4 Fig. 4.1 shows the variation with extension x of the tensile force F for two wires, G and H, made from the same material.

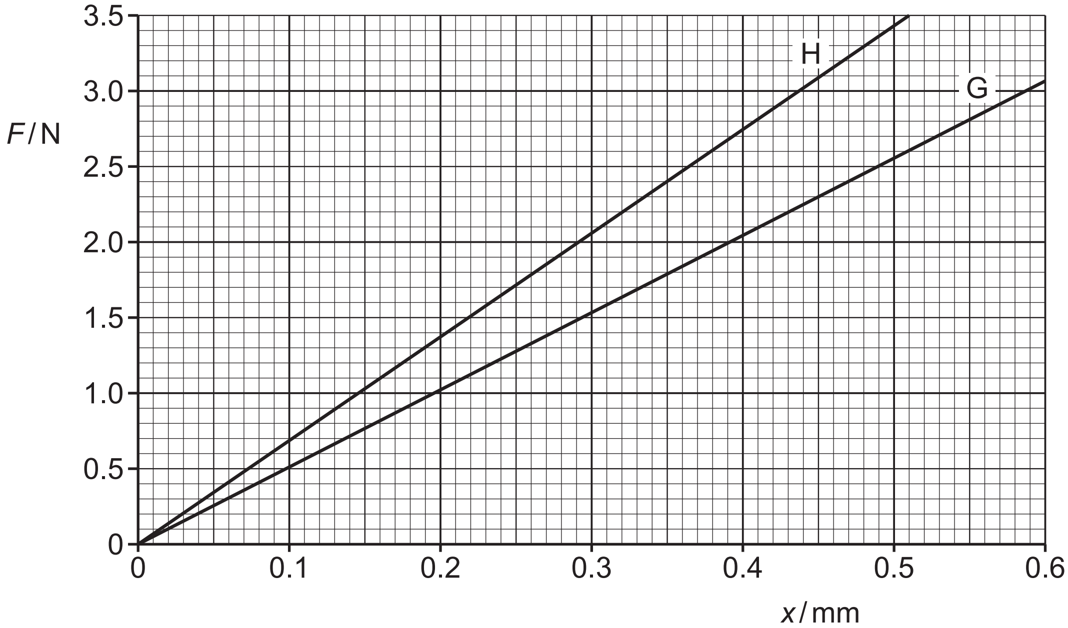

Fig. 4.1

The elastic limit has not been exceeded for G or H.

(a) For the lines in Fig. 4.1:

(i) state what is represented by the gradient

.... [1]

(ii) explain why the area under the line represents the elastic potential energy of the wire.

....

....

....

.... [2]

(b) Wires G and H are joined together end-to-end to form a composite wire of negligible weight. The composite wire hangs vertically from a fixed support.

A block of weight of 2.0 N is attached to the end of the wire, as shown in Fig. 4.2.

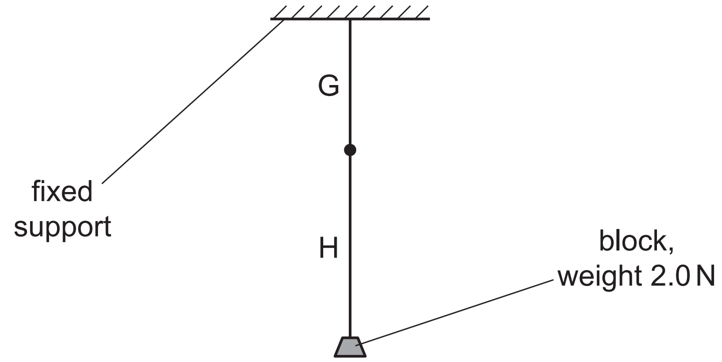

Fig. 4.2

(i) Use Fig. 4.1 to determine:

- the extension x_G of wire G

x_G = ... mm

- the extension x_H of wire H.

x_H = ... mm
[1]

(ii) Calculate the total elastic potential energy E_P of the composite wire due to the weight of the block.

E_P = ... J [2]

(iii) The original length of wire G is L and the original length of wire H is $1.5L$.

Calculate the ratio

$$\frac{\text{cross-sectional area of wire G}}{\text{cross-sectional area of wire H}}.$$

ratio = ... [3]

[Total: 9]