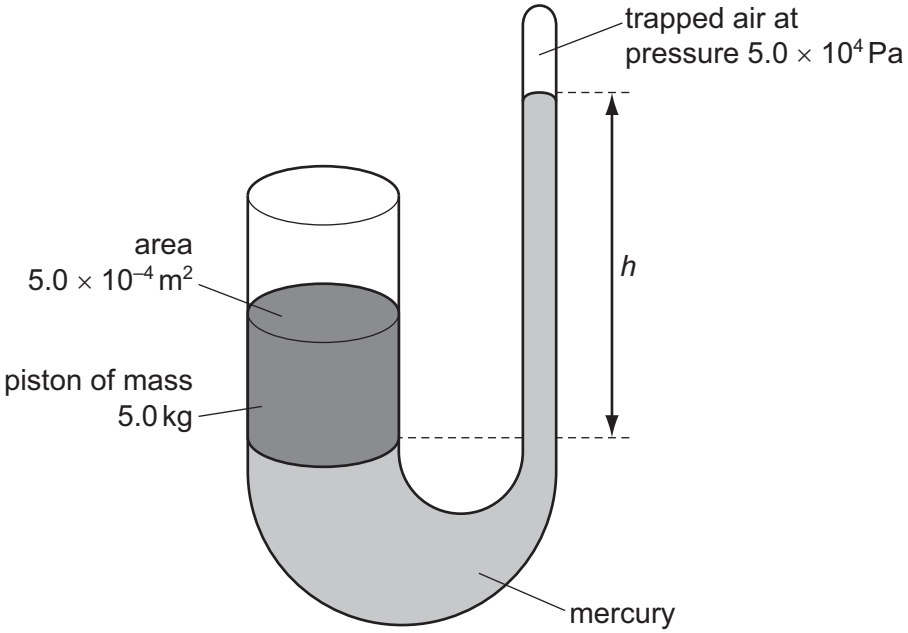
19 A U-tube closed at one end contains mercury. Air at a pressure of 5.0×10^4 Pa is trapped at the closed end. The other end is open to the atmosphere and is fitted with a piston of mass 5.0 kg and cross-sectional area 5.0×10^{-4} m^2.

The density of mercury is 13 600 kg m^{-3} and atmospheric pressure is 1.01×10^5 Pa.



What is the height h of the mercury column?

A 37 cm **B** 44 cm **C** 74 cm **D** 110 cm

20 A known tensile force acts on a wire. The wire does not exceed its elastic limit.

Which two measurements enable the strain of the wire to be calculated?

A the unstretched length of the wire and the cross-sectional area of the wire

B the unstretched length of the wire and the extension of the wire

C the Young modulus of the wire's material and the extension of the wire

D the Young modulus of the wire's material and the unstretched length of the wire

21 The Young modulus of steel is determined using a length of steel wire and is found to have the value E.

Another experiment is carried out using a wire of the same steel, but of half the length and half the diameter.

Which value is obtained for the Young modulus in the second experiment?

A $\frac{1}{2}E$ **B** E **C** $2E$ **D** $4E$