9 The majority of stars in the universe are thought to be main sequence stars. For such stars the luminosity increases with the mass of the star.

(a) It is suggested that the relationship between luminosity and mass is of the form

$$L = L_{\text{Sun}} M^{p}$$

where L = luminosity, M = (mass of star / mass of the Sun) and L_{Sun} and p are constants.

Explain why a graph of log L against log M would give a straight line.

(2)

(b) The table shows data for a range of main sequence stars.

$L/10^{25}$ W	M		
3.63	0.557		
469	1.88		
5920	3.52		
40 800	5.85		
294 000	9.72		

(i) Plot a graph of log L against log M. You may use the columns provided to show any processed data.

(5)

(ii) Determine values for p and L_{Sun} and hence state the mathematical relationship between L and M.

(4)

(Total for Question 9 = 11 marks)