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Formulas

Building blocks for data analysis

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Meet the Speaker



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What are the benefits of using formulas?



Formulas ensure consistent data



Formulas remove subjectivity



Formulas drive automation



Formulas reduce data entry



Formulas can aggregate and generate underlying data for dashboards (to use in Smartsheet or outside)

...which ultimately helps with engaging executives!

Learning Objectives

What's in it for me?



1

Implement the use of common functions, helper columns, and cross-sheet formulas to summarize data and make informed decisions.



2

Demonstrate three different methods for optimizing the creation of formulas.



3

Use error messages along with CPROS and isolation techniques to troubleshoot and resolve formula errors and unexpected results.

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refresher

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1

Formula fundamentals refresher

Common functions

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Common Functions

Fabulous Five Functions



COUNT How many?

SUM How much (total)?

IF Is it true?

OR Any

AND All

Full list of Smartsheet functions:

<https://help.smartsheet.com/functions>

COUNT: How many?

COUNT

Format

=COUNT(range)

Single-sheet

=COUNT(Employee:Employee)

Cross-sheet

=COUNT({Employee})

Translation

Count the number of nonblank cells in the **selected range**.

Employee	Active?	Years
AP Aviv Perez	Yes	12
HS Harley Sterling	Yes	10
GG Guadalupe Garcia	Yes	12
VB Vera Bowers	No	7
HS Hiro Senjima	Yes	17
KS Kai Senjima	Yes	3
PF Paul Finley	Yes	15
DK Diana Kennedy	Yes	5
VP Victoria Pearson	No	3
BF Bruce Ferguson	Yes	10
KG Kiran Gupta	Yes	1
PH Patricia Hall	Yes	16
RE Roderick Edwards	Yes	3

COUNT: How many?

COUNTIF

Format

=COUNTIF(range, criterion)

Single-sheet

=COUNTIF([Active?:][Active?], "Yes")

Cross-sheet

=COUNTIF({Active?}, "Yes")

Translation

Count the number of rows that meet the **criterion** in the **selected range**.

Employee	Active?	Years
AP Aviv Perez	Yes	12
HS Harley Sterling	Yes	10
GG Guadalupe Garcia	Yes	12
VB Vera Bowers	No	7
HS Hiro Senjima	Yes	17
KS Kai Senjima	Yes	3
PF Paul Finley	Yes	15
DK Diana Kennedy	Yes	5
VP Victoria Pearson	No	3
BF Bruce Ferguson	Yes	10
KG Kiran Gupta	Yes	1
PH Patricia Hall	Yes	16
RE Roderick Edwards	Yes	3

COUNT: How many?

COUNTIFS

Format

=COUNTIFS(**range1**, **criterion1**,
range2, **criterion2**,
etc.)

Single-sheet

=COUNTIFS(**[Active?]:[Active?]**, "Yes",
Years:Years, <10)

Cross-sheet

=COUNTIFS(**{Active?}**, "Yes",
{Years}, <10)

Translation

Count the number of rows
where all of the **criteria** are met
in their **respective** ranges.

Employee	Active?	Years
AP Aviv Perez	Yes	12
HS Harley Sterling	Yes	10
GG Guadalupe Garcia	Yes	12
VB Vera Bowers	No	7
HS Hiro Senjima	Yes	17
KS Kai Senjima	Yes	3
PF Paul Finley	Yes	15
DK Diana Kennedy	Yes	5
VP Victoria Pearson	No	3
BF Bruce Ferguson	Yes	10
KG Kiran Gupta	Yes	1
PH Patricia Hall	Yes	16
RE Roderick Edwards	Yes	3

SUM: How much (total)?

Employee	Active?	Years
AP Aviv Perez	Yes	12
HS Harley Sterling	Yes	10
GG Guadalupe Garcia	Yes	12
VB Vera Bowers	No	7
HS Hiro Senjima	Yes	17
KS Kai Senjima	Yes	3
PF Paul Finley	Yes	15
DK Diana Kennedy	Yes	5
VP Victoria Pearson	No	3
BF Bruce Ferguson	Yes	10
KG Kiran Gupta	Yes	1
PH Patricia Hall	Yes	16
RE Roderick Edwards	Yes	3

SUM

Format

=SUM(range)

Single-sheet

=SUM(Years:Years)

Cross-sheet

=SUM({Years})

Translation

Add together all of the numerical values in the selected range.

SUM: How much (total)?

Employee	Active?	Years
AP Aviv Perez	Yes	12
HS Harley Sterling	Yes	10
GG Guadalupe Garcia	Yes	12
VB Vera Bowers	No	7
HS Hiro Senjima	Yes	17
KS Kai Senjima	Yes	3
PF Paul Finley	Yes	15
DK Diana Kennedy	Yes	5
VP Victoria Pearson	No	3
BF Bruce Ferguson	Yes	10
KG Kiran Gupta	Yes	1
PH Patricia Hall	Yes	16
RE Roderick Edwards	Yes	3

SUMIF

Format

`=SUMIF(range, criterion, [range to sum - optional])`

Single-sheet

`=SUMIF([Active?]:[Active?], "Yes", Years:Years)`

Cross-sheet

`=SUMIF({Active?}, "Yes", {Years})`

Translation

Add together all of the values in the range to sum, but only add the values from the rows that meet one criterion in one selected range.

SUM: How much (total)?

Employee	Active?	Years
AP Aviv Perez	Yes	12
HS Harley Sterling	Yes	10
GG Guadalupe Garcia	Yes	12
VB Vera Bowers	No	7
HS Hiro Senjima	Yes	17
KS Kai Senjima	Yes	3
PF Paul Finley	Yes	15
DK Diana Kennedy	Yes	5
VP Victoria Pearson	No	3
BF Bruce Ferguson	Yes	10
KG Kiran Gupta	Yes	1
PH Patricia Hall	Yes	16
RE Roderick Edwards	Yes	3

SUMIFS

Format

```
=SUMIFS(range to sum,  
range1, criterion1,  
range2, criterion2,  
etc.)
```

Single-sheet

```
=SUMIFS(Years:Years,  
[Active?]:[Active?], "Yes",  
Years:Years, <10)
```

Cross-sheet

```
=SUMIFS({Years},  
{Active?}, "Yes",  
{Years}, <10)
```

Translation

Add together all of the values in the range to sum, but only add the values from the rows that meet all specified criteria in their respective ranges.

IF: Is it true?

IF

Format

=IF(**expression**, **value if true**,
[**value if false - optional**])

Single-sheet

=IF(Years@row <= 3, "New")

Cross-sheet

=IF(COUNTIF({Years}, <=3) > 5, "Target Exceeded",
"Within Target")

Translation

If **this statement** is true, do **this**. Otherwise, do **this**. (If no value if false, show blank.)

Employee	Active?	Years
AP Aviv Perez	Yes	12
HS Harley Sterling	Yes	10
GG Guadalupe Garcia	Yes	12
VB Vera Bowers	No	7
HS Hiro Senjima	Yes	17
KS Kai Senjima	Yes	3
PF Paul Finley	Yes	15
DK Diana Kennedy	Yes	5
VP Victoria Pearson	No	3
BF Bruce Ferguson	Yes	10
KG Kiran Gupta	Yes	1
PH Patricia Hall	Yes	16
RE Roderick Edwards	Yes	3

New

New

New

New

IF: Is it true?

Nested IF

Format

`=IF(expression1, value if true, IF(expression2, value if true, [value if false - optional]))`

Single-sheet

`=IF(Years@row <= 3, "New", IF(Years@row < 10, "Mid-tenure", "Senior"))`

Cross-sheet

`=IF(COUNTIF({Years}, <=3) > 5, "Exceeded", IF(COUNTIF({Years}, <=3) >= 3, "Approaching", "Within Target"))`

Translation

If this statement is true, do this. Otherwise, if this other statement is true, do this. Otherwise, do this. (If no value if false listed, show blank.)

Employee	Active?	Years	
AP Aviv Perez	Yes	12	Sr
		10	Sr
		12	Sr
		7	Mid
		17	Sr
		3	New
		15	Sr
		5	Mid
		3	New
BF Bruce Ferguson	Yes	10	Sr
KG Kiran Gupta	Yes	1	New
PH Patricia Hall	Yes	16	Sr
RE Roderick Edwards	Yes	3	New

Employee	Active?	Years	
AP Aviv Perez	Yes	12	Sr
HS Harley Sterling	Yes	10	Sr
GG Guadalupe Garcia	Yes	12	Sr
VB Vera Bowers	No	7	Mid
HS Hiro Senjima	Yes	17	Sr
KS Kai Senjima	Yes	3	Mid
PF Paul Finley	Yes	15	Sr
DK Diana Kennedy	Yes	5	Mid
VP Victoria Pearson	No	3	Mid
BF Bruce Ferguson	Yes	10	Sr
KG Kiran Gupta	Yes	1	Mid
PH Patricia Hall	Yes	16	Sr
RE Roderick Edwards	Yes	3	Mid

IF: Is it true?

Nested IF: best practice & troubleshooting

Order is every important!

Nested IFs work left to right and **stop** when they find a "true" result.

```
=IF(Years@row < 10, "Mid-tenure",
    IF(Years@row <= 3, "New",
        "Senior"))
```

Incorrect results? Errors? Break it down!

```
=IF(Years@row < 10, "Mid-tenure",
    IF(Years@row <= 3, "New",
        "Senior"))
```

Order: **most** restrictive to **least** restrictive

```
=IF(Years@row <= 3, "New",
    IF(Years@row < 10, "Mid-tenure",
        "Senior"))
```

Common Functions

Logic with OR & AND: one or many?

OR(logical_expression1,
logical_expression2,
logical_expression3)

OR

One or more statements
are true

AND(logical_expression1,
logical_expression2,
logical_expression3)

AND

All statements are true

Employee	Active?	Years in Role
AP Aviv Perez	Yes	12
HS Harley Sterling	Yes	10
GG Guadalupe Garcia	Yes	12
VB Vera Bowers	No	7
HS Hiro Senjima	Yes	17
KS Kai Senjima	Yes	3
PF Paul Finley	Yes	15
DK Diana Kennedy	Yes	5
VP Victoria Pearson	No	3
BF Bruce Ferguson	Yes	10
KG Kiran Gupta	Yes	1
PH Patricia Hall	Yes	16
RE Roderick Edwards	Yes	3

Common Functions

Logic with OR & AND: one or many?

IF/OR

Format

=IF(OR(logical_expression1,
logical_expression2,
logical_expression3),
value if true, [value if false - optional])

Example

=IF(OR([Active?]
@row = "Yes",
[Years in Role]
@row >= 10),
1)

Translation

If **any** of the statements within OR are true, do this. Otherwise, do this. (If no value if false, show blank.)

Employee	Active?	Years in Role
AP Aviv Perez	Yes	12
HS Harley Sterling	Yes	10
GG Guadalupe Garcia	Yes	12
VB Vera Bowers	No	7
HS Hiro Senjima	Yes	17
KS Kai Senjima	Yes	3
PF Paul Finley	Yes	15
DK Diana Kennedy	Yes	5
VP Victoria Pearson	No	3
BF Bruce Ferguson	Yes	10
KG Kiran Gupta	Yes	1
PH Patricia Hall	Yes	16
RE Roderick Edwards	Yes	3

Common Functions

Logic with OR & AND: one or many?

IF/AND

Format

=IF(AND(logical_expression1,
logical_expression2,
logical_expression3),
value if true, [value if false - optional])

Example

=IF(AND([Active?]
@row = "Yes",
[Years in Role]
@row >= 10),
1)

Translation

If **all** of the statements within AND are true, do this. Otherwise, do this. (If no value if false, show blank.)

What did we learn?

Section 1 - Formula fundamentals refresher

- 5 fabulous functions (and their variations):
 - COUNT/IF/S
 - SUM/IF/S
 - IF
 - AND
 - OR



2

Where to use formulas

Helper Columns & Metrics Sheets

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Helper Columns

Surface hard-to-access data

Level

- Number of times a row is indented
- Conditional formatting
- Reference specific subset of rows in formulas & reports

Format =COUNT(ANCESTORS([Column that will never be blank]@row))

Example =COUNT(ANCESTORS([Project | Phase | Task]@row))

Translation Count the number of (nonblank) ancestors the referenced cell has.

Level	Project Phase Task
0	Project A
1	Phase I
2	Task 1
	Task 2
	Task 3
	Task 4
	Phase II
	Task 1
	Task 2
	Task 3
	Task 4

Helper Columns

Surface hard-to-access data

PARENT

- Displays data from parent row
- Grouping & display parent in reports
- Reference specific subset of rows in formulas & reports

Format =PARENT([Column to display]@row)

Example =PARENT([Project | Phase | Task]@row)

Translation Display the value in the Parent cell of the referenced cell.

	Project Phase Task
	Project A
Project A	Phase I
	Task 1
Phase I	Task 2
	Task 3
	Task 4
Project A	Phase II
	Task 1
Phase II	Task 2
	Task 3
	Task 4

Helper Columns

Surface hard-to-access data

INDEX/ANCESTORS

- Displays data from "nth" ancestor
- Grouping & display ancestor in reports
- Reference specific subset of rows in formulas & reports

Format =INDEX(ANCESTORS([Column to display]@row), n)

Example =INDEX(ANCESTORS([Project | Phase | Task]@row), 1)

Translation Show the nth ancestor of the referenced cell.

The diagram shows a hierarchical task list with the following structure:

- Project A** (indicated by red arrow 1)
 - Phase I** (indicated by red arrow 2)
 - Task 1
 - Task 2 (highlighted with a blue box)
 - Task 3
 - Task 4
 - Phase II**
 - Task 1
 - Task 2
 - Task 3
 - Task 4
- Project B** (indicated by green arrow)
 - Phase I**
 - Task 1
 - Task 2
 - Task 3

Red annotations: '1' points to Project A, '2' points to Phase I, and 'Project A' points to the Project A header. A blue box highlights 'Task 2' under Phase I of Project A.

Green annotation: 'Project B' points to the Project B header.

Metrics Sheets

Summarize data with cross-sheet formulas

- Summarize data for dashboard
- Easy to find data source for chart & metric widgets
- Stacked bar charts - not bound by report limitations

- Training Courses Completed by Role			
Marketing	77		
Sales	103		
Customer Success	74		
- Progress report by Tenure			
Not Started	In Progress	Complete	
New	1	19	4
Mid-tenure	3	37	5
Senior	2	52	5
- Training Courses Completed by Month			
IT Security Training	Anti-Harassment Training	Diversity Training	
January	15	12	4
February	13	12	4
March	8	11	4
April	10	13	3
May	10	10	1
June	14	13	1
July	12	11	2

What did we learn?

Section 2 - Helper columns and metrics sheets

- Helper columns help surface hard to access data
 - Level
 - PARENT
 - INDEX/ANCESTORS
- Metrics sheets summarize data in all in one place for easy access



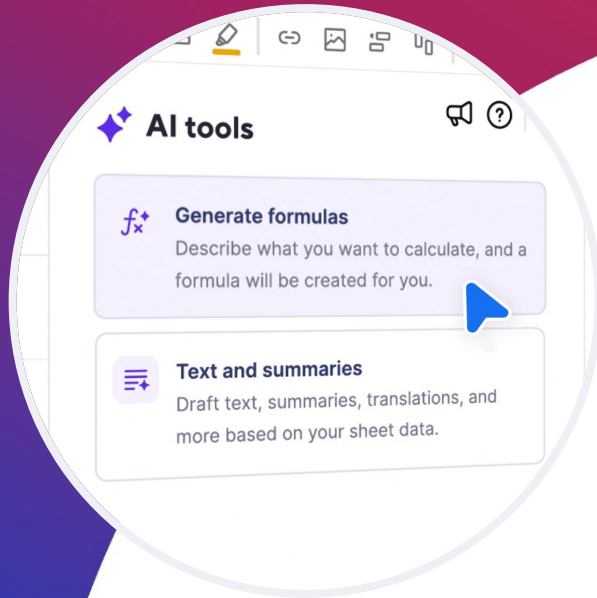
3

Optimize your formula creation

AI formula generation; making formulas scalable

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Optimize your formula creation



Have AI do the work for you!

- Explain what you want
- Column name autocomplete
- Test suggested formula
 - Does it give you the result you expect (on every row)?
 - If not:
 - Review
 - Rephrase
 - Reorder
 - Regenerate

Optimize your formula creation

@row references

type it manually?

Label	Count
Marketing	=COUNTIFS({Training Status}, "Complete", {Team}, "Marketing")
Sales	
Customer Success	

Label	Count
Marketing	8
Sales	=COUNTIFS({Training Status}, "Complete", {Team}, "Sales")
Customer Success	

Label	Count
Marketing	8
Sales	6
Customer Success	=COUNTIFS({Training Status}, "Complete", {Team}, "Customer Success")

Optimize your formula creation

@row references

Don't type it manually. Use an @row reference and drag-fill.

Label	Count
Marketing	=COUNTIFS({Training Status}, "Complete", {Team}, <u>Label@row</u>)
Sales	6
Customer Success	0

Label	Count	Column3	Column4
	Not Started	In Progress	Complete
Marketing	=COUNTIFS({Training Status}, Count64, {Team}, Label@row)		
Sales			
Customer Success			

Label	Count	Column3	Column4
	Not Started	In Progress	Complete
Marketing	3		
Sales	0		
Customer Success	=COUNTIFS({Training Status}, Count66, {Team}, Label@row)		

Optimize your formula creation

Absolute references

Lock your **row** to drag-fill **down**

Count64 - Row Unlocked.

Row reference will shift with drag-fill.

Label	Count	Column3	Column4
	Not Started	In Progress	Complete
Marketing	=COUNTIFS({Training Status}, Count\$64, {Team}, Label@row)		
Sales			
Customer Success			

Label	Count	Column3	Column4
	Not Started	In Progress	Complete
Marketing	3		
Sales	0		
Customer Success	=COUNTIFS({Training Status}, Count\$64, {Team}, Label@row)		

Optimize your formula creation

Absolute references

Lock your **row** to drag-fill **down**

Count64 - Row Unlocked.
Row reference will shift with drag-fill.

Count\$64 - Row Locked.
Row reference will stay the same with drag-fill.



Label	Count	Column3	Column4
	Not Started	In Progress	Complete
Marketing	=COUNTIFS({Training Status}, Count\$64, {Team}, Label@row)		
Sales	0		
Customer Success	2		

Label	Count	Column3	Column4
	Not Started	In Progress	Complete
Marketing	3	0	=COUNTIFS({Training Status}, [Column4]\$64, {Team}, [Column3]@row)
Sales	0		
Customer Success	2		

Optimize your formula creation

Absolute references

Lock your **column** to drag-fill **across**

Label@row - Column Unlocked.
Column reference will shift with drag-fill.

Label	Count	Column3	Column4
	Not Started	In Progress	Complete
Marketing	=COUNTIFS({Training Status}, Count\$64, {Team}, \$Label@row)		
Sales	0		
Customer Success	2		


Label	Count	Column3	Column4
	Not Started	In Progress	Complete
Marketing	3	25	=COUNTIFS({Training Status}, [Column4]\$64, {Team}, \$Label@row)
Sales	0		
Customer Success	2		

Optimize your formula creation

Absolute references

Lock your **column** to drag-fill **across**

Label@row - Column Unlocked.
Column reference will shift with drag-fill.

 \$Label@row - Column Locked.
Column reference will stay the same with drag-fill.

Label	Count	Column3	Column4	
Marketing	New	Mid-Tenure	Senior	
Not Started	=COUNTIFS({Training Status}, \$Label@row, {Tenure}, Count\$73, {Team}, Label73)			
In Progress	0	0	0	
Complete	0	0	0	

Label	Count	Column3	Column4	
Marketing	New	Mid-Tenure	Senior	
Not Started	2	0	0	
In Progress	0	0	0	
Complete	0	0	=COUNTIFS({Training Status}, \$Label@row, {Tenure}, [Column4]\$73, {Team}, [Column3]75)	

Optimize your formula creation

Absolute references

Lock both **column** and **row** to maintain reference to **single cell**

Count64 - Row and Column Unlocked.
Column and row references will shift with drag-fill.

Label	Count	Column3	Column4
Marketing	New	Mid-Tenure	Senior
Not Started	=COUNTIFS({Training Status}, \$Label@row, {Tenure}, Count\$73, {Team}, \$Label\$73)		
In Progress			
Complete			


Label	Count	Column3	Column4
Marketing	New	Mid-Tenure	Senior
Not Started	2	1	0
In Progress	6	11	4
Complete	3	3	=COUNTIFS({Training Status}, \$Label@row, {Tenure}, [Column4]\$73, {Team}, \$Label\$73)

Optimize your formula creation

Absolute references

Lock both **column** and **row** to maintain reference to **single cell**

Count64 - Row and Column Unlocked.
Column and row references will shift with drag-fill.

 **\$**Count**\$**64 - Row and Column Locked.
Column reference will stay the same with drag-fill.

Optimize your formula creation

Column formulas

- Use instead of drag-fill
- Applies to all rows in sheet - even new ones!

The screenshot shows a context menu in Smartsheet. The menu is open over a table with columns 'Start Date' and 'End Date'. The 'Convert to Column Formula' option is highlighted at the bottom of the menu. A tooltip next to it reads: 'Apply formula to the entire column. [Learn More](#)'. Other menu items include 'Paste Special...', 'Clear Contents', 'View Cell History...', 'Insert Row', 'Delete Row', 'Add a Row Comment', 'Row Actions...', 'Insert Image', 'Generate formula', 'Generate content', 'Link from Cell in Other Sheet...', 'Manage References...', and 'Hyperlink...'. The 'Level' column in the background table is set to 0.

Level	Start Date	End Date
0	01/01/24	12/31/24
	01/01/24	03/29/24
	04/01/24	06/28/24
	07/08/24	09/30/24
	10/01/24	12/31/24
	08/05/24	08/27/24
	08/05/24	08/26/24
	08/05/24	08/07/24
	08/06/24	08/14/24
	08/08/24	08/08/24
	08/09/24	08/26/24
	08/12/24	08/27/24
	08/12/24	08/16/24
	08/13/24	08/23/24
	08/16/24	08/19/24
	08/18/24	08/27/24
	08/23/24	09/19/24
	08/23/24	09/06/24

Optimize your formula creation

Column formulas

- Use instead of drag-fill
- Applies to all rows in sheet - even new ones!

Best Practice

- Need to apply formula to other columns?
Drag-fill first, then convert to column formulas.
- Need to exclude specific rows from formula?
Use IF to indicate what should happen conditionally.
- Cannot use absolute references in column formula.
 - Need to reference one cell?

Level <i>f_x</i>	Project Phase Task	Assigned To
0	Project A	Aviv Perez
1	Phase I	Harley Sterling
2	Task 1	Guadalupe Garcia
2	Task 2	Vera Bowers
2	Task 3	Hiro Senjima
2	Task 4	Kai Senjima
1	Phase II	Paul Finley
2	Task 1	Diana Kennedy
2	Task 2	Victoria Pearson
2	Task 3	Bruce Ferguson
2	Task 4	Kiran Gupta
0	Project B	Kelly Smart
1	Phase I	Brooklyn Jansen
2	Task 1	Harry Riggs
2	Task 2	Melissa Brundige
2	Task 3	Olivia Carter

Optimize your formula creation

Need to reference a specific cell?

Using absolute or cell references and converting to column formula...

Level fx	Project Phase Task	Assigned To	Start Date	End Date	Q3	
0	Quarters		01/01/24	12/31/24		=IF(Level@row = 2, IF(AND([Start Date]@row >= [Start Date]4, [Start Date]@row <= [End Date]4), 1, 0))
1	Quarter 1		01/01/24	03/29/24		
1	Quarter 2		04/01/24	06/28/24	★	
1	Quarter 3		07/08/24	09/30/24	★	
1	Quarter 4		10/01/24	12/31/24	★	
0	Project A	Aviv Perez	08/05/24	08/27/24	★	

Optimize your formula creation

Need to reference a specific cell?

...will result in a vague error message.



The screenshot displays a Smartsheet interface with a table and an error dialog box. The table has columns for 'Level', 'Project | Phase | Task', and 'Assigned To'. The 'Level' column contains values 0, 1, 1, 1, 1, and 0. The 'Project | Phase | Task' column contains 'Quarters' (expanded to show 'Quarter 1', 'Quarter 2', 'Quarter 3', and 'Quarter 4') and 'Project A'. The 'Assigned To' column shows 'Aviv Boy'.

An error dialog box is open, displaying a warning icon and the message: "The column formula syntax isn't quite right, see our help article https://help.smartsheet.com/articles/2481944?ss_lc for more information." The dialog box has an "OK" button.

The formula bar shows the formula: `[Date]@row >= [Start Date]4, [Start Date]@row <= [End`

Level	Project Phase Task	Assigned To
0	Quarters	
1	Quarter 1	
1	Quarter 2	
1	Quarter 3	
1	Quarter 4	
0	Project A	Aviv Boy

Optimize your formula creation

Need to reference a specific cell?

Instead, use sheet summary field to reference cell...

Project Phase Task	Assigned To	Start Date	End Date
Quarters		01/01/24	12/31/24
Quarter 1		01/01/24	03/29/24
Quarter 2		04/01/24	06/28/24
Quarter 3		07/08/24	09/30/24
Quarter 4		10/01/24	12/31/24
Project A	Aviv Perez	08/05/24	08/27/24
Phase I	Harley Sterling	08/05/24	08/26/24
Task 1	Guadalupe Garcia	08/05/24	08/07/24
Task 2	Vera Bowers	08/06/24	08/14/24
Task 3	Hiro Senjima	08/08/24	08/08/24
Task 4	Kai Senjima	08/09/24	08/26/24
Phase II	Paul Finley	08/12/24	08/27/24
Task 1	Diana Kennedy	08/12/24	08/16/24
Task 2	Victoria Pearson	08/13/24	08/23/24

Sheet Summary

Q3 Start *fx*

=[Start Date]4

Q3 End *fx*

09/30/24

Optimize your formula creation

Need to reference a specific cell?

...and reference sheet summary field in formula!

Project Phase Task	Assigned To	Start Date	End Date	Starts in Q3
Quarters		01/01/24	12/31/24	★
Quarter 1		01/01/24	03/29/24	★
Quarter 2		04/01/24	06/28/24	★
Quarter 3		07/08/24	09/30/24	★
Quarter 4		10/01/24	12/31/24	★
Project A	Aviv Perez	08/05/24	08/27/24	★
Phase I	Harley Sterling	08/05/24	08/26/24	★
Task 1	Guadalupe Garcia	08/05/24	08/07/24	★
Task 2	Vera Bowers	08/06/24	08/14/24	★
Task 3	Hiro Senjima	08/08/24	08/08/24	★
Task 4	Kai Senjima	08/09/24	08/26/24	★
Phase II	Paul Finley	08/12/24	08/27/24	★
Task 1	Diana Kennedy	08/12/24	08/16/24	★

Sheet Summary

Q3 Start *fx*
07/08/24

Q3 End *fx*
09/30/24

```
=IF(Level@row = 2, IF(AND([Start Date]@row >= [Q3 Start]#, [Start Date]@row <= [Q3 End]#), 1, 0))
```



What did we learn?

Section 3 - Optimize your formula creation

- Have AI do the work for you!
- Don't type it manually - use @row references
- Use \$ to create absolute references to rows, columns, or cells
- Convert to column formula to apply to all rows in the sheet
- Bypass Column Formula absolute reference limitation by leveraging Sheet Summary

4

Troubleshooting Techniques

Error messages, CPROS, Break it down

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Problematic Formulas: Symptoms

Formulas require troubleshooting for two main reasons

Incorrect Result

- Wrong Symbols
- Unexpected Values

Error Message

- #UNPARSEABLE
- #INVALID REF
- #INCORRECT ARGUMENT

Problematic Formulas: Causes

These symptoms are typically associated with a main cause

Criteria / Question

- Incorrect Operator
- Wrong Reference Range

Syntax / Structure

- Misplaced or Extra Elements
- Typos or Misspellings

Formula Error Messages

One Stop Shop in Help Center

The Smartsheet Help Center provides a list of formula error messages, their causes, and the resolutions you can implement to fix the errors..

When working with an error message, check here first for tips!

#BLOCKED

Cause

The calculation is blocked because at least one of the cells referenced by the formula has an error.

Resolution

Determine which cell referenced by this formula contains an error, which will be more descriptive of the problem.

#BOOLEAN EXPECTED

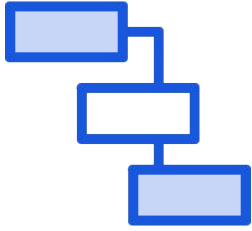
Cause

The formula is in a specific type of column (Date, Number, Symbol) and the returned value is of a different type.

Resolution

Either move the formula to a different column or convert the result to the appropriate type. Add an empty string to convert formula results to text values. For example =TODAY() + "" allows you to enter today's date into a text column.

Tips For Handling Errors



Referred Errors

If an error doesn't make sense for the formula or column, it may be coming from the referenced data

Check for errors in the selected ranges and correct those first before returning to your original formula



IFERROR()

IFERROR is added to hide or mask expected errors with a formula

Remove IFERRORs when troubleshooting until the formula is working as expected, then replace them



Text Data Mimics

Data which appears as one type (Text, Numbers, Dates) may actually be formatted as text and cause formula errors

Check columns types, or use ISDATE/ISTEXT/ISNUMBER to check that all values are in the correct format

Troubleshooting Steps: CPROS

A standard approach to problem solving

C - Commas

P - Parenthesis

R - Ranges/References

O - Options

S- Strings



Commas

- Compare all functions against the Help Center Syntax
- Check they are not inside of quotes, parenthesis or reference ranges
- Verify no double commas - ,, or comma-parenthesis ,)

✗ IF(ISBLANK([Option A]@row) [Option B]@row,, [Option A]@row)

✗ IF(ISBLANK([Option A]@row,) [Option B]@row, [Option A]@row)

✗ IF(ISBLANK([Option A]@row), [Option B]@row, [Option A]@row,)

✓ IF(ISBLANK([Option A]@row), [Option B]@row, [Option A]@row)

Parenthesis

- Set the 'Order of Operations' for the formula
- Designate which elements go with each function
- Smartsheet will add missing closed parenthesis when submitting a formula
 - Will NOT remove extra ones

✗ IF(ISBLANK([Option A]@row, [Option B]@row, [Option A]@row))

✗ IF(ISBLANK [Option A]@row) [Option B]@row, [Option A]@row)

✗ IF(ISBLANK([Option A]@row), [Option B]@row, [Option A]@row))

✓ IF(ISBLANK([Option A]@row), [Option B]@row, [Option A]@row)

Ranges or References

- Define what cells(s) are used
- Range/Reference in the formula change color
 - Cell(s) in the sheet are given a matching border
 -
- Multiple appearances
 - [Column Name]7>Today()
 - [Column Name]@row
 - [Column Name]:[Column Name]
 - [Column Name]1:[Column Name]20
 - {Column Name}
 - [Field Name]#

Task Name	Site	Site Symbol
Task 1	Seattle	☁️
Task 1.a	Portland	☁️
Task 1.b	Miami	☀️
Task 2	Miami	☀️
Task 3	Seattle	☁️
Task 3.a	Seattle	☁️
Task 3.a.i	Miami	☀️

Ranges or References

- Check for typos: are all values spelled correctly compared to the sheet values?
- Are the correct values being used?
- Are there blanks or invalid values in the ranges?

	Location	Requested Task Date	Quarter
Total in Miami:	Miami	01/05/24	Q1
	Boston	02/07/24	Q1
	Sydney	03/09/24	Q1
	Boston	02/07/24	Q1
	Boston	02/07/24	Q1
	Sydney	03/09/24	Q1
	Sydney	03/09/24	Q1
	Boston	02/07/24	Q1
	Boston	02/07/24	Q1
	Boston	02/07/24	Q1
	Sydney	03/09/24	Q1

Sheet Summary :

Boston Q1 Count *fx*

```
=COUNTIFS(Location:Location, "Q1",
Quarter:Quarter, "Boston")
```

```
COUNTIFS(range1, criterion1, [range2,
criterion2, ...])
```

[Reference Another Sheet](#)

Example

```
COUNTIFS(Quantity:Quantity, >25, [Item Name
Name], "T-Shirt")
```

Summary

Counts the number of cells within a range that of the specified criteria.

[Option B]@row, [Option A]@row)

[Option B], [Option A]@row)

[Option B]@row, [Option B]@row)

[Option B]@row, [Option A]@row)

Range or Reference: OR and ANDs

Reference is needed with each logical condition

Can be @cell, column@row, or another format

Option A	Option B	Primary Column
500	1500	=IF(OR(ISBLANK([Option A]@row), <1000), [Option B]@row, [Option A]@row)
5000	600	#INVALID OPERATI
	700	#INVALID OPERATI

=IF(OR(ISBLANK([Option A]@row), <1000), [Option B]@row, [Option A]@row)

Option A	Option B	Primary Column
500	1500	=IF(OR(ISBLANK([Option A]@row), [Option A]@row < 1000), [Option B]@row, [Option A]@row)
5000	600	5000
	700	700

=IF(OR(ISBLANK([Option A]@row), [Option A]@row<1000), [Option B]@row, [Option A]@row)

Optionals

- **Built in Default Value**
- **If not added, verify the default behavior**
 - **Blank or "Do Nothing"**
 - **Use Closest Match**
 - **Round to Whole Number**

Syntax

`MATCH(search_value, range, [search_type])`

- **search_value** – The value to search for.
- **range** – The cell range (lookup table) to be searched.
- **search_type** –[optional] The default is 1. The manner in which to search, depending on whether the range is sorted ascending (1), not sorted (0), or sorted descending (-1).



Strings

- Text values in a formula require quotes
- Smartsheet only recognizes vertical quotes
 - Directional Quotes are ignored
- Quotes missing around a text
 - #UNPARSEABLE
 - Reference Ranges don't turn color
- Numeric Values should not have quotes
 - "50" = Five, Zero
 - "50" is smaller than 6

Break It Down

Separate Nested Formulas for Testing

Nested Formulas can have errors or incorrect results for several reasons

- One or more individual parts has an error that carries forward in the formula
- Individual parts are not nested correctly, disrupting the syntax
- Steps are nested out of order, generating an incorrect result

```
IF(ISBLANK(Value@row, "Missing",  
IF(Value@row<50, "Low",  
IF(Value@row<100, "Medium",  
"High")))))
```

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"Missing",  
IF(Value@row<50,  
"Low",  
IF(Value@row<100,  
"Medium",  
"High"))))
```

**ISBLANK is missing
a parenthesis,
which was added at
the end**

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IF(ISBLANK(Value@row),  
"Missing",  
IF(Value@row<50,  
"Low",  
IF(Value@row<100,  
"Medium",  
"High"))
```

Missing comma in the middle is interfering with the syntax

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```
IF(ISBLANK(Value@row),  
"Missing",  
IF(Value@row<50,  
"High",  
IF(Value@row<100,  
"Medium",  
"Low")))
```

**Flipped string outputs
giving unexpected
results**

A woman with long, dark braids is shown from the chest up, looking off to the side with a thoughtful expression. She is wearing a maroon blazer over a green top. The background behind her is a gradient of red and purple.

What did we learn?

Section 4 - Troubleshooting

- Formulas Errors can provide clues for likely troubleshooting steps by using the Help Center resources
- Before you 'See the Pros', check the CPROS
 - Commas
 - Parenthesis
 - Ranges/References
 - Optionals
 - Strings
- Breaks nested formulas down to better see possible syntax problems, mismatched criteria/question, or sequence issues

5

Wrap it up

Takeaways & go-do's

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What did we learn?

Formulas: Building Blocks for Data Analysis

- Formula refresher
 - 5 foundational functions
 - Helper columns
 - Metrics sheets
- Create your formulas more efficiently
 - Make AI do the work for you
 - Use @row references
 - Use column formulas and absolute references with drag-fill
- Troubleshoot
 - Error messages
 - CPROS
 - Break it down

Register for upcoming User Groups



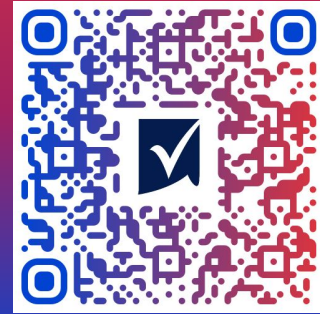
Continue to expand your Smartsheet skills and connections by attending a **User Group**.

Smartsheet User Groups

- **Discover** how others are using Smartsheet
- **Network** with the Smartsheet team and your peers
- **Virtual** and **in-person** events around the globe

Next steps...

- Take the survey
- Scan QR code for takeaways
 - Formula resources
 - Practice sheets
- Take the survey
- Attend other sessions



Take the survey

We'd love to hear your thoughts on the session.

Open this session in the mobile app, click "Survey," and answer two questions — it's that easy!

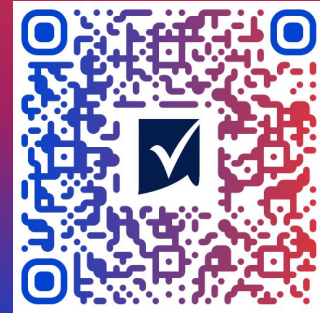
Thank you.

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Next steps...

- Formulas:
 - Attend Courtney's INDEX/MATCH/COLLECT session tomorrow afternoon.
- Dashboards:
 - Attend Kendra's Dashboard Design session tomorrow afternoon.
 - Attend Joe's Smartsheet Charts Unpacked session on Thursday morning.
- Conditional formatting:
 - Attend Rob's Advanced Power User Tips session tomorrow afternoon.
- Take the survey



Take the survey

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Thank you.

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by participating in the conversation on social media!
Use **#SmartsheetENGAGE** and tag Smartsheet
in your posts all week long.



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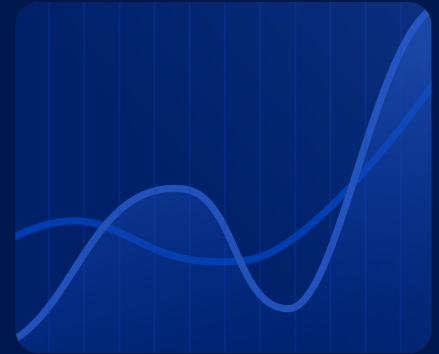
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