

Question 9**(13 marks)**

The World Health Organisation produces tables showing Child Growth Standards. The median lengths (cm) for girls at various times during the first five years of life are shown below.

Age (months)	0	3	12	21	27	42	48	60
Median length (cm)	49.1	59.8	74.0	83.7	88.3	99.0	102.7	109.4
Predicted length (cm)	58.2	61.0	69.5	77.9	<i>A</i>	97.7	<i>B</i>	114.7
Residual	−9.1	−1.2	4.5	5.8	4.7	1.3	<i>C</i>	<i>D</i>

- (a) (i) Determine the equation of the least-squares line for predicting the median length from a girl's age. (1 mark)

- (ii) Use the equation from (a)(i) to determine the predicted median lengths *A* and *B* in the above table.

A = _____

B = _____ (2 marks)

- (iii) What increase in median length can be expected for each additional year? (1 mark)

- (iv) Given that the correlation coefficient is 0.97, describe the association between age and median length in terms of its direction and strength. (2 marks)

- (v) What percentage of the variation in the median length can be explained by the variation in age? (1 mark)

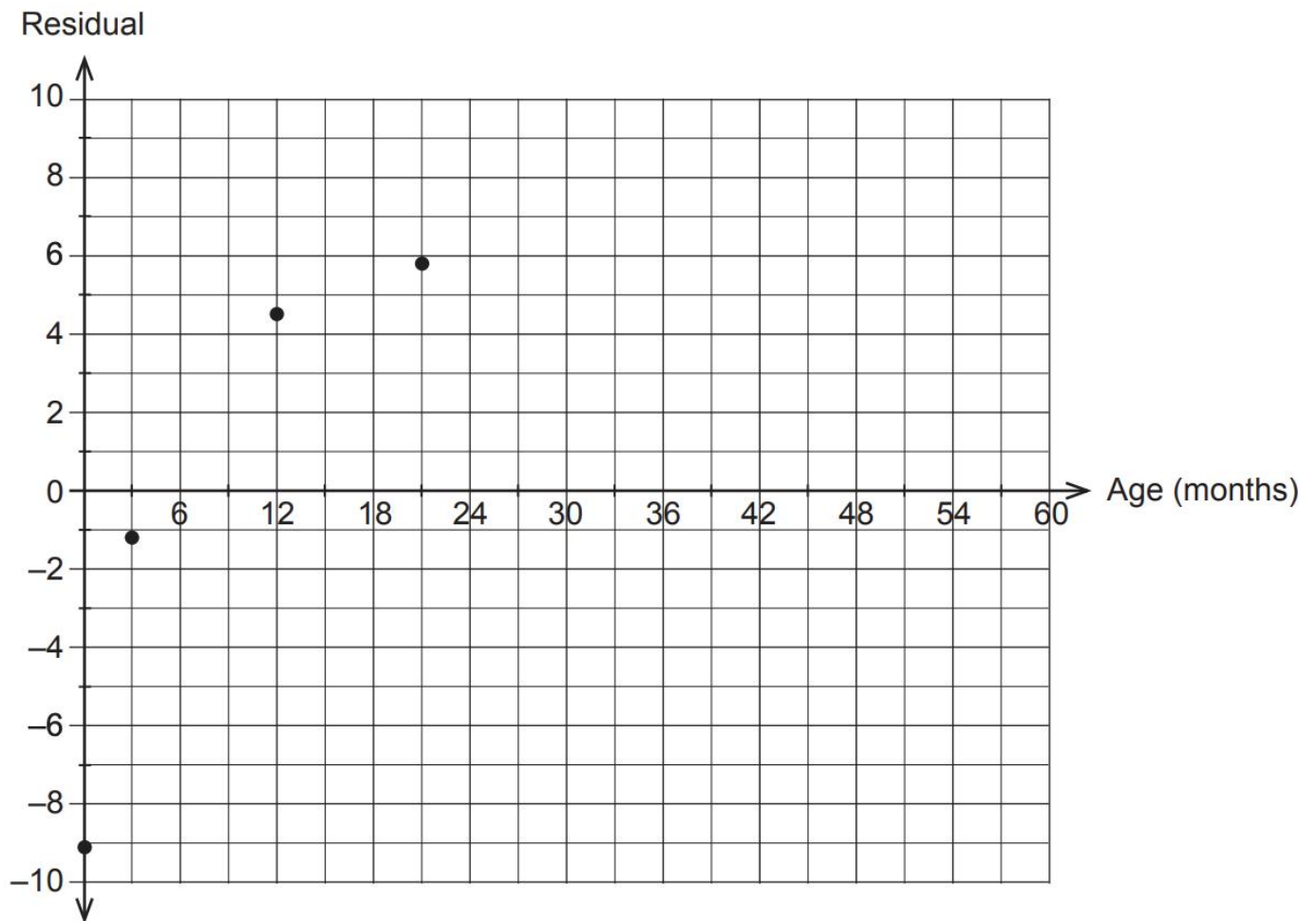
- (b) (i) Determine the residuals C and D in the table.

$C =$ _____

$D =$ _____

(2 marks)

- (ii) Hence, complete the scattergraph of the residuals against age on the axes below by plotting the last four residual values. (2 marks)



- (iii) Use the residual plot to assess the appropriateness of fitting a linear model to the data. (2 marks)