4.6 Time Series and Moving Averages: 1-hour Pack

EDEXCEL 1ST0 · Calculator allowed · about 60 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 The table gives the number of ice creams sold at a stall each week.

Time	Ice creams
week 1	49
week 2	52
week 3	54
week 4	65
week 5	57
week 6	61
week 7	75

Give decimal answers to 1 decimal place.

(a) Work out all the 3-point moving averages for this data.

(b) Describe the trend shown by the moving averages.

(c) Use the last two of these moving averages to estimate the next moving average, assuming the trend continues.

(Total for Question 1 is 5 marks)

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2 The table gives the number of customers at a garden centre each week, in hundreds.

Time	Customers
week 1	56
week 2	46
week 3	47
week 4	44
week 5	40
week 6	39

Give decimal answers to 1 decimal place.

(a) Work out all the 3-point moving averages for this data.

(b) Describe the trend shown by the moving averages.

(c) Use the last two of these moving averages to estimate the next moving average, assuming the trend continues.

(Total for Question 2 is 5 marks)

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3 The table shows quarterly figures for the number of customers at a garden centre each month, in hundreds.

Quarter	Value
2022 Q1	60
2022 Q2	79
2022 Q3	93
2022 Q4	79
2023 Q1	72
2023 Q2	91
2023 Q3	105
2023 Q4	91
2024 Q1	84
2024 Q2	103
2024 Q3	117
2024 Q4	103

(a) Work out the 4-point moving average for the first four quarters.
(b) Work out the 4-point centred moving average for the 2022 Q4 quarter.
(c) State the seasonal effect for 2022 Q4, that is the value minus the centred moving average.

(Total for Question 3 is 5 marks)

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4 The table gives the number of ice creams sold at a stall each week.

Time	Ice creams
week 1	22
week 2	30
week 3	25
week 4	35
week 5	34
week 6	32
week 7	37

Give decimal answers to 1 decimal place.

(a) Work out all the 3-point moving averages for this data.

(b) Describe the trend shown by the moving averages.

(c) Use the last two of these moving averages to estimate the next moving average, assuming the trend continues.

(Total for Question 4 is 5 marks)

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5 The table gives weekly sales, in thousands of pounds, at a shop.

Time	Sales
week 1	47
week 2	51
week 3	52
week 4	59
week 5	58
week 6	64
week 7	61
week 8	66

Give decimal answers to 1 decimal place.

(a) Work out all the 3-point moving averages for this data.

(b) Describe the trend shown by the moving averages.

(c) Use the last two of these moving averages to estimate the next moving average, assuming the trend continues.

(Total for Question 5 is 5 marks)

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6 The table shows quarterly figures for the number of visitors, in hundreds, to a seaside cafe each day.

Quarter	Value
2021 Q1	46
2021 Q2	63
2021 Q3	77
2021 Q4	64
2022 Q1	58
2022 Q2	75
2022 Q3	89
2022 Q4	76
2023 Q1	70
2023 Q2	87
2023 Q3	101
2023 Q4	88

(a) Work out the 4-point moving average for the first four quarters.
(b) Work out the 4-point centred moving average for the 2021 Q3 quarter.
(c) State the seasonal effect for 2021 Q3, that is the value minus the centred moving average.

(Total for Question 6 is 5 marks)

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7 The table gives the number of customers at a garden centre each week, in hundreds.

Time	Customers
week 1	50
week 2	51
week 3	44
week 4	46
week 5	39
week 6	39
week 7	37
week 8	37

Give decimal answers to 1 decimal place.

(a) Work out all the 3-point moving averages for this data.

(b) Describe the trend shown by the moving averages.

(c) Use the last two of these moving averages to estimate the next moving average, assuming the trend continues.

(Total for Question 7 is 5 marks)

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8 The table gives the daily number of hot drinks sold at a kiosk.

Time	Drinks
day 1	60
day 2	62
day 3	65
day 4	56
day 5	58
day 6	60

Give decimal answers to 1 decimal place.

(a) Work out all the 3-point moving averages for this data.

(b) Describe the trend shown by the moving averages.

(c) Use the last two of these moving averages to estimate the next moving average, assuming the trend continues.

(Total for Question 8 is 5 marks)

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9 The table shows quarterly figures for the number of ice creams sold at a stall each week.

Quarter	Value
2021 Q1	53
2021 Q2	70
2021 Q3	79
2021 Q4	67
2022 Q1	61
2022 Q2	78
2022 Q3	87
2022 Q4	75
2023 Q1	69
2023 Q2	86
2023 Q3	95
2023 Q4	83

(a) Work out the 4-point moving average for the first four quarters.

(b) Work out the 4-point centred moving average for the 2022 Q1 quarter.

(c) State the seasonal effect for 2022 Q1, that is the value minus the centred moving average.

(Total for Question 9 is 5 marks)

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10 The table gives daily sales, in thousands of pounds, at a shop.

Time	Sales
day 1	49
day 2	40
day 3	48
day 4	55
day 5	52
day 6	49
day 7	59

Give decimal answers to 1 decimal place.

(a) Work out all the 3-point moving averages for this data.

(b) Describe the trend shown by the moving averages.

(c) Use the last two of these moving averages to estimate the next moving average, assuming the trend continues.

(Total for Question 10 is 5 marks)

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11 The table shows quarterly figures for the number of customers at a garden centre each month, in hundreds.

Quarter	Value
2019 Q1	43
2019 Q2	57
2019 Q3	70
2019 Q4	59
2020 Q1	51
2020 Q2	65
2020 Q3	78
2020 Q4	67
2021 Q1	59
2021 Q2	73
2021 Q3	86
2021 Q4	75

(a) Work out the 4-point moving average for the first four quarters.
(b) Work out the 4-point centred moving average for the 2020 Q1 quarter.
(c) State the seasonal effect for 2020 Q1, that is the value minus the centred moving average.

(Total for Question 11 is 5 marks)

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12 Four successive seasonal variations for a shop's quarterly sales are +12, +28, -15, and an unknown value for the fourth quarter. Seasonal variations for a full year should sum to (approximately) zero. Work out the missing seasonal variation, and state which of the four quarters has the largest positive seasonal variation.

(Total for Question 12 is 3 marks)

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Mark scheme · 4.6 Time Series and Moving Averages: 1-hour Pack

Question 1

adds three consecutive values and divides by 3	**M1**
all 5 moving averages 51.7, 57, 58.7, 61, 64.3 cao	**A1**
trend is increasing	**B1**
last moving average plus (last minus the one before)	**M1**
67.7 (accept 67.6, from moving averages rounded to 1 decimal place)	**A1**

Answer: (a) 51.7, 57, 58.7, 61, 64.3; (b) increasing; (c) 67.7

Question 2

adds three consecutive values and divides by 3	**M1**
all 4 moving averages 49.7, 45.7, 43.7, 41 cao	**A1**
trend is decreasing	**B1**
last moving average plus (last minus the one before)	**M1**
38.3 cao	**A1**

Answer: (a) 49.7, 45.7, 43.7, 41; (b) decreasing; (c) 38.3

Question 3

adds four consecutive values and divides by 4	**M1**
77.75 cao	**A1**
averages two consecutive 4-point moving averages	**M1**
82.25 cao	**A1**
-3.25 cao	**B1**

Answer: (a) 77.75; (b) 82.25; (c) -3.25

Question 4

adds three consecutive values and divides by 3	**M1**
all 5 moving averages 25.7, 30, 31.3, 33.7, 34.3 cao	**A1**
trend is increasing	**B1**
last moving average plus (last minus the one before)	**M1**
35 (accept 34.9, from moving averages rounded to 1 decimal place)	**A1**

Answer: (a) 25.7, 30, 31.3, 33.7, 34.3; (b) increasing; (c) 35

Question 5

adds three consecutive values and divides by 3	**M1**
all 6 moving averages 50, 54, 56.3, 60.3, 61, 63.7 cao	**A1**
trend is increasing	**B1**
last moving average plus (last minus the one before)	**M1**
66.3 (accept 66.4, from moving averages rounded to 1 decimal place)	**A1**

Answer: (a) 50, 54, 56.3, 60.3, 61, 63.7; (b) increasing; (c) 66.3

Question 6

adds four consecutive values and divides by 4	**M1**
62.5 cao	**A1**
averages two consecutive 4-point moving averages	**M1**
64 cao	**A1**
13 cao	**B1**

Answer: (a) 62.5; (b) 64; (c) 13

Question 7

adds three consecutive values and divides by 3	**M1**
all 6 moving averages 48.3, 47, 43, 41.3, 38.3, 37.7 cao	**A1**
trend is decreasing	**B1**
last moving average plus (last minus the one before)	**M1**
37 (accept 37.1, from moving averages rounded to 1 decimal place)	**A1**

Answer: (a) 48.3, 47, 43, 41.3, 38.3, 37.7; (b) decreasing; (c) 37

Question 8

adds three consecutive values and divides by 3	**M1**
all 4 moving averages 62.3, 61, 59.7, 58 cao	**A1**
trend is decreasing	**B1**
last moving average plus (last minus the one before)	**M1**
56.3 cao	**A1**

Answer: (a) 62.3, 61, 59.7, 58; (b) decreasing; (c) 56.3

Question 9

adds four consecutive values and divides by 4	**M1**
67.25 cao	**A1**
averages two consecutive 4-point moving averages	**M1**
72.25 cao	**A1**
-11.25 cao	**B1**

Answer: (a) 67.25; (b) 72.25; (c) -11.25

Question 10

adds three consecutive values and divides by 3	**M1**
all 5 moving averages 45.7, 47.7, 51.7, 52, 53.3 cao	**A1**
trend is increasing	**B1**
last moving average plus (last minus the one before)	**M1**
54.7 (accept 54.6, from moving averages rounded to 1 decimal place)	**A1**

Answer: (a) 45.7, 47.7, 51.7, 52, 53.3; (b) increasing; (c) 54.7

Question 11

adds four consecutive values and divides by 4	**M1**
57.25 cao	**A1**
averages two consecutive 4-point moving averages	**M1**
62.25 cao	**A1**
-11.25 cao	**B1**

Answer: (a) 57.25; (b) 62.25; (c) -11.25

Question 12

12 + 28 - 15, oe (=25)	**M1**
-25 cao	**A1**
the quarter with +28 identified as the largest positive seasonal variation, ft	**A1**

Answer: Missing seasonal variation = -25; the quarter with +28 has the largest positive seasonal variation.

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