

**Question 8**
**(16 marks)**

The table below shows the average price per kilogram of watermelon in a supermarket for each of the four seasons of the year over a four-year period.

Year	Quarter	Time ( <i>t</i> )	Average price (\$)	4-point centred moving average	Quarterly mean	Average price as a percentage of the quarterly mean	Deseasonalised data
2019	Summer	1	1.06	-	1.85	57.30	1.80
	Autumn	2	1.36	-		73.51	1.79
	Winter	3	2.94	1.87		158.92	1.89
	Spring	4	2.03	1.92		109.73	1.86
2020	Summer	5	1.24	1.97	<b>P</b>	59.05	2.11
	Autumn	6	1.58	2.04		75.24	2.07
	Winter	7	3.12	2.12		148.57	2.01
	Spring	8	2.44	2.20		116.19	2.23
2021	Summer	9	1.47	2.29	2.39	61.51	2.50
	Autumn	10	1.93	2.36		80.75	2.53
	Winter	11	3.48	2.41		145.61	2.23
	Spring	12	2.69	2.44		112.55	2.46
2022	Summer	13	<b>Q</b>	<b>R</b>	2.75	57.09	2.69
	Autumn	14	2.07	2.75		<b>S</b>	2.72
	Winter	15	4.65	-		169.09	2.99
	Spring	16	2.71	-		98.55	2.48

(a) Determine the values **P**, **Q**, **R** and **S** in the table above.

(4 marks)

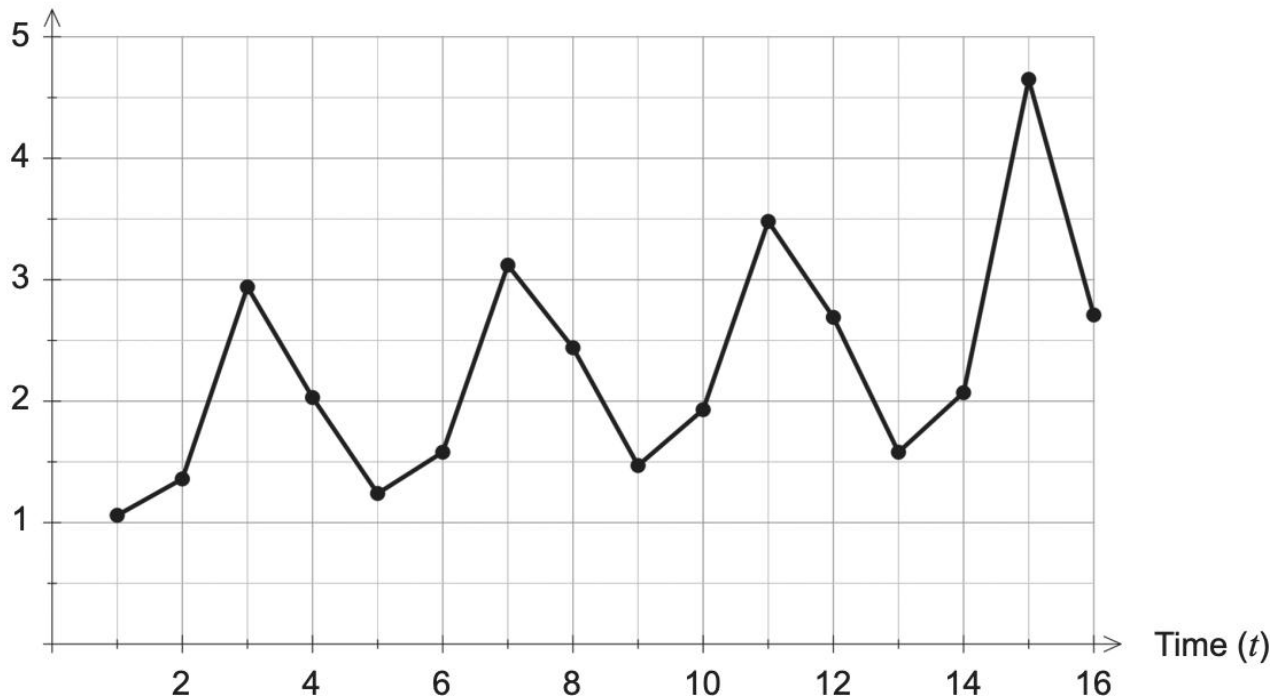
- (b) Complete the following table. (1 mark)

Season	Summer	Autumn	Winter	Spring
Seasonal index	58.83%	76.19%		109.26%

- (c) Interpret the seasonal index for Summer in the context of this question. (1 mark)

- (d) Define 'deseasonalised data'. (1 mark)
- (e) Using information from the tables on page 6, show how the deseasonalised data value for Autumn 2021 was calculated. (1 mark)
- (f) Determine the equation of the least-squares line using the deseasonalised data. (1 mark)
- (g) The graph below is the time series plot for these data. On this graph draw the least-squares line determined in part (f). (2 marks)

Average price (\$)



- (h) Predict the average price per kilogram of watermelon from the supermarket in Spring 2024. (3 marks)
- (i) Discuss the reliability of the prediction in part (h). (2 marks)