3 (a) Define the Young modulus.


**(b)** The Young modulus of steel is  $1.9 \times 10^{11} \, \text{Pa}$ . The Young modulus of copper is  $1.2 \times 10^{11} \, \text{Pa}$ .

A steel wire and a copper wire each have the same cross-sectional area and length. The two wires are each extended by equal forces.

(i) the definition of the Young modulus to determine the ratio

extension of the copper wire extension of the steel wire

(ii) The two wires are each extended by a force. Both wires obey Hooke's law.

On Fig. 3.1, sketch a graph for each wire to show the variation with extension of the force.

Label the line for steel with the letter **S** and the line for copper with the letter **C**.

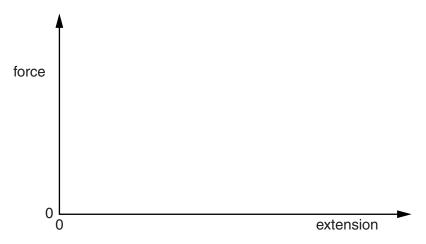


Fig. 3.1