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6. Following some school examinations, Chetna is studying the results of the 16 students in her class. The mark for paper 1, x, and the mark for paper 2, y, for each student are summarised in the following statistics.

$$\bar{x} = 35.75 \qquad \bar{y} = 25.75 \qquad \sigma_x = 7.79 \qquad \sigma_y = 11.91 \qquad \sum xy = 15\,837$$

(a) Comment on the differences between the marks of the students on paper 1 and paper 2

(2)

Chetna decides to examine these data in more detail and plots the marks for each of the 16 students on the scatter diagram opposite.

(b) (i) Explain why the circled point (38, 0) is possibly an outlier.

(ii) Suggest a possible reason for this result.

(2)

Chetna decides to omit the data point (38, 0) and examine the other 15 students' marks.

(c) Find the value of $\bar{x}$ and the value of $\bar{y}$ for these 15 students.

(3)

For these 15 students

(d) (i) explain why $\sum xy$ is still 15 837

(ii) show that $S_{xy} = 1169.8$

(3)

For these 15 students, Chetna calculates $S_{xx} = 965.6$ and $S_{yy} = 1561.7$ correct to 1 decimal place.

(e) Calculate the product moment correlation coefficient for these 15 students.

(2)

(f) Calculate the equation of the line of regression of y on x for these 15 students, giving your answer in the form $y = a + bx$

(4)

The product moment correlation coefficient between x and y for all 16 students is 0.746

(g) Explain how your calculation in part (e) supports Chetna's decision to omit the point (38, 0) before calculating the equation of the linear regression line.

(1)

(h) Estimate the mark in the second paper for a student who scored 38 marks in the first paper.

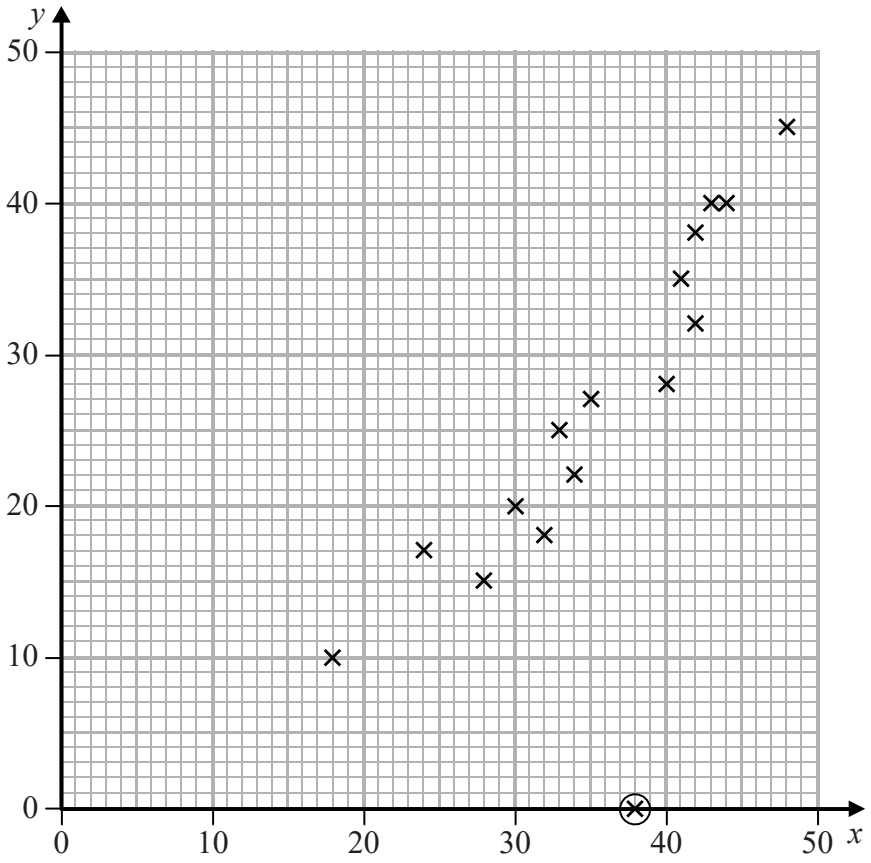
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Q6

(Total 18 marks)

TOTAL FOR PAPER: 75 MARKS

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