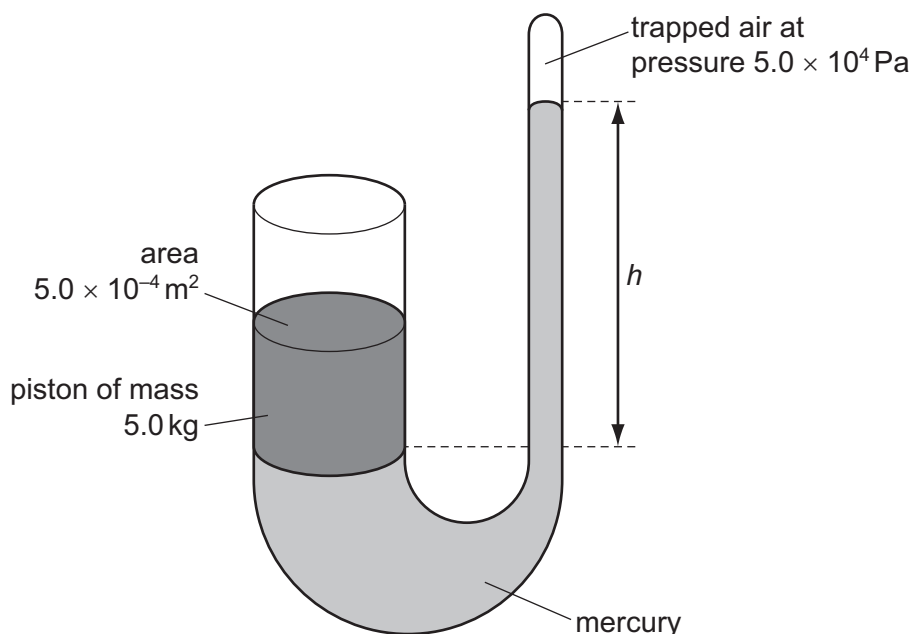


- 19 A U-tube closed at one end contains mercury. Air at a pressure of  $5.0 \times 10^4 \text{ Pa}$  is trapped at the closed end. The other end is open to the atmosphere and is fitted with a piston of mass  $5.0 \text{ kg}$  and cross-sectional area  $5.0 \times 10^{-4} \text{ m}^2$ .

The density of mercury is  $13\,600 \text{ kg m}^{-3}$  and atmospheric pressure is  $1.01 \times 10^5 \text{ Pa}$ .



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**  $4E$