

3 (a) Define the *Young modulus*.

.....
.....[1]

(b) The Young modulus of steel is 1.9×10^{11} Pa. The Young modulus of copper is 1.2×10^{11} 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

$$\frac{\text{extension of the copper wire}}{\text{extension of the steel wire}} .$$

ratio =[3]

(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

[1]

[Total: 5]