

Charts and Advanced Charts

Choose the right chart for every question, build and format column, bar, line, area, pie, scatter and combo charts, add sparklines, and create the advanced business charts taught in class: thermometer, Pareto, population pyramid and waterfall, plus histogram, box plot, treemap and funnel.

● Live classes 7–8

✦ Excel for Microsoft 365, 2026

Intermediate

🕒 130 min

By the end of this lesson you can

- Pick the right chart type from the question you want to answer
- Insert, edit and format charts quickly (elements, axes, labels, colours, templates)
- Build combo charts with a secondary axis and add sparklines
- Build thermometer, Pareto, population pyramid and waterfall charts step by step
- Use the newer statistical and hierarchy charts and apply chart design best practices

Datasets used

superstore_sales.csv

hr_employees.csv

Start with the question, not the chart

Chart chooser

Comparison

Column or bar chart. Which region sells most?

Trend over time

Line or area chart. How did sales move month by month?

Part of a whole

Pie/doughnut (≤ 5 parts), stacked bar, treemap. What share is Technology?

Relationship

Scatter or bubble chart. Do discounts reduce profit?

Distribution

Histogram or box plot. How are order values spread?

Contribution / flow

Waterfall, Pareto, funnel. What drove the change in profit?

Choose a chart by the question you are answering.

Creating and editing a chart

STEP BY STEP The fast way

1. Select the data **including headers** (or a summary table / pivot table). For a quick chart press **Alt + F1** (embedded) or **F11** (new chart sheet).
2. Or use **Insert** → **Recommended Charts** to preview options.
3. Click the chart: three buttons appear at its top-right: **Chart Elements** (+), **Chart Styles** (brush) and **Chart Filters** (funnel).
4. **Chart Design** tab: Switch Row/Column, Select Data, Change Chart Type, Move Chart, Quick Layout.
5. **Format** pane: double-click any element (axis, series, label) or press **Ctrl + 1** with it selected.

Element	Good practice
Title	Say the insight: "Technology drives 77% of sales", not "Sales by Category"
Axes	Start bar/column axes at zero; format numbers (K, L, %); remove unnecessary decimals
Gridlines	Light grey or none
Data labels	Use them instead of an axis when there are few bars
Legend	Only if there is more than one series; better: label lines directly
Colour	One highlight colour for the point you want to make, grey for the rest
Template	Right-click → Save as Template to reuse your style



The core chart types

Here are the core charts built from Superstore data. The Excel steps follow each one.



Column (comparison), line (trend), clustered and stacked bar (comparison of parts), and scatter (relationship).

Chart	Excel path	Use when
Clustered column / bar	Insert → Column or Bar	Comparing categories; use bar when labels are long or there are many categories
Stacked / 100% stacked	Same menu	Showing parts of a total across groups
Line	Insert → Line (with markers)	Trends over time; up to ~5 lines
Area	Insert → Line → Area	Cumulative trends; volume over time
Pie / doughnut	Insert → Pie	2–5 parts of a whole that add to 100%
Scatter (XY)	Insert → Scatter	Relationship between two numbers; add a trendline (right-click series → Add Trendline, tick Display R ²)
Bubble	Insert → Scatter → Bubble	Scatter with a third measure as bubble size

COMMON MISTAKES Chart crimes to avoid

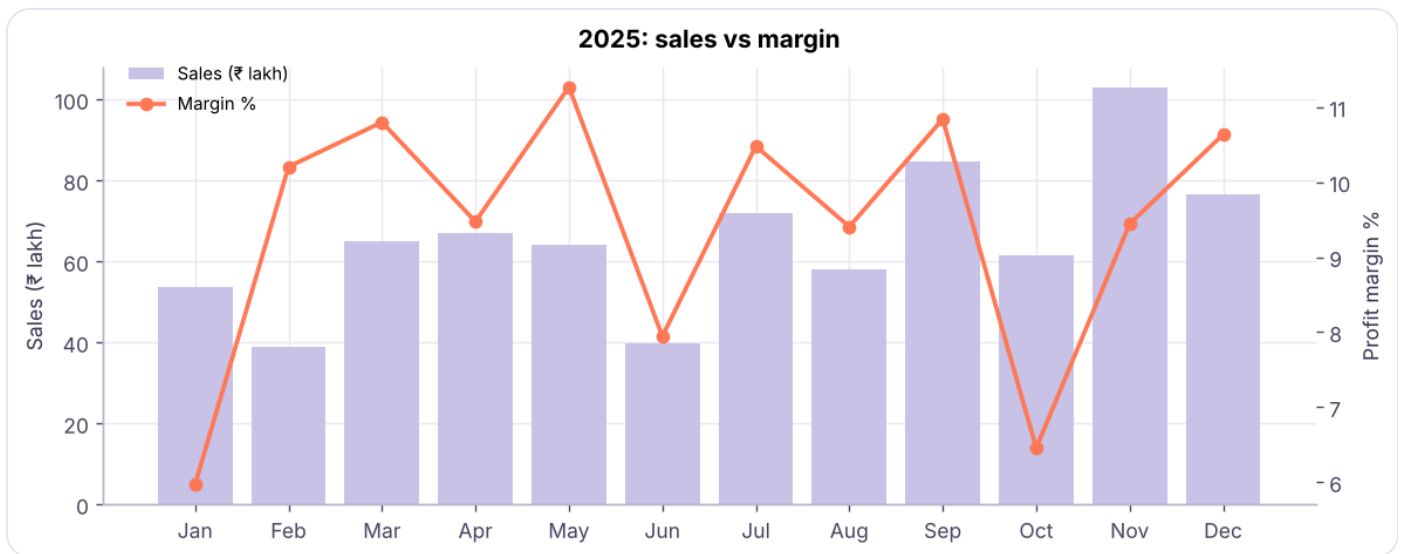
3D charts, pie charts with 10 slices, two different units on one axis, truncated bar axes that exaggerate differences, rainbow colours, and charts without units. If you need to squint, the chart has failed.

Combo charts and the secondary axis

When two measures have very different scales (sales in lakhs and profit margin in %), plot one as columns and the other as a line on a **secondary axis**.

STEP BY STEP Build a combo chart

1. Make a summary table: Month, Sales, Margin %.
2. Select it → Insert → **Combo Chart** → Create Custom Combo Chart.
3. Sales: Clustered Column. Margin %: Line with Markers, tick **Secondary Axis**.
4. Add axis titles so readers know which axis belongs to which series.



Combo chart: monthly sales (columns, left axis) and profit margin (line, right axis) for 2025.

Sparklines

Sparklines are tiny charts **inside a cell**: Insert → **Sparklines** → Line, Column or Win/Loss. Select the data range (for example 12 months in a row) and the location cell. Use **Sparkline** → **Show** → **High Point / Low Point** to mark extremes. They are ideal in dashboard tables, one row per product or region.

Thermometer chart (target vs actual)

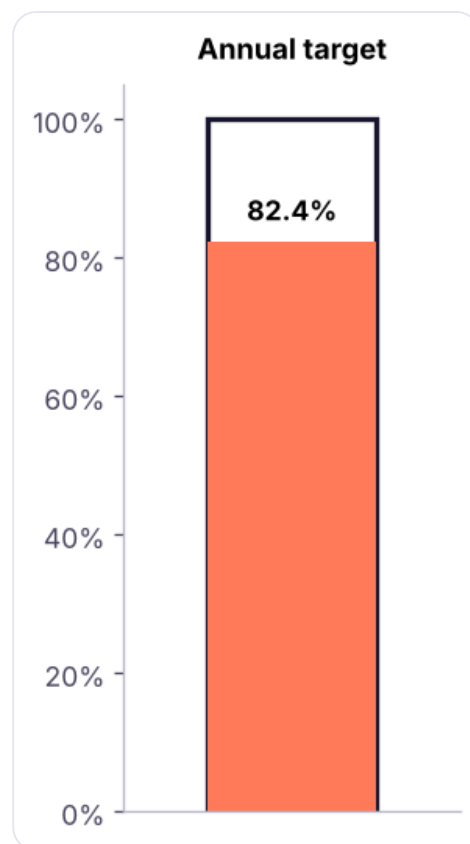
A thermometer shows progress towards a single target, such as "₹ 7.4 crore of the ₹ 9 crore annual target".

X Thermometer data		
	A	B
1	Metric	Value
2	Target	900
3	Achieved	742
4	% achieved	82.4%

B4 =B3/B2

STEP BY STEP**Build it**

1. Select only the % **achieved** cell (and its label) → Insert → **Clustered Column**.
2. Format the vertical axis: Minimum **0**, Maximum **1** (100%). Delete the horizontal axis and gridlines.
3. Format the series: Gap Width **0%** so the column fills the width; choose a strong fill colour.
4. Optional: add a second series with value 1 (100%) on the secondary axis, no fill and a thick border to draw the "glass" of the thermometer; set the secondary axis to 0–1 as well.
5. Resize the chart to be tall and narrow; add a data label showing 82.4%.



Thermometer chart: 82.4% of the annual target achieved.

Pareto chart (the 80/20 rule)

The Pareto principle says that roughly 80% of effects come from 20% of causes: a few sub-categories drive most sales, a few complaint types cause most tickets. A Pareto chart shows sorted bars plus a **cumulative %** line.

Python

```
pareto = s.groupby("sub_category")["sales"].sum().sort_values(ascending=False).to_frame()
pareto["share %"] = (pareto.sales / pareto.sales.sum() * 100).round(1)
pareto["cumulative %"] = pareto["share %"].cumsum().round(1)
pareto["sales"] = (pareto.sales / 1e5).round(1)
pareto.rename(columns={"sales": "sales (₹ lakh)"})
```

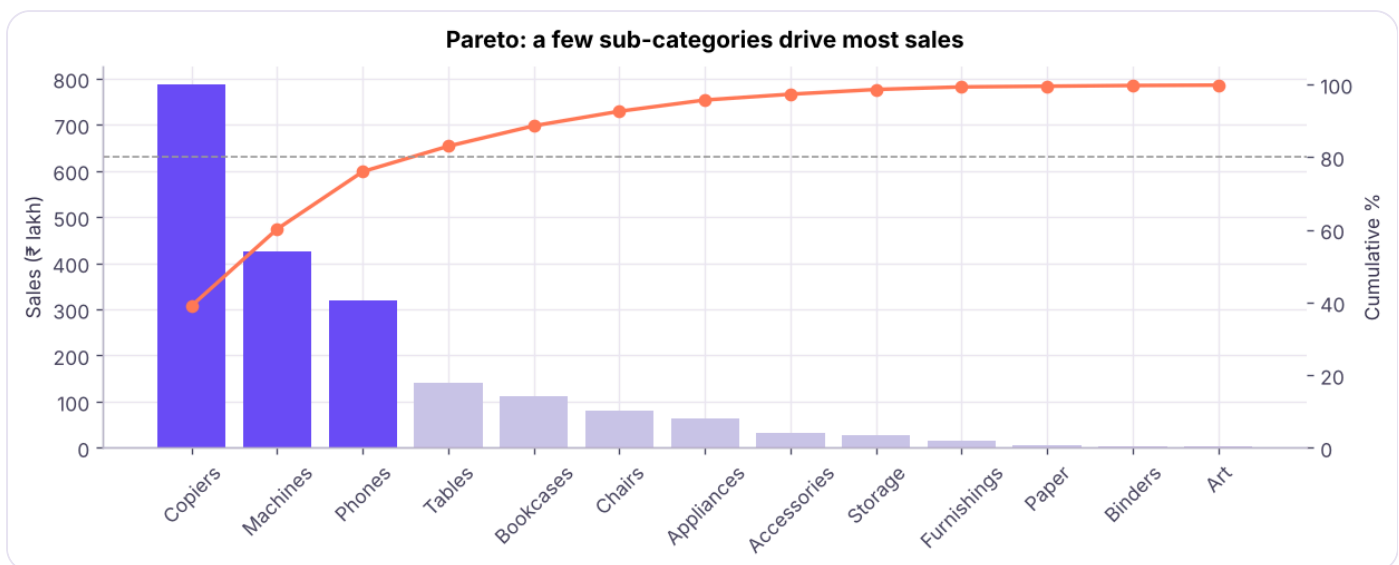
OUTPUT

	sales (₹ lakh)	share %	cumulative %
sub_category			
Copiers	787.5	39.1	39.1
Machines	425.9	21.1	60.2
Phones	319.2	15.8	76.0
Tables	140.5	7.0	83.0
Bookcases	112.7	5.6	88.6
Chairs	80.9	4.0	92.6
Appliances	63.3	3.1	95.7
Accessories	31.8	1.6	97.3
Storage	26.6	1.3	98.6
Furnishings	14.3	0.7	99.3
Paper	4.9	0.2	99.5
Binders	4.0	0.2	99.7

13 rows × 3 columns (first 12 shown)

STEP BY STEP Build it in Excel

1. Summarise sales by sub-category (pivot or SUMIFS) and **sort largest to smallest**.
2. Add Cumulative %: in C2 =SUM(\$B\$2:B2)/SUM(\$B\$2:\$B\$13), copy down.
3. Select the three columns → Insert → **Combo**: Sales = Clustered Column, Cumulative % = Line on the **Secondary Axis**.
4. Set the secondary axis maximum to 100%. Optionally add a horizontal 80% reference line.
5. Excel 2016+ also has a built-in **Insert → Statistical → Pareto** chart that sorts and accumulates for you from raw data.



Pareto chart of sales by sub-category. Copiers, Machines and Phones alone make up 76% of sales; adding Tables passes the 80% line.

Population pyramid

A population pyramid compares two groups (typically male and female) across age bands, with one group's bars going left and the other's going right. In business it works for any two-sided comparison: this year vs last year by product, or two regions by age band.

Python

```
hr = pd.read_csv("hr_employees.csv")
hr["age_band"] = pd.cut(hr.age, [20, 25, 30, 35, 40, 45, 50, 55, 60], labels=["21-25", "26-30", "31-35", "36-40", "41-45", "46-50", "51-55", "56-60"])
pyr = hr.pivot_table(index="age_band", columns="gender", values="emp_id", aggfunc="count", observed=False)
pyr["Male (negative)"] = -pyr["Male"]
pyr
```

OUTPUT

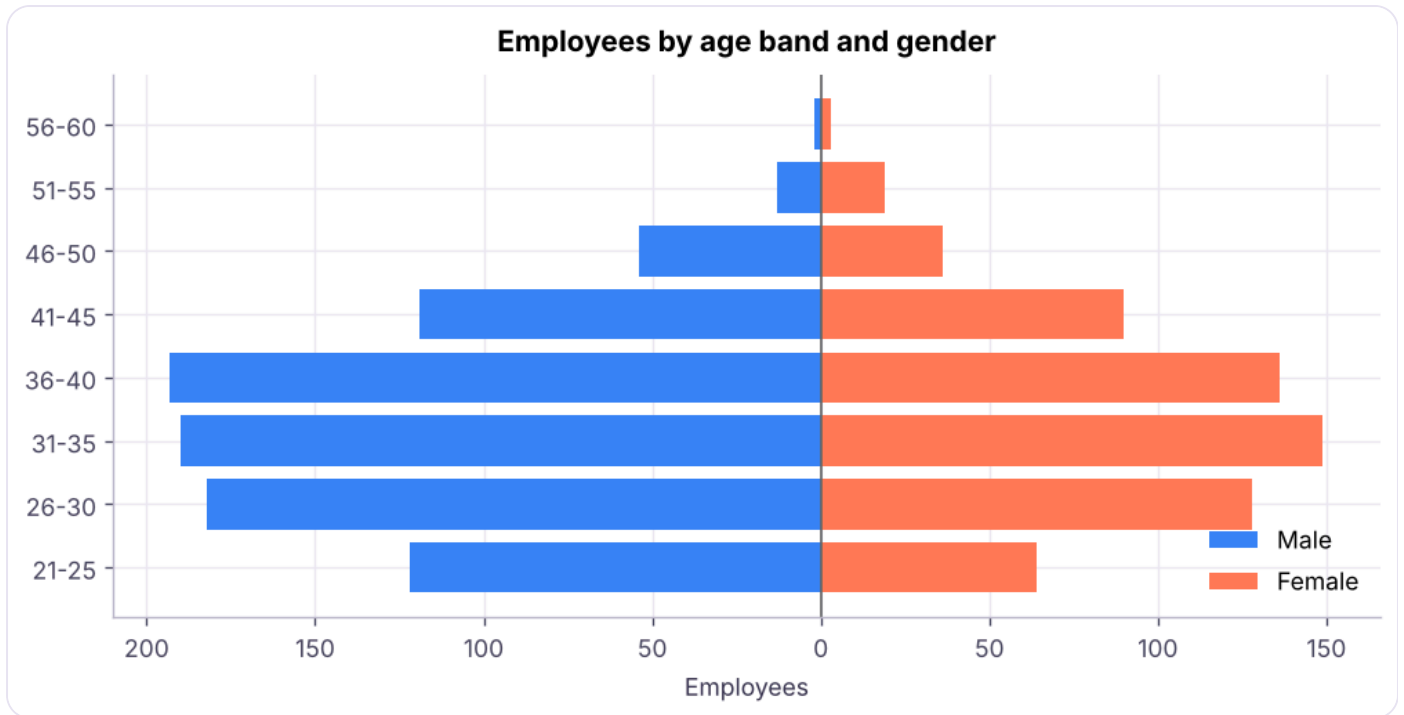
gender	Female	Male	Male (negative)
age_band			
21-25	64	122	-122
26-30	128	182	-182
31-35	149	190	-190
36-40	136	193	-193
41-45	90	119	-119
46-50	36	54	-54
51-55	19	13	-13
56-60	3	2	-2

8 rows × 3 columns

STEP BY STEP

Build it

1. Count employees by age band and gender (pivot table or COUNTIFS).
2. Make the male counts **negative** ($= -C2$) in a helper column so they plot to the left.
3. Select age bands, the negative male column and the female column → Insert → **Clustered Bar**.
4. Format series: Series Overlap **100%**, Gap Width **10–30%**.
5. Format the horizontal axis numbers with the custom format `#,##0;#,##0` so negative values show without a minus sign.
6. Vertical axis → Labels → Label Position: **Low** so the age labels sit on the left edge.



Population pyramid of the 1,500 employees in the HR dataset.

Waterfall chart

A waterfall shows how a starting value becomes an ending value through positive and negative steps: revenue to profit, last year's sales to this year's, or budget to actual.

X

Waterfall data: from revenue to net profit (₹ lakh)

	A	B
1	Step	Amount
2	Revenue	1200
3	Cost of goods	-640
4	Gross profit	560
5	Marketing	-120
6	Salaries	-210
7	Other income	35
8	Net profit	265

B4

=B2+B3

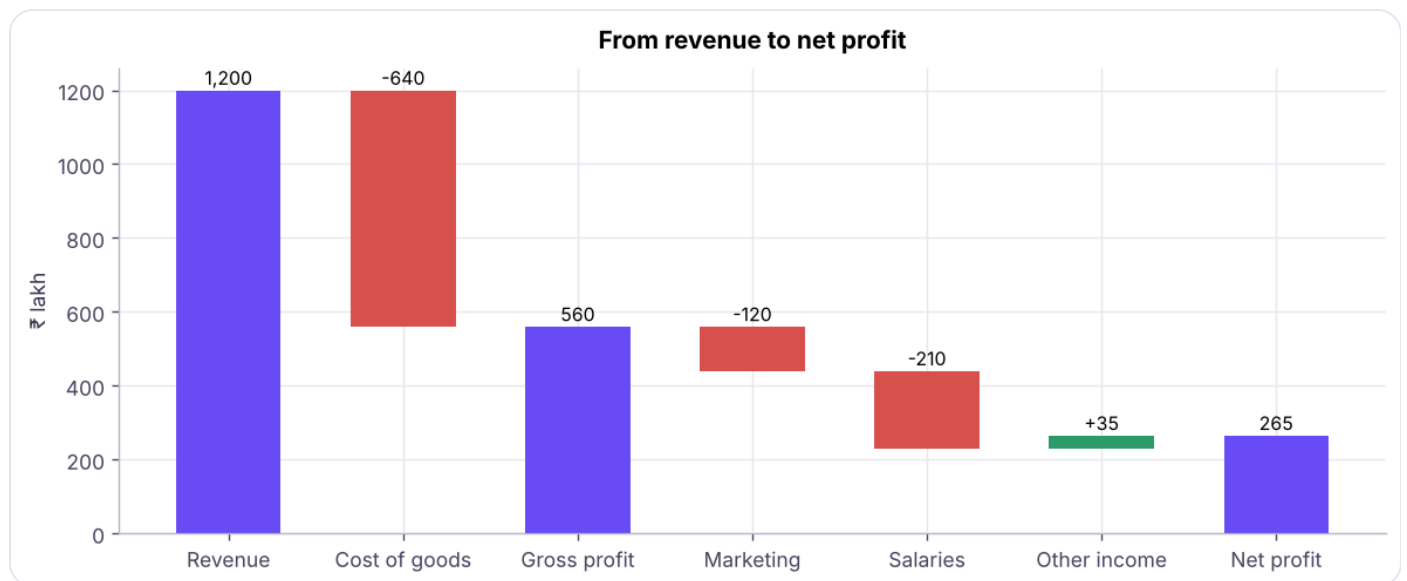
B8

=B4+B5+B6+B7

STEP BY STEP Build it (Excel 2016 and later)

1. Select the table → Insert → **Waterfall** (Insert → Charts → Waterfall, Funnel...).
2. Click the **Gross profit** bar twice (to select only that point) → right-click → **Set as total**.
Do the same for **Net profit**. Totals then start from zero instead of floating.
3. Colour increases, decreases and totals differently (Format Data Point) and add data labels.

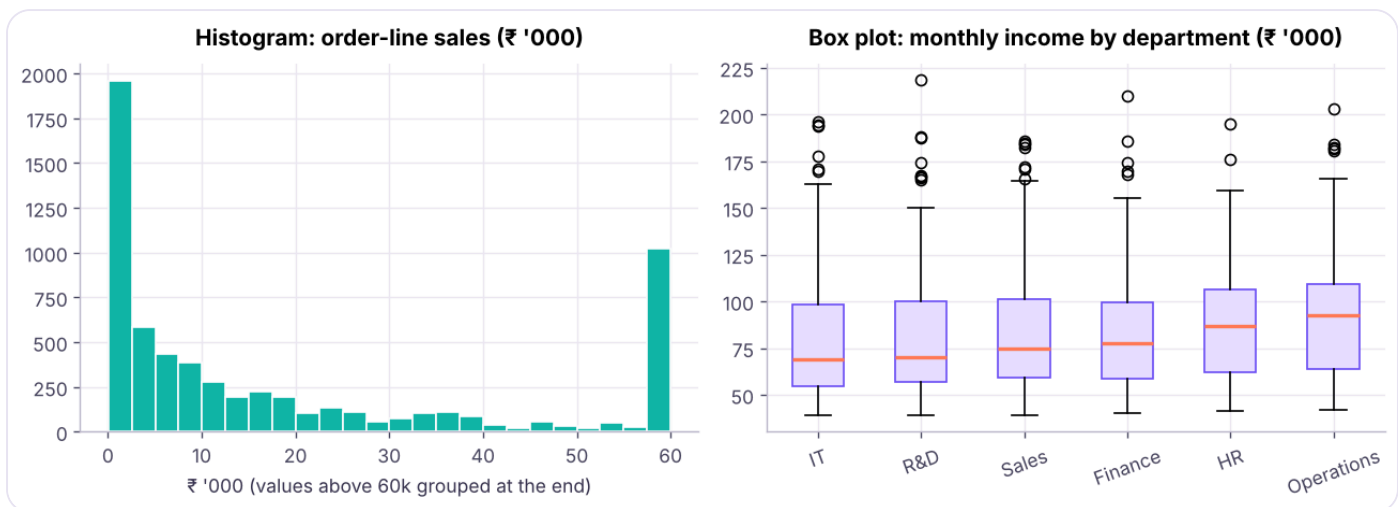
In older Excel versions you build the same chart as a **stacked column** with an invisible "base" series, an "up" series and a "down" series computed with formulas.



Waterfall from revenue to net profit. Totals are anchored at zero; increases are green and decreases are red.

Statistical and hierarchy charts (Excel 2016+)

Chart	Insert path	Shows	Example question
Histogram	Insert → Statistical → Histogram	Frequency distribution; set bin width in Format Axis	How are order values distributed?
Box & Whisker	Insert → Statistical → Box and Whisker	Median, quartiles and outliers by group	Do salaries vary more in Sales than in IT?
Treemap	Insert → Hierarchy → Treemap	Nested rectangles sized by value	Category → sub-category share of sales
Sunburst	Insert → Hierarchy → Sunburst	Rings for hierarchy levels	Region → state → city
Funnel	Insert → Waterfall → Funnel	Drop-off between stages	Visitors → sign-ups → orders
Filled map	Insert → Maps	Values by country or state	Sales by state (needs internet)



Histogram of order-line sales values and box plots of monthly income by department (HR data).

Dynamic charts

Charts become interactive when their source updates:

- **Table source:** new rows are added to the chart automatically.
- **Named range / dynamic named range** (Lesson 9) as the series values:
=Book1.xlsx!SalesLast12.
- **Drop-down + formulas:** a Data Validation drop-down picks a region, formulas (XLOOKUP/FILTER) pull that region's numbers into a helper table, and the chart reads the helper table.
- **Pivot charts + slicers** (Lesson 8) for click-to-filter dashboards (Lesson 11).

Copilot can suggest and insert charts from a sentence ("show monthly sales by region as a line chart"), and **Analyze Data** (Home → Analyze Data) proposes ready-made pivot charts with insights. Python in Excel can create seaborn or matplotlib charts inside the grid with `=PY()`.

Summary

KEY TAKEAWAYS

- Choose the chart from the question: comparison (bar/column), trend (line), part-of-whole (pie for ≤ 5 , stacked bar, treemap), relationship (scatter), distribution (histogram, box), contribution (waterfall, Pareto).
- Titles should state the insight; start bar axes at zero; use one highlight colour.
- Combo charts with a secondary axis show two measures of different scales.
- **Thermometer**: one % column, axis 0–100%, gap width 0.
- **Pareto**: sorted bars + cumulative % line on a secondary axis; look for the ~80% point.
- **Population pyramid**: one series negative, overlap 100%, custom format #, ##0;#, ##0.
- **Waterfall**: Insert → Waterfall, then "Set as total" for subtotal bars.

Quick quiz

6 questions · tap an answer to check it

1. Which chart best shows how monthly revenue changed over two years?

A Pie

B Line

C Treemap

D Scatter

Answer: B. Lines show trends over time.

2. In a Pareto chart, what does the line represent?

- A The average value
- B The cumulative percentage of the total
- C The target
- D The trend

Answer: B. The line accumulates each bar's share to show where ~80% is reached.

3. How do you make the male bars go to the left in a population pyramid?

- A Make the male values negative and format the axis to hide the minus sign
- B Use a pie chart
- C Reverse the category order
- D Put males on a secondary axis

Answer: A. Negative values plot to the left; #,##0;# ,##0 shows them as positive numbers.

4. In Excel's waterfall chart, why must Gross profit be "Set as total"?

- A To change its colour
- B So it starts from zero instead of floating on the previous step
- C To hide it
- D To make it a line

Answer: B. Totals should be anchored to the axis; otherwise Excel treats them as another step.

5. When should you use a secondary axis?

- A Whenever there are two series
- B When two series have very different scales or units, such as sales and margin %**
- C When the chart is a pie
- D Never

Answer: B. A secondary axis lets both series be readable; label both axes clearly.

6. Which chart shows median, quartiles and outliers for several groups?

- A Histogram
- B Box and whisker**
- C Funnel
- D Sunburst

Answer: B. Box plots summarise distributions and highlight outliers.

EXERCISE Build four charts from Superstore

(1) A Pareto chart of profit by sub-category (watch out for negative profit: what does it mean?). (2) A combo chart of quarterly sales (columns) and order count (line, secondary axis). (3) A waterfall from 2024 total sales to 2025 total sales, with one step per region showing the change. (4) A box plot of discount by category.

Show solution (worked answer)

(1) Sort profit descending; negative sub-categories (such as Tables and Bookcases here) reduce the cumulative total, so the cumulative line rises above 100% and then falls; a Pareto chart works best on positive values, so plot losses separately. (2) Pivot by quarter with Sum of sales and Count of order_id → Combo chart with the count on the secondary axis. (3) Table: 2024 total; North change; South change; East change; West change; 2025 total. Insert → Waterfall; set the first and last bars as totals. (4) Select category and discount columns → Insert → Box and Whisker.

INTERVIEW CORNER Questions you may be asked

Q: How do you choose a chart type? From the question: comparison, trend, composition, relationship, distribution or contribution. Then simplify: remove clutter, highlight the key point and write an insight title.

Q: What is a Pareto analysis used for? To find the vital few causes (products, customers, complaint types) that produce most of the effect, so that effort is focused where it matters.

Q: How would you show actual vs target for 10 sales reps? A bar chart of actuals with a target marker (a line or a thin overlapping bar per rep), or a bullet chart; a thermometer works for one overall target.

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