4 **(a)** Define, for a wire,

(i) *stress*,

.....

..... [1]

(ii) *strain*.

.....

..... [1]

(b) A wire of length 1.70 m hangs vertically from a fixed point, as shown in Fig. 4.1.

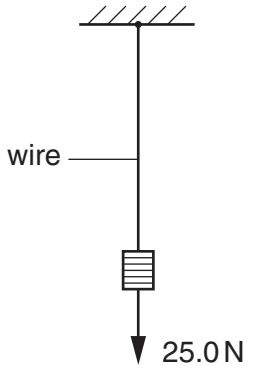

Fig. 4.1

The wire has cross-sectional area $5.74 \times 10^{-8}\,m^2$ and is made of a material that has a Young modulus of 1.60×10^{11} Pa. A load of 25.0 N is hung from the wire.

(i) Calculate the extension of the wire.

extension = ... m [3]

(ii) The same load is hung from a second wire of the same material. This wire is twice the length but the **same volume** as the first wire. State and explain how the extension of the second wire compares with that of the first wire.

.....

.....

..... [3]