

4 (a) Define the Young modulus of a material.

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

(b) A metal wire P that obeys Hooke's law is stretched within its limit of proportionality.

(i) On Fig. 4.1, sketch the variation of tensile force F in the wire with its extension x .

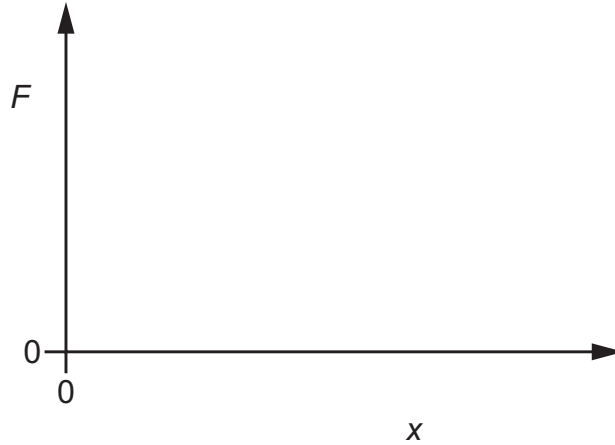


Fig. 4.1

[1]

(ii) State the name of the quantity represented by the gradient of the line in Fig. 4.1.

..... [1]

(iii) State the name of the quantity represented by the area under the line in Fig. 4.1.

..... [1]

(c) Another wire Q is made from a metal that has twice the Young modulus of the metal of wire P in (b). Wire Q has the same volume as wire P but has double the cross-sectional area of wire P.

The two wires are extended by equal tensile forces within their limits of proportionality.

State and explain how the extension of wire Q compares with the extension of wire P.

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..... [3]