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11 A student investigates the extension of an elastic band for different forces.

(a) (i) List the laboratory apparatus that the student needs for this investigation.

(3)

(ii) Extension, force and temperature are variables for this investigation.

Draw a line from each variable to its type.

(2)

variable

type of variable

extension •

• control

force •

• dependent

temperature •

• independent

(iii) Describe how the student can measure the extension of the elastic band when he adds a force of 12 N.

(2)



- (b) The student obtains this data as he first adds weights to the elastic band (loading) and as he then removes weights from the band (unloading).

Force in N	Extension in cm
	Loading
0	0.0
2	2.3
4	5.3
6	9.8
8	15.3
10	20.0

Force in N	Extension in cm
	Unloading
0	0.0
1	1.4
3	5.0
7	14.8
9	19.1
10	20.0

He plots the loading data on a graph as shown.

- (i) Suggest how the student could improve the quality of his data.

(2)

- (ii) Draw a curve of best fit through the loading data.

(1)

- (iii) On the same axes, plot the unloading data.

(2)

- (iv) Draw a curve of best fit through the unloading data.

(1)

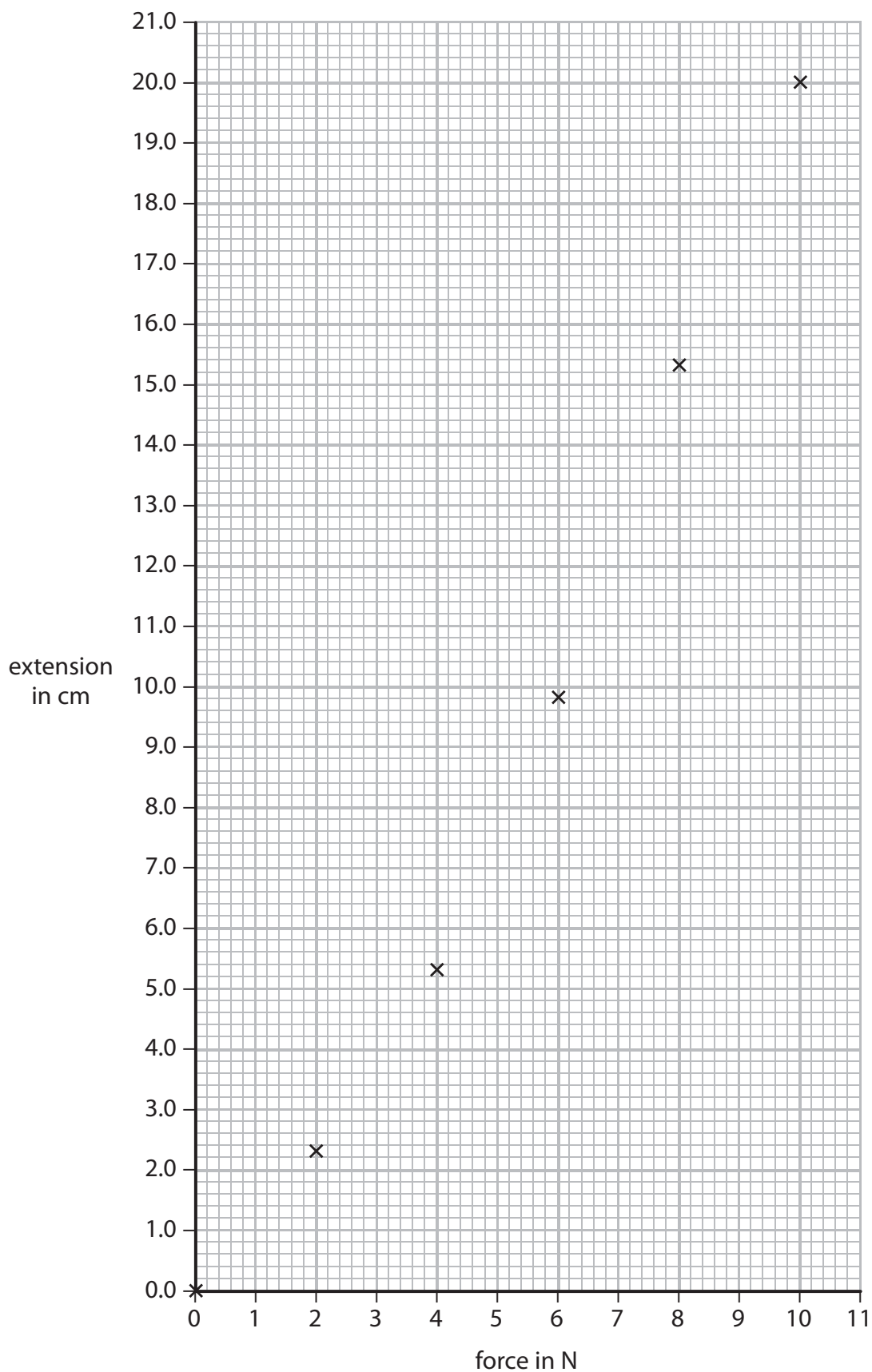
- (v) The student concludes that the band is an elastic material and that it obeys Hooke's law.

Discuss whether his conclusion is correct.

You should support your argument with data.

(3)





(Total for Question 11 = 16 marks)

