Question 10 **(15 marks)**

A football club records body measurements for all of their players. Shown below are the waistline measurements (cm) and percentage body fat for eleven players.

Player	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
Waistline measurement (w)	89	100	87	96	94	83	81	83	84	97	98
Percentage body fat (p)	14	17	11	19	17	12	9	10	8	14	19

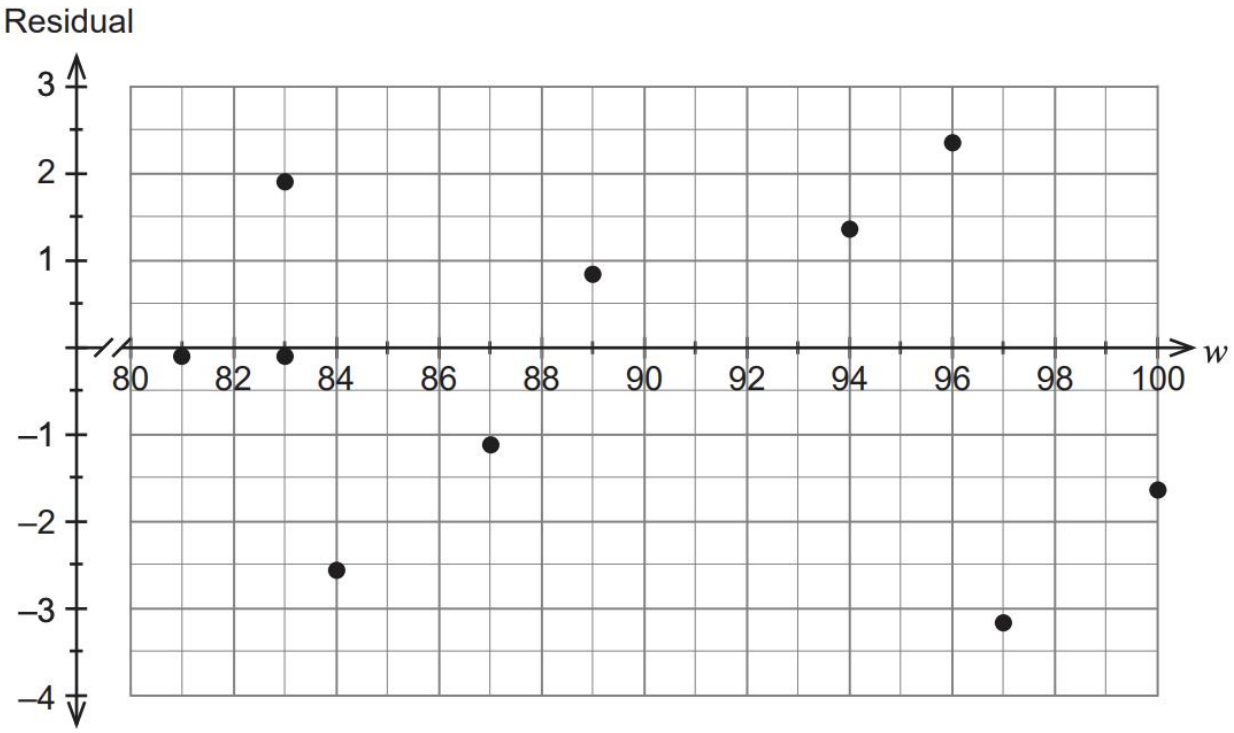
Research has shown that estimates for percentage body fat can be determined by using waistline measurements.

(a) Calculate the correlation coefficient r_{wp} for these data. (1 mark)

(b) Determine the equation of the least-squares line for these data. (1 mark)

(c) In the context of this question, interpret the slope of the line found in part (b). (2 marks)

(d) The residual plot shown below is for the first 10 players' data. Calculate the residual for player number 11 and plot this point on the graph. (2 marks)



(e) Comment on the appropriateness of fitting a linear model to the data. Justify your answer. (2 marks)

(f) What percentage of the variation in the percentage body fat measurements is **unexplained** by the variation in the waistline measurements? (2 marks)

(g) Wayne is player number 12 and has a waistline measurement of 105 cm.

(i) Determine his predicted percentage of body fat. (1 mark)

(ii) Comment on the validity of the prediction and give a justification for your answer. (2 marks)

(h) Player number 13 has a residual of –2.6. What information does this provide about the percentage body fat for this player? (2 marks)