



Analysing time series graphs - TSN

Mana Maths

Te reo Māori terms



wā

time

Open in Te Aka

raupapa

series/sequence

Open in Te Aka

kauwhata

graph

Open in Te Aka

kaupeka

season

Open in Te Aka

Analysing time series graphs - TSN — Foundation

- 1.** What does TSN stand for when analysing time series graphs?
- 2.** In TSN, what does the T stand for?
- 3.** In TSN, what does the S stand for?
- 4.** In TSN, what does the N stand for?
- 5.** What are the two possible long-term trends (T) in a time series?
- 6.** What is seasonality (S) in a time series graph?
- 7.** What is noise (N) in a time series graph?
- 8.** True or false: A long-term trend can be described as "positive" or "negative".
- 9.** True or false: Seasonality refers to regular patterns that repeat over time.

- 10.** True or false: Noise refers to the main pattern in the data.
- 11.** Which TSN component would describe a general increase in sales over 5 years?
- 12.** Which TSN component would describe higher ice cream sales every summer?
- 13.** Which TSN component would describe an unexpected drop in sales due to a one-time event?
- 14.** Circle the correct description: Long-term trend shows the overall direction / seasonal patterns / unusual points.

Analysing time series graphs - TSN — Proficient

1. A company's profits show a general increase from 2015 to 2020, with higher profits every Q4. Identify T, S, and N.
2. Temperature data shows a slight decrease over 10 years, with peaks every July and troughs every January. Identify T, S, and N.
3. A time series has an increasing trend with regular peaks every 3 months. What components are present?
4. Describe what T, S, and N would look like in a graph of monthly electricity usage.
5. A retail store has increasing sales trend with Christmas spikes. One year had a fire closure. Identify all TSN components.
6. Why is it wrong to say a trend is "positive" or "negative"?

- 7.** Give an example of seasonality in: a) retail sales, b) tourism, c) agriculture.
- 8.** What might cause noise in: a) website traffic data, b) stock prices, c) temperature records?
- 9.** A time series shows decreasing trend with no regular patterns but has one very high point. What could explain the high point?
- 10.** Compare two time series: Series A has clear seasonality, Series B has no seasonality. What does this tell you?
- 11.** If you remove the noise from a time series, what are you left with?
- 12.** How can identifying seasonality help a business with planning?
- 13.** A time series has an increasing trend with quarterly seasonality. Sketch what this might look like.
- 14.** True or false: All time series have all three TSN components.

Analysing time series graphs - TSN — Excellence

- 1.** Analyse this scenario:
A café's daily sales show overall growth, weekly patterns (busier weekends), and a spike when a celebrity visited. Identify and justify T, S, N.
- 2.** A time series shows decreasing trend with strong annual seasonality. How would removing the seasonality affect appearance of the trend?
- 3.** Compare the usefulness of T, S, and N for:
a) forecasting, b) understanding causes, c) identifying problems.
- 4.** Design a time series with: increasing trend, quarterly seasonality, and one noise event. Describe what each component represents.
- 5.** A business sees sales increase Jan-Mar, drop Apr-Jun, repeat yearly. Is this trend or seasonality? Justify.
- 6.** How can noise be distinguished from the start of a new trend?

- 7.** Critique: "This time series has a positive trend because it goes up and down." What's wrong?
- 8.** Given monthly temperature data for 5 years, describe how you'd identify T, S, and N.
- 9.** Why might a time series appear to have no trend when it actually has seasonality masking it?
- 10.** A dataset has both weekly and yearly seasonality. How would this appear in a time series graph?
- 11.** Explain how TSN analysis could help a farmer plan crop planting and harvesting.
- 12.** If noise is removed from data before analysis, what potential information might be lost?
- 13.** Compare TSN analysis for: a) stock prices, b) website traffic, c) climate data. How do components differ?
- 14.** Propose a real-world situation where identifying noise is more important than identifying trend.