

FIT1013 - Week 1 Resources

Calculating Data with Formulas and Functions

Week 1 Resources

| | |
|--|----|
| 1. Objectives | 2 |
| 2. Making Workbooks User-Friendly | 2 |
| 3. Use/Write Excel functions..... | 3 |
| 3. Performing What-If Analysis | 14 |
| 4. Interpreting Error Values | 16 |
| 5. Understand Excel Cell References..... | 17 |
| 6. Practice and Apply | 20 |

Reference:

Microsoft Excel 2016, New Perspectives Series, Parsons, Oja, Carey,
Desjardins Comprehensive Edn., Cengage Learning, **Modules 1,2, 3**

Sections © 2017 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part, except for use as permitted in a license distributed with a certain product or service or otherwise on a password-protected website for classroom use.

1. Objectives

- Make workbooks user friendly
- Use/Write Excel functions
- Perform what-if analysis
- Interpret error values
- Understand Excel cell references

2. Making Workbooks User-Friendly

- Many users may use the workbook so it is important they understand the contents
- An explanatory worksheet can be added explaining concepts including:
- Industry jargon (industry-specific terms, or technical terms) or unusual terms
- What is being calculated and why
- How the equations make those calculations

The screenshot shows an Excel spreadsheet titled "Wingait Farm" with the following structure:

| | A | B | C | D | E | F |
|----|------------------------------|-----|---|--------------------------------|--------|---|
| 1 | Wingait Farm | | | | | |
| 2 | Corn Yield Calculator | | | | | |
| 3 | | | | | | |
| 4 | Total Corn Crop (acres) | 137 | | | | |
| 5 | | | | | | |
| 6 | Sample Plot | | | Agricultural Constants | | |
| 7 | Number of Rows | 6 | | Square Feet in an Acre | 43,560 | |
| 8 | Row Width (ft.) | 2.5 | | Standard Corn Moisture Content | 15.50% | |
| 9 | Row Length (ft.) | 294 | | Pounds of Corn in a Bushel | 56 | |
| 10 | Sample Area (acres) | | | Market Price per Bushel | \$3.85 | |
| 11 | | | | | | |
| 12 | Corn Weight | | | | | |
| 13 | Sample Weight (lbs.) | | | | | |
| 14 | Moisture Content | | | | | |
| 15 | Dry Weight (lbs.) | | | | | |
| 16 | Market Weight (lbs.) | | | | | |
| 17 | | | | | | |

Annotations in the image:

- size of the farm in acres:** Points to cell B4 (137).
- dimensions of the sample plot:** Points to cells B7 (6), B8 (2.5), and B9 (294).
- constants used in agricultural calculations:** Points to the "Agricultural Constants" section (D6:E10).

The spreadsheet includes a tab bar at the bottom with tabs for "Documentation", "Yield", "Yield History", "Growth", and "Explanation of Formulas". The "Yield" tab is currently selected.

Reference: Ex134 © 2017 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part, except for use as permitted in a license distributed with a certain product or service or otherwise on a password-protected website for classroom use.

3. Use/Write Excel functions

Using Excel functions

- Quick way to calculate summary data
- Every function follows a set of rules (syntax) that specifies how the function should be written
- General syntax of all Excel functions:
 - *FUNCTION(argument 1, argument2, ...)*
- Square brackets indicate optional arguments:
 - *FUNCTION(argument1, [argument2=value2, ...])*
- An argument can be any type of value including text, numbers, cell references, or even other formulas or functions
- Functions can be placed inside another function, or nested; **nested** functions must include all parentheses

| Function | Description |
|--|--|
| AVERAGE(<i>number1</i> [, <i>number2</i> ,...]) | Calculates the average of a collection of numbers, where <i>number1</i> , <i>number2</i> , and so forth are numbers or cell references |
| COUNT(<i>value1</i> [, <i>value2</i> ,...]) | Counts how many cells in a range contain numbers, where <i>value1</i> , <i>value2</i> , and so forth are either numbers or cell references |
| COUNTA(<i>value1</i> [, <i>value2</i> ,...]) | Counts how many cells are not empty in ranges <i>value1</i> , <i>value2</i> , and so forth including both numbers and text entries |
| INT(<i>number</i>) | Displays the integer portion of <i>number</i> |
| MAX(<i>number1</i> [, <i>number2</i> ,...]) | Calculates the maximum value of a collection of numbers, where <i>number1</i> , <i>number2</i> , and so forth are either numbers or cell references |
| MEDIAN(<i>number1</i> [, <i>number2</i> ,...]) | Calculates the median, or middle, value of a collection of numbers, where <i>number1</i> , <i>number2</i> , and so forth are either numbers or cell references |
| MIN(<i>number1</i> [, <i>number2</i> ,...]) | Calculates the minimum value of a collection of numbers, where <i>number1</i> , <i>number2</i> , and so forth are either numbers or cell references |
| RAND() | Returns a random number between 0 and 1 |
| ROUND(<i>number</i> , <i>num_digits</i>) | Rounds <i>number</i> to the number of digits specified by <i>num_digits</i> |
| SUM(<i>number1</i> [, <i>number2</i> ,...]) | Adds a collection of numbers, where <i>number1</i> , <i>number2</i> , and so forth are either numbers or cell references |

Reference: © 2017 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part, except for use as permitted in a license distributed with a certain product or service or otherwise on a password-protected website for classroom use.

<https://support.office.com/en-us/article/Excel-functions-by-category-5f91f4e9-7b42-46d2-9bd1-63f26a86c0eb>

Using the Function Library and the Insert Function Dialog Box

| Category | Description |
|--------------------|---|
| Compatibility | Functions from Excel 2010 or earlier, still supported to provide backward compatibility |
| Cube | Retrieve data from multidimensional databases involving online analytical processing (OLAP) |
| Database | Retrieve and analyze data stored in databases |
| Date & Time | Analyze or create date and time values and time intervals |
| Engineering | Analyze engineering problems |
| Financial | Analyze information for business and finance |
| Information | Return information about the format, location, or contents of worksheet cells |
| Logical | Return logical (true-false) values |
| Lookup & Reference | Look up and return data matching a set of specified conditions from a range |
| Math & Trig | Perform math and trigonometry calculations |
| Statistical | Provide statistical analyses of data sets |
| Text | Return text values or evaluate text |
| Web | Provide information on web-based connections |

Reference: © 2017 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part, except for use as permitted in a license distributed with a certain product or service or otherwise on a password-protected website for classroom use.

Working with Date Functions

- Date functions insert or calculate dates and times
- For scheduling or determining on what days of the week certain dates occur

| Function | Description |
|--|--|
| <code>DATE(year, month, day)</code> | Creates a date value for the date represented by the <i>year</i> , <i>month</i> , and <i>day</i> arguments |
| <code>DAY(date)</code> | Extracts the day of the month from <i>date</i> |
| <code>MONTH(date)</code> | Extracts the month number from <i>date</i> where 1=January, 2=February, and so forth |
| <code>YEAR(date)</code> | Extracts the year number from <i>date</i> |
| <code>NETWORKDAYS(start, end[, holidays])</code> | Calculates the number of whole working days between <i>start</i> and <i>end</i> ; to exclude holidays, add the optional <i>holidays</i> argument containing a list of holiday dates to skip |
| <code>WEEKDAY(date[, return_type])</code> | Calculates the weekday from <i>date</i> , where 1=Sunday, 2=Monday, and so forth; to choose a different numbering scheme, set <i>return_type</i> to 1 (1=Sunday, 2=Monday, ...), 2 (1=Monday, 2=Tuesday, ...), or 3 (0=Monday, 1=Tuesday, ...) |
| <code>WORKDAY(start, days[, holidays])</code> | Returns the workday after <i>days</i> workdays have passed since the <i>start</i> date; to exclude holidays, add the optional <i>holidays</i> argument containing a list of holiday dates to skip |
| <code>NOW()</code> | Returns the current date and time |
| <code>TODAY()</code> | Returns the current date |

In your own time, explore other DATE functions

Counting Cells

Excel has two functions for counting cells—the **COUNT** function and the **COUNTA** function

- COUNT function:
 - The COUNT function tallies how many cells in a range contain numbers or dates
 - The COUNT function does not count blank cells or cells that contain text
 - The COUNT function syntax is
COUNT(*value1*[, *value2*, *value3*, ...])
- COUNTA function
 - Use to tally the nonblank cells in a range—whether those entries are numbers, dates, or text
 - The COUNTA function syntax is:
COUNTA(*value1*[, *value2*, *value3*, ...])

Logical Functions

A function which contains a **logical condition** – i.e. a condition which evaluates to either True or False

e.g. The IF() function (a **logical** function):

Syntax:

IF(logical_test, value_if_true, value_if_false)

e.g. in cell A3 we could enter

= IF(A1>A2, A1-A2, 0)

Working with Logical Functions

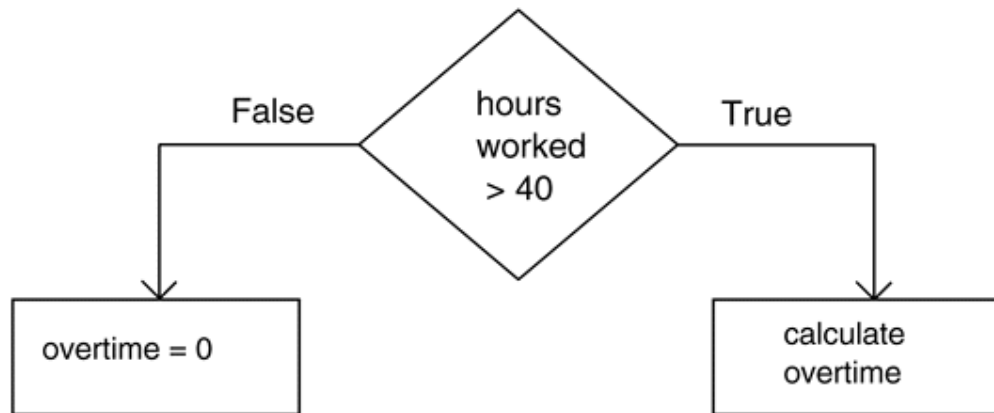
- A **comparison operator** is a symbol that indicates the relationship between two values

Frequently used in logical
...

| Operator | Statement | Description |
|----------|-----------|--|
| = | A1 = B1 | Tests whether the value in cell A1 <i>is equal to</i> the value in cell B1 |
| > | A1 > B1 | Tests whether the value in cell A1 <i>is greater than</i> the value in cell B1 |
| < | A1 < B1 | Tests whether the value in cell A1 <i>is less than</i> the value in cell B1 |
| >= | A1 >= B1 | Tests whether the value in cell A1 <i>is greater than or equal to</i> the value in cell B1 |
| <= | A1 <= B1 | Tests whether the value in cell A1 <i>is less than or equal to</i> the value in cell B1 |
| <> | A1 <> B1 | Tests whether the value in cell A1 <i>is not equal to</i> the value in cell B1 |

Example

IF(logical_test, value_if_true, value_if_false)



Using the IF function syntax

IF(hours worked > 40, calculate overtime, overtime is 0)

↑
Condition

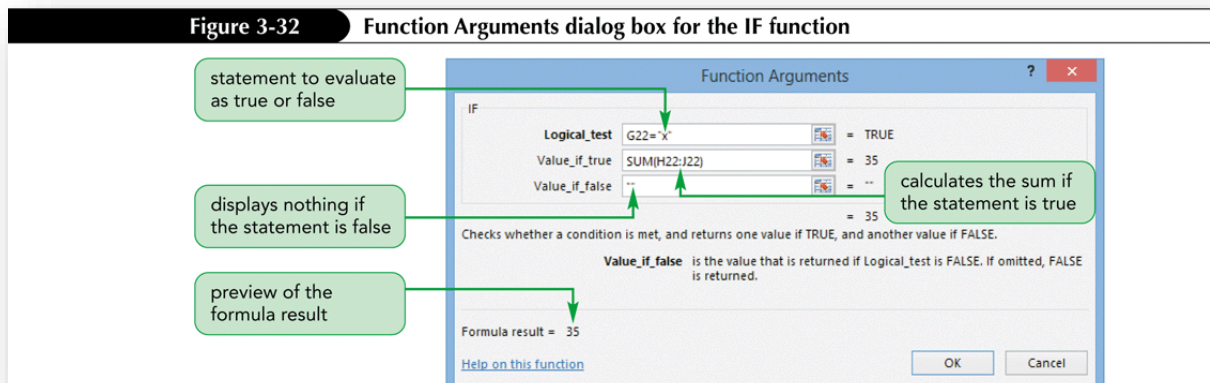
↑
Value-if-true

↑
Value-if-false

Using the IF Function

- Returns one value if a condition is true and returns a different value if that condition is false
- The syntax of the IF function is:
(logical_test, [value_if_true,] [value_if_false])

Figure 3-32 Function Arguments dialog box for the IF function



Using a Lookup Function

- **Lookup functions** find values in tables of data and insert them in another location in the worksheet such as cells or in formulas
 - An **exact match lookup** is when the lookup value must match one of the compare values in the first column of the lookup table
 - An **approximate match lookup** occurs when the lookup value falls within a range of numbers in the first column of the lookup table
- The table that stores the data you want to retrieve is called a lookup table
- A lookup table organizes numbers or text into categories

| Corn Hybrids | | | |
|--------------|-----------|-------------|----------------|
| Hybrid | Yield | Height | Maturity (GDD) |
| CS6300 | Very Good | Medium Tall | 2521 |
| CS6389 | Good | Medium Tall | 2640 |
| CS6403 | Very Good | Medium | 2725 |
| CS6478 | Very Good | Medium | 2795 |
| CS6488 | Excellent | Medium | 2790 |
| CS6489 | Excellent | Tall | 2920 |
| CS6492 | Excellent | Medium | 2768 |
| CS6538 | Excellent | Medium | 2847 |


Say, Lookup value is CS6489

Return value of lookup function is 2920

Finding an Exact Match with the VLOOKUP Function


The syntax of the VLOOKUP function is:


VLOOKUP(lookup_value, table_array, col_index_num[, range_lookup=TRUE])


Formula Builder 


Show All Functions

VLOOKUP

lookup_value = "CS6489"
 

table_array = {"CS6300","Very Good","Me..."
 

col_index_num = 4
 

range_lookup = FALSE
 

Financial Functions for Loans and Interest Payments

| Function | Description |
|--|---|
| <code>FV(rate, nper, pmt, [pv=0], [type=0])</code> | Calculates the future value of an investment, where <i>rate</i> is the interest rate per period, <i>nper</i> is the total number of periods, <i>pmt</i> is the payment in each period, <i>pvt</i> is the present value of the investment, and <i>type</i> indicates whether payments should be made at the end of the period (0) or the beginning of the period (1) |
| <code>PMT(rate, nper, pv, [fv=0], [type=0])</code> | Calculates the payments required each period on a loan or investment, where <i>fv</i> is the future value of the investment |
| <code>IPMT(rate, per, nper, pv, [fv=0], [type=0])</code> | Calculates the amount of a loan payment devoted to paying the loan interest, where <i>per</i> is the number of the payment period |
| <code>PPMT(rate, per, nper, pv, [fv=0], [type=0])</code> | Calculates the amount of a loan payment devoted to paying off the principal of a loan |
| <code>PV(rate, nper, pmt, [fv=0], [type=0])</code> | Calculates the present value of a loan or investment based on periodic, constant payments |
| <code>NPER(rate, pmt, pv, [fv=0], [type=0])</code> | Calculates the number of periods required to pay off a loan or investment |
| <code>RATE(nper, pmt, pv, [fv=0], [type=0])</code> | Calculates the interest rate of a loan or investment based on periodic, constant payments |

Working with Financial Functions

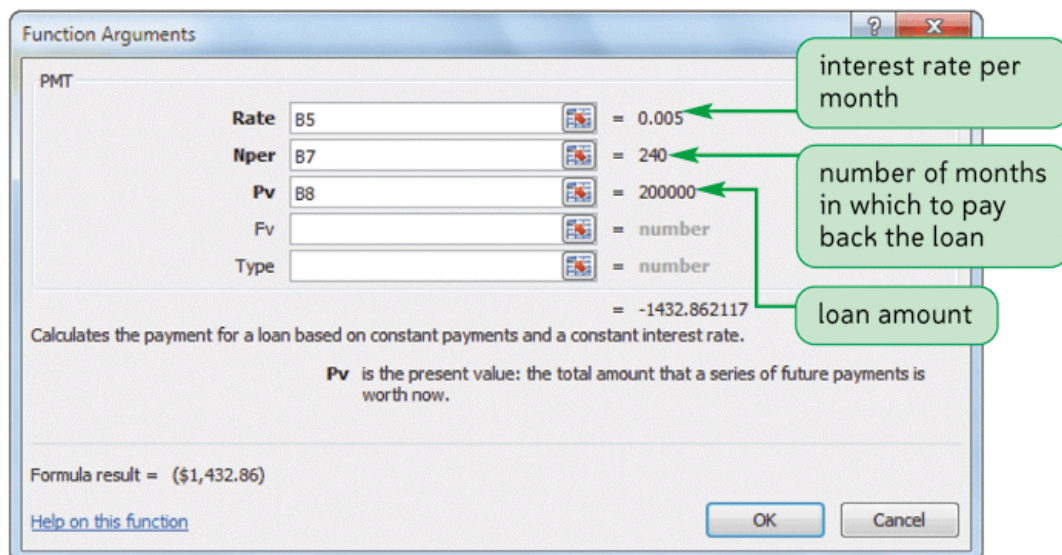
- Cost of a loan to the borrower is largely based on three factors:
 - Principal:** amount of money being loaned
 - Interest:** amount added to the principal by the lender
 - Calculated as **simple interest** or as **compound interest**
 - Time required to pay back the loan

See Module 9 of textbook for more financial functions

Using the PMT Function to Determine a Monthly Loan Payment

- For loan or investment calculations, you need to know the following information:
 - The annual interest rate
 - The payment period, or how often payments are due and how often interest is compounded
 - The length of the loan in terms of the number of payment periods
 - The amount being borrowed or invested
- $\text{PMT}(\text{rate}, \text{nper}, \text{pv}, [\text{fv}=0] [\text{type}=0])$

$\text{PMT}(\text{rate}, \text{nper}, \text{pv}, [\text{fv}=0] [\text{type}=0])$



The image shows the 'Function Arguments' dialog box for the PMT function in Excel. The dialog has a title bar 'Function Arguments' and a close button. Inside, the function name 'PMT' is listed. Below it, five arguments are shown: Rate (B5), Nper (B7), Pv (B8), Fv (empty), and Type (empty). Each argument has a small icon to its right. To the right of each argument is a value: Rate = 0.005, Nper = 240, Pv = 200000, Fv = number, and Type = number. Below these arguments, the formula result is shown as -1432.862117. A description of the function is provided: 'Calculates the payment for a loan based on constant payments and a constant interest rate.' A note explains that 'Pv is the present value: the total amount that a series of future payments is worth now.' At the bottom, the formula result is shown as (\$1,432.86). There are 'OK' and 'Cancel' buttons at the bottom right. Three green callout boxes with arrows point to the arguments: 'interest rate per month' points to Rate, 'number of months in which to pay back the loan' points to Nper, and 'loan amount' points to Pv.

| Argument | Value |
|----------|-------------|
| Rate | B5 = 0.005 |
| Nper | B7 = 240 |
| Pv | B8 = 200000 |
| Fv | = number |
| Type | = number |

Formula result = -1432.862117

Calculates the payment for a loan based on constant payments and a constant interest rate.

Pv is the present value: the total amount that a series of future payments is worth now.

Formula result = (\$1,432.86)

[Help on this function](#)

OK Cancel

Using Functions to Manage Personal Finances

| Function | Use to determine... |
|--------------------------|---|
| FV (future value) | How much an investment will be worth after a series of monthly payments at some future time |
| PMT (payment) | How much you have to spend each month to repay a loan or mortgage within a set period of time |
| IPMT (interest payment) | How much of your monthly loan payment is used to pay the interest |
| PPMT (principal payment) | How much of your monthly loan payment is used for repaying the principal |
| PV (present value) | Largest loan or mortgage you can afford given a set monthly payment |
| NPER (number of periods) | How long it will take to pay off a loan with constant monthly payments |

Excel has been developed over the years to include a wide range of functions covering many areas or disciplines including engineering and mathematics. See link for more on Excel functions:

<https://support.office.com/en-us/article/excel-functions-by-category-5f91f4e9-7b42-46d2-9bd1-63f26a86c0eb>

3. Performing What-If Analysis

What-if analysis tools in Excel allow you to use several different sets of values in one or more formulas to explore all the various results. For example, you might want to achieve a target profit that are determined by a number of factors (values). By setting a target profit, you can see what combinations of values will lead to that target profit.

A **what-if analysis** in Excel lets you explore the **impact that changing input values has** on the calculated values in the workbook. One way to perform a what-if analysis is by changing one or more of the input values to see how they affect the calculated results

Another method is the **Trial and Error method**. This requires some guesswork as you estimate which values to change and by how much.

To perform a what-if analysis by trial and error:

- Change the value of a worksheet cell (the input cell)
- Observe its impact on one or more calculated cells (the result cells)
- Repeat until the desired results are achieved

Goal Seek in Excel automates the trial-and-error process by specifying a value for a calculated item.

To perform a what-if analysis using Goal Seek:

- On the **DATA** tab, in the Data Tools group, click the **What-If Analysis** button, and then click **Goal Seek**
- Select the result cell in the Set cell box, and then specify its value (goal) in the To value box
- In the **By changing** cell box, specify the input cell
- Click the OK button; the value of the input cell changes to set the value of the result cell

Goal Seek Dialog Box

In some ways, Goal Seek is the opposite of trial and error as it allows you to input the answer and then calculates the associated variables to arrive at the answer

The screenshot shows the Microsoft Excel interface with the 'Wingait Farm' spreadsheet. The 'Data' tab is active in the ribbon. The spreadsheet contains a 'Corn Yield Calculator' section with the following data:

| Sample Plot | | Agricultural Constants | |
|---------------------|------|--------------------------------|--------|
| Number of Rows | 6 | Square Feet in an Acre | 43,560 |
| Row Width (ft.) | 2.5 | Standard Corn Moisture Content | 15.50% |
| Row Length (ft.) | 294 | Pounds of Corn in a Bushel | 56 |
| Sample Area (acres) | 0.20 | Market Price per Bushel | \$3.85 |

The 'Goal Seek' dialog box is open, showing:

- Set cell:
- To value:
- By changing cell:

The 'Goal Seek Status' dialog box is also open, showing:

- Goal Seeking with Cell B23
- Found a solution.
- Target value: 100000
- Current value: \$100,000.00

The spreadsheet also includes a 'Yield' section with the following data:

| | |
|--------------------------|--------------|
| Sample Bushels | 34 |
| Bushels per Acre | 168 |
| Total Yield (bushels) | 23,002 |
| Projected Market Revenue | \$ 88,559.40 |

In addition to Module 3 of your prescribed textbook, see more details on performing what-if Analysis in Excel:

<https://support.office.com/en-us/article/introduction-to-what-if-analysis-22bffa5f-e891-4acc-bf7a-e4645c446fb4?ui=en-US&rs=en-US&ad=US>

4. Interpreting Error Values

- An error value indicates that some part of a formula is preventing Excel from returning a calculated value
- An error value begins with a hash sign (#) followed by an error name that indicates the type of error

| Error Value | Description |
|-------------|--|
| #DIV/0! | The formula or function contains a number divided by 0. |
| #NAME? | Excel doesn't recognize text in the formula or function, such as when the function name is misspelled. |
| #N/A | A value is not available to a function or formula, which can occur when a workbook is initially set up prior to entering actual data values. |
| #NULL! | A formula or function requires two cell ranges to intersect, but they don't. |
| #NUM! | Invalid numbers are used in a formula or function, such as text entered in a function that requires a number. |
| #REF! | A cell reference used in a formula or function is no longer valid, which can occur when the cell used by the function was deleted from the worksheet. |
| #VALUE! | The wrong type of argument is used in a function or formula. This can occur when you reference a text value for an argument that should be strictly numeric. |

© 2017 Cengage Learning. All Rights Reserved. May not be copied, scanned, or duplicated, in whole or in part, except for use as permitted in a license distributed with a certain product or service or otherwise on a password-protected website for classroom use.

5. Understand Excel Cell References

- Workbooks can include data entered in cells that are then referenced in formulas to perform calculations on that data
- Types of cell references
 - Relative
 - Absolute
 - Mixed

Relative References

When a formula includes a cell reference, Excel interprets it as being located relative to the position of the current cell

| | | | | | | | |
|--|---|------------------|----|---|-----|---|---|
| formula references a cell three rows up and three columns to the left of the active cell | | A | B | C | D | E | F |
| | 1 | | | | | | |
| | 2 | Referenced Cells | | | | | |
| | 3 | | | | | | |
| | 4 | 10 | 20 | | | | |
| | 5 | 30 | 40 | | | | |
| | 6 | | | | | | |
| | 7 | | | | =A4 | | |
| | 8 | | | | | | |
| | 9 | | | | | | |

| | | | | | | | |
|--|---|------------------|----|---|-----|-----|---|
| when copied to new cells, each formula still references a cell three rows up and three columns to the left | | A | B | C | D | E | F |
| | 1 | | | | | | |
| | 2 | Referenced Cells | | | | | |
| | 3 | | | | | | |
| | 4 | 10 | 20 | | | | |
| | 5 | 30 | 40 | | | | |
| | 6 | | | | | | |
| | 7 | | | | =A4 | =B4 | |
| | 8 | | | | =A5 | =B5 | |
| | 9 | | | | | | |

| | | | | | | | |
|---------------------------------|---|------------------|----|---|----|----|---|
| values returned by each formula | | A | B | C | D | E | F |
| | 1 | | | | | | |
| | 2 | Referenced Cells | | | | | |
| | 3 | | | | | | |
| | 4 | 10 | 20 | | | | |
| | 5 | 30 | 40 | | | | |
| | 6 | | | | | | |
| | 7 | | | | 10 | 20 | |
| | 8 | | | | 30 | 40 | |
| | 9 | | | | | | |

Absolute References

A fixed reference—one that always references the same cell no matter where it is moved—is called an absolute reference

formula absolutely
references the cell located
in column A and row 4

| | A | B | C | D | E | F |
|---|------------------|----|---|-------|---|---|
| 1 | | | | | | |
| 2 | Referenced Cells | | | | | |
| 3 | | | | | | |
| 4 | 10 | 20 | | | | |
| 5 | 30 | 40 | | | | |
| 6 | | | | | | |
| 7 | | | | =A\$4 | | |
| 8 | | | | | | |
| 9 | | | | | | |

when copied to new cells,
the reference remains
fixed on cell A4

| | A | B | C | D | E | F |
|---|------------------|----|---|-------|-------|---|
| 1 | | | | | | |
| 2 | Referenced Cells | | | | | |
| 3 | | | | | | |
| 4 | 10 | 20 | | | | |
| 5 | 30 | 40 | | | | |
| 6 | | | | | | |
| 7 | | | | =A\$4 | =A\$4 | |
| 8 | | | | =A\$4 | =A\$4 | |
| 9 | | | | | | |

values returned by
each formula

| | A | B | C | D | E | F |
|---|------------------|----|---|----|----|---|
| 1 | | | | | | |
| 2 | Referenced Cells | | | | | |
| 3 | | | | | | |
| 4 | 10 | 20 | | | | |
| 5 | 30 | 40 | | | | |
| 6 | | | | | | |
| 7 | | | | 10 | 10 | |
| 8 | | | | 10 | 10 | |
| 9 | | | | | | |

Mixed References

A **mixed reference** contains both relative and absolute references

mixed cell reference that fixes the column reference for the first term and the row reference for the second term

| | A | B | C | D | E | F | G |
|---|---|----------------------|---|---|---|---|---|
| 1 | | Multiplication Table | | | | | |
| 2 | | 1 | 2 | 3 | 4 | 5 | |
| 3 | 1 | =A3*B\$2 | | | | | |
| 4 | 2 | | | | | | |
| 5 | 3 | | | | | | |
| 6 | 4 | | | | | | |
| 7 | 5 | | | | | | |
| 8 | | | | | | | |

when copied to the B3:B7 range, the fixed references remain unchanged and the relative references are shifted

| | A | B | C | D | E | F | G |
|---|---|----------------------|----------|----------|----------|----------|---|
| 1 | | Multiplication Table | | | | | |
| 2 | | 1 | 2 | 3 | 4 | 5 | |
| 3 | 1 | =A3*B\$2 | =A3*C\$2 | =A3*D\$2 | =A3*E\$2 | =A3*F\$2 | |
| 4 | 2 | =A4*B\$2 | =A4*C\$2 | =A4*D\$2 | =A4*E\$2 | =A4*F\$2 | |
| 5 | 3 | =A5*B\$2 | =A5*C\$2 | =A5*D\$2 | =A5*E\$2 | =A5*F\$2 | |
| 6 | 4 | =A6*B\$2 | =A6*C\$2 | =A6*D\$2 | =A6*E\$2 | =A6*F\$2 | |
| 7 | 5 | =A7*B\$2 | =A7*C\$2 | =A7*D\$2 | =A7*E\$2 | =A7*F\$2 | |
| 8 | | | | | | | |

values returned by each formula

| | A | B | C | D | E | F | G |
|---|---|----------------------|----|----|----|----|---|
| 1 | | Multiplication Table | | | | | |
| 2 | | 1 | 2 | 3 | 4 | 5 | |
| 3 | 1 | 1 | 2 | 3 | 4 | 5 | |
| 4 | 2 | 2 | 4 | 6 | 8 | 10 | |
| 5 | 3 | 3 | 6 | 9 | 12 | 15 | |
| 6 | 4 | 4 | 8 | 12 | 16 | 20 | |
| 7 | 5 | 5 | 10 | 15 | 20 | 25 | |
| 8 | | | | | | | |

Additional resources:

This give a good description of cell references in Excel 2016:

<https://www.gcflearnfree.org/excel2016/relative-and-absolute-cell-references/1/>

<https://www.youtube.com/watch?v=iDg9s7BJ2m4>

This is Microsoft's support page for Excel cell references:

<https://support.office.com/en-us/article/create-or-change-a-cell-reference-c7b8b95d-c594-4488-947e-c835903cebaa>

6. Practice and Apply

1. Understanding how to use and write Excel functions
2. Understanding how to perform what-if analysis
3. Understanding how to interpret error values
4. Understanding cell references
5. Do all exercises in Tutorial 1