



eClassroom

GCSE Mathematics

Time Series

Questions

Pearson Edexcel GCSE & iGCSE Mathematics

Section A — Foundation

Worked Examples

[Fluency]

The table shows quarterly sales. Calculate the 4-point moving averages.

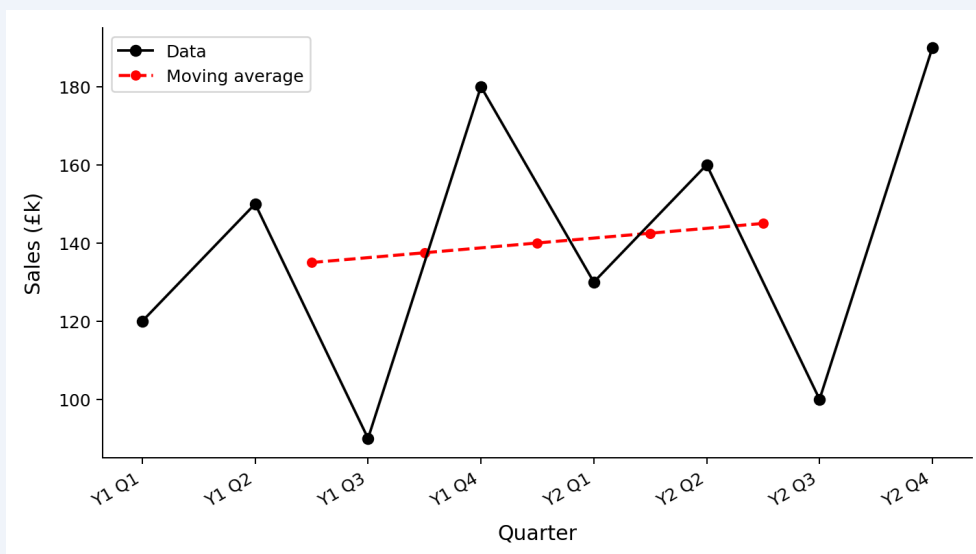
Quarter	Y1 Q1	Y1 Q2	Y1 Q3	Y1 Q4	Y2 Q1	Y2 Q2	Y2 Q3	Y2 Q4
Sales (£k)	120	150	90	180	130	160	100	190

$$MA_1 = \frac{120 + 150 + 90 + 180}{4} = 135$$

$$MA_2 = \frac{150 + 90 + 180 + 130}{4} = 137.5$$

[Reasoning]

Plot the time series and moving averages. Describe the trend.



Trend: Generally increasing — moving average rises from 135 to 145.

[Problem Solving]

The seasonal variation for Y1 Q3 is: actual – moving average.

$$90 - 135 = -45 \Rightarrow \text{Q3 is typically 45 below trend}$$



[Fluency]

1.

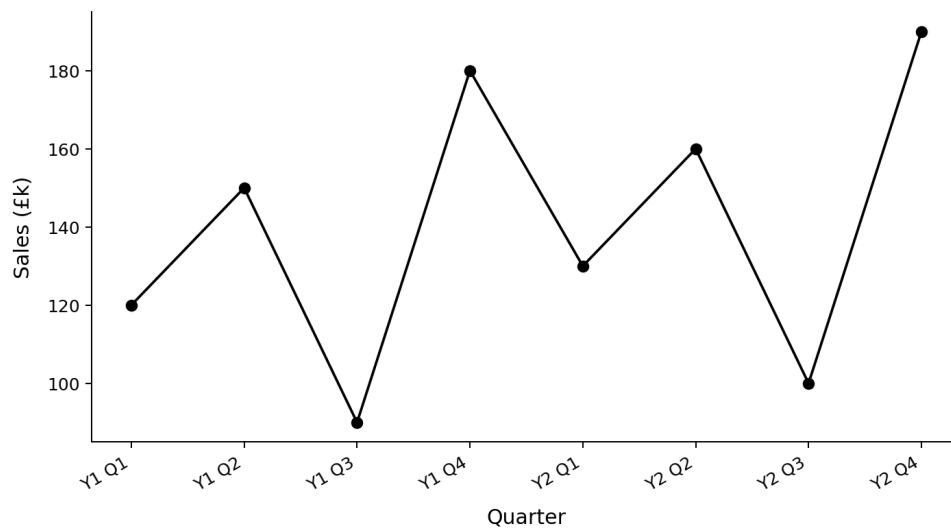
Quarter	Y1 Q1	Y1 Q2	Y1 Q3	Y1 Q4	Y2 Q1	Y2 Q2	Y2 Q3	Y2 Q4
Sales (£k)	120	150	90	180	130	160	100	190

Calculate all five 4-point moving averages.

(4 marks)

[Fluency]

2.



- (a) Describe the overall trend in sales. (1)
 (b) In which quarter are sales consistently highest? (1)
 (c) In which quarter are sales consistently lowest? (1)

(3 marks)

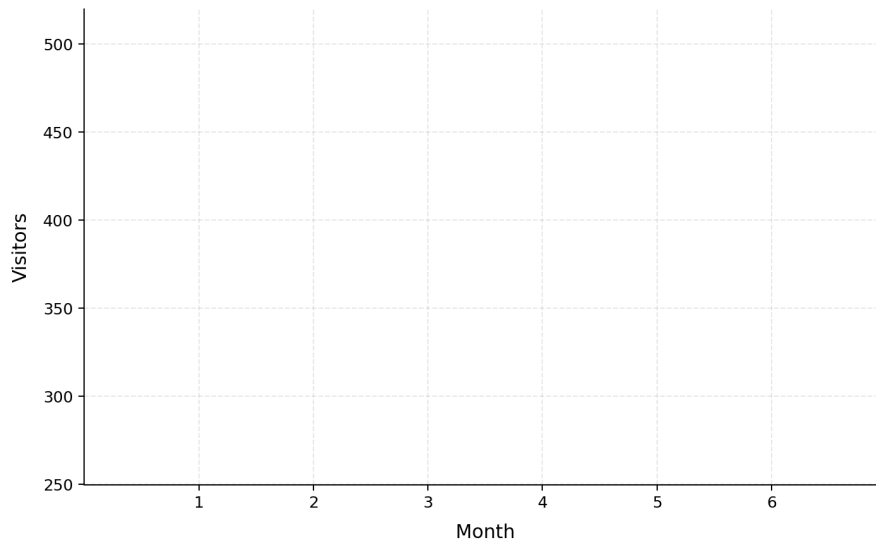


[Fluency]

3.

Month	Jan	Feb	Mar	Apr	May	Jun
Visitors	320	280	410	390	450	480

- (a) Plot the time series. (2)
(b) Describe the trend in visitor numbers. (1)



(3 marks)

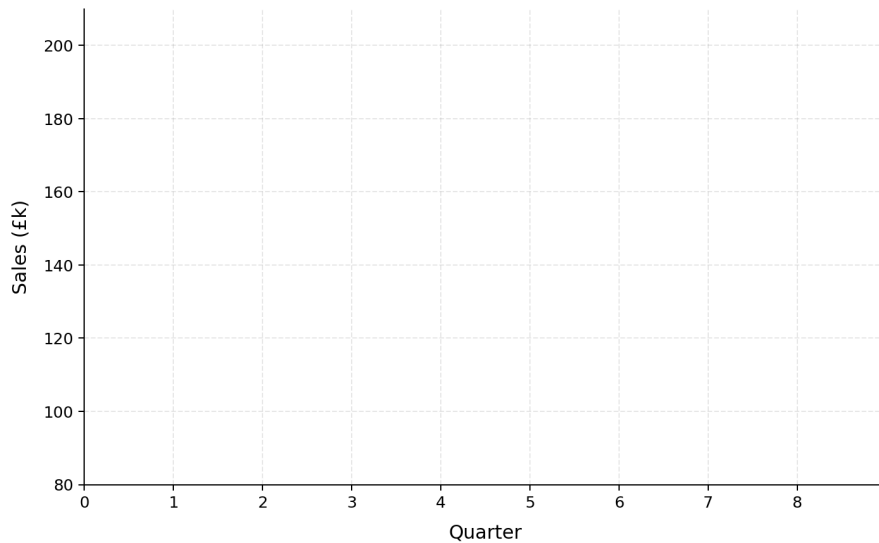


[Reasoning]

4.

Quarter	Y1 Q1	Y1 Q2	Y1 Q3	Y1 Q4	Y2 Q1	Y2 Q2	Y2 Q3	Y2 Q4
Sales (£k)	120	150	90	180	130	160	100	190

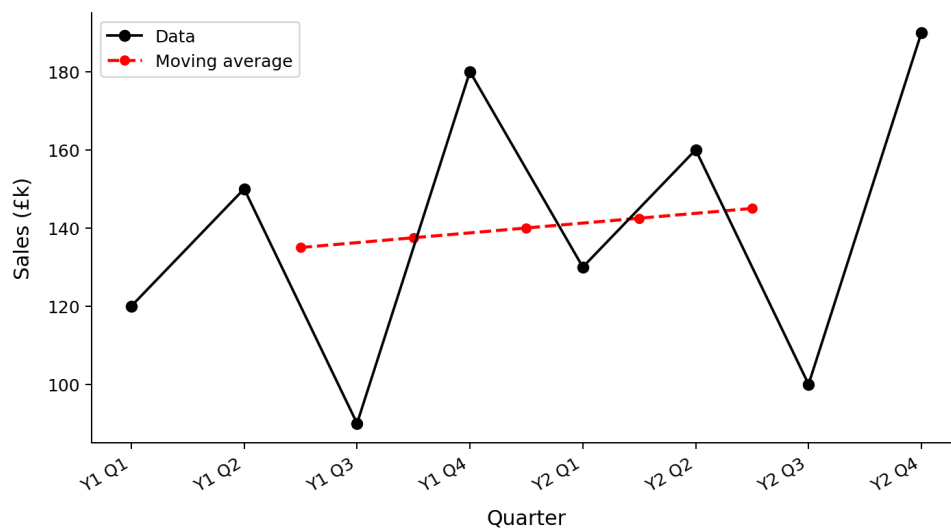
- (a) Calculate the 5 moving averages. (4)
- (b) Plot both the original data and moving averages on the axes below. (3)
- (c) Describe the trend shown by the moving averages. (1)



(8 marks)

[Reasoning]

5.



The moving average for Y2 Q4 is 145.

- (a) Calculate the seasonal variation for Y1 Q3 (sales=90). (2)
- (b) Calculate the seasonal variation for Y2 Q4 (sales=190). (2)

(4 marks)

**[Problem Solving]****6.**

The moving averages for a quarterly dataset are: 48, 50, 52, 54, 56.

The trend is linear.

- (a) Find the next predicted moving average. (1)
(b) The seasonal variation for Q2 is always +8. Predict the Q2 value for Year 3. (2)

(3 marks)

[Problem Solving]**7.**

Explain why moving averages are used instead of the raw data to identify trends in time series.

(2 marks)





Section B — Higher

Worked Examples

[Fluency]

Use the trend line to make a prediction and assess its reliability.

Extend the trend line and read off the predicted value.

Reliability depends on whether the trend is likely to continue.

[Reasoning]

Calculate seasonal variation: actual – moving average.

Seasonal variation = actual – moving average

[Problem Solving]

Explain why seasonal variations repeat.

Regular patterns (e.g. higher sales in Q4 every year) repeat because the same factors (holidays, weather, school terms) recur each year.

[Fluency]

1.

Year	2018	2019	2020	2021	2022	2023
Sales	142	158	134	175	161	188

- Calculate the 3-point moving averages. (3)
- Plot the data and moving averages. (3)
- Extend the trend line to predict 2024 sales. (2)

(8 marks)

[Reasoning]

2.

Quarter	Y1 Q1	Y1 Q2	Y1 Q3	Y1 Q4	Y2 Q1	Y2 Q2	Y2 Q3	Y2 Q4
Sales (£k)	120	150	90	180	130	160	100	190
Moving avg	—	—	135.0	137.5	140.0	142.5	145.0	—

- Calculate the seasonal variation for each of Y1 Q3 and Y1 Q4. (3)
- The average Q3 seasonal variation is -45 and the trend predicts 150 for Y3 Q3. Predict actual Y3 Q3 sales. (2)

(5 marks)



**[Problem Solving]****3.**

A company's quarterly profits (£000s) for two years are:

Quarter	Y1 Q1	Y1 Q2	Y1 Q3	Y1 Q4	Y2 Q1	Y2 Q2
Profit	42	65	38	80	48	72

- (a) Calculate the 4-point moving averages. (2)
- (b) Plot the data and moving averages and describe the trend. (4)
- (c) Calculate the seasonal variation for Y1 Q2. (2)

(8 marks)