eClassroom

GCSE Mathematics

Time Series

Worked Solutions

Pearson Edexcel GCSE & iGCSE Mathematics

Section A — Foundation — Worked Solutions

[Fluency] Question 1

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

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

$$MA_3 = \frac{90 + 180 + 130 + 160}{4} = 140$$

$$MA_4 = \frac{180 + 130 + 160 + 100}{4} = 142.5$$

$$MA_5 = \frac{130 + 160 + 100 + 190}{4} = 145$$

∴ **135, 137.5, 140, 142.5, 145**

[Fluency] Question 2

(a) Generally increasing trend

(b) Q4 consistently highest

(c) Q3 consistently lowest

∴ **(a) Increasing (b) Q4 (c) Q3**

[Fluency] Question 3

Points plotted at (1,320),(2,280),(3,410),(4,390),(5,450),(6,480)

(b) Generally increasing trend — visitors rising over the period

∴ **(b) Generally increasing trend**

[Reasoning] Question 4

MAs: 135, 137.5, 140, 142.5, 145 (see Q1)

(c) Moving averages show a steady increasing trend — rising by 2.5 each quarter

∴ **MAs: 135, 137.5, 140, 142.5, 145 Trend: steadily increasing**

[Reasoning] Question 5

(*a*) Y1 Q3 seasonal variation $= 90 - 135 = -45$

(*b*) Y2 Q4 seasonal variation $= 190 - 145 = +45$

∴ **(a) –45 (b) +45**

[Problem Solving] Question 6

(a) Trend increases by 2 each time: next MA = 56+2 = 58

(b) Predicted MA for Y3 Q2 = 58+2 = 60. Seasonal variation = +8. Predicted value = 60+8 = 68

∴ **(a) 58 (b) 68**

[Problem Solving] Question 7

Raw data fluctuates due to seasonal patterns, masking the underlying trend.

Moving averages smooth out these fluctuations, making the long-term trend clearer.

∴ **Moving averages remove seasonal variation to reveal the underlying trend.**

Section B — Higher — Worked Solutions

[Fluency] Question 1

$$MA_1 = \frac{142 + 158 + 134}{3} = 144.7$$

$$MA_2 = \frac{158 + 134 + 175}{3} = 155.7$$

$$MA_3 = \frac{134 + 175 + 161}{3} = 156.7$$

$$MA_4 = \frac{175 + 161 + 188}{3} = 174.7$$

(c) Extend trend line: ≈ 185

∴ **MAs: 144.7, 155.7, 156.7, 174.7 Predicted 2024: ≈185**

[Reasoning] Question 2

(*a*) Y1 Q3 : $90 - 135 = -45$ Y1 Q4 : $180 - 135 = +45$

(b) Predicted = trend + seasonal variation = 150 + (–45) = 105

∴ **(a) –45, +45 (b) £105,000**

[Problem Solving] Question 3

$$MA_1 = \frac{42 + 65 + 38 + 80}{4} = 56.25$$

$$MA_2 = \frac{65 + 38 + 80 + 48}{4} = 57.75$$

(b) Trend is slightly increasing

(*c*) Y1 Q2 seasonal variation $= 65 - 56.25 = +8.75$

∴ **MAs: 56.25, 57.75 (c) seasonal variation Y1 Q2 = +8.75**