Teacher guidance

Key focus

This objective builds on the TSN framework (Trend, Seasonality, Noise) by requiring students to read and quantify values directly off a time series graph, not just label a pattern verbally. Every task in this LO shows a real graph: students must locate a value at a given time point, calculate an amount or percentage change along the trend, name the peak/trough and cycle length of a seasonal pattern, spot and quantify a noise point, and read a dashed trend line to make a numeric prediction. The beta textbook reference for this skill is Ex 31.03, pg 590.

Before students begin

Students should already be able to read a labelled linear scale, subtract two values, calculate a percentage change, and explain what a point on a line graph represents. Keep the boundary clear: this objective is about interpreting an existing time series, not constructing the graph or fitting a formal statistical model.

Suggested teaching sequence

1. Recap the TSN acronym briefly, then move straight to a graph: model reading a specific value at a labelled time point.
2. Model describing the trend as a full sentence with a quantified change (e.g. "profit increased by $28,000 from 2018 to 2022"), not just "it went up."
3. Introduce *cycle*: the length of one full repeat of a seasonal pattern (e.g. 4 quarters = 1 year). Show a graph and have students state the cycle length, and name the peak and trough quarter.
4. Show a graph with one noise point among steady data. Have students locate it, read its value, and calculate how far it departs from the surrounding values.
5. Introduce the dashed trend/prediction line: show how it is read like any other point on the axis to give a numeric prediction, and discuss why a prediction can turn out wrong (unmodelled noise, a genuine future change in trend).
6. Present a graph where seasonality causes large swings between periods (e.g. Q1 vs. Q3). Model comparing only the Q1 values across cycles, then only the Q3 values, to reveal a trend the raw zig-zag line hides.
7. Present a graph with a sharp one-off dip. Have students check whether later points resume the original pattern (noise) or move to a sustained new level (a genuine trend change), using the actual numbers to justify the call.
8. Have students write a full quantified TSN description of an unfamiliar graph: trend with a percentage change, seasonality with its cycle length and peak/trough, and a decision on whether noise is present.

Core examples to model

- Reading + quantifying trend: revenue rises $12,000 to $40,000 across five years – read both endpoints off the axis and subtract.

- Cycle, peak, trough: quarterly sales peak every Q4 and trough every Q1 – one cycle is 4 quarters.
- Noise, quantified: weekly attendance sits near 40 except for one week at 5 – name the week and the gap from the surrounding values.
- Prediction from a trend line: a dashed line extending from the last plotted point to a future time index gives a specific numeric forecast, e.g. 150 mm for next year's rainfall.
- Seasonality masking a trend: Q1 values alone (40, 42, 45) and Q3 values alone (70, 73, 76) both increase steadily, even though the graph as a whole zig-zags sharply between them.

Watch for

- Naming a TSN letter without reading the actual numbers: this LO always expects a value, an amount, or a percentage to back up the classification, not just the label.
- Treating the zig-zag between a seasonal peak and trough as "no trend": students must compare same-period values across cycles (e.g. this Q1 vs. last Q1) before concluding there is or isn't an underlying trend.
- Reading a trend/prediction line as certain: a dashed line is only ever an estimate based on the pattern so far – unmodelled events (noise) can make any single prediction wrong.
- Calling a one-off dip a "new trend" (or vice versa): check whether the points after the unusual one resume the original pattern (noise) or settle at a different level for several periods (genuine change).
- Forgetting to state the units or the specific time points used in a calculation (e.g. giving "25%" with no mention of 2018 to 2022).

Checks for understanding

- Can students read a specific value off a time series graph at a named time point?
- Do they quantify the trend (an amount or a percentage change) rather than only describing its direction?
- Can they state the length of a seasonal cycle and name its peak and trough?
- Can they locate a noise point and quantify how far it departs from the surrounding pattern?
- Can they read a dashed trend/prediction line to give a specific numeric forecast, and explain a limitation of that forecast?
- Can they reveal a trend hidden by seasonality by comparing same-period values across cycles?
- Can they justify, using the actual figures, whether an unusual point is noise or a genuine change in trend?

Support and extension

For support, cover the line between points and ask students to read two named coordinates before describing any pattern; then provide the sentence stem "From … to …, the value increased/decreased from … to …". For extension, give a graph containing both strong seasonality and one anomalous point, and require a full TSN paragraph that quantifies the trend, states the cycle, identifies peak and trough periods, and defends whether the unusual point is noise.