Name: _____ Date: _____

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50 points

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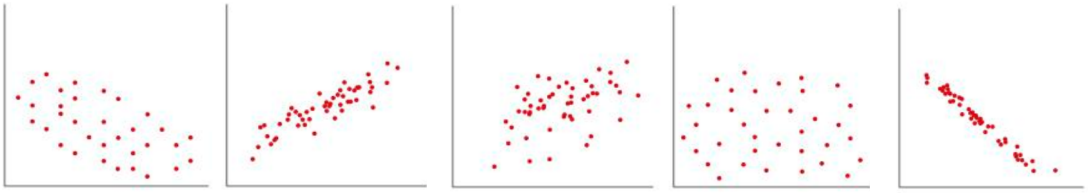
1 **a** Write down the maximum and minimum values that Pearson's product-moment correlation coefficient (r) can take.

b Match each scatter graph with the r-value from the list below which best describes the correlation between variables x and y.

r-values: -0.96, -0.6, 0, 0.5, 0.9



A B C D E

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3 An environmental group records the annual numbers of eggs (e) laid each year by eagles in a wildlife park, t years after 2010.

Years (t)	Eggs (e)
0	29
2	38
4	27
6	19
8	12

The relationship between the variables can be modelled by the regression equation $e = at + b$.

a Find the values of a and of b.

b Use the regression equation to estimate the number of eggs in the park when $t = 5$.

c Explain why it is not reliable to use the regression equation to estimate the number of eggs in the year 2050.

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5 The maximum daily temperature at the beach (x°C) and the number of bottles of water sold per day (y) at Marley's beach stall is given in this table.

x	24	23.5	23	22	21	20.3	20	18.2	17	26
y	260	199	174	162	149	135	118	115	102	246

a Write down the mean maximum temperature.

b Write down Pearson's product-moment correlation coefficient, r.

c Comment on what the value of r for this data tells you.

d Write down the equation of the y on x regression line.

e Estimate how many bottles of water Marley will sell on a day when the maximum temperature is 19.6°C.

f On a day when the temperature is forecast to be 36°C, Marley estimates that he will sell 429 bottles of water. Give one reason why his answer might be unreliable.

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13 **P2:** Ten pieces of paired bivariate data are obtained from ten twins, one of which is female and the other is male, by giving them an intelligence test. The data is given in the table below.

Female	100	110	95	90	103	120	97	105	89	111
Male	98	107	95	89	100	112	99	101	89	109

a Find the Pearson product moment correlation coefficient, r. (2 marks)

b State the type of linear correlation that is shown in this example. (2 marks)

c Let the male score be represented by x and the female score by y. Find the equation of the

i y on x line of best fit

ii x on y line of best fit. (4 marks)

d Another pair of female–male twins is discovered. The male scored 105 on the test but the female was too ill to take it. Estimate the score that she would have obtained, giving your answer to the nearest integer. (1 mark)

e Another pair of female/male twins is discovered. The female scored 95 on the test but the male refused to take it. Estimate the score that he would have obtained, giving your answer to the nearest integer. (1 mark)

f If for a further pair of male/female twins the male scored 140 on the test, explain why it would be unreliable to use a line of best fit to estimate the females score. (1 mark)