# Components of a time series

1. Time series components

* Trend
* Seasonal
* Residual

1. Trend

* A long-term increase or decrease of the baseline of the time series
* Not necessarily linear

1. Seasonality

* A fixed periodic pattern in the time series
* Patterns relate to seasonal factors such as time of the year or day of week
* E.g.: Black Friday, Christmas, School holidays, etc.

1. Residual

* Everything leftover after subtracting the other components
* Useful to examine to determine how much structure of the underlying time series is captured in the trend and seasonality
* Large residuals -> there is still information to be extract through the trend or seasonal component or our methods for estimating the trend and seasonal component could be improved

1. Bringing it back together

* Either sum or multiply trend, seasonal, residual components together to recover the original series

1. Why is decomposition useful?

* EDA: to answer questions such as: ‘what was the impact of an ad campaign once we account for seasonality?’
* Pre-processing: useful for identifying outliers and can be used to impute outliers and missing data
* Feature engineering: derive features from the components to use as inputs in ML models
* Forecasting: forecast the components and aggregate to produce the final forecast

1. Decomposition is not always possible

* Not all time series can be easily broken down into components