7. A chemistry teacher recorded the mark in a theory test, t, and the mark in a practical test, p, for 12 students.

Here are the paired results for these two tests.

t	23	46	35	58	97	21	29	83	60	53	75	80
p	33	42	47	68	95	42	45	81	74	40	85	92

The teacher knows that 2 other students missed the practical test but sat the theory test. To predict practical test marks for these students, she decides to calculate the least squares regression line of p on t

The teacher calculated the following summary statistics

$$\bar{t} = 55 \qquad \bar{p} = 62 \qquad S_{tp} = 5780 \qquad S_{tt} = 6948$$

(a) Use these summary statistics to find the equation of the least squares regression line of p on t, giving your answer in the form $p = a + bt$
You must show your working clearly.

(4)

(b) Give an interpretation of the gradient of your regression line.

(1)

The theory test marks for the two students who missed the practical test were

Student	Mark in the theory test
A	62
B	20

(c) Using your answer to part (a) estimate

(i) the practical test mark for student A

(ii) the practical test mark for student B

(3)

(d) State, giving a reason, which of the two estimates found in part (c) would give the more reliable estimate.

(2)

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Question 7 continued

(Total for Question 7 is 10 marks)

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