1. **The Project**

I created this Power BI report following the Maven Analytics Power BI for Business Intelligence course, in which a database for 'AdventureWorks Bike Shop' was provided.

The brief of the course was to provide the management team with a way to track KPIs (sales, revenue, profit, returns), compare regional performance, analyse product-level trends and identify high-value customers.

2. **The Data**

The dataset consisted of the following tables:
Calendar Lookup
Customer Lookup
Product Lookup
Product Subcategories Lookup
Product Categories Lookup
Territory Lookup
Returns Data
Sales Data 2020
Sales Data 2021
Sales Data 2022

3. **Connecting and Shaping the Data**

The first step in creating the Power BI report was to load and transform each of the tables in order to ensure they were formatted correctly for the purposes of the report and analysis.

Examples of the table transformations that took place were:

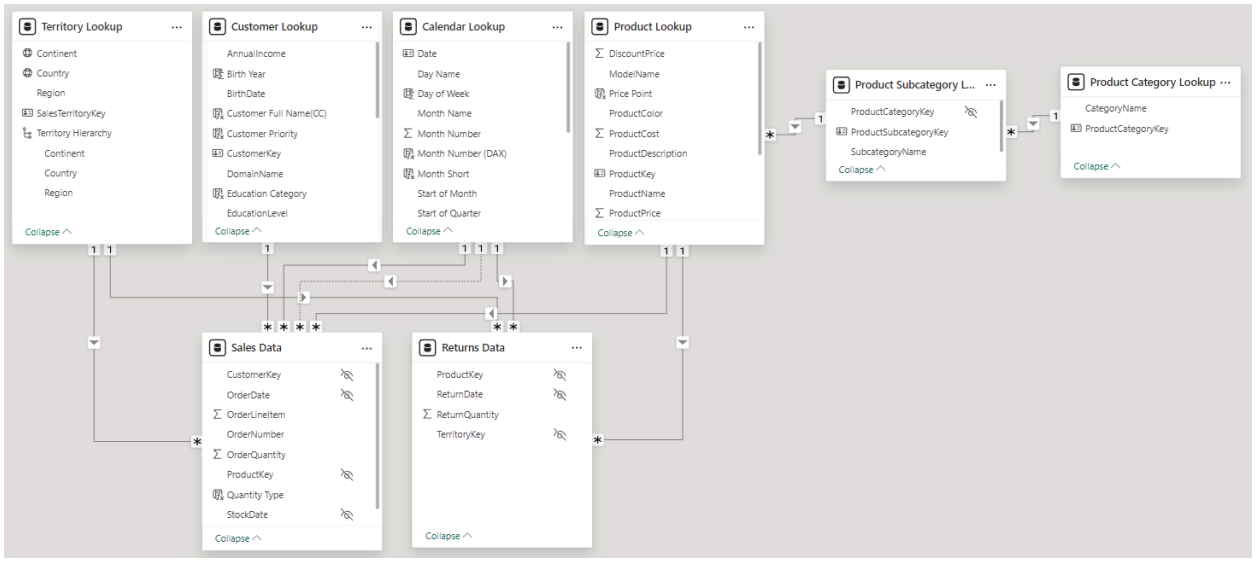
a. Confirming all column headers were correctly promoted and given the correct data type
b. Adding new columns (such as SKU Type), using details from other columns in the table
c. Amending the calendar table to enable later yearly, monthly, weekly and daily analysis
d. Combining the 3 Sales Data Tables

Profiling tools were used to review the quality, distribution and profile of the various columns in tables, ensuring a higher quality of data before loading it into Power BI front-end.

4. **Creating a Data Model**

Once all the data was loaded, the next step was to connect the tables in a meaningful way to create a working data model.

The dataset contained two types of tables; data tables and lookup tables. By considering the primary key in the lookup tables (such as Product Lookup having a primary key of product_id), and where this is found as a foreign key in an associated data table (such as in the Sales Data table), it is possible to create connections between the tables to form this data model.



5. Adding Calculated Columns

Using DAX, additional columns were added to some of the tables.

Examples of the calculated columns created include:

Education Category

```
Education Category =
SWITCH(
    TRUE(),
    'Customer Lookup'[EducationLevel] = "High School" || 'Customer Lookup'[EducationLevel] = "Partial High School", "High School",
    'Customer Lookup'[EducationLevel] = "Bachelors" || 'Customer Lookup'[EducationLevel] = "Partial College", "Undergrad",
    'Customer Lookup'[EducationLevel] = "Graduate Degree", "Graduate",
    "Other"
)
```

Income Level

```
Income Level =
SWITCH(
    TRUE(),
    'Customer Lookup'[AnnualIncome] >= 150000, "Very High",
    'Customer Lookup'[AnnualIncome] >= 100000, "High",
    'Customer Lookup'[AnnualIncome] >= 50000, "Average",
    "Low"
)
```

6. Adding Measures

The final step before beginning the data visualisation was to create the numerical fields that can be later analysed in the report. A dedicated measure table was created, in which a number of measures were added in order to easily and repeatedly access the required information for different data points.

Examples of the measures created include:
Total Customers
Total Cost
Total Profit
Total Revenue
Return Rate (%)
Bike Returns
Bike Sales
90-Day Rolling Profit

```
Total Customers =
DISTINCTCOUNT(
    'Sales Data'[CustomerKey]
)
```

```
Return Rate =
DIVIDE([Quantity Returned], [Quantity Sold]
)
```

```
Bike Sales =
CALCULATE([Quantity Sold],
'Product Subcategory Lookup'[ProductCategoryKey] = 1
)
```

```
90-day Rolling Profit =
CALCULATE(
    [Total Profit],
    DATESINPERIOD(
        'Calendar Lookup'[Date],
        MAX(
            'Calendar Lookup'[Date]
        ),
        -90,
        DAY
        ))
```

These measures were chosen based on the needs of the project. As the brief advised the management team wanted to be able to track KPIs including revenue, profit and returns these measures were vital to provide this information in the visualisation.

7. Visualising the Data

In order to plan the dashboard, the following three questions were considered:

1. What type of data are you working with?
2. What do you want to communicate?

3. Who is the end user and what do they need?

By taking these three questions into consideration, the best forms of visualisations and the key pieces of information to be shared can be decided with a rough plan put together for each page of the dashboard itself.

Four pages were identified as required from the brief:

1. Executive Dashboard - to provide a way to track KPIs and provide top product information
2. Map - to visually compare regional performance
3. Product Detail - to provide more detailed product-level trends
4. Customer Detail - to provide detailed information on a customer-level and help identify high-value customers and target groups

The dashboard was then created using a variety of visuals, measures and interactive tools.

1. Executive Dashboard:
    a. KPI Cards

    These highlight the total revenue, profit, orders and return rate, with filter interactions with the monthly revenue line chart, orders by category chart and top 10 products table.
    b. Monthly Revenue Line Chart

    This line chart displays the total revenue per month, with a slicer to amend the time period being shown. Anomalies are set up, explained by country and product sub-category.
    c. Top 10 Product Table

    This table is filtered to show the Top 10 ordered products overall, with filter interactions with the monthly revenue line chart and orders by category chart to enable the user to quickly see which products were sold the most in a given time period or category.
    A drill through on to the product page can be followed from this table, providing further insight into order and return patterns.
    d. Order by Category Chart

    Customised tool-tips have been created for this chart, allowing the user to view details about the total revenue, profit, orders and returns for each category of products when hovering over the bar.
    e. Top Ordered and Top Returned Product
    f. Filter Panel

    The pop-up panel allows the user to filter the entire page by year and/or by continent to allow the user to view a more targeted report where required.

2. Map
    a. Interactive Map

    The map provides a visual insight on where orders have been placed from. The user can hover over the bubbles to view a tool-tip which details the total orders from the country.
    b. Filter Panel

Filter buttons are available at the top of the page to allow the user to filter this content by continent.

3. Product Detail
    a. Selected Product Card

To allow the user to see which product they are viewing details for. This can be changed by following the drill through on the Top 10 Products on the Executive Dashboard.

    b. KPI Gauges

Three gauges highlight how well the product is doing in terms of monthly orders, revenue and profit based on the monthly target (+10% of the previous month), and provide a quick visual insight for the user.

    c. Monthly Profit Line Chart

This line chart displays the total profit per month, with a slicer to amend the time period being shown. A numeric parameter allows the user to adjust the price of the product in 10% increments or decrements to see the predicted impact on profit.

    d. KPI Area Chart

A field parameter for this chart allows the user to select which product metric they wish to view; allowing the user to choose from total orders, revenue, profit, returns and return rate.

4. Customer Detail
    a. KPI Cards

These two cards show the user the up to date number of unique customers, and the average revenue per customer. The year slicer on the page allows the user to see these details per year.

    b. Order Visualisations

Two donut charts are used to show the proportion of orders placed by customers based on their income level and occupation type.

    c. Total Customer and Revenue per Customer Line Chart

This line chart can be selected to either show the monthly trends for total customers or revenue per customer. The slicer allows the user to amend which time periods are shown.

    d. Top 100 Customers

As a feature of the report is to identify top customers, this table allows the user to see the top 100 customers based on the number of orders they have placed. The table also displays the revenue each customer has generated.

    e. Top Customer

This highlights the name, number of orders and total revenue from the customer in the specified time range and/or selected income level or occupation group who has generated the highest revenue.

    f. Additional Insight

An ‘info’ button has been added to take the user to a predetermined view of this report. As described, it shows the top customer at the start of August 2021 and the revenue they generated.

8. Key Insights

Whilst accessories drive the highest number of orders, bikes provide a much larger profit for the company. Accessories have had 17,000 orders and created around £569,000 profit, whereas there have been merely 14,000 orders for bikes creating a profit of around £9.7 million.

Whilst there has been a general increase in the number of orders since January 2020, there was a drop from July 2020 to January 2021, this may have been due to the Covid-19 pandemic preventing customers from requiring, or being able to purchase, the outdoor equipment alongside possible difficulties in supply chains and deliveries.

The top ordered product (Water Bottle - 30 oz.) appears to have created a stable profit for the company since September 2021, there are no major patterns in the time of year the product is ordered and/or returned. This product is the top ordered product in all continents, showing that it is a valuable product to continue.

Whilst the total number of unique customers has increased over time, the average revenue per customer has decreased. This may be due to the increase of sales of accessories compared to more expensive bikes.

Customers in the ‘average’ income group account for 47% of all orders placed. Those in the ‘professional’ occupation group account for 43% of all orders placed. Therefore, these customer groups would be good target groups when looking to increase sales.