Microsoft Excel Comprehensive Handbook

FROM CORE FOUNDATIONS TO ADVANCED DASHBOARD ANALYTICS

1. ESSENTIAL FORMULAS & KEY FUNCTIONS

Formulas are expressions that evaluate values inside cells. Every formula must start with an equals sign (`=`). Excel provides hundreds of standard functions categorized by data domain.

Core Mathematical & Statistical Functions

Function	Syntax	Practical Example	Description
SUM	`=SUM(range)`	`=SUM(C2:C20)`	Calculates total revenue across a range.
AVERAGE	`=AVERAGE(range)`	`=AVERAGE(D2:D50)`	Finds mean test score or sales average.
COUNT / COUNTA	`=COUNTA(range)`	`=COUNTA(A2:A100)`	Counts non-empty numeric or text entries.
COUNTIF	`=COUNTIF(range, criteria)`	`=COUNTIF(B2:B10, "Passed")`	Counts cells meeting a specified condition.
SUMIFS	`=SUMIFS(sum_rng, rng1, crt1, ...)`	`=SUMIFS(C:C, A:A, "East", B:B, ">500")`	Sums values matching multiple conditions.

Logical & Lookup Functions

- `=IF(E2>=70, "Pass", "Fail")`
- `=IFS(A1>=90, "A", A1>=80, "B", A1>=70, "C", TRUE, "F")`
- `=VLOOKUP(Lookup_Value, Table_Array, Col_Index, [Range_Lookup])`
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> **Practical Example: Dynamic Sales Bonus Calculation**
>
> Calculate a 5% bonus only for sales over $10,000 in the "North" region, otherwise $0:
>
> `=IF(AND(Region="North", Sales>10000), Sales*0.05, 0)`

2. SORTING & FILTERING DATA

Managing raw datasets efficiently requires structuring data to focus on critical subsets.

Data Sorting

- **Single-Level Sort:** Orders data by a single column (e.g., Alphabetical A-Z, Numeric Largest-to-Smallest, or Chronological Date order).
- **Multi-Level Sort:** Orders data by primary criteria, then secondary criteria (e.g., Sort by *Department* A-Z, then by *Salary* Highest to Lowest).

Data Filtering

- **AutoFilter:** Highlight dataset standard headers and toggle **Data > Filter**. Enables quick filtering by specific text matches, numeric thresholds, or color labels.
- **Advanced Filter:** Allows complex AND/OR criteria copied to separate output locations using criteria ranges outside the main data table.

3. DATA VISUALIZATION & CHARTS

Visual representations convert raw numbers into actionable business intelligence insights.

Chart Type	Best Use Case	Key Options & Features
Column / Bar	Comparing discrete categories.	Clustered or Stacked representations.
Line Chart	Tracking trends continuously over time.	Trendlines, markers, secondary axes.
Pie / Donut	Proportional part-to-whole comparisons.	Best for small category groups (< 6).
Scatter Plot	Identifying correlations between two variables.	Regression lines and R-squared metrics.

4. PIVOT TABLES & DATA ANALYSIS

Pivot Tables are interactive summarize tools that quickly process thousands of raw data rows without formulas.

Building a Pivot Table

1. Select raw dataset (ensure headers exist and contain no entirely blank rows/columns).
2. Navigate to **Insert > PivotTable** and choose placement on a new worksheet.
3. Drag fields into four main layout zones:
    - **Rows:** Categorical breakdowns down the left margin.
    - **Columns:** Secondary categorical groupings across top headers.
    - **Values:** Summarized metrics (SUM, COUNT, AVERAGE, MAX/MIN).
    - **Filters:** High-level dataset restrictions for the whole table.

> **Pivot Table Workflow Example: Regional Revenue Breakdown**
> To summarize quarterly product performance by territory: Drag **Region** to *Rows*, **Quarter** to *Columns*, and **Sales Amount** to *Values* (set to SUM). Right-click values to display numbers formatted as *Currency ($)*.

Pivot Features: Calculated Fields & Slicers

- **Calculated Fields:** Create new metrics using arithmetic on existing Pivot fields (e.g., `Profit = Revenue - Cost`).
- **Slicers & Timelines:** Interactive visual buttons that filter Pivot Tables dynamically with a single click.

5. INTERACTIVE EXCEL DASHBOARDS

An Excel Dashboard combines key metrics, visual charts, and interactive controls into a single, high-level reporting interface.