

- 14 A student carried out an experiment to determine the Young modulus of a sample of stainless steel in the form of a wire. The student added weights to the wire and measured the corresponding extensions.

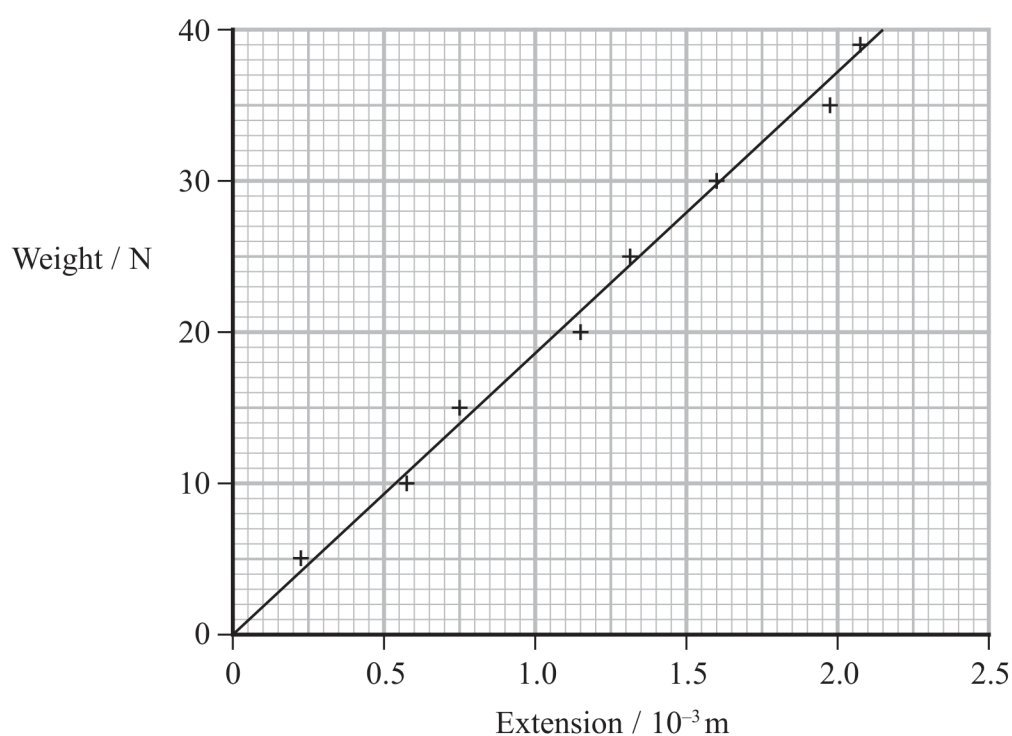
The wire had an unstretched length of 2.6 m. The diameter of the wire was 5.6×10^{-4} m.

The student plotted a graph of weight against extension. The graph showed that the limit of proportionality was not exceeded.

- (a) State what is meant by the limit of proportionality.

(1)

- (b) The student's graph is shown below.



- (i) Determine the gradient of the graph.

(2)

Gradient =



(ii) Determine the Young modulus of stainless steel using your value for the gradient.

(3)

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Young modulus =

(c) The breaking stress for this stainless steel is known to be 480 MPa.

Deduce whether it is safe for the student to increase the weight to 100.0 N.

(3)

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(Total for Question 14 = 9 marks)

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