



BUSINESS INTELLIGENCE

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BI Basics

(Business Intelligence Basics):

- ▶ Business Intelligence (BI) refers to the use of technologies, applications, and practices to collect, integrate, analyze, and present business data to support decision-making processes within an organization.
- ▶ It is Data-Driven Decision Support System.
- ▶ The primary goal of BI is to help business users and decision-makers gain actionable insights from data and improve overall business performance.

BI Basics (Business Intelligence Basics):

Business Intelligence



Information Gathering :

- ▶ Information gathering is the process of collecting relevant data from various sources to create a comprehensive understanding of a particular subject or problem.
- ▶ In the context of BI, information gathering involves identifying and extracting data from internal and external sources, including databases, spreadsheets, cloud services, websites, and more.
- ▶ The data collected must be accurate, relevant, and up-to-date to ensure meaningful analysis.

Decision Making:

- ▶ BI plays a crucial role in enhancing decision-making processes within an organization.
- ▶ By providing accurate and timely insights, BI empowers decision-makers to make informed choices based on data-driven evidence rather than relying solely on intuition.
- ▶ BI tools often include interactive dashboards, ad-hoc querying capabilities, and data visualization to support decision-making at various levels of the organization.



THE 2 SYSTEMS



READINGGRAPHICS
ACTIONABLE INSIGHTS IN ONE PAGE

System 1 (Fast Thinking)

Continuously scans
our environment.



Fast but error-prone



Works automatically
& effortlessly via
shortcuts, impulses
and intuition.



System 2 (Slow Thinking)

Used for specific
problems, **only if**
necessary



Takes effort to analyze,
reason, solve complex
problems, **exercise**
self-control



Slow but reliable



1. Slow But Accurate

- You have a slow thinking system which you can think of as a spotlight of attention. You use this system when you really focus on and think about a problem step by step. This slow-thinking system is very accurate. However, it can only process so much information at any one time and requires a lot of energy.
- Many of us don't use our slow thinking system for most decisions. Instead, we use our fast system, otherwise known as our intuition.

2. Fast But Error-Prone

- Your fast-thinking system can take in massive amounts of data at once. It can also make snap decisions very quickly, with pretty high accuracy.
- However, your fast-thinking system has one big disadvantage. It is prone to logical fallacies and perceptual biases.
- If your slow thinking system is like a spotlight, your fast thinking system is like the area of a picture that isn't in focus. You don't have to burn much energy to use it, but you don't see things as clearly as you do with your slow-thinking system.

Figure 1: A Comparison of System 1 and System 2 Thinking

System 1

"Fast"

DEFINING CHARACTERISTICS

Unconscious
Effortless
Automatic

WITHOUT self-awareness or control

"What you see is all there is."

ROLE

Assesses the situation
Delivers updates

System 2

"Slow"

DEFINING CHARACTERISTICS

Deliberate and conscious
Effortful
Controlled mental process

WITH self-awareness or control

Logical and skeptical

ROLE

Seeks new/missing information
Makes decisions

Managing BI:

- ▶ Managing BI involves overseeing the entire BI infrastructure, which includes data storage, ETL (Extract, Transform, Load) processes, data warehouses, BI tools, and user access.
- ▶ Effective management ensures that data is accurate, secure, and accessible to the right users at the right time.

User/Market Segmentation:

- ▶ BI user segmentation involves categorizing users based on their roles, responsibilities, and information needs within an organization.
- ▶ Different user segments may require access to specific data, reports, and dashboards tailored to their job functions.
- ▶ Understanding user segments helps BI teams deliver personalized and relevant insights to each group.

User/Market Segmentation

- While market segmentation divides the entire target market into smaller subsets, customer segmentation takes your existing customer base and divides it into sections based on similar needs and behaviors.
- Keep in mind that customers will fit into more than one segment, depending on the segmentation variables you choose.

Market Segmentation

Types of Market Segmentation:

- Demographic Segmentation
 - Behavioral Segmentation
 - Geographic Segmentation
 - Psychographic Segmentation
-





Demographic Segmentation

- Age
 - Sex
 - Marital Status
 - Family Size
 - Occupation
 - Education Level
 - Income
 - Race
 - Nationality Religion
-

Behavioral Segmentation

- Online shopping habits
 - Actions taken on a website
 - Benefits sought
 - Loyalty
-



Geographic Segmentation,
splitting up your market based on
their location, is a basic but highly
useful segmentation strategy



Psychographics VS Demographics

Personality

Values

Interests

Lifestyles



Age/Gender

Race

Location

Employment Status

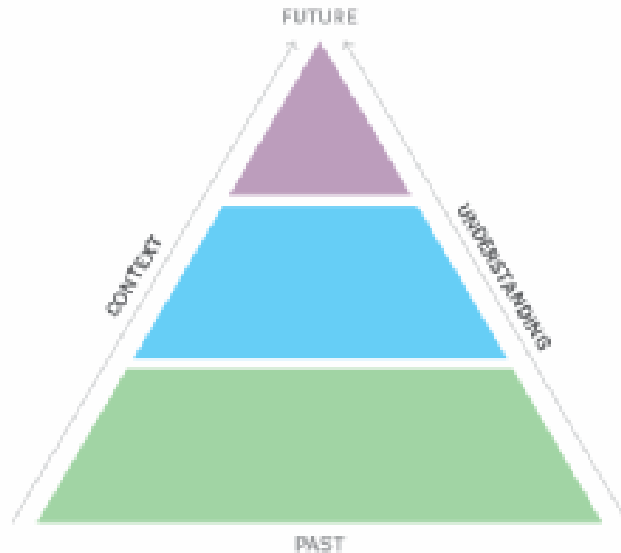
Gathering BI Requirements:

- ▶ Gathering BI requirements involves understanding the needs and expectations of stakeholders to determine the data and insights they require.
- ▶ This process requires close collaboration between business users and BI analysts to identify key performance indicators (KPIs), data dimensions, and visualization preferences to build a BI solution that addresses business needs effectively.

Content and Knowledge Management:

- ▶ Content and knowledge management in BI refer to organizing and maintaining the repository of data, reports, dashboards, and analytical models.
- ▶ This ensures that data is consistent, up-to-date, and easily accessible to users.
- ▶ Knowledge management involves documenting insights, best practices, and data definitions to share knowledge across the organization.

Knowledge triangle



■ **KNOWLEDGE:** Awareness and understanding of information, gained through experience.

■ **INFORMATION:** Data that has been organized and contextualized, often stored in documents and other files, such as invoices.

■ **DATA:** Raw facts and figures, such as names and numbers in spreadsheets.

A strategic approach to BI:

- ▶ A strategic approach to BI involves aligning BI initiatives with an organization's overall business objectives.
- ▶ It requires defining clear goals, identifying key performance indicators, and prioritizing projects that will have the most significant impact on the organization's success.
- ▶ A strategic approach helps ensure that BI efforts contribute to the organization's growth and competitive advantage.

The significance of visual analytics:

- ▶ Visual analytics is a critical component of BI that uses graphical representations, charts, and interactive dashboards to present data visually.
- ▶ The significance of visual analytics lies in its ability to make complex data more understandable and accessible to a broader audience.
- ▶ Visualizations help identify patterns, trends, and outliers quickly; enabling better and faster decision-making.

Information Visualization:

- ▶ Information visualization is the process of transforming raw data into graphical representations such as charts, graphs, heatmaps, and other visual elements.
- ▶ The goal is to make data more intuitive and easier to comprehend, allowing users to gain insights at a glance.

Data representation :

- ▶ Data representation refers to the various formats used to present data.
- ▶ It can be numerical (e.g., tables), visual (e.g., charts), or textual (e.g., summaries).
- ▶ The choice of data representation depends on the nature of the data and the insights sought by users.

Data Collection & Binding :

- ▶ Data collection involves gathering data from multiple sources and integrating it into a centralized repository, often a data warehouse, to create a unified view.
- ▶ Data binding refers to the process of connecting the data to the BI tools and visualizations, enabling users to interact with the data and extract meaningful insights.

Structured Data :

- ▶ Structured data is organized and formatted in a consistent manner, making it easily searchable and analysable.
- ▶ It fits neatly into predefined data models and is usually stored in relational databases or spreadsheets.

Unstructured Data :

- ▶ Unstructured data lacks a predefined data model and doesn't fit neatly into traditional databases.
- ▶ It includes things like text documents, emails, social media posts, images, and videos.
- ▶ Analyzing unstructured data requires specialized tools like natural language processing and machine learning algorithms to extract valuable insights.

Pivot Table:

- ▶ PivotTable is an extremely powerful tool that you can use to slice and dice data.
- ▶ Knowledge of PivotTable features helps us to start with exploring, analyzing, and reporting data based on the requirements.

Pivot Table:

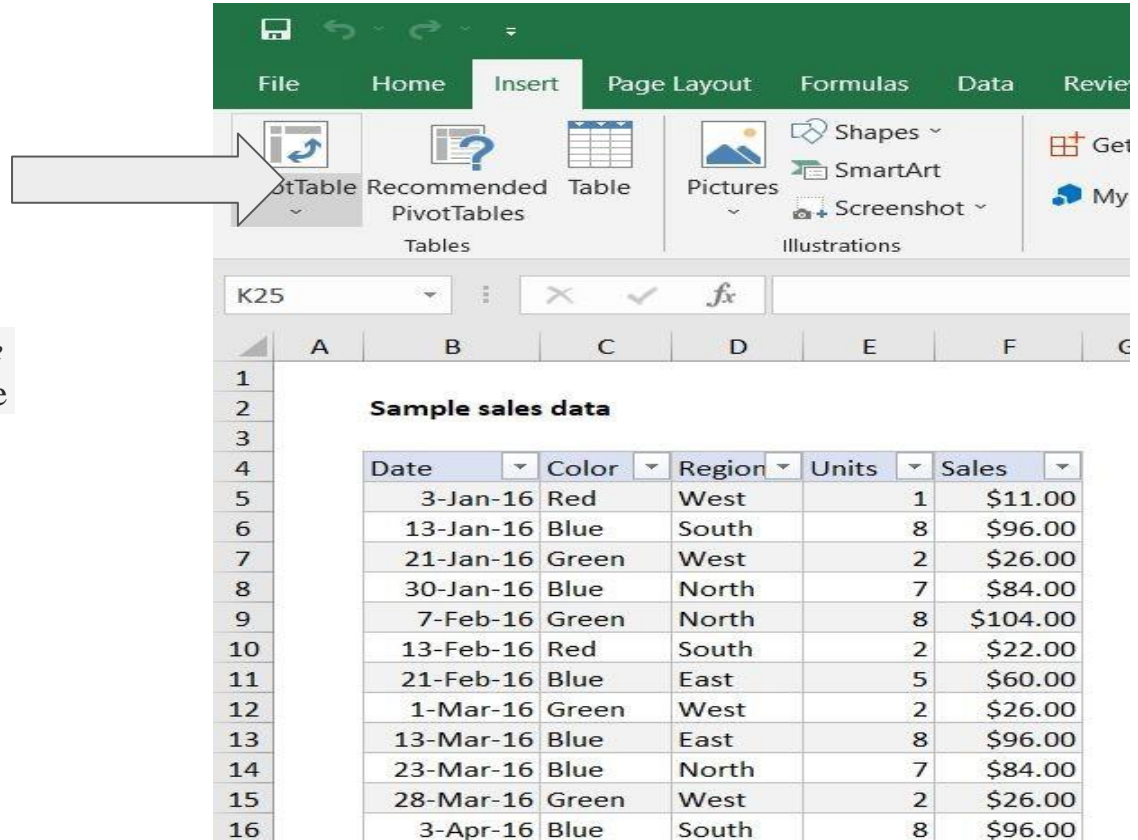
- ▶ A PivotTable is an interactive way to quickly summarize large amounts of data. You can use a PivotTable to analyze numerical data in detail and answer unanticipated questions about your data.
- ▶ A PivotTable is specially designed for Querying large amounts of data in many user-friendly ways.

Features of Pivot Table:

- ◆ Creating a PivotTable is extremely simple and fast
- ◆ Enabling churning of data instantly by simple dragging of fields, sorting and filtering and different calculations on the data.
- ◆ Arriving at the suitable representation for your data as you gain insights into it.
- ◆ Ability to create reports on the fly.
- ◆ Producing multiple reports from the same PivotTable in a matter of seconds.
- ◆ Providing interactive reports to synchronize with the audience.

Pivot Table

1. To start off, select *any cell in the data* and click Pivot Table on the Insert tab of the ribbon:

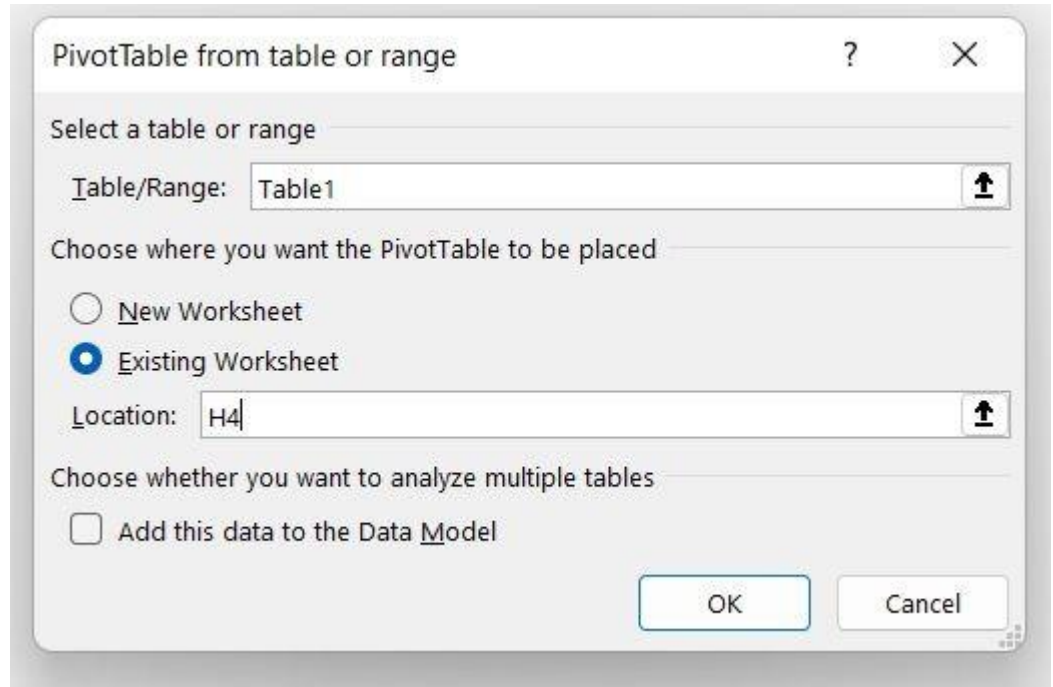


The screenshot shows the Microsoft Excel interface with the 'Insert' tab selected on the ribbon. A large grey arrow points to the 'PivotTable' button in the 'Tables' group. Below the ribbon, a table titled 'Sample sales data' is shown, containing 16 rows of data with columns for Date, Color, Region, Units, and Sales.

Date	Color	Region	Units	Sales
3-Jan-16	Red	West	1	\$11.00
13-Jan-16	Blue	South	8	\$96.00
21-Jan-16	Green	West	2	\$26.00
30-Jan-16	Blue	North	7	\$84.00
7-Feb-16	Green	North	8	\$104.00
13-Feb-16	Red	South	2	\$22.00
21-Feb-16	Blue	East	5	\$60.00
1-Mar-16	Green	West	2	\$26.00
13-Mar-16	Blue	East	8	\$96.00
23-Mar-16	Blue	North	7	\$84.00
28-Mar-16	Green	West	2	\$26.00
3-Apr-16	Blue	South	8	\$96.00

The sample data contains 452 records with 5 fields of information: Date, Color, Units, Sales, and Region. This data is perfect for a pivot table.

2. Override the default location and enter H4 to place the pivot table on the current worksheet:



Excel will display the Create Pivot Table window. Notice the data range is already filled in. The default location for a new pivot table is New Worksheet.

3. Click OK, and Excel builds an empty pivot table starting in cell H4.

H4

✕

✓

fx

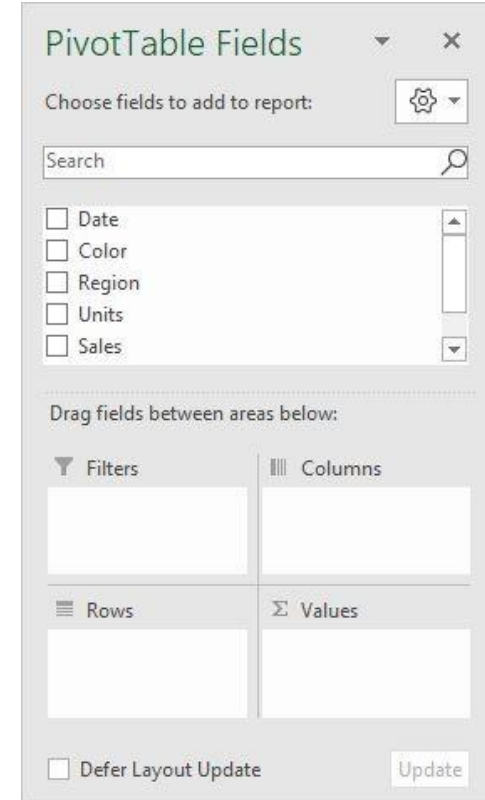
	A	B	C	D	E	F	G	H	I	J	K
1											
2		Sample sales data				New empty Pivot Table					
3											
4		Date	Color	Region	Units	Sales					
5		3-Jan-16	Red	West	1	\$11.00					
6		13-Jan-16	Blue	South	8	\$96.00					
7		21-Jan-16	Green	West	2	\$26.00					
8		30-Jan-16	Blue	North	7	\$84.00					
9		7-Feb-16	Green	North	8	\$104.00					
10		13-Feb-16	Red	South	2	\$22.00					
11		21-Feb-16	Blue	East	5	\$60.00					
12		1-Mar-16	Green	West	2	\$26.00					
13		13-Mar-16	Blue	East	8	\$96.00					
14		23-Mar-16	Blue	North	7	\$84.00					
15		28-Mar-16	Green	West	2	\$26.00					
16		3-Apr-16	Blue	South	8	\$96.00					
17		12-Apr-16	Green	South	1	\$13.00					
18		16-Anr-16	Red	East	8	\$88.00					

PivotTable2

To build a report, choose fields from the PivotTable Field List

Excel also displays the PivotTable Fields pane, which is empty at this point. Note all five fields are listed, but unused:

To build a pivot table, drag fields into one the Columns, Rows, or Values area. The Filters area is used to apply global filters to a pivot table.



Add fields

1. Drag the Sales field to the Values area.

Excel calculates a grand total, 26356. This is the sum of all sales values in the entire data set:

H4

✕

✓

fx

Sum of Sales

	A	B	C	D	E	F	G	H	I
1									
2	Sample sales data								
3									
4		Date	Color	Region	Units	Sales	Sum of Sales		
5		3-Jan-16	Red	West	1	\$11.00	26356		
6		13-Jan-16	Blue	South	8	\$96.00			
7		21-Jan-16	Green	West	2	\$26.00			
8		30-Jan-16	Blue	North	7	\$84.00			
9		7-Feb-16	Green	North	8	\$104.00			
10		13-Feb-16	Red	South	2	\$22.00			
11		21-Feb-16	Blue	East	5	\$60.00			
12		1-Mar-16	Green	West	2	\$26.00			

Grand total of ALL data

Sum of Sales

26356

Grand total of
ALL data

2. Drag the Color field to the Rows area.

Excel breaks out sales by Color. You can see Blue is the top seller, while Silver comes in last:

Notice the Grand Total remains 26356.
This makes sense, because we are still
reporting on the full set of data.

H4										
	A	B	C	D	E	F	G	H	I	J
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										

Sample sales data

Date	Color	Region	Units	Sales
3-Jan-16	Red	West	1	\$11.00
13-Jan-16	Blue	South	8	\$96.00
21-Jan-16	Green	West	2	\$26.00
30-Jan-16	Blue	North	7	\$84.00
7-Feb-16	Green	North	8	\$104.00
13-Feb-16	Red	South	2	\$22.00
21-Feb-16	Blue	East	5	\$60.00
1-Mar-16	Green	West	2	\$26.00
13-Mar-16	Blue	East	8	\$96.00
23-Mar-16	Blue	North	7	\$84.00
28-Mar-16	Green	West	2	\$26.00
3-Apr-16	Blue	South	8	\$96.00

Color	Sum of Sales
Blue	7464
Green	6414
Red	5508
Silver	6970
Grand Total	26356

You can see Color is a Row field, and Sales is a

PivotTable Fields ▼ ✕

Choose fields to add to report: ⚙️ ▼

Search 🔍

☐ Date ▲







☒ **Color**

☐ Region

☐ Units

☒ **Sales** ▼

Drag fields between areas below:

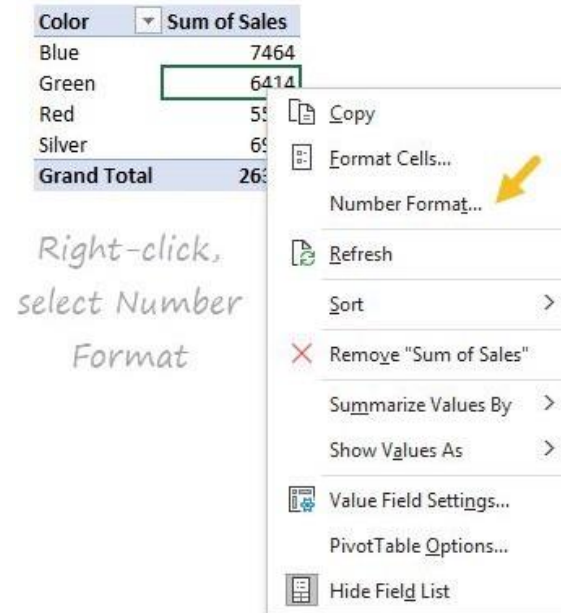
 Filters	 Columns
<div></div>	<div></div>
<div> Rows</div> <div>Color ▼ </div> <div></div>	<div> Values</div> <div>Sum of Sales ▼ </div> <div></div>

☐ Defer Layout Update Update

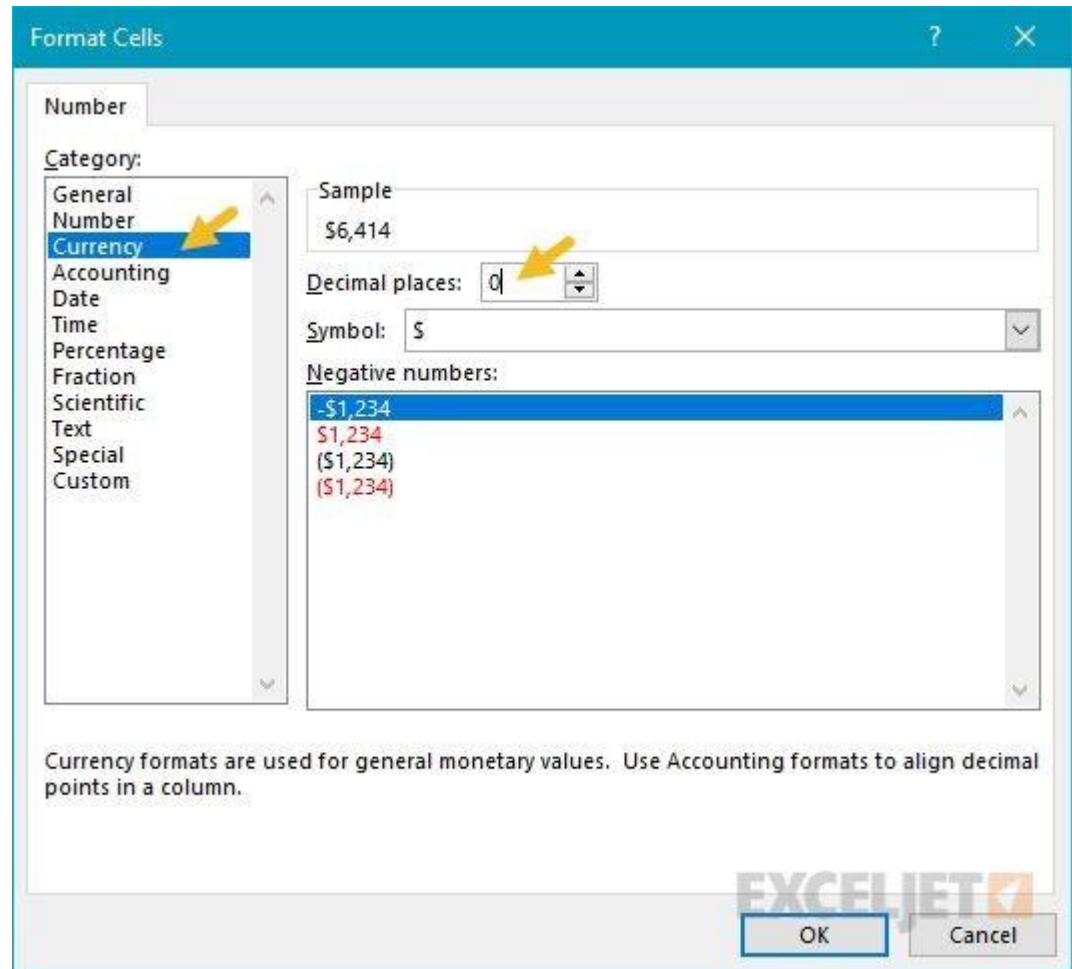
Number formatting

Pivot Tables can apply and maintain number formatting automatically to numeric fields. This is a big time-saver when data changes frequently.

1. Right-click any Sales number and choose Number Format:



2. Apply Currency formatting with zero decimal places, then click OK:



The image shows the 'Format Cells' dialog box in Microsoft Excel, with the 'Number' tab selected. The 'Category' list on the left has 'Currency' highlighted with a yellow arrow. The 'Sample' field shows '\$6,414'. The 'Decimal places' spinner is set to '0' with a yellow arrow. The 'Symbol' dropdown is set to '\$'. The 'Negative numbers' list has '-\$1,234' selected. At the bottom, there is a note about currency formats and 'OK' and 'Cancel' buttons.

Format Cells

Number

Category:

- General
- Number
- Currency**
- Accounting
- Date
- Time
- Percentage
- Fraction
- Scientific
- Text
- Special
- Custom

Sample

\$6,414

Decimal places: 0

Symbol: \$

Negative numbers:

- \$1,234**
- \$1,234
- (\$1,234)
- (\$1,234)

Currency formats are used for general monetary values. Use Accounting formats to align decimal points in a column.

OK **Cancel**

- In the resulting pivot table, all sales values have Currency format applied
- Currency format will continue to be applied to Sales values, even when the pivot table is reconfigured, or new data is added.:

16										
	A	B	C	D	E	F	G	H	I	J
1										
2	Sample sales data									
3										
4	Date	Color	Region	Units	Sales					
5	3-Jan-16	Red	West	1	\$11.00					
6	13-Jan-16	Blue	South	8	\$96.00					
7	21-Jan-16	Green	West	2	\$26.00					
8	30-Jan-16	Blue	North	7	\$84.00					
9	7-Feb-16	Green	North	8	\$104.00					
10	13-Feb-16	Red	South	2	\$22.00					
11	21-Feb-16	Blue	East	5	\$60.00					
12	1-Mar-16	Green	West	2	\$26.00					
13	13-Mar-16	Blue	East	8	\$96.00					
14	23-Mar-16	Blue	North	7	\$84.00					
15	28-Mar-16	Green	West	2	\$26.00					
16	3-Apr-16	Blue	South	8	\$96.00					

Color	Sum of Sales
Blue	\$7,464
Green	\$6,414
Red	\$5,508
Silver	\$6,970
Grand Total	\$26,356

Sorting by value

1. Right-click any Sales value and choose Sort > Largest to Smallest.

Color	Sum of Sales
Blue	\$7,464
Green	\$6,111
Red	\$5,432
Silver	\$4,987
Grand Total	\$23,994

Right-click, select Sort

Sort >

- Sort Smallest to Largest
- Sort Largest to Smallest
- More Sort Options...

EXCELJET

Excel now lists top-selling colors first. This sort order will be maintained when data changes, or when the pivot table is reconfigured

Excel interface showing a PivotTable and its source data.

Formula Bar: I5, 7464

Worksheet Tabs: A, B, C, D, E, F, G, H, I, J

Sample sales data (Sorted largest to smallest):

Date	Color	Region	Units	Sales
3-Jan-16	Red	West	1	\$11.00
13-Jan-16	Blue	South	8	\$96.00
21-Jan-16	Green	West	2	\$26.00
30-Jan-16	Blue	North	7	\$84.00
7-Feb-16	Green	North	8	\$104.00
13-Feb-16	Red	South	2	\$22.00
21-Feb-16	Blue	East	5	\$60.00
1-Mar-16	Green	West	2	\$26.00
13-Mar-16	Blue	East	8	\$96.00
23-Mar-16	Blue	North	7	\$84.00
28-Mar-16	Green	West	2	\$26.00
3-Apr-16	Blue	South	8	\$96.00

PivotTable Summary:

Color	Sum of Sales
Blue	\$7,464
Silver	\$6,970
Green	\$6,414
Red	\$5,508
Grand Total	\$26,356

Yellow arrow pointing down from the PivotTable to the Grand Total.

Refresh data

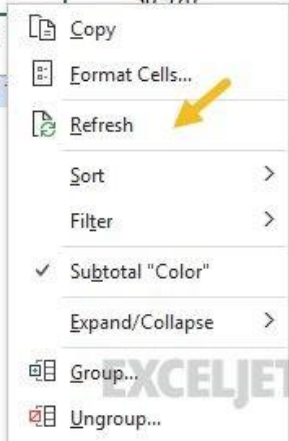
Pivot table data needs to be "refreshed" in order to bring in updates. To reinforce how this works, we'll make a big change to the source data and watch it flow into the pivot table.

1. Select cell F5 and change \$11.00 to \$2000.
2. Right-click anywhere in the pivot table and select "Refresh".

Right-click, select "Refresh"

Date	Color	Region	Units	Sales
3-Jan-16	Red	West	1	\$2,000.00
13-Jan-16	Blue	South	8	\$96.00
21-Jan-16	Green	West	2	\$26.00
30-Jan-16	Blue	North	7	\$84.00
7-Feb-16	Green	North	8	\$104.00
13-Feb-16	Red	South	2	\$22.00
21-Feb-16	Blue	East	5	\$60.00
1-Mar-16	Green	West	2	\$26.00
13-Mar-16	Blue	East	8	\$96.00
23-Mar-16	Blue	North	7	\$84.00
28-Mar-16	Green	West	2	\$26.00
3-Apr-16	Blue	South	8	\$96.00
12-Apr-16	Green	South	1	\$13.00
16-Apr-16	Red	East	8	\$88.00
23-Apr-16	Red	West	6	\$66.00
30-Apr-16	Green	South	5	\$65.00

Color	Sum of Sales
Blue	\$7,464
Silver	\$6,970
Green	
Red	
Grand	



Notice "Red" is now the top selling color, and automatically moves to the top:

H5 X ✓ fx Red

	A	B	C	D	E	F	G	H	I	J
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										

Sample sales data

Date	Color	Region	Units	Sales
3-Jan-16	Red	West	1	\$2,000.00
13-Jan-16	Blue	South	8	\$96.00
21-Jan-16	Green	West	2	\$26.00
30-Jan-16	Blue	North	7	\$84.00
7-Feb-16	Green	North	8	\$104.00
13-Feb-16	Red	South	2	\$22.00
21-Feb-16	Blue	East	5	\$60.00
1-Mar-16	Green	West	2	\$26.00
13-Mar-16	Blue	East	8	\$96.00
23-Mar-16	Blue	North	7	\$84.00
28-Mar-16	Green	West	2	\$26.00
3-Apr-16	Blue	South	8	\$96.00
12-Apr-16	Green	South	1	\$13.00
16-Apr-16	Red	East	8	\$88.00

Color	Sum of Sales
Red	\$7,497
Blue	\$7,464
Silver	\$6,970
Green	\$6,414
Grand Total	\$28,345

Red moves to the top as the best selling color

3. Change F5 back to \$11.00 and refresh the pivot again.

Note: changing F5 to \$2000 is not realistic, but it's a good way to force a change you can easily see in the pivot table. Try changing an existing color to something new, like "Gold" or "Black". When you refresh, you'll see the new color appear. You can use undo to go back to original data and pivot.

Second value field

You can add more than one field as a Value field.

1. Drag Units to the Value area to see Sales and Units together:

Excel interface showing a PivotTable setup. The formula bar displays 7464. The PivotTable is titled "Sample sales data" and is structured as follows:

Date	Color	Region	Units	Sales
3-Jan-16	Red	West	1	\$11.00
13-Jan-16	Blue	South	8	\$96.00
21-Jan-16	Green	West	2	\$26.00
30-Jan-16	Blue	North	7	\$84.00
7-Feb-16	Green	North	8	\$104.00
13-Feb-16	Red	South	2	\$22.00
21-Feb-16	Blue	East	5	\$60.00
1-Mar-16	Green	West	2	\$26.00
13-Mar-16	Blue	East	8	\$96.00
23-Mar-16	Blue	North	7	\$84.00
28-Mar-16	Green	West	2	\$26.00
3-Apr-16	Blue	South	8	\$96.00
12-Apr-16	Green	South	1	\$13.00
16-Apr-16	Red	East	8	\$88.00

Summary Table:

Color	Sum of Sales	Sum of Units
Blue	\$7,464	608
Silver	\$6,970	473
Green	\$6,414	481
Red	\$5,508	486
Grand Total	\$26,356	2048

Units added as a Value field

Percent of total

There are different ways to display values.

One option is to show values as a percent of total. If you want to display the same field in different ways, add the field twice.

1. Remove the Units from the Values area

2. Add the Sales field (again) to the Values area.

3. Right-click the second instance and choose "% of grand total":

Color	Sum of Sales	Sum of Sales2
Blue	\$7,464	7464
Silver	\$6,970	69
Green	\$6,414	64
Red	\$5,508	55
Grand Total	\$26,356	263

*Changing
calculation to show
percent of total*

Copy

Format Cells...

Number Format...

Refresh

Sort >

Remove "Sum of Sales2"

Summarize Values By >

Show Values As >

Value Field Settings...

PivotTable Options...

Hide Field List

✓ No Calculation

% of Grand Total

% of Column Total

% of Row Total

% Of...

% of Parent Row Total

The result is a breakdown by color along with a percent of total:

J5										
	A	B	C	D	E	F	G	H	I	J
1										
2		Sample sales data								
3										
4		Date	Color	Region	Units	Sales				
5		3-Jan-16	Red	West	1	\$11.00				
6		13-Jan-16	Blue	South	8	\$96.00				
7		21-Jan-16	Green	West	2	\$26.00				
8		30-Jan-16	Blue	North	7	\$84.00				
9		7-Feb-16	Green	North	8	\$104.00				
10		13-Feb-16	Red	South	2	\$22.00				
11		21-Feb-16	Blue	East	5	\$60.00				
12		1-Mar-16	Green	West	2	\$26.00				
13		13-Mar-16	Blue	East	8	\$96.00				
14		23-Mar-16	Blue	North	7	\$84.00				
15		28-Mar-16	Green	West	2	\$26.00				
16		3-Apr-16	Blue	South	8	\$96.00				
17		12-Apr-16	Green	South	1	\$13.00				
18		16-Apr-16	Red	East	8	\$88.00				

Color	Sum of Sales	Sum of Sales2
Blue	\$7,464	28.3%
Silver	\$6,970	26.4%
Green	\$6,414	24.3%
Red	\$5,508	20.9%
Grand Total	\$26,356	100.0%

Second Sales field
displays % of total

EXCELJET

Note: the number format for percentage has also been adjusted to show 1 decimal.

PivotTable Fields ▼ ✕

Choose fields to add to report: ⚙ ▼

Search 🔍

☒ **Date**
☒ **Color**
☐ Region
☒ **Units** ▼
☒ **Sales** ▼

Drag fields between areas below:

Filters	Columns
	Date ▼

Rows	Values
Color ▼	Sum of Sales ▼

☐ Defer Layout Update Update

Two-way Pivot

Pivot tables can plot data in various two-dimensional arrangements.

1. Drag the Date field out of the columns area
2. Drag Region into the Columns area.

Excel builds a two-way pivot table that breaks down sales by color and region:

G	H	I	J	K	L	M	N
---	---	---	---	---	---	---	---

Two-way Pivot table, Color by Region

Sum of Sales		Region ▼				
Color ▼		East	North	South	West	Grand Total
Blue		\$1,121	\$2,358	\$1,710	\$2,275	\$7,464
Silver		\$697	\$2,645	\$1,149	\$2,479	\$6,970
Green		\$1,198	\$1,678	\$1,059	\$2,479	\$6,414
Red		\$714	\$2,028	\$1,126	\$1,640	\$5,508
Grand Total		\$3,730	\$8,709	\$5,044	\$8,873	\$26,356

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3. Swap Region and Color (i.e. drag Region to the Rows area and Color to the Columns area).

Excel builds another two-dimensional pivot table:

G	H	I	J	K	L	M	N
---	---	---	---	---	---	---	---

Two-way Pivot table, Region by Color

Sum of Sales Color 					
Region 	Blue	Silver	Green	Red	Grand Total
East	\$1,121	\$697	\$1,198	\$714	\$3,730
North	\$2,358	\$2,645	\$1,678	\$2,028	\$8,709
South	\$1,710	\$1,149	\$1,059	\$1,126	\$5,044
West	\$2,275	\$2,479	\$2,479	\$1,640	\$8,873
Grand Total	\$7,464	\$6,970	\$6,414	\$5,508	\$26,356

Again notice total sales (\$26,356) is the same in *all pivot tables above*. Each table presents a different view of the *same data*, so they all sum to the *same total*.

The above example shows how quickly you can build different pivot tables from the same data. You can create many other kinds of pivot tables, using all kinds of data.

Key Pivot Table benefits

- **Simplicity:** Basic pivot tables are very simple to set up and customize. There is no need to learn complicated formulas
- **Speed:** You can create a good-looking, useful report with a pivot table in minutes. Even if you are very good with formulas, pivot tables are faster to set up and require much less effort.
- **Flexibility:** Unlike formulas, pivot tables don't lock you into a particular view of your data. You can quickly rearrange the pivot table to suit your needs. You can even clone a pivot table and build a separate view

Key Pivot Table benefits

- **Accuracy:** As long as a pivot table is set up correctly, you can rest assured results are accurate. In fact, a pivot table will often highlight problems in the data faster than any other tool.
- **Formatting:** A Pivot table can automatically apply consistent number and style formatting, even as data changes.
- **Updates:** Pivot tables are designed for ongoing updates. If you base a pivot table on an Excel Table, the table resizes as needed with new data. All you need to do is click Refresh, and your pivot table will show you the latest.

Key Pivot Table benefits

- **Filtering:** Pivot tables contain several tools for filtering data. Need to look at North America and Asia, but exclude Europe? A pivot table makes it simple.
- **Charts:** Once you have a pivot table, you can easily create a pivot chart.



Analysis ToolPak in Excel

General

Formulas

Proofing

Save

Language

Accessibility

Advanced

Customize Ribbon

Quick Access Toolbar

Add-ins

Trust Center



View and manage Microsoft Office Add-ins.

Add-ins

Name ▲	Location	Type
Active Application Add-ins		
<i>No Active Application Add-ins</i>		
Inactive Application Add-ins		
Analysis ToolPak	C:\...t\Office16\Library\Analysis\ANALYS32.XLL	Excel Add-in
Analysis ToolPak - VBA	C:\...ffice16\Library\Analysis\ATPVBAEN.XLAM	Excel Add-in
Date (XML)	C:\...es\Microsoft Shared\Smart Tag\MOFL.DLL	Action
Euro Currency Tools	C:\...e\root\Office16\Library\EUROTOOL.XLAM	Excel Add-in
Microsoft Actions Pane 3		XML Expansion Pack
Microsoft Power Map for Excel	C:\...ap Excel Add-in\EXCELPLUGINSHELL.DLL	COM Add-in
Solver Add-in	C:\...t\Office16\Library\SOLVER\SOLVER.XLAM	Excel Add-in
Document Related Add-ins		
<i>No Document Related Add-ins</i>		
Disabled Application Add-ins		
<i>No Disabled Application Add-ins</i>		

Add-in: Analysis ToolPak

Publisher: Microsoft Office

Compatibility: No compatibility information available

Location: C:\Program Files\Microsoft Office\root\Office16\Library\Analysis\ANALYS32.XLL

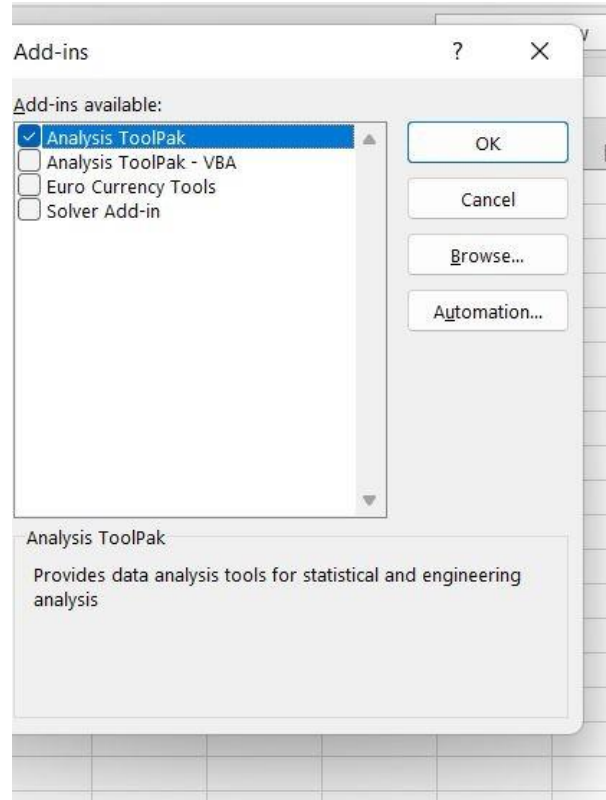
Description: Provides data analysis tools for statistical and engineering analysis

Manage: Excel Add-ins ▼

Go...

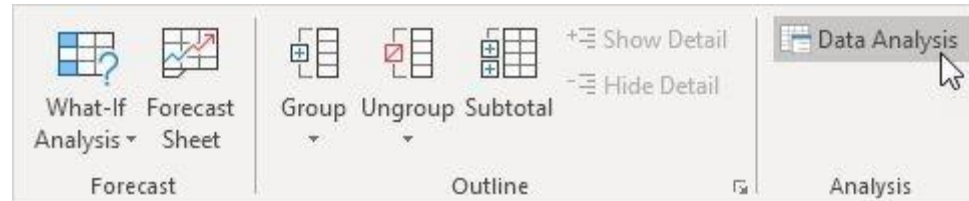
OK

Cancel



To use the Analysis Toolpak add-in in Excel to quickly generate correlation coefficients between multiple variables, execute the following steps.

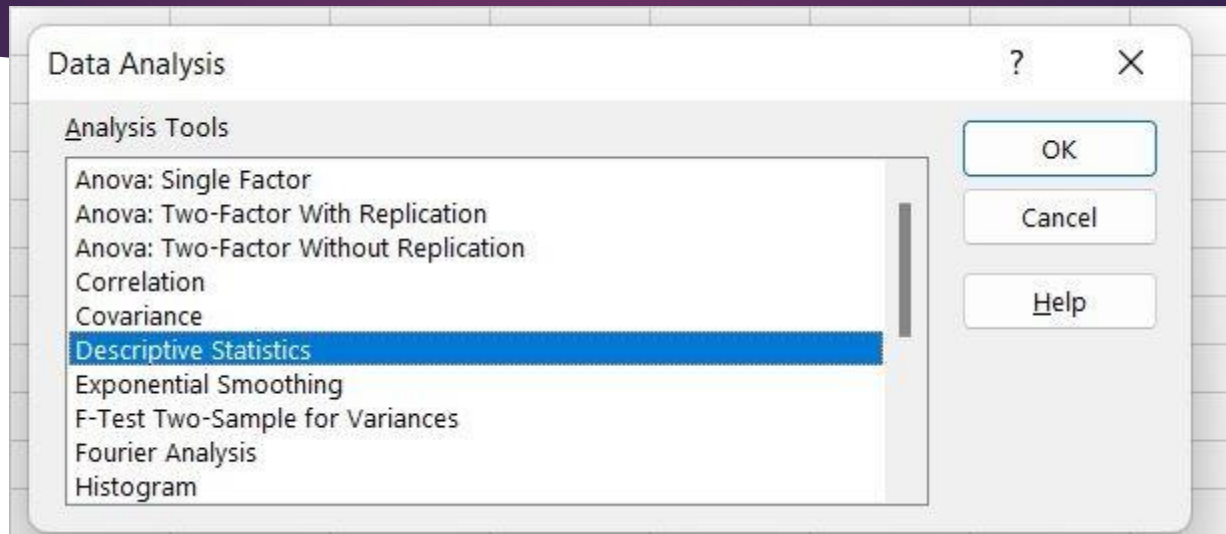
1. On the Data tab, in the Analysis group, click Data Analysis.



Note: can't find the Data Analysis button? Click [here](#) to load the Analysis ToolPak add-in.

2. Select Correlation and click OK.

Descriptive Statistics in Excel



Descriptive Statistics

Input

Input Range:

\$A\$2:\$A\$21



Grouped By:



Columns



Rows

☐ Labels in first row

Output options



Output Range:

\$D\$10:\$F\$26



New Worksheet Ply:



New Workbook



Summary statistics



Confidence Level for Mean:

95

%



Kth Largest:

1



Kth Smallest:

1



OK

Cancel

Help

Column1

Mean 47.25

Standard E 7.879311685

Median 55

Mode 87

Standard E 35.23735309

Sample Va 1241.671053

Kurtosis -1.715300569

Skewness -0.003594223

Range 96

Minimum 4

Maximum 100

Sum 945

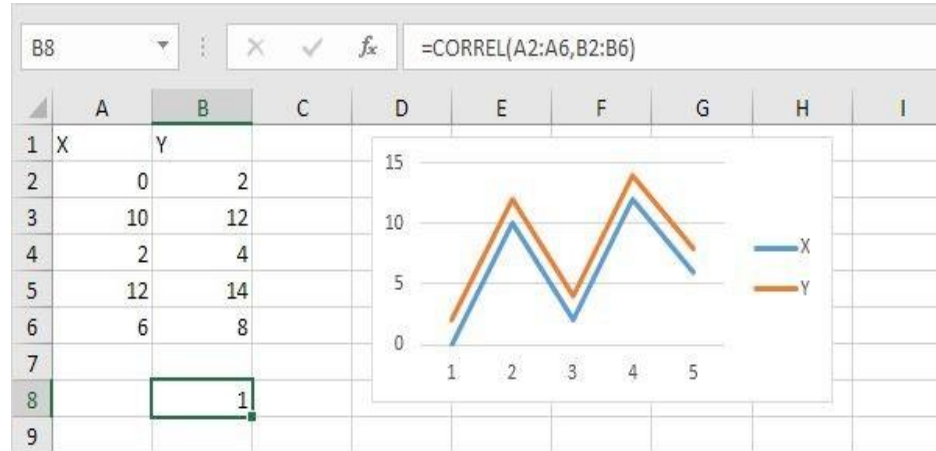
Count 20

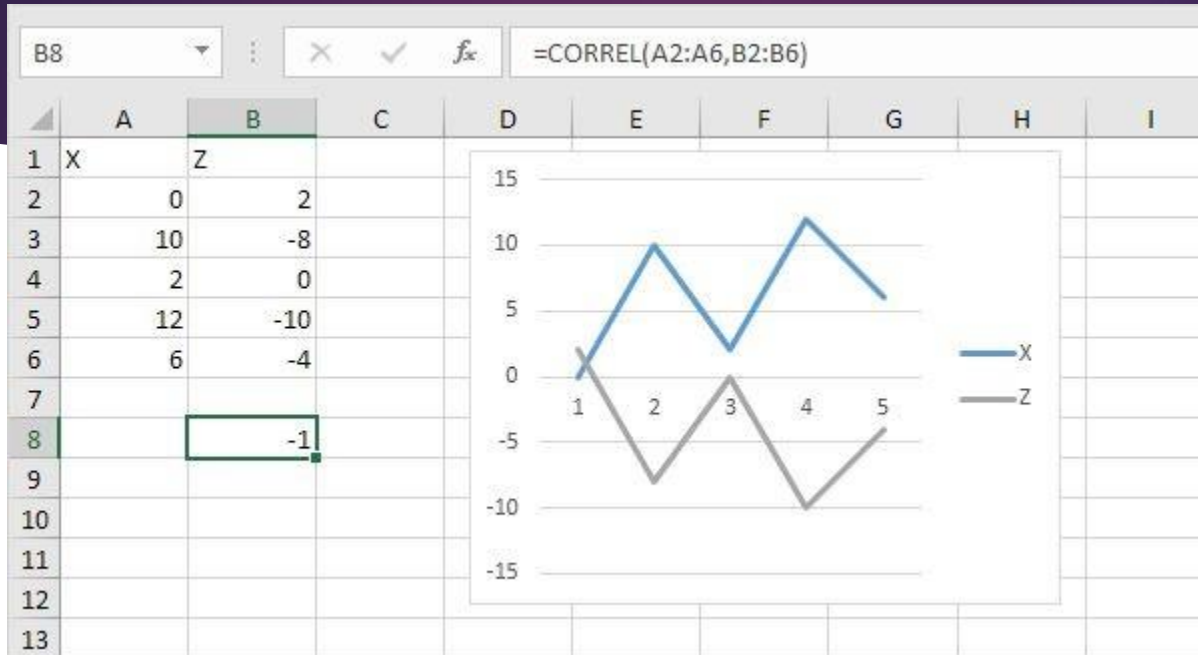
0

Correlation in Excel

The correlation coefficient (a value between -1 and +1) tells you how strongly two variables are related to each other. We can use the CORREL function or the Analysis Toolpak add-in in Excel to find the correlation coefficient between two variables.

- A correlation coefficient of +1 indicates a perfect positive correlation. As variable X increases, variable Y increases. As variable X decreases, variable Y decreases.






- A correlation coefficient near 0 indicates no correlation.

A correlation coefficient of -1 indicates a perfect negative correlation. As variable X increases, variable Z decreases. As variable X decreases, variable Z increases.

Correlation ? X


Input

Input Range: 

Grouped By: ☒ Columns ☐ Rows

☒ Labels in first row

Output options

☒ Output Range: 

☐ New Worksheet Ply:

☐ New Workbook

OK Cancel Help

Conclusion: variables A and C are positively correlated (0.91). Variables A and B are not correlated (0.19). Variables B and C are also not correlated (0.11) . You can verify these conclusions by looking at the graph.

