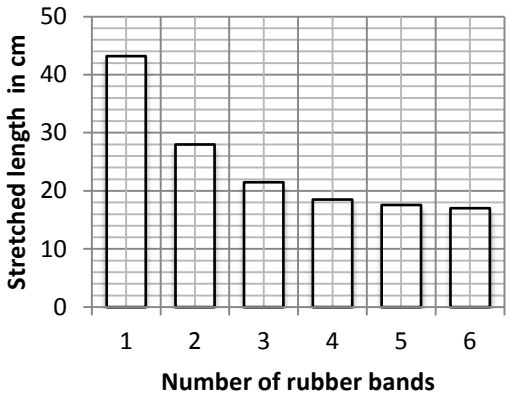
Question number	Answer	Notes	Marks
4 (a) (i)	18.7 ± 0.5 (cm);	accept any value between 18.2 and 19.2	1
(ii)	Any two of - MP1 Mention of <u>parallax</u> error; MP2 Idea of zero error; MP3 End of ruler is worn; MP4 Hook is curved; MP5 Hook stretches bands to different lengths; MP6 Bands are not close to ruler; MP7Bands are not parallel to ruler; MP8 Bands are twisted;	Ignore human error Ignore inaccurate scale Ignore anomaly, no average, references to Hooke's law	2
(b)	Idea of a controlled variable; e.g. force kept constant temperature kept constant	Allow properties of bands, e.g. type, brand, material, thickness, elasticity, original length Ignore idea of consistent technique, e.g. using same equipment	1

Question number	Answer	Notes	Marks
4 (c) (i)	Discrete/discontinuous; OR Independent;	Allow non-continuous, categoric	1
(ii)	Axes labelled - quantities and distance unit; Suitable scale chosen - longest bar occupies at least half the grid; All 5 bars for given data correctly plotted;;	Ignore orientation Ignore the 4 band value Bar length plotted to nearest small square. Deduct one mark for each plotting error (max -2) Data plotted correctly, but only as floating "x's" gets maximum of one mark for plotting Reject both plotting marks if a line graph is drawn (only scale and axes marks are available in this case)	4
(iii)	MP1 Idea of inverse relationship; MP2 Idea of non linearity;	Allow: pattern statements negative correlation Accept ecf "curved line"	2



Number of rubber bands	Stretched length in cm
1	43.2
2	28.0
3	21.5
4	(Ignore)
5	17.6
6	17.0

Total 11 marks