

Introduction to cell references

INTRODUCTION TO SPREADSHEETS



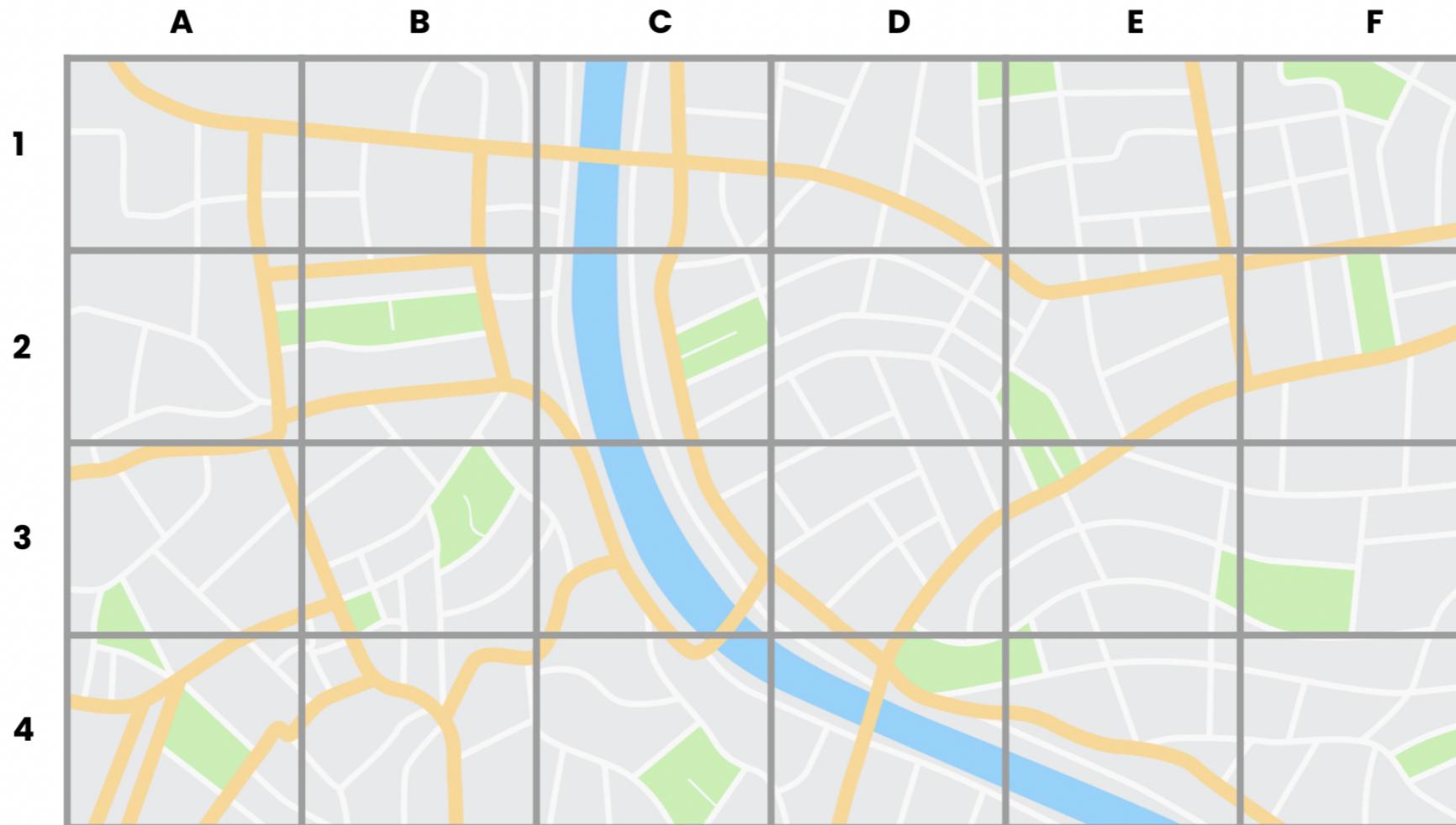
James Chapman

Curriculum Manager, DataCamp

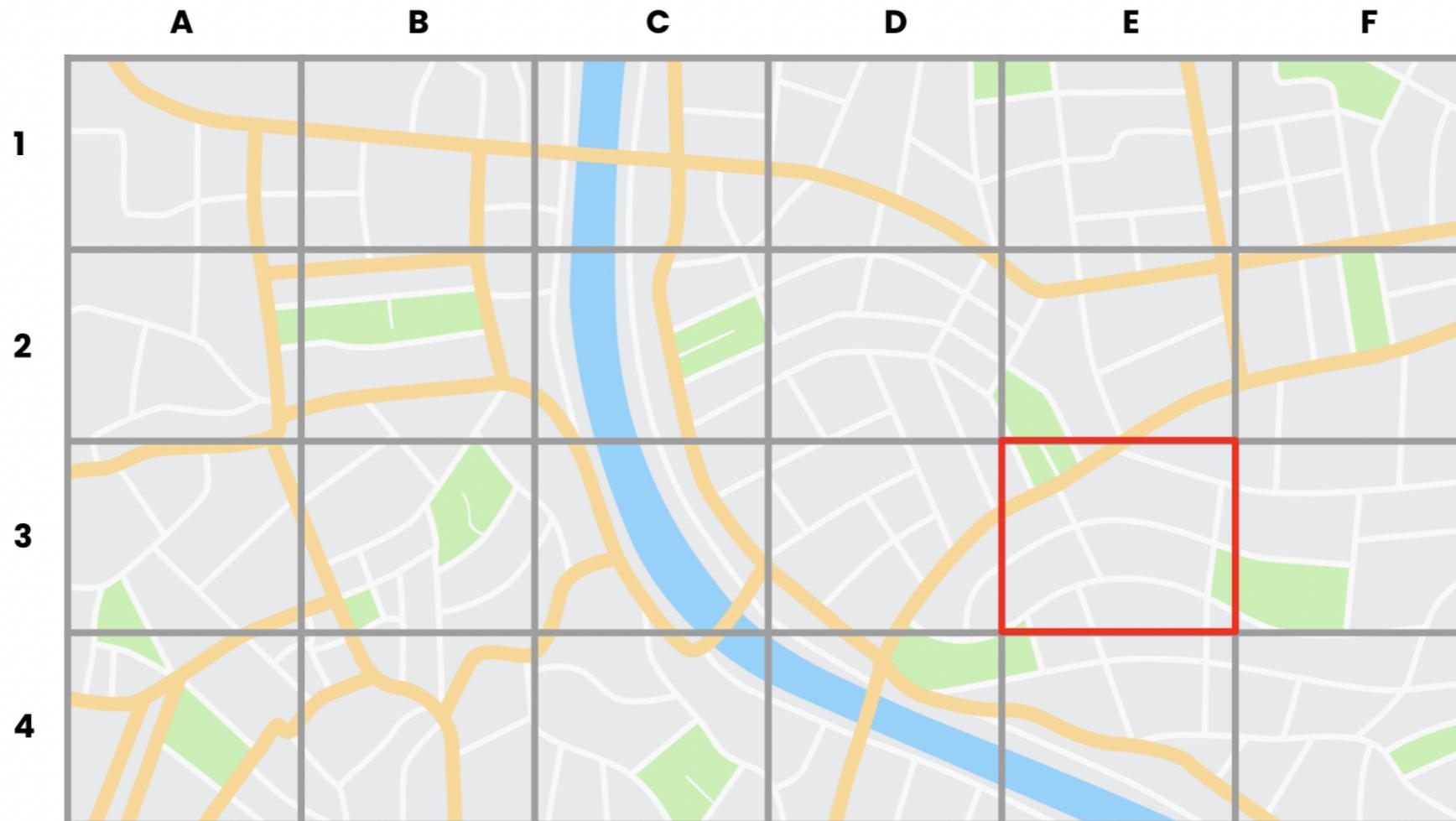
Recap: cell addresses

- Each cell is uniquely identified by its **cell address**, e.g., D4
- Current process to use a cell's value:
 1. Identify cell using its address
 2. Look at the value contained in the cell
 3. Manually input this value into another cell
- This is a lot of work, and prone to errors!
- **Cell references** can avoid much of this work

Cell references

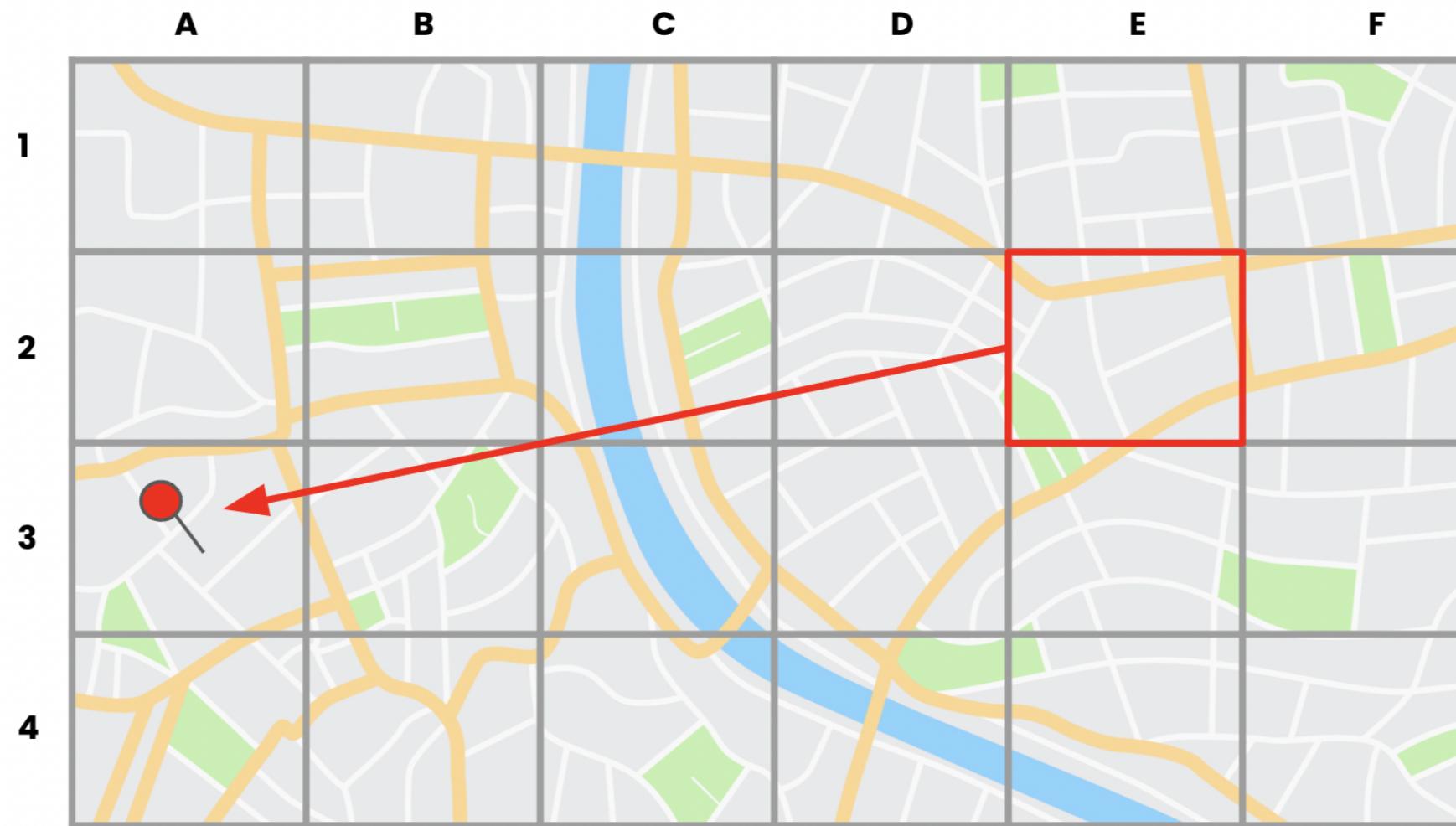


Cell references



Cell references

- **Cell references** point to cells and retrieve their values
- Example: E2 point to A3



Cell references

- **Cell references** point to cells and retrieve their values
- Example: E2 point to A3

E2	A	B	C	D	E
1					
2					
3	12				
4					

Cell references

- **Cell references** point to cells and retrieve their values
- Example: E2 point to A3

The screenshot shows a spreadsheet interface with a toolbar at the top containing icons for file, print, and zoom (100%), along with currency, percentage, and number format buttons. The formula bar shows the cell reference 'E2' and a formula input field starting with '='. The main grid has columns labeled A through E and rows labeled 1 through 4. Cell A3 contains the value '12'. The cell reference 'E2' is highlighted with a blue border, indicating it is selected or being edited.

	A	B	C	D	E
1					
2					
3	12				
4					

- Cell references can *only* be created inside formulas

Cell references

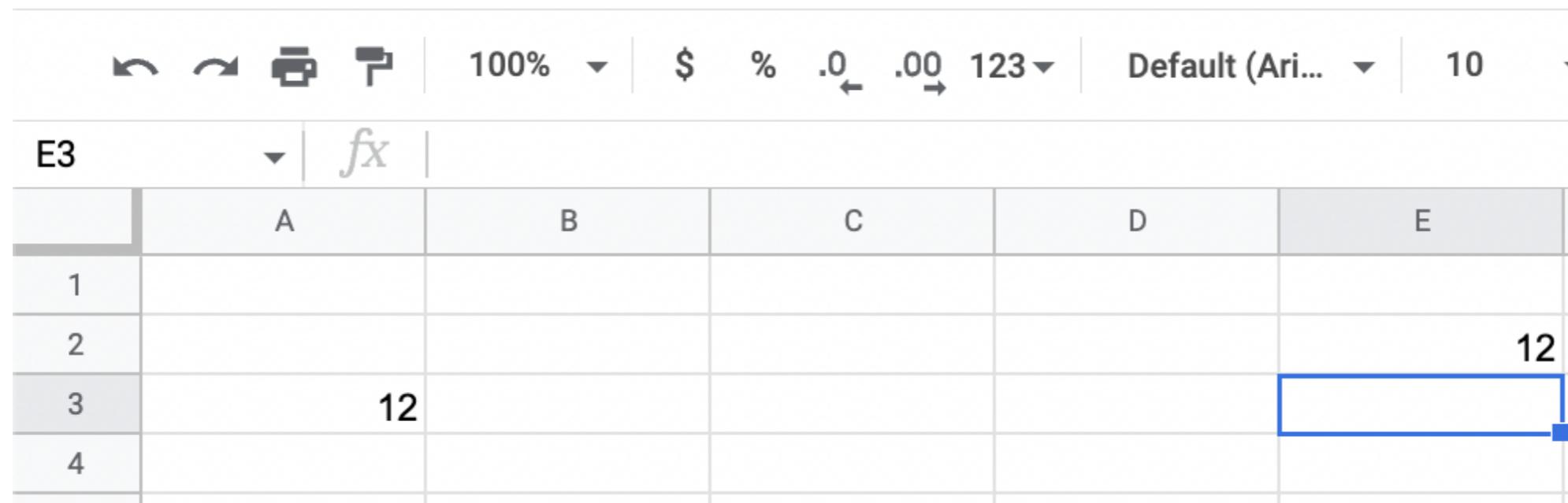
- **Cell references** point to cells and retrieve their values
- Example: E2 point to A3

The screenshot shows a spreadsheet interface with a toolbar at the top and a grid below. The toolbar includes icons for zoom, orientation, print, and other functions, followed by a zoom level of 100%, currency symbols (\$, %), and number formats (.0, .00, 123). The formula bar shows the cell reference E2 and the formula = A3. The grid has columns labeled A through E and rows labeled 1 through 4. Cell A3 contains the value 12, which is highlighted with a dashed orange border. Cell E2 also contains the formula = A3. A blue tooltip is visible over cell E2, displaying the formula ? = A3.

	A	B	C	D	E
1					
2					
3	12				
4					

Cell references

- **Cell references** point to cells and retrieve their values
- Example: E2 point to A3



The screenshot shows a spreadsheet interface with a toolbar at the top containing icons for back, forward, print, and other functions. The zoom level is set to 100%. The formula bar shows the cell reference "E3". The main area displays a 4x5 grid of cells labeled A through E and 1 through 4. Cell A3 contains the value "12". Cell E2 also contains the value "12", which is highlighted with a blue selection border. The formula bar also has an "fx" button.

	A	B	C	D	E
1					
2					12
3	12				
4					

Cell references

- **Cell references** point to cells and retrieve their values
- Example: E2 point to A3

		A	B	C	D	E
1						
2						12
3	13					
4						

Cell references

- **Cell references** point to cells and retrieve their values
- Example: E2 point to A3

A4	A	B	C	D	E
1					
2					13
3		13			
4					

- Cell references can be used to update cells in real-time

Circular references

- What happens when a cell references itself?
- Example: Update A3 to reference A3

The screenshot shows a spreadsheet interface with the following details:

- Toolbar:** Includes icons for back, forward, print, and search, followed by zoom (100%), currency (\$), percentage (%), decimal (.0), and number (123) buttons.
- Cell A3:** Contains the formula `=A3`, which is highlighted with a blue border.
- Cell E2:** Contains the value `13`.
- Table Structure:** A 5x6 grid with columns labeled A through F and rows labeled 1 through 5.

Circular references

- What happens when a cell references itself?
- Example: Update A3 to reference A3

The screenshot shows a spreadsheet interface with a toolbar at the top and a 5x6 grid of cells. The toolbar includes icons for back, forward, print, and zoom (100%), along with currency (\$), percentage (%), and number (.0 .00) buttons. The grid has columns labeled A through F and rows labeled 1 through 5. Cell A4 contains the value '1'. Cell A3 contains the formula '#REF!', which is highlighted with a blue border. Cell E2 also contains the formula '#REF!', with a red arrow pointing from it to the formula bar above. The formula bar shows the address 'A3'.

A4	A	B	C	D	E
1					
2					
3	#REF!				
4					#REF!
5					

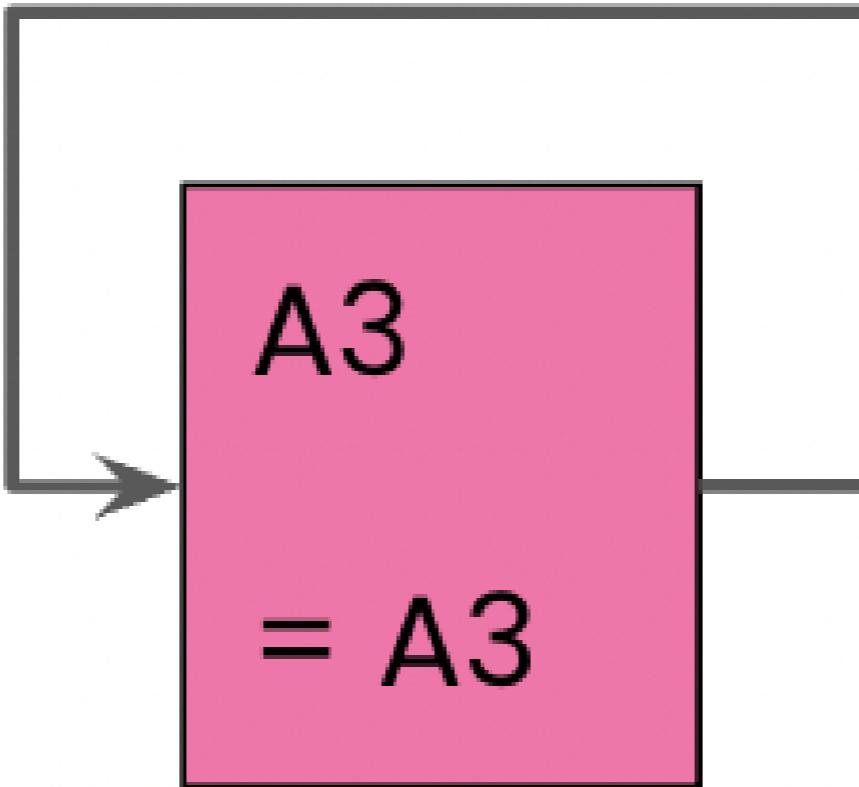
Circular references

- What happens when a cell references itself?
- Example: Update A3 to reference A3

	A	B	C	D
1				
2				
3	#REF!			
4				
5				
6				
7				
8				
9				

Error
Circular dependency detected.
To resolve with iterative
calculation, see File > Settings.

Circular references



Circular references

- What happens when a cell references itself?
- Example: Update A3 to reference E2

The screenshot shows a spreadsheet interface with a toolbar at the top and a grid below. The toolbar includes icons for back, forward, print, and search, followed by zoom (100%), currency (\$), percentage (%), and number formats (.0, .00, 123). The status bar shows 'Default (Ari...' and '10'. The grid has columns labeled A through E and rows labeled 1 through 5. Cell A3 contains the formula '= E2'. Cell E2 contains the value '13'. The cell A3 is highlighted with a blue border, and the cell E2 is highlighted with an orange dashed border.

A	B	C	D	E
1				
2				13
3	? = E2			
4				
5				

Circular references

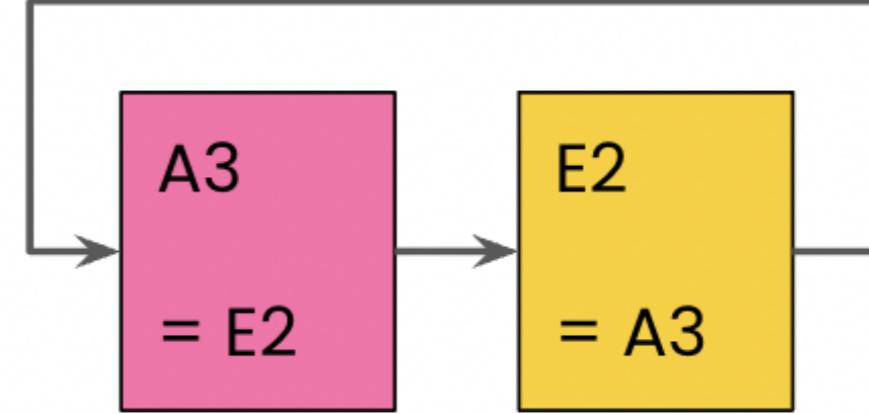
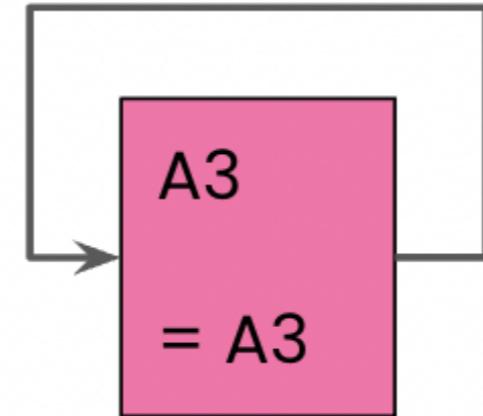
- What happens when a cell references itself?
- Example: Update A3 to reference E2

	A	B	C	D
1				
2				
3	#REF!			
4				
5				
6				
7				
8				
9				

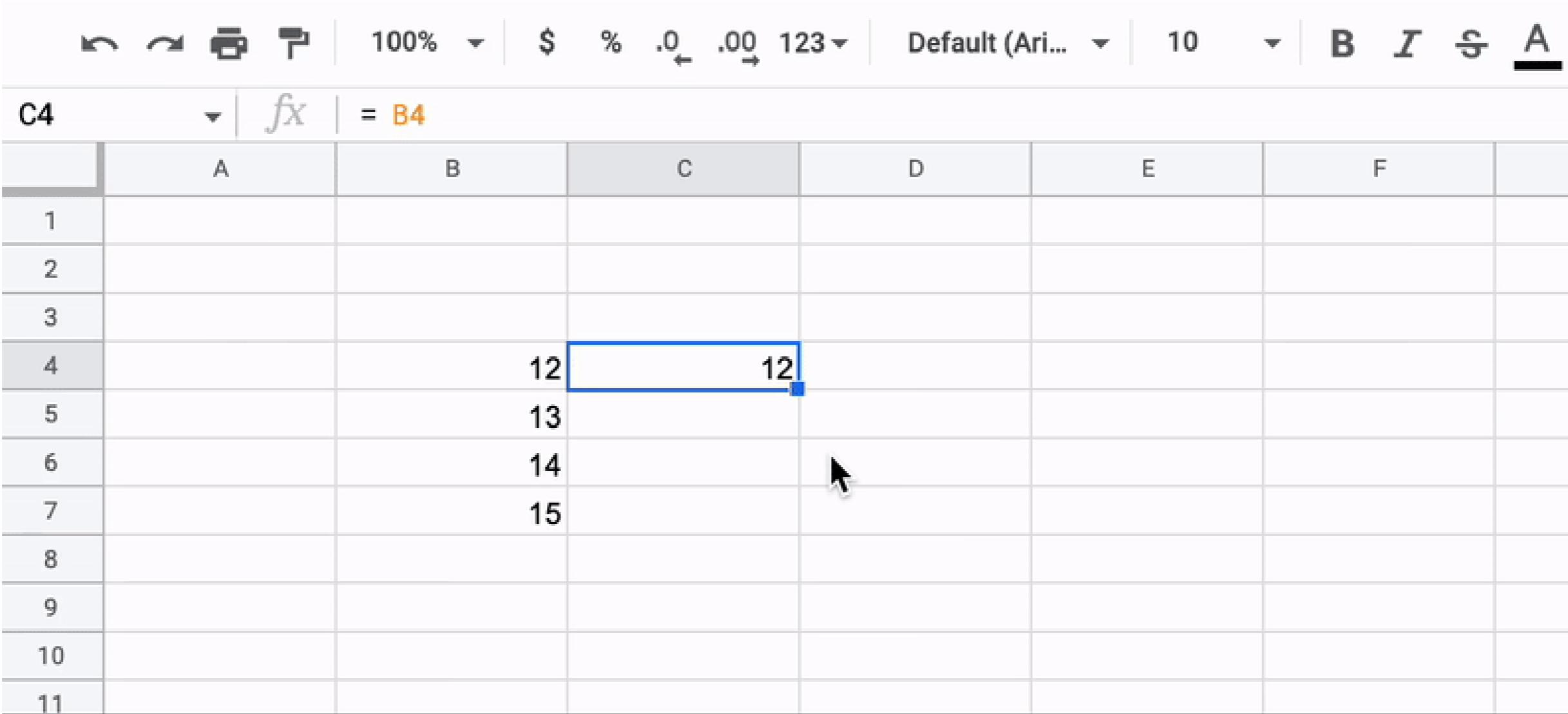
Error
Circular dependency detected.
To resolve with iterative
calculation, see File > Settings.

Circular references

- What happens when a cell references itself?
- Example: Update A3 to reference E2
- **Circular reference:** a cell reference that directly or indirectly references itself
- Formulas using circular references can't be computed



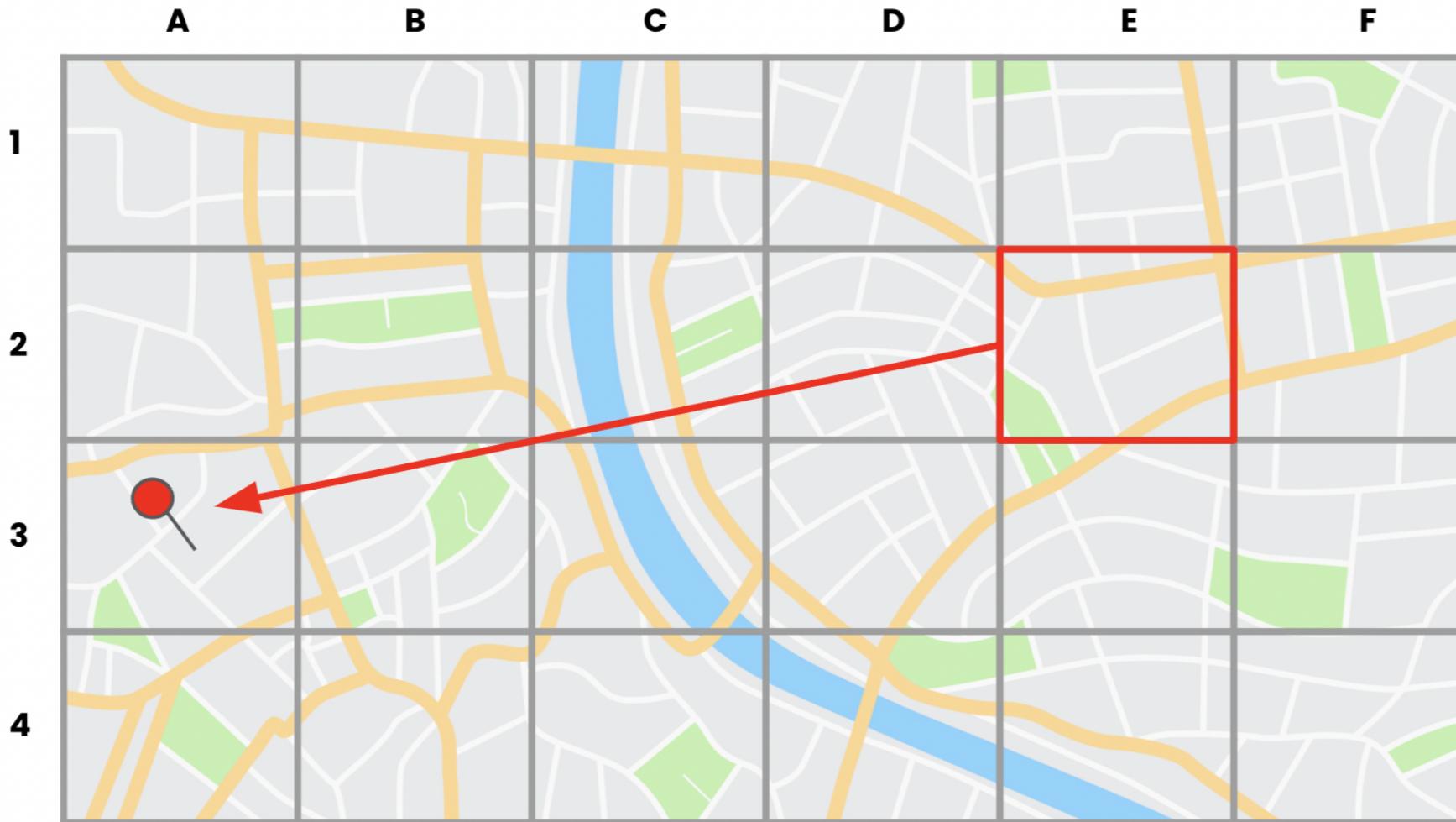
Copying references



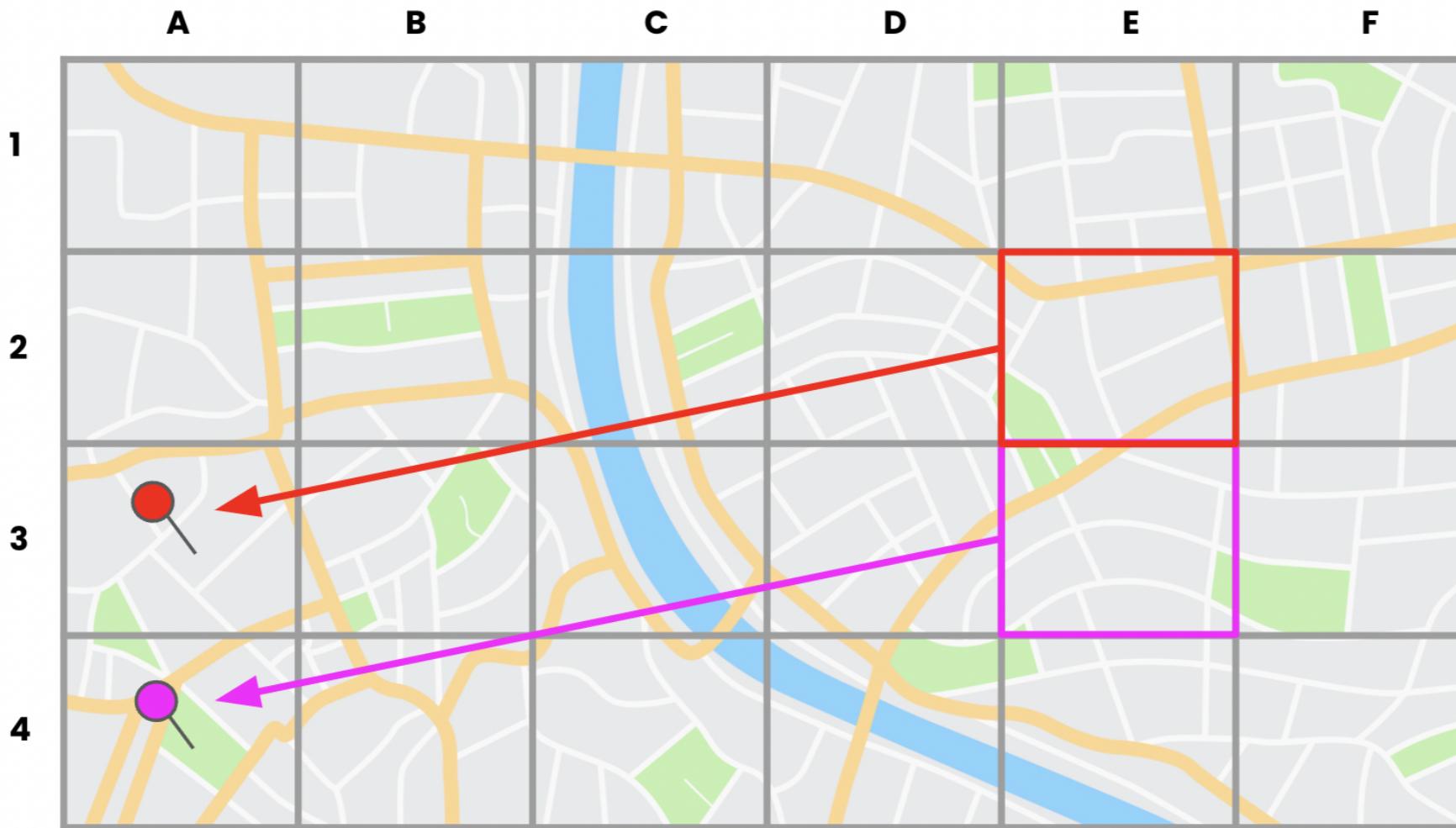
A screenshot of a spreadsheet application interface. The top menu bar includes icons for back, forward, print, and zoom (100%), followed by currency (\$), percentage (%), and number formats (.0, .00, 123). The font dropdown shows "Default (Ari..." with a size of 10. The toolbar also includes bold (B), italic (I), underline (U), and strike-through (S) buttons. The active cell is C4, which contains the formula =B4. The formula bar above the grid shows the formula = B4. The spreadsheet grid has columns labeled A through F and rows labeled 1 through 11. Cell B4 contains the value 12. A blue selection box surrounds the range B4:D4, indicating a copy operation. The cursor is positioned over cell C6.

	A	B	C	D	E	F
1						
2						
3						
4		12	12			
5		13				
6		14				
7		15				
8						
9						
10						
11						

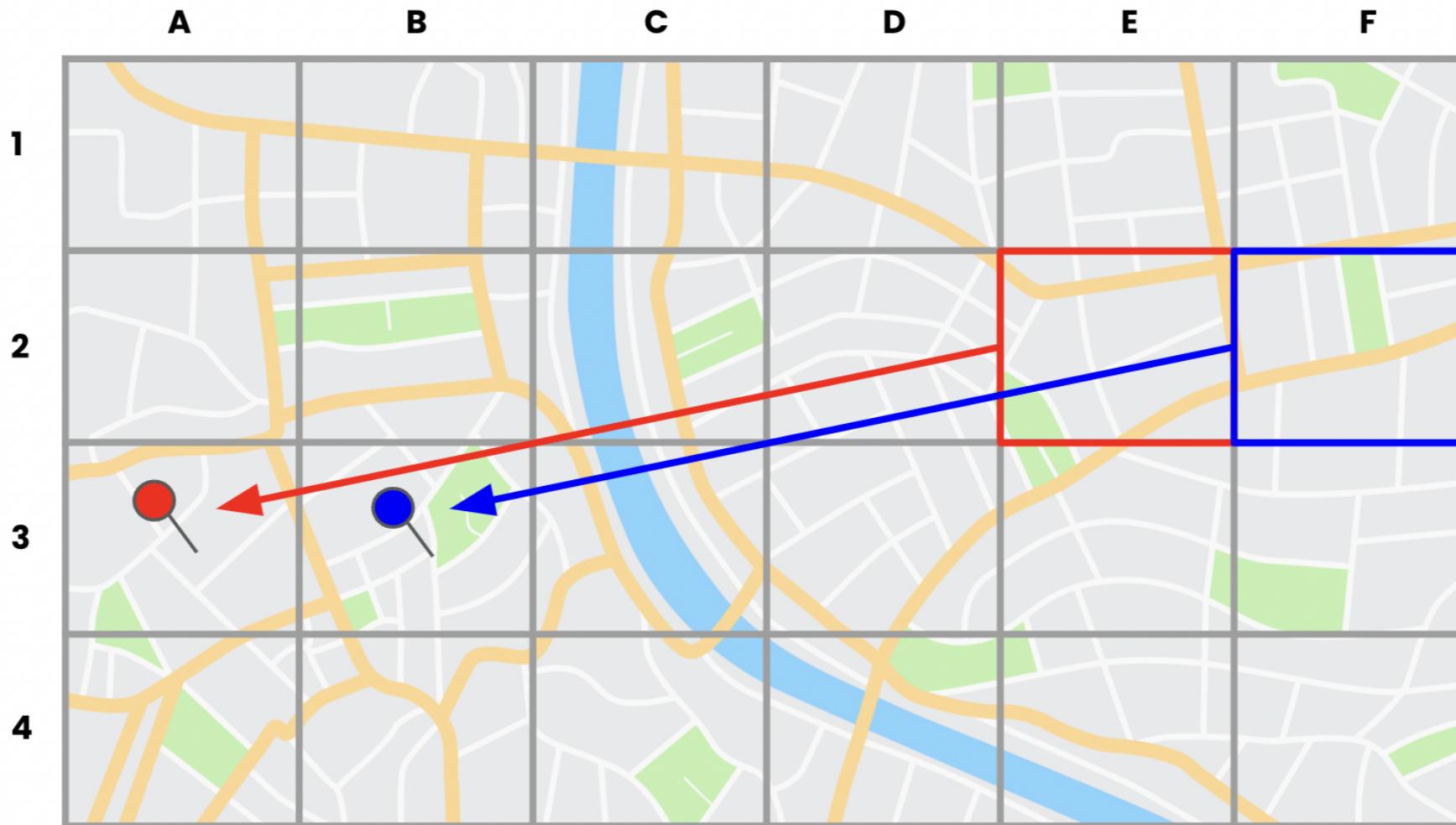
Copying references



Copying references

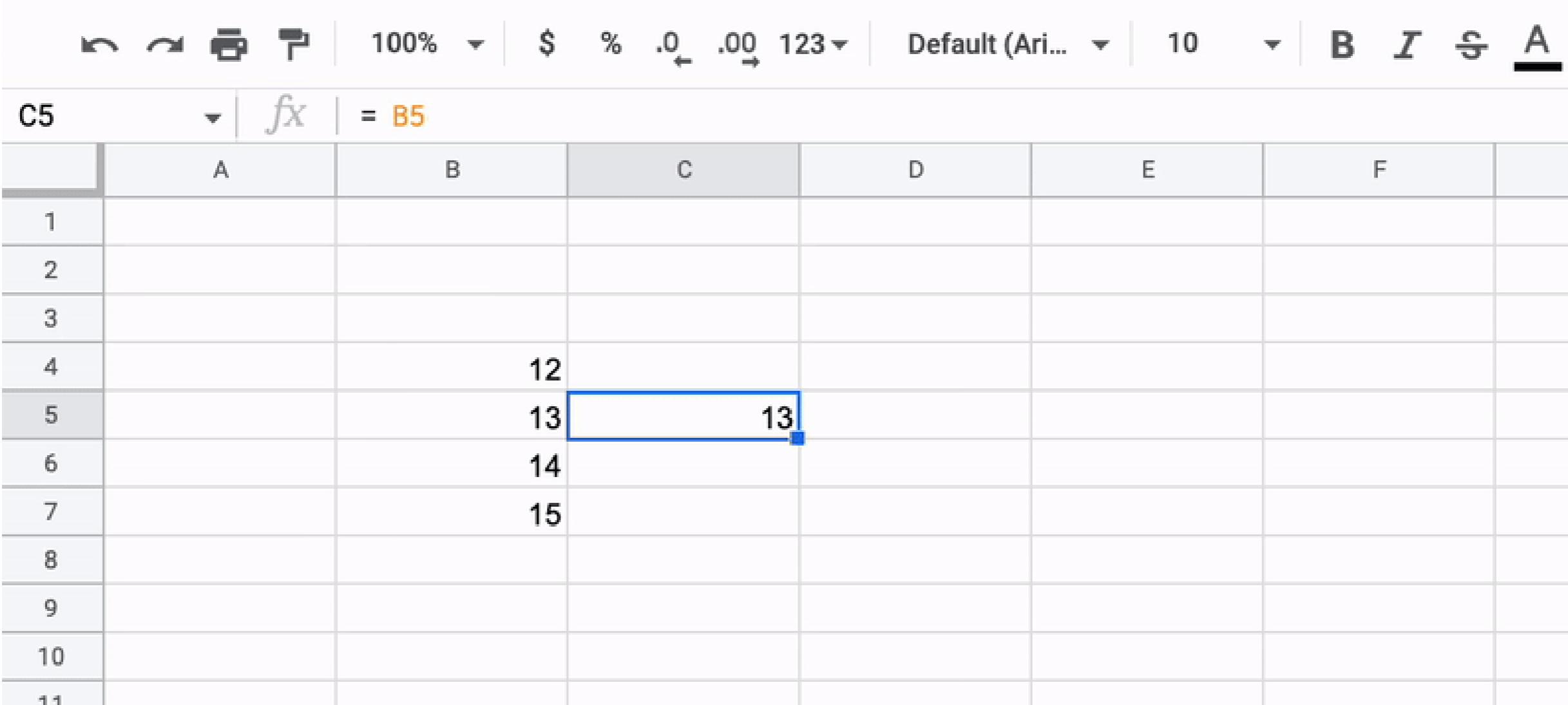


Copying references



Copying references - vertically

- Copying a cell reference vertically will shift the reference up or down
- Example: Copy cell reference **B5** from **C5** to **C4**



C5						
	A	B	C	D	E	F
1						
2						
3						
4			12			
5			13	13		
6			14			
7			15			
8						
9						
10						
11						

Copying references - horizontally

- Copying a cell reference horizontally will shift the reference left or right
- Example: Copy cell reference **B5** from **C5** to **D5**

C5						
	A	B	C	D	E	F
1						
2						
3						
4			12			
5			13	13		
6				14		
7				15		
8						
9						
10						
11						

Let's practice!

INTRODUCTION TO SPREADSHEETS

Calculations with cell references

INTRODUCTION TO SPREADSHEETS



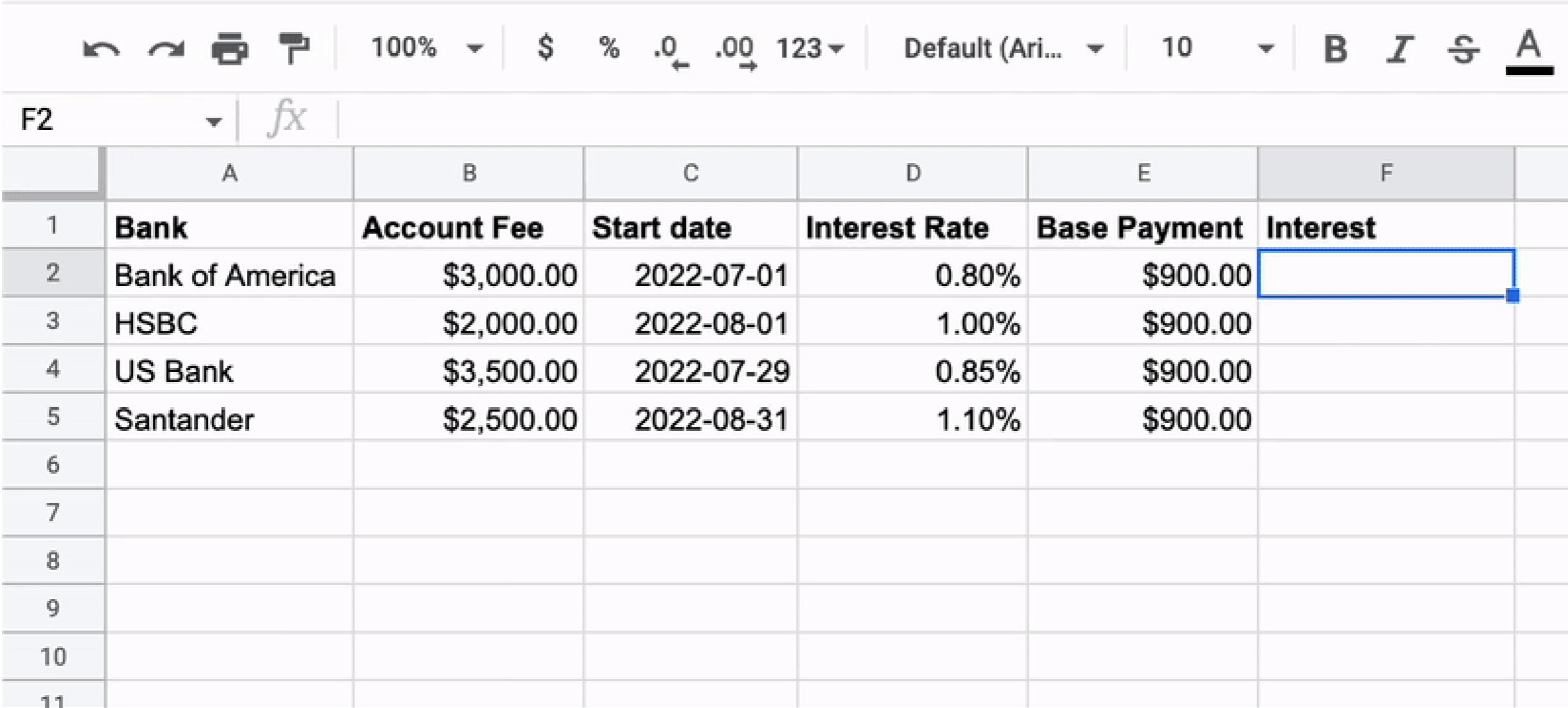
James Chapman

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Recap: arithmetic in spreadsheets

- Spreadsheets supports common arithmetic operations:
 - Addition: `+`
 - Subtraction: `-`
 - Multiplication: `*`
 - Division: `/`
 - Exponentiation: `^`
 - Specify order of operations: `()`

Recap: arithmetic in spreadsheets



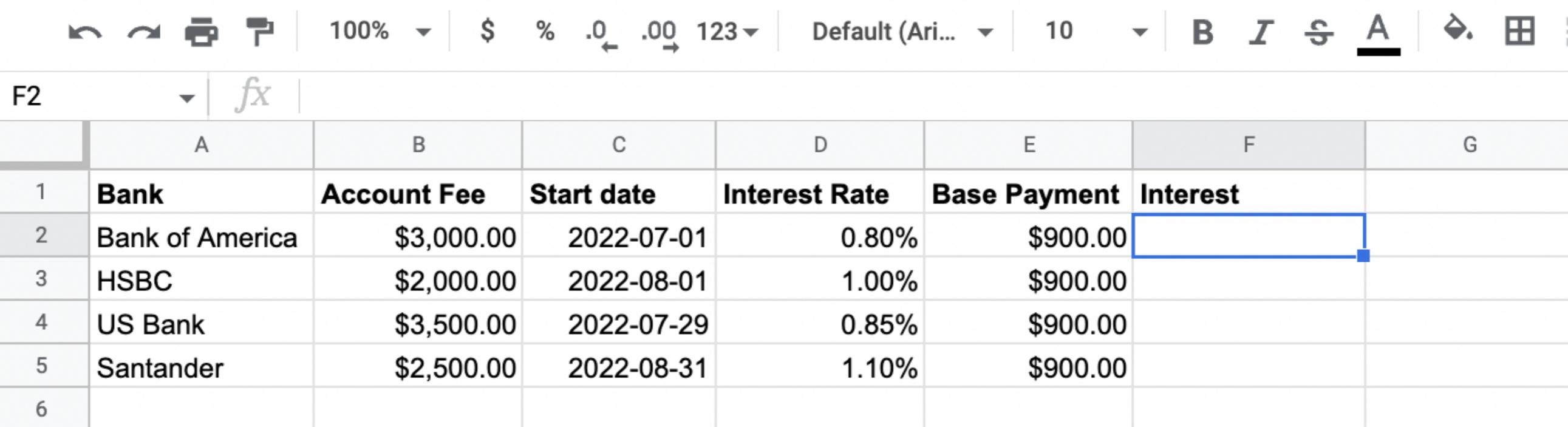
The screenshot shows a spreadsheet interface with a toolbar at the top and a table below. The table has columns labeled A through F. Row 1 contains the column headers: Bank, Account Fee, Start date, Interest Rate, Base Payment, and Interest. Rows 2 through 5 contain data for different banks: Bank of America, HSBC, US Bank, and Santander. The 'Interest' column for Bank of America is currently selected, indicated by a blue border around the cell.

	A	B	C	D	E	F
1	Bank	Account Fee	Start date	Interest Rate	Base Payment	Interest
2	Bank of America	\$3,000.00	2022-07-01	0.80%	\$900.00	
3	HSBC	\$2,000.00	2022-08-01	1.00%	\$900.00	
4	US Bank	\$3,500.00	2022-07-29	0.85%	\$900.00	
5	Santander	\$2,500.00	2022-08-31	1.10%	\$900.00	
6						
7						
8						
9						
10						
11						

Recap: arithmetic in spreadsheets

- Slow process → won't scale for larger datasets
- Error-prone due to typos when copying values
- Each formula would have to be manually edited if values change

Performing arithmetic on cell references



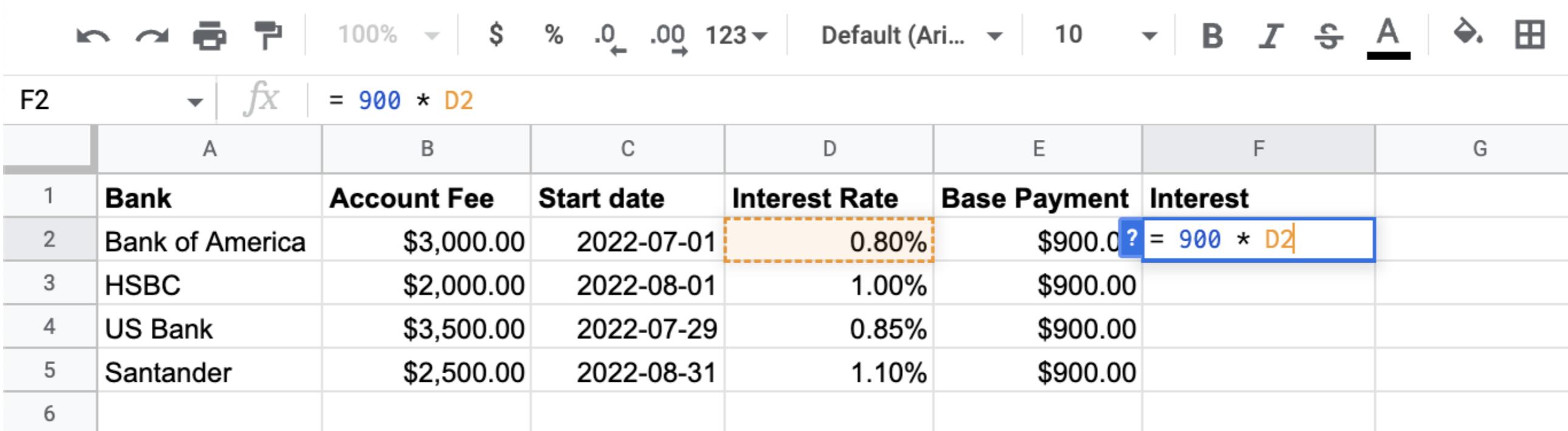
	A	B	C	D	E	F	G
1	Bank	Account Fee	Start date	Interest Rate	Base Payment	Interest	
2	Bank of America	\$3,000.00	2022-07-01	0.80%	\$900.00		
3	HSBC	\$2,000.00	2022-08-01	1.00%	\$900.00		
4	US Bank	\$3,500.00	2022-07-29	0.85%	\$900.00		
5	Santander	\$2,500.00	2022-08-31	1.10%	\$900.00		
6							

Performing arithmetic on cell references

The screenshot shows a spreadsheet interface with a toolbar at the top. The formula bar displays "F2" and "= 900 *". The main area contains a table with columns labeled A through G. The first row (header) includes column labels: Bank, Account Fee, Start date, Interest Rate, Base Payment, and Interest. The second row (data) shows "Bank of America" with an account fee of \$3,000.00, starting on 2022-07-01, an interest rate of 0.80%, and a base payment of \$900.00. The formula = 900 * is entered into the "Interest" column for this row, with the cell F2 highlighted.

	A	B	C	D	E	F	G
1	Bank	Account Fee	Start date	Interest Rate	Base Payment	Interest	
2	Bank of America	\$3,000.00	2022-07-01	0.80%	\$900.00	= 900 *	
3	HSBC	\$2,000.00	2022-08-01	1.00%	\$900.00		
4	US Bank	\$3,500.00	2022-07-29	0.85%	\$900.00		
5	Santander	\$2,500.00	2022-08-31	1.10%	\$900.00		
6							

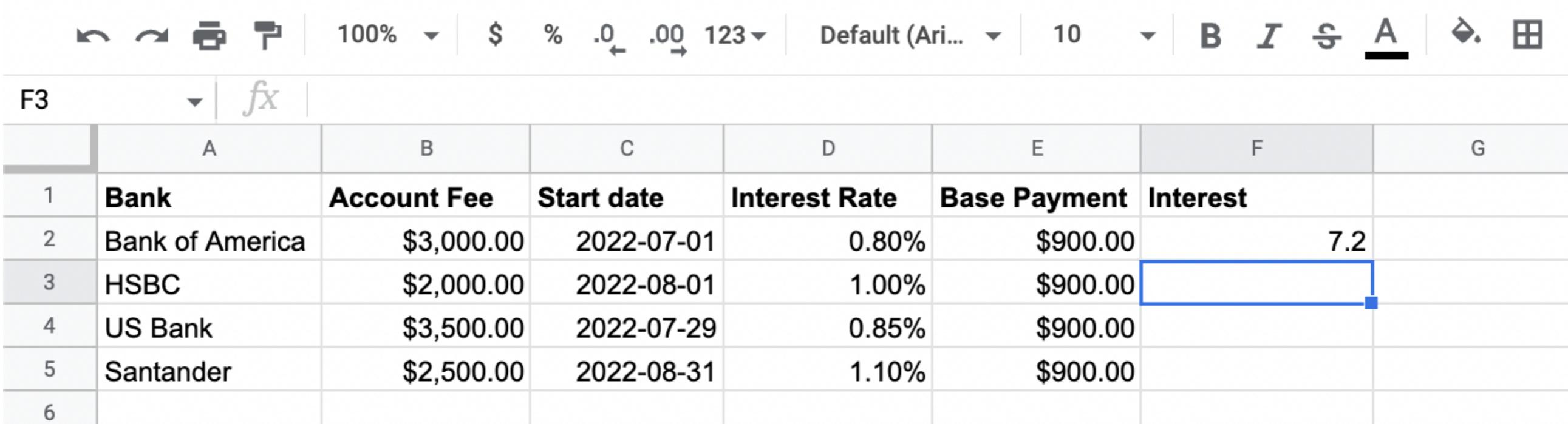
Performing arithmetic on cell references



The screenshot shows a spreadsheet interface with a toolbar at the top. The formula bar indicates the current cell is F2, and the formula $= 900 * D2$ is entered. The main area displays a table with columns: Bank, Account Fee, Start date, Interest Rate, Base Payment, and Interest. The Interest Rate column (D) has a header 'Interest Rate' and contains values like 0.80%, 1.00%, etc. The formula $= 900 * D2$ is visible in the Interest cell of the second row. A dashed orange box highlights the value 0.80% in cell D2.

	A	B	C	D	E	F	G
1	Bank	Account Fee	Start date	Interest Rate	Base Payment	Interest	
2	Bank of America	\$3,000.00	2022-07-01	0.80%	\$900.00	= 900 * D2	
3	HSBC	\$2,000.00	2022-08-01	1.00%	\$900.00		
4	US Bank	\$3,500.00	2022-07-29	0.85%	\$900.00		
5	Santander	\$2,500.00	2022-08-31	1.10%	\$900.00		
6							

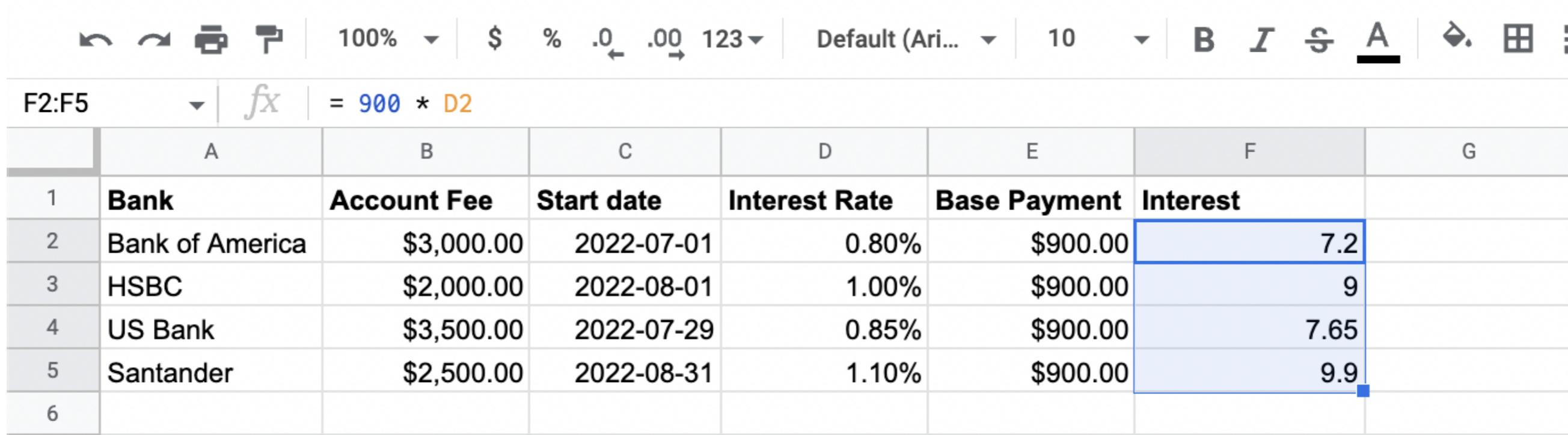
Performing arithmetic on cell references



A screenshot of a spreadsheet application interface. The top menu bar includes icons for back, forward, print, and search, followed by zoom levels (100%, \$, %, .0, .00, 123), a formula dropdown (Default (Ari...)), and a font dropdown (10, B, I, S, A). The formula bar shows 'F3' and '=B3*E3'. The main area displays a table with the following data:

	A	B	C	D	E	F	G
1	Bank	Account Fee	Start date	Interest Rate	Base Payment	Interest	
2	Bank of America	\$3,000.00	2022-07-01	0.80%	\$900.00	7.2	
3	HSBC	\$2,000.00	2022-08-01	1.00%	\$900.00		
4	US Bank	\$3,500.00	2022-07-29	0.85%	\$900.00		
5	Santander	\$2,500.00	2022-08-31	1.10%	\$900.00		
6							

Performing arithmetic on cell references



The screenshot shows a spreadsheet interface with a toolbar at the top. The formula bar displays "F2:F5" and the formula "= 900 * D2". The main area contains a table with columns labeled A through G. The columns are titled: Bank, Account Fee, Start date, Interest Rate, Base Payment, and Interest. The data rows show information for five banks: Bank of America, HSBC, US Bank, and Santander. The "Interest" column for each row contains a value: 7.2, 9, 7.65, and 9.9 respectively. The cell F2 is selected.

	A	B	C	D	E	F	G
1	Bank	Account Fee	Start date	Interest Rate	Base Payment	Interest	
2	Bank of America	\$3,000.00	2022-07-01	0.80%	\$900.00	7.2	
3	HSBC	\$2,000.00	2022-08-01	1.00%	\$900.00	9	
4	US Bank	\$3,500.00	2022-07-29	0.85%	\$900.00	7.65	
5	Santander	\$2,500.00	2022-08-31	1.10%	\$900.00	9.9	
6							

Performing arithmetic on cell references

The screenshot shows a spreadsheet interface with a formula bar at the top. The formula bar displays the cell reference F2 and the formula = 900 * D2, where the multiplication part is highlighted with a red rounded rectangle. Below the formula bar is a table with data. The table has columns labeled A through G. The first row contains column headers: Bank, Account Fee, Start date, Interest Rate, Base Payment, and Interest. The second row contains data for Bank of America: \$3,000.00, 2022-07-01, 0.80%, \$900.00, and 7.2. The third row contains data for HSBC: \$2,000.00, 2022-08-01, 1.00%, \$900.00, and 9. The fourth row contains data for US Bank: \$3,500.00, 2022-07-29, 0.85%, \$900.00, and 7.65. The fifth row contains data for Santander: \$2,500.00, 2022-08-31, 1.10%, \$900.00, and 9.9. The sixth row is empty.

	Bank	Account Fee	Start date	Interest Rate	Base Payment	Interest
2	Bank of America	\$3,000.00	2022-07-01	0.80%	\$900.00	7.2
3	HSBC	\$2,000.00	2022-08-01	1.00%	\$900.00	9
4	US Bank	\$3,500.00	2022-07-29	0.85%	\$900.00	7.65
5	Santander	\$2,500.00	2022-08-31	1.10%	\$900.00	9.9
6						

Performing arithmetic on cell references

The screenshot shows a spreadsheet interface with a formula bar at the top. The formula bar displays the cell reference F3 and the formula = 900 * D3, which is highlighted with a red rounded rectangle. Below the formula bar is a toolbar with various icons. The main area contains a table with data. The table has columns labeled A through G and rows numbered 1 through 6. The columns are labeled: Bank, Account Fee, Start date, Interest Rate, Base Payment, and Interest. The data rows are as follows:

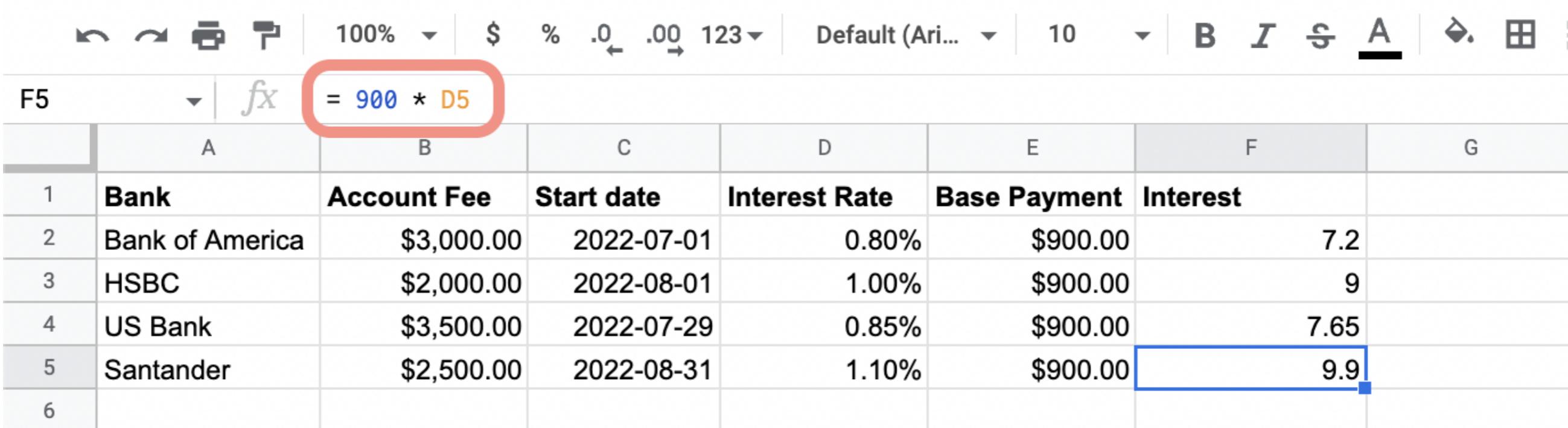
	Bank	Account Fee	Start date	Interest Rate	Base Payment	Interest
1	Bank of America	\$3,000.00	2022-07-01	0.80%	\$900.00	7.2
2	HSBC	\$2,000.00	2022-08-01	1.00%	\$900.00	9
3	US Bank	\$3,500.00	2022-07-29	0.85%	\$900.00	7.65
4	Santander	\$2,500.00	2022-08-31	1.10%	\$900.00	9.9
5						
6						

Performing arithmetic on cell references

The screenshot shows a spreadsheet interface with a formula bar at the top. The formula bar displays the formula `= 900 * D4`, which is highlighted with a red rounded rectangle. The rest of the formula bar contains standard input fields and buttons. Below the formula bar is a table with data. The table has columns labeled A through G and rows numbered 1 through 6. The data includes bank names, account fees, start dates, interest rates, base payments, and calculated interests.

	Bank	Account Fee	Start date	Interest Rate	Base Payment	Interest
1	Bank of America	\$3,000.00	2022-07-01	0.80%	\$900.00	7.2
2	HSBC	\$2,000.00	2022-08-01	1.00%	\$900.00	9
3	US Bank	\$3,500.00	2022-07-29	0.85%	\$900.00	7.65
4	Santander	\$2,500.00	2022-08-31	1.10%	\$900.00	9.9
5						
6						

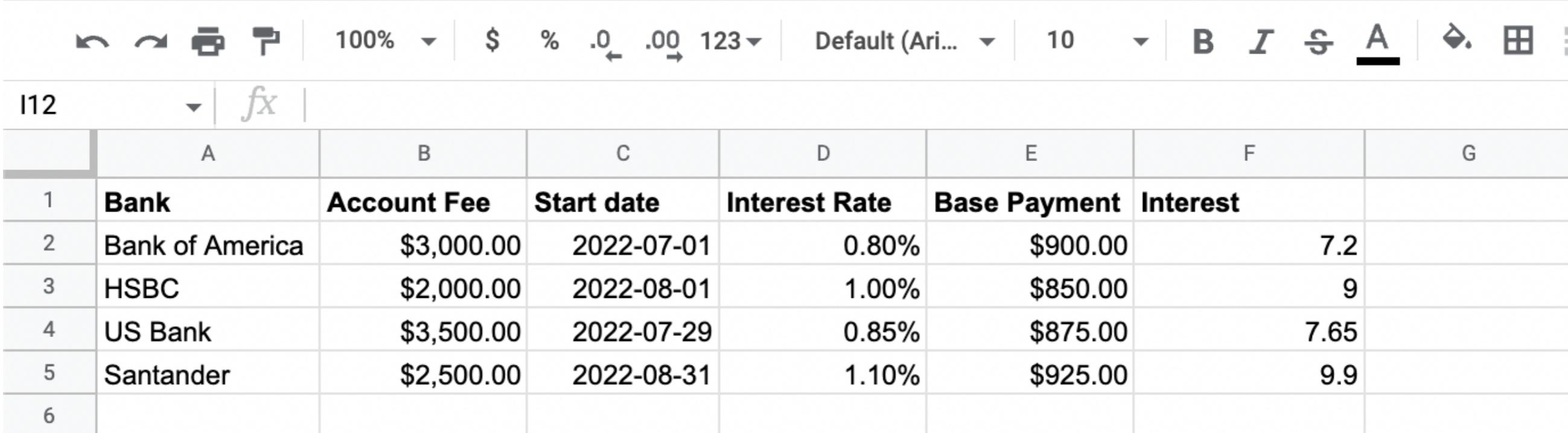
Performing arithmetic on cell references



The screenshot shows a spreadsheet interface with a formula bar at the top. The formula bar displays the formula `= 900 * D5`, which is highlighted with a red box. The cell reference `D5` is highlighted in orange. Below the formula bar is a table with columns labeled A through G. The first row contains column headers: Bank, Account Fee, Start date, Interest Rate, Base Payment, and Interest. The second row contains data for Bank of America: \$3,000.00, 2022-07-01, 0.80%, \$900.00, and 7.2. The third row contains data for HSBC: \$2,000.00, 2022-08-01, 1.00%, \$900.00, and 9. The fourth row contains data for US Bank: \$3,500.00, 2022-07-29, 0.85%, \$900.00, and 7.65. The fifth row contains data for Santander: \$2,500.00, 2022-08-31, 1.10%, \$900.00, and 9.9. The sixth row is empty. The cell `F5` is selected and contains the value 9.9, which is highlighted with a blue box.

	A	B	C	D	E	F	G
1	Bank	Account Fee	Start date	Interest Rate	Base Payment	Interest	
2	Bank of America	\$3,000.00	2022-07-01	0.80%	\$900.00	7.2	
3	HSBC	\$2,000.00	2022-08-01	1.00%	\$900.00	9	
4	US Bank	\$3,500.00	2022-07-29	0.85%	\$900.00	7.65	
5	Santander	\$2,500.00	2022-08-31	1.10%	\$900.00	9.9	
6							

Combining references in calculations



The screenshot shows a spreadsheet interface with a toolbar at the top and a table below. The table has columns labeled A through G and rows numbered 1 through 6. The columns represent different financial metrics for various banks.

	A	B	C	D	E	F	G
1	Bank	Account Fee	Start date	Interest Rate	Base Payment	Interest	
2	Bank of America	\$3,000.00	2022-07-01	0.80%	\$900.00	7.2	
3	HSBC	\$2,000.00	2022-08-01	1.00%	\$850.00	9	
4	US Bank	\$3,500.00	2022-07-29	0.85%	\$875.00	7.65	
5	Santander	\$2,500.00	2022-08-31	1.10%	\$925.00	9.9	
6							

Combining references in calculations

The screenshot shows a spreadsheet interface with the following elements:

- Formula Bar:** Displays the cell reference "F2" and the formula "= 900 * D2".
- Toolbar:** Includes icons for back, forward, print, and search, along with zoom controls (100%, \$, %, .0, .00, 123), a currency symbol, and a dropdown for "Default (Ari...)".
- Table:** A data table with columns labeled A through G. The columns contain the following data:

	A	B	C	D	E	F	G
1	Bank	Account Fee	Start date	Interest Rate	Base Payment	Interest	
2	Bank of America	\$3,000.00	2022-07-01	0.80%	\$900.00	7.2	
3	HSBC	\$2,000.00	2022-08-01	1.00%	\$850.00	9	
4	US Bank	\$3,500.00	2022-07-29	0.85%	\$875.00	7.65	
5	Santander	\$2,500.00	2022-08-31	1.10%	\$925.00	9.9	
6							

Combining references in calculations

The screenshot shows a spreadsheet interface with a toolbar at the top. The active cell is F2, which contains the formula `= E2 * D2`. The formula bar also displays this formula. The table below has columns labeled A through G. The first row contains column headers: Bank, Account Fee, Start date, Interest Rate, Base Payment, and Interest. The second row contains data for Bank of America: \$3,000.00, 2022-07-01, 0.80%, \$900.00, and the formula `= E2 * D2` in the Interest column. Subsequent rows show data for HSBC, US Bank, and Santander.

	A	B	C	D	E	F	G
1	Bank	Account Fee	Start date	Interest Rate	Base Payment	Interest	
2	Bank of America	\$3,000.00	2022-07-01	0.80%	\$900.00	= E2 * D2	
3	HSBC	\$2,000.00	2022-08-01	1.00%	\$850.00	9	
4	US Bank	\$3,500.00	2022-07-29	0.85%	\$875.00	7.65	
5	Santander	\$2,500.00	2022-08-31	1.10%	\$925.00	9.9	
6							

Combining references in calculations

The screenshot shows a spreadsheet interface with a formula bar at the top containing the formula `= E2 * D2`. The table below has columns labeled A through G. The first row contains column headers: Bank, Account Fee, Start date, Interest Rate, Base Payment, and Interest. The second row contains data for Bank of America: \$3,000.00, 2022-07-01, 0.80%, \$900.00, and \$7.20. The third row contains data for HSBC: \$2,000.00, 2022-08-01, 1.00%, \$850.00, and 9. The fourth row contains data for US Bank: \$3,500.00, 2022-07-29, 0.85%, \$875.00, and 7.65. The fifth row contains data for Santander: \$2,500.00, 2022-08-31, 1.10%, \$925.00, and 9.9. Row 6 is empty.

	A	B	C	D	E	F	G
1	Bank	Account Fee	Start date	Interest Rate	Base Payment	Interest	
2	Bank of America	\$3,000.00	2022-07-01	0.80%	\$900.00	\$7.20	
3	HSBC	\$2,000.00	2022-08-01	1.00%	\$850.00	9	
4	US Bank	\$3,500.00	2022-07-29	0.85%	\$875.00	7.65	
5	Santander	\$2,500.00	2022-08-31	1.10%	\$925.00	9.9	
6							

Combining references in calculations

The screenshot shows a spreadsheet interface with a toolbar at the top. The formula bar displays "F2:F5" and the formula $= E2 * D2$. The main area contains a table with columns labeled A through G. The columns are titled: Bank, Account Fee, Start date, Interest Rate, Base Payment, and Interest. The table has 6 rows, numbered 1 to 6. Rows 2 through 5 contain data, while row 6 is empty. Row 1 is the header. The "Interest" column values are highlighted with a blue border.

	A	B	C	D	E	F	G
1	Bank	Account Fee	Start date	Interest Rate	Base Payment	Interest	
2	Bank of America	\$3,000.00	2022-07-01	0.80%	\$900.00	\$7.20	
3	HSBC	\$2,000.00	2022-08-01	1.00%	\$850.00	\$8.50	
4	US Bank	\$3,500.00	2022-07-29	0.85%	\$875.00	\$7.44	
5	Santander	\$2,500.00	2022-08-31	1.10%	\$925.00	\$10.18	
6							

Combining references in calculations

The screenshot shows a spreadsheet interface with a toolbar at the top containing icons for file, undo, redo, print, and zoom, followed by numerical and text input fields. The main area displays a table with data rows numbered 1 through 11. The columns are labeled A through F. Column A contains row numbers. Columns B through F contain data: Bank, Account Fee, Start date, Interest Rate, Base Payment, and Interest respectively. The 'Interest Rate' column (D) has its header 'Interest Rate' bolded. The value '0.80%' in row 2 is highlighted with a blue selection bar. The 'Base Payment' column (E) has its header bolded. The 'Interest' column (F) has its header bolded.

	A	B	C	D	E	F
1	Bank	Account Fee	Start date	Interest Rate	Base Payment	Interest
2	Bank of America	\$3,000.00	2022-07-01	0.80%	\$900.00	\$7.20
3	HSBC	\$2,000.00	2022-08-01	1.00%	\$850.00	\$8.50
4	US Bank	\$3,500.00	2022-07-29	0.85%	\$875.00	\$7.44
5	Santander	\$2,500.00	2022-08-31	1.10%	\$925.00	\$10.18
6						
7						
8						
9						
10						
11						

Comparing references

- Comparison operators:
 - Equal to: `=`
 - Not equal to: `<>`
 - Greater than: `>`
 - Less than: `<`
 - Greater than or equal to: `>=`
 - Less than or equal to: `<=`
- Return `TRUE` or `FALSE` values

Comparing references

The screenshot shows a spreadsheet interface with a toolbar at the top and a table below. The table has columns labeled A through G. Column A is 'Bank', B is 'Account Fee', C is 'Start date', D is 'Interest Rate', E is 'Base Payment', and F is 'Interest > \$8'. Row 2 contains data for Bank of America: Account Fee is \$3,000.00, Start date is 2022-07-01, Interest Rate is 0.80%, and Base Payment is \$900.00. Row 3 contains data for HSBC: Account Fee is \$2,000.00, Start date is 2022-08-01, Interest Rate is 1.00%, and Base Payment is \$850.00. Row 4 contains data for US Bank: Account Fee is \$3,500.00, Start date is 2022-07-29, Interest Rate is 0.85%, and Base Payment is \$875.00. Row 5 contains data for Santander: Account Fee is \$2,500.00, Start date is 2022-08-31, Interest Rate is 1.10%, and Base Payment is \$925.00. Row 6 is empty. The cell F2 is selected. The formula bar shows 'F2' and 'fx'. The toolbar includes icons for back, forward, print, and search, along with zoom, currency, and number format buttons.

	A	B	C	D	E	F	G
1	Bank	Account Fee	Start date	Interest Rate	Base Payment	Interest > \$8	
2	Bank of America	\$3,000.00	2022-07-01	0.80%	\$900.00		
3	HSBC	\$2,000.00	2022-08-01	1.00%	\$850.00		
4	US Bank	\$3,500.00	2022-07-29	0.85%	\$875.00		
5	Santander	\$2,500.00	2022-08-31	1.10%	\$925.00		
6							

Comparing references

The screenshot shows a spreadsheet interface with a toolbar at the top. The formula bar displays "F2" and the formula $= E2 * D2$. The main area contains a table with columns labeled A through G. Row 1 defines the columns: Bank, Account Fee, Start date, Interest Rate, Base Payment, and Interest > \$8. Rows 2 through 6 list data for different banks: Bank of America, HSBC, US Bank, and Santander. The "Interest > \$8" column in row 2 is highlighted with a blue border, and the formula $= E2 * D2$ is displayed in the formula bar above it.

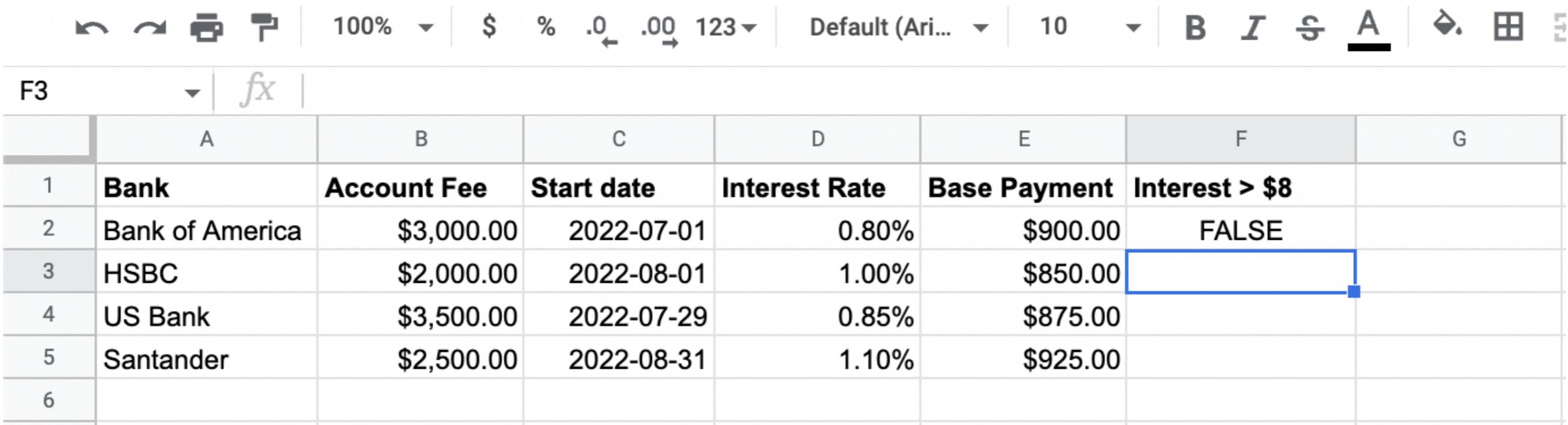
	A	B	C	D	E	F	G
1	Bank	Account Fee	Start date	Interest Rate	Base Payment	Interest > \$8	
2	Bank of America	\$3,000.00	2022-07-01	0.80%	\$900.0?	= E2 * D2	
3	HSBC	\$2,000.00	2022-08-01	1.00%	\$850.00		
4	US Bank	\$3,500.00	2022-07-29	0.85%	\$875.00		
5	Santander	\$2,500.00	2022-08-31	1.10%	\$925.00		
6							

Comparing references

F2 $= \text{E2} * \text{D2} > 8$

	A	B	C	D	E	F	G
1	Bank	Account Fee	Start date	Interest Rate	Base Payment	Interest > \$8	
2	Bank of America	\$3,000.00	2022-07-01	0.80%	\$900.0?	= E2 * D2 > 8	
3	HSBC	\$2,000.00	2022-08-01	1.00%	\$850.00		
4	US Bank	\$3,500.00	2022-07-29	0.85%	\$875.00		
5	Santander	\$2,500.00	2022-08-31	1.10%	\$925.00		
6							

Comparing references



The screenshot shows a spreadsheet interface with a toolbar at the top and a table below. The table has columns labeled A through G. Column A contains row numbers 1 through 6. Columns B through E contain numerical and date data. Column F contains formulas, and column G contains the results of those formulas. Row 2 shows a value of FALSE in column F. Row 3 shows an empty cell in column F, indicated by a blue selection border.

F3	A	B	C	D	E	F	G
1	Bank	Account Fee	Start date	Interest Rate	Base Payment	Interest > \$8	
2	Bank of America	\$3,000.00	2022-07-01	0.80%	\$900.00	FALSE	
3	HSBC	\$2,000.00	2022-08-01	1.00%	\$850.00		
4	US Bank	\$3,500.00	2022-07-29	0.85%	\$875.00		
5	Santander	\$2,500.00	2022-08-31	1.10%	\$925.00		
6							

Comparing references

A screenshot of a spreadsheet application interface. The top bar includes standard icons for file, print, and zoom (100%), along with currency (\$), percentage (%), and decimal (.00) buttons. The formula bar shows the range F2:F5 and the formula = E2 * D2 > 8. The main table has columns labeled A through G. Column A is a row index from 1 to 6. Column B is labeled "Bank". Column C is labeled "Account Fee". Column D is labeled "Start date". Column E is labeled "Interest Rate". Column F is labeled "Base Payment". Column G is labeled "Interest > \$8". The data rows are:

	Bank	Account Fee	Start date	Interest Rate	Base Payment	Interest > \$8
1	Bank	Account Fee	Start date	Interest Rate	Base Payment	Interest > \$8
2	Bank of America	\$3,000.00	2022-07-01	0.80%	\$900.00	FALSE
3	HSBC	\$2,000.00	2022-08-01	1.00%	\$850.00	TRUE
4	US Bank	\$3,500.00	2022-07-29	0.85%	\$875.00	FALSE
5	Santander	\$2,500.00	2022-08-31	1.10%	\$925.00	TRUE
6						

Let's practice!

INTRODUCTION TO SPREADSHEETS

Absolute references

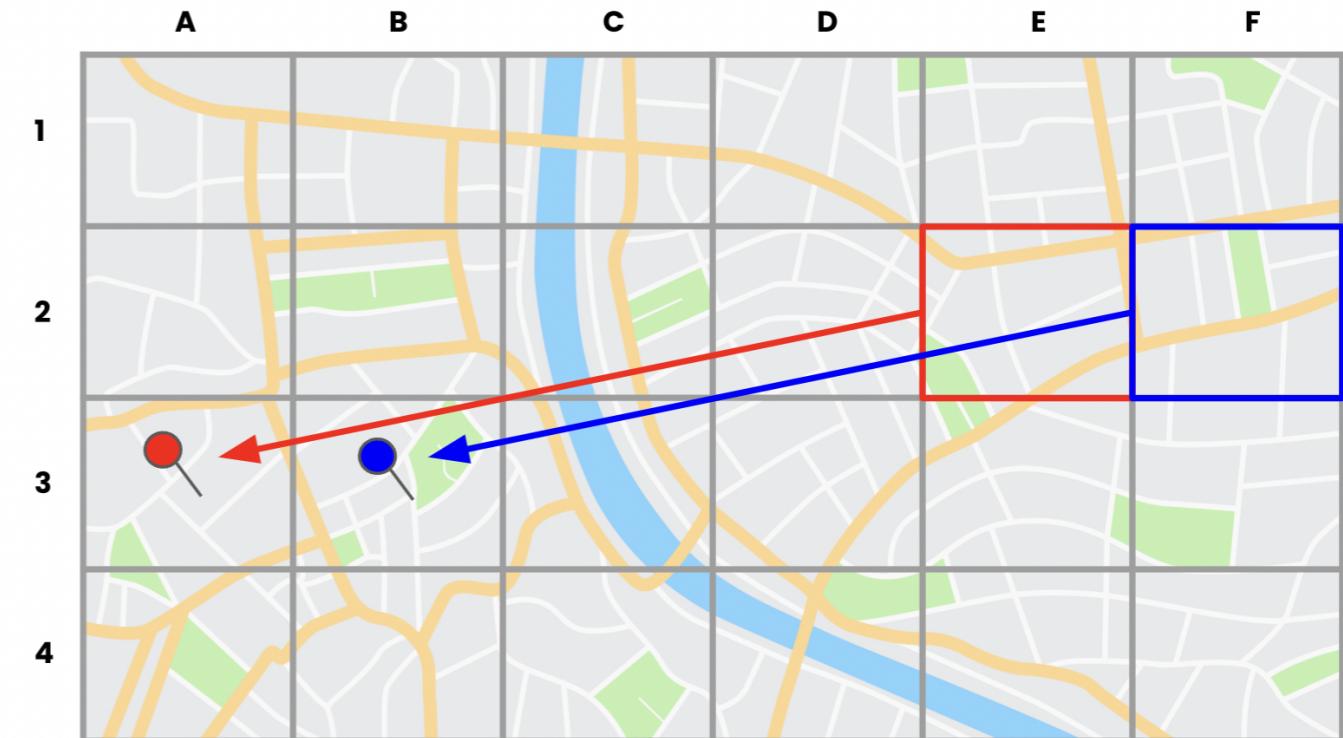
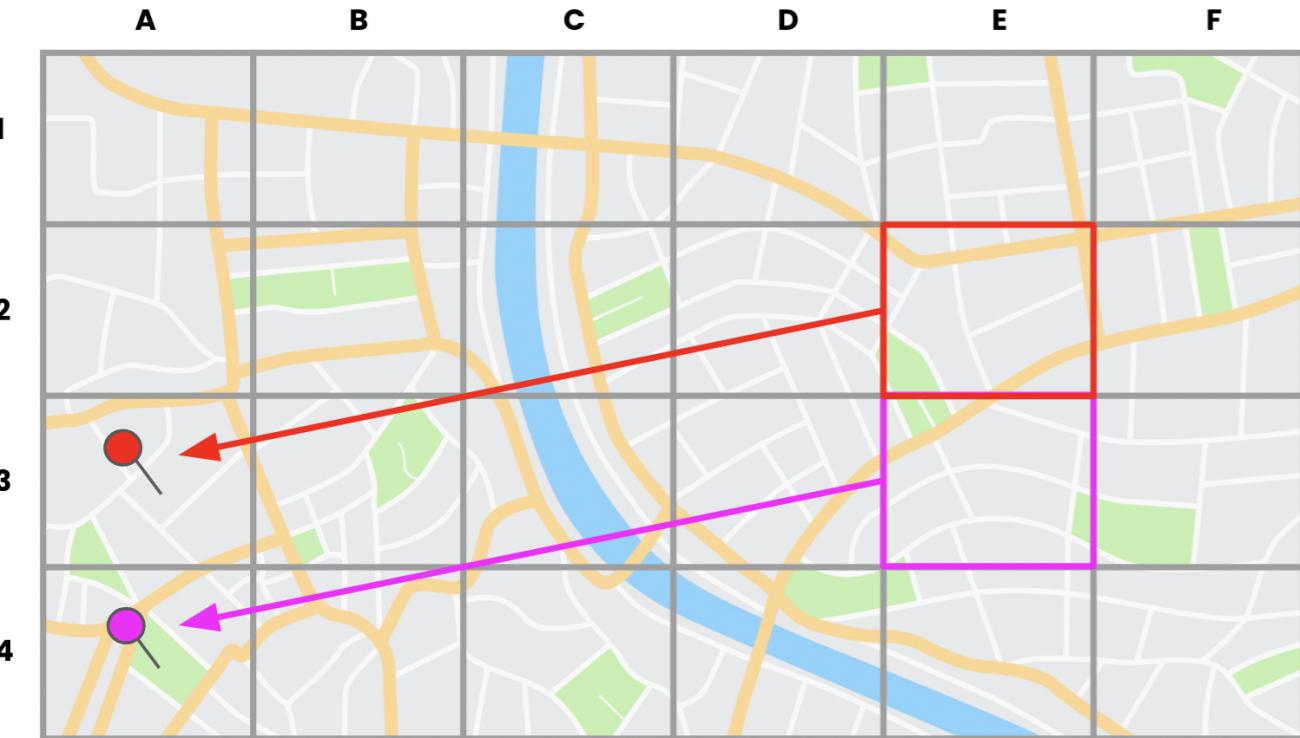
INTRODUCTION TO SPREADSHEETS



James Chapman

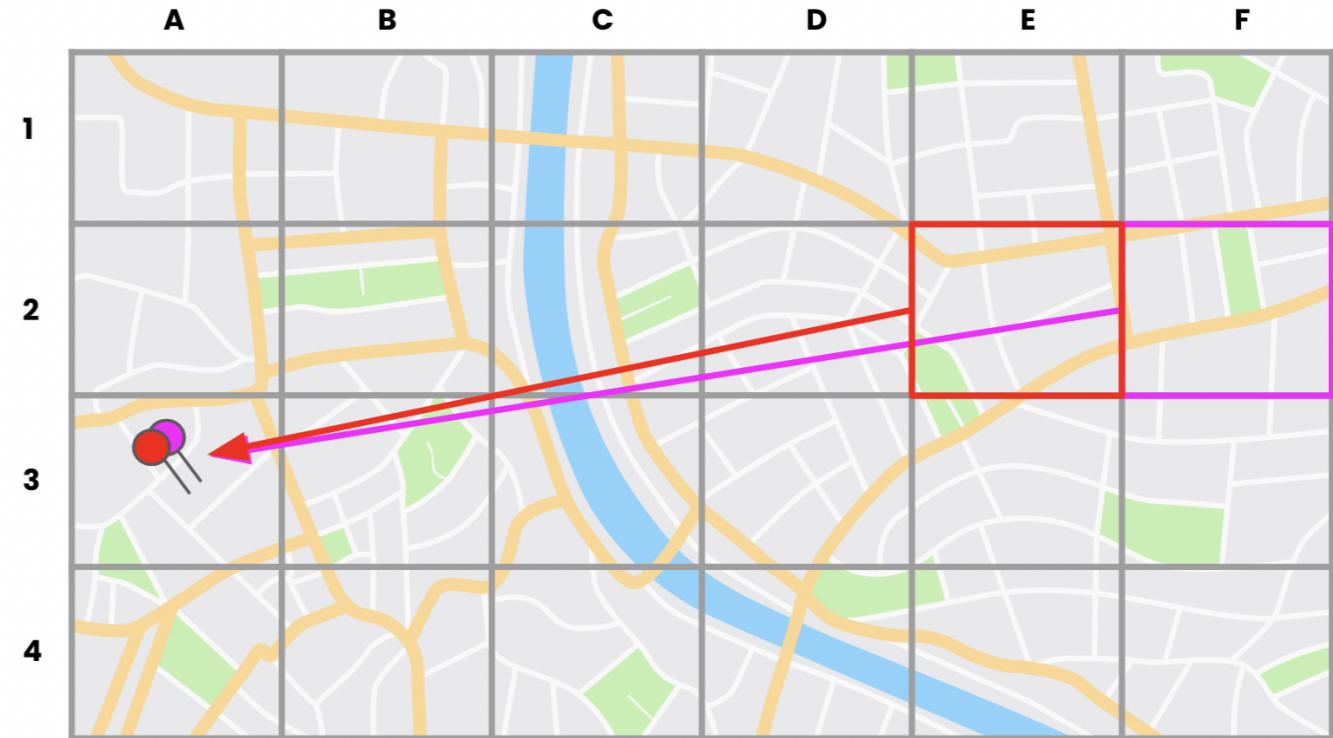
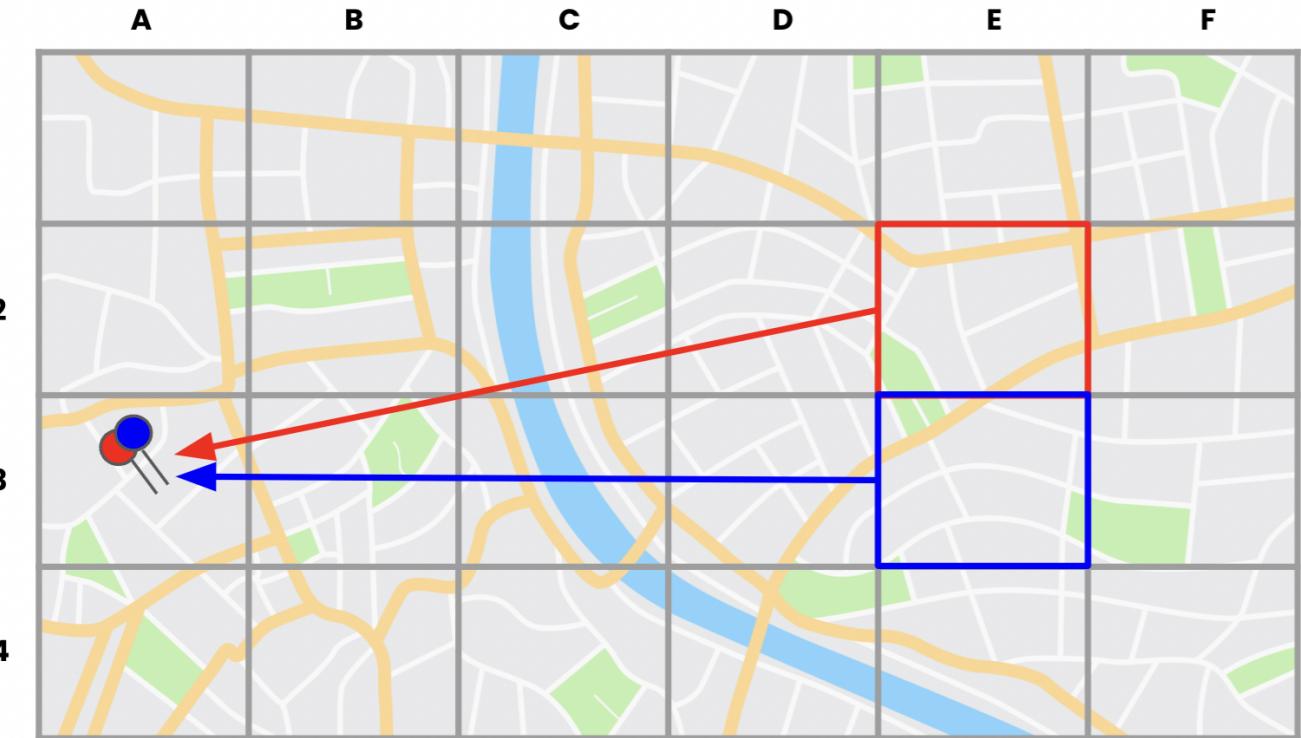
Curriculum Manager, DataCamp

Relative references



- **Relative references** change when copied

Absolute references



- **Absolute references** don't change when copied
- Will update if the referenced cell is changed

Absolute references: fixing columns and rows

The screenshot shows a spreadsheet interface with a toolbar at the top containing icons for file, print, and zoom, followed by numerical and text input fields. The main area displays a table with the following data:

	A	B	C	D	E	F	G
1	Bank	Account Fee	Start date	Fixed Period	Base Payment	Interest	
2	Bank of America	\$3,000.00	2022-07-01	5	\$900.00		
3	HSBC	\$2,000.00	2022-08-01	7	\$850.00		
4	US Bank	\$3,500.00	2022-07-29	5	\$875.00		
5	Santander	\$2,500.00	2022-08-31	5	\$925.00		
6							
7	Interest Rate	1.20%					
8							

Absolute references: fixing columns and rows

The screenshot shows a spreadsheet interface with a toolbar at the top. The formula bar displays "F2" and the formula "= E2 *". The main area contains a table with the following data:

	A	B	C	D	E	F	G
1	Bank	Account Fee	Start date	Fixed Period	Base Payment	Interest	
2	Bank of America	\$3,000.00	2022-07-01	5	\$900.0?	= E2 *	
3	HSBC	\$2,000.00	2022-08-01	7	\$850.00		
4	US Bank	\$3,500.00	2022-07-29	5	\$875.00		
5	Santander	\$2,500.00	2022-08-31	5	\$925.00		
6							
7	Interest Rate	1.20%					
8							

Absolute references: fixing columns and rows

The screenshot shows a spreadsheet interface with a toolbar at the top. The formula bar indicates the current cell is F2, and the formula = E2 * \$B\$7 is entered. The main area displays a table with data and formulas.

	A	B	C	D	E	F	G
1	Bank	Account Fee	Start date	Fixed Period	Base Payment	Interest	
2	Bank of America	\$3,000.00	2022-07-01	5	\$900.0?	= E2 * \$B\$7	
3	HSBC	\$2,000.00	2022-08-01	7	\$850.00		
4	US Bank	\$3,500.00	2022-07-29	5	\$875.00		
5	Santander	\$2,500.00	2022-08-31	5	\$925.00		
6							
7	Interest Rate	1.20%					
8							

Absolute references: fixing columns and rows

The screenshot shows a spreadsheet interface with a toolbar at the top and a table below. The table has columns labeled A through G and rows numbered 1 through 8. Row 1 contains column headers: Bank, Account Fee, Start date, Fixed Period, Base Payment, and Interest. Rows 2 through 5 contain data for different banks: Bank of America, HSBC, US Bank, and Santander. Row 6 is empty. Row 7 contains the Interest Rate (1.20%). Row 8 is empty. The cell F3 is selected, indicated by a blue border. The formula bar above the table shows "F3". The toolbar includes icons for back, forward, print, and search, along with dropdown menus for zoom (100%), number format (\$, %, .0, .00, 123), font style (Default (Ari...)), font size (10), and bold (B). The table is set against a light gray background with white grid lines.

	A	B	C	D	E	F	G
1	Bank	Account Fee	Start date	Fixed Period	Base Payment	Interest	
2	Bank of America	\$3,000.00	2022-07-01	5	\$900.00	\$10.80	
3	HSBC	\$2,000.00	2022-08-01	7	\$850.00		
4	US Bank	\$3,500.00	2022-07-29	5	\$875.00		
5	Santander	\$2,500.00	2022-08-31	5	\$925.00		
6							
7	Interest Rate	1.20%					
8							

Absolute references: fixing columns and rows

The screenshot shows a spreadsheet interface with a toolbar at the top. The formula bar displays "F2:F5" and the formula $= E2 * \$B\7 . The main area contains a table with the following data:

	A	B	C	D	E	F	G
1	Bank	Account Fee	Start date	Fixed Period	Base Payment	Interest	
2	Bank of America	\$3,000.00	2022-07-01	5	\$900.00	\$10.80	
3	HSBC	\$2,000.00	2022-08-01	7	\$850.00	\$10.20	
4	US Bank	\$3,500.00	2022-07-29	5	\$875.00	\$10.50	
5	Santander	\$2,500.00	2022-08-31	5	\$925.00	\$11.10	
6							
7	Interest Rate	1.20%					
8							

Absolute references: fixing columns and rows

The screenshot shows a spreadsheet interface with a toolbar at the top and a table below. The formula bar displays the formula `= E3 * B7`, where `E3` is highlighted with a red oval and `B7` is highlighted with a blue rectangle. The table has columns labeled A through G and rows numbered 1 through 8. Column A contains row numbers. Columns B through D contain account details. Columns E and F contain calculated values. Column G is empty.

	A	B	C	D	E	F	G
1	Bank	Account Fee	Start date	Fixed Period	Base Payment	Interest	
2	Bank of America	\$3,000.00	2022-07-01	5	\$900.00	\$10.80	
3	HSBC	\$2,000.00	2022-08-01	7	\$850.00	\$10.20	
4	US Bank	\$3,500.00	2022-07-29	5	\$875.00	\$10.50	
5	Santander	\$2,500.00	2022-08-31	5	\$925.00	\$11.10	
6							
7	Interest Rate	1.20%					
8							

Absolute references: fixing columns and rows

The screenshot shows a spreadsheet interface with a toolbar at the top and a table below. The formula bar displays the formula `= E4 * B7`, where `E4` is highlighted with a red oval and `B7` is highlighted with a blue rectangle. The table has columns labeled A through G and rows numbered 1 through 8. Column A contains row numbers. Columns B through D contain account details. Columns E and F contain calculations. Column G is empty.

	A	B	C	D	E	F	G
1	Bank	Account Fee	Start date	Fixed Period	Base Payment	Interest	
2	Bank of America	\$3,000.00	2022-07-01	5	\$900.00	\$10.80	
3	HSBC	\$2,000.00	2022-08-01	7	\$850.00	\$10.20	
4	US Bank	\$3,500.00	2022-07-29	5	\$875.00	\$10.50	
5	Santander	\$2,500.00	2022-08-31	5	\$925.00	\$11.10	
6							
7	Interest Rate	1.20%					
8							

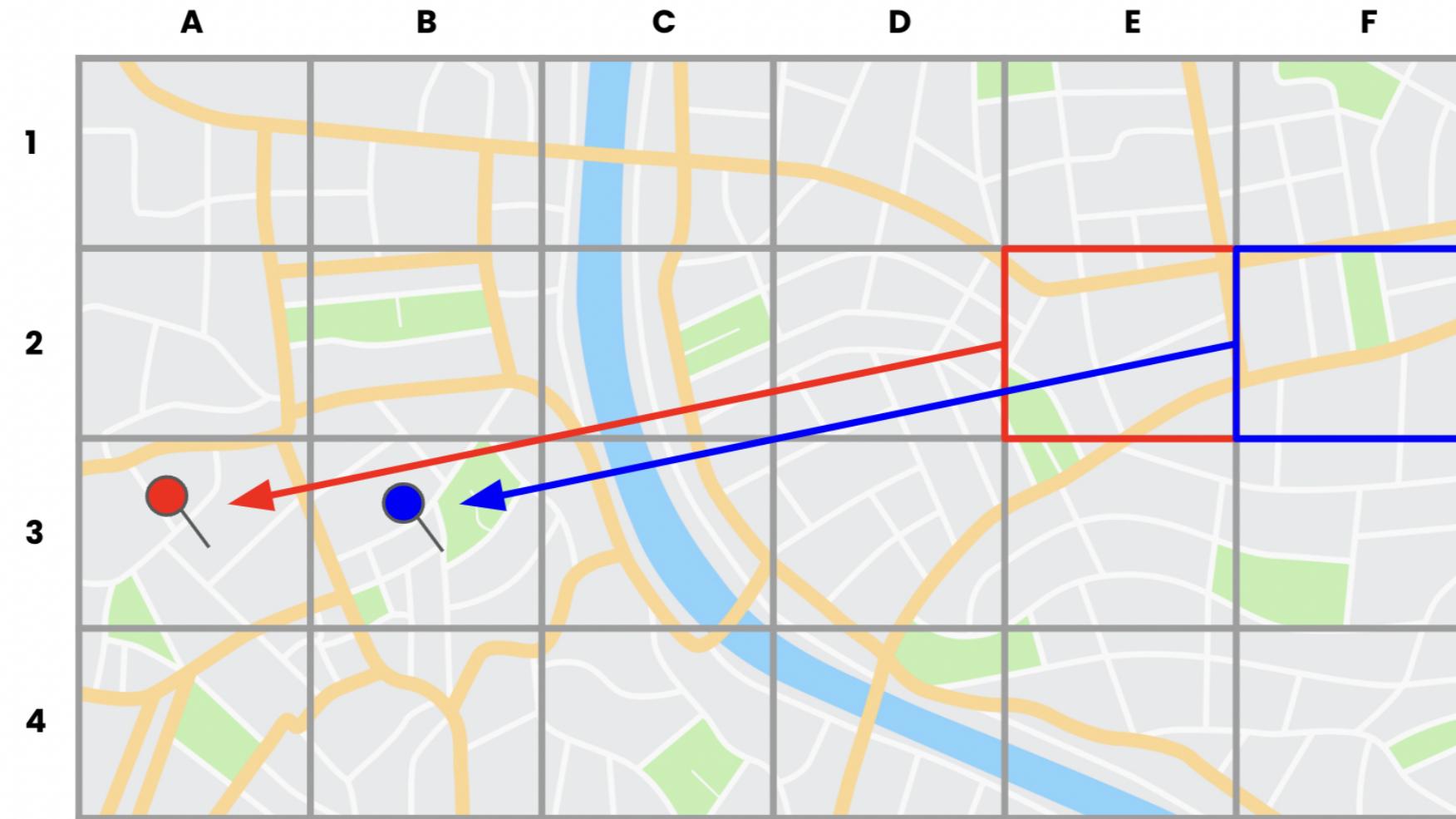
Absolute references: fixing columns and rows

The screenshot shows a spreadsheet interface with a toolbar at the top and a table below. The formula bar displays the formula `= E5 * B7`, where `E5` is highlighted with a red oval and `B7` is highlighted with a blue rectangle. The table has columns labeled A through G and rows numbered 1 through 8. Column A contains row numbers. Columns B through D contain data for five banks. Column E contains base payments. Column F contains interest amounts. Column G is empty. Row 7 contains the formula for calculating the interest in column F.

	A	B	C	D	E	F	G
1	Bank	Account Fee	Start date	Fixed Period	Base Payment	Interest	
2	Bank of America	\$3,000.00	2022-07-01	5	\$900.00	\$10.80	
3	HSBC	\$2,000.00	2022-08-01	7	\$850.00	\$10.20	
4	US Bank	\$3,500.00	2022-07-29	5	\$875.00	\$10.50	
5	Santander	\$2,500.00	2022-08-31	5	\$925.00	\$11.10	
6							
7	Interest Rate	1.20%					
8							

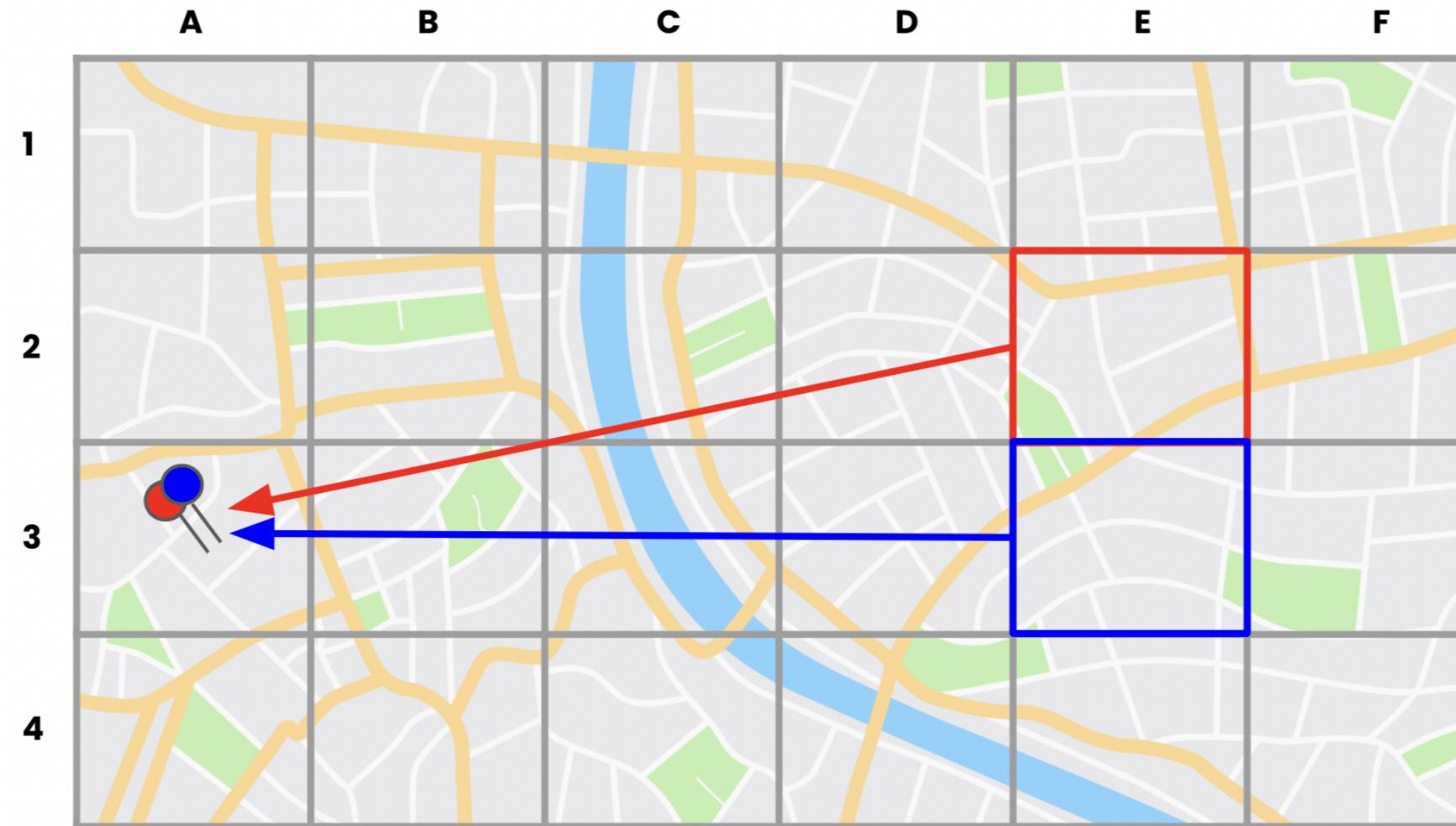
Absolute references: fixing rows

- **Partial absolute references** only change when copied in one direction



Absolute references: fixing rows

- **Partial absolute references** only changed when copied in one direction



Absolute references: fixing rows

The screenshot shows a spreadsheet interface with a toolbar at the top and a table below. The table has columns labeled A through H and rows numbered 1 through 8. Row 1 contains column headers: Bank, Account Fee, Start date, Fixed Period, Base Payment, Interest, and Tax. Rows 2 through 5 provide data for four different banks: Bank of America, HSBC, US Bank, and Santander. Row 6 is blank. Row 7 contains two values: Interest Rate (1.20%) and Tax Rate (12.00%). Row 8 is blank.

	A	B	C	D	E	F	G	H
1	Bank	Account Fee	Start date	Fixed Period	Base Payment	Interest	Tax	
2	Bank of America	\$3,000.00	2022-07-01	5	\$900.00	\$10.80		
3	HSBC	\$2,000.00	2022-08-01	7	\$850.00	\$10.20		
4	US Bank	\$3,500.00	2022-07-29	5	\$875.00	\$10.50		
5	Santander	\$2,500.00	2022-08-31	5	\$925.00	\$11.10		
6			Tax Rate					
7	Interest Rate	1.20%	12.00%					
8								

Absolute references: fixing rows

The screenshot shows a spreadsheet interface with a toolbar at the top. The formula bar indicates the current cell is F2, and the formula = E2 * \$B\$7 is entered. The table below has columns labeled A through H. Rows 1 through 5 contain data for different banks: Bank of America, HSBC, US Bank, and Santander. Row 6 is a header for interest rates. Row 7 contains the values 1.20% and 12.00%. Row 8 is empty. The cell F2, which contains the formula, is highlighted with a blue border.

	A	B	C	D	E	F	G	H
1	Bank	Account Fee	Start date	Fixed Period	Base Payment	Interest	Tax	
2	Bank of America	\$3,000.00	2022-07-01	5	\$900.00	\$10.80		
3	HSBC	\$2,000.00	2022-08-01	7	\$850.00	\$10.20		
4	US Bank	\$3,500.00	2022-07-29	5	\$875.00	\$10.50		
5	Santander	\$2,500.00	2022-08-31	5	\$925.00	\$11.10		
6	Tax Rate							
7	Interest Rate	1.20%	12.00%					
8								

Absolute references: fixing rows

The screenshot shows a spreadsheet interface with a toolbar at the top. The formula bar displays the cell F2 and the formula = E2 * B\$7. The main table has columns labeled A through H. Row 1 contains column headers: Bank, Account Fee, Start date, Fixed Period, Base Payment, Interest, and Tax. Rows 2 through 5 show data for different banks: Bank of America, HSBC, US Bank, and Santander. Row 6 is a blank header row for 'Tax Rate'. Row 7 contains two values: 'Interest Rate' and '1.20%'. Row 8 is a blank row. The cell E2 is highlighted with a blue border, and the formula = E2 * B\$7 is shown in the formula bar. The cell B\$7 is highlighted with an orange dashed border.

	A	B	C	D	E	F	G	H
1	Bank	Account Fee	Start date	Fixed Period	Base Payment	Interest	Tax	
2	Bank of America	\$3,000.00	2022-07-01	5	\$900.00	= E2 * B\$7		
3	HSBC	\$2,000.00	2022-08-01	7	\$850.00	\$10.20		
4	US Bank	\$3,500.00	2022-07-29	5	\$875.00	\$10.50		
5	Santander	\$2,500.00	2022-08-31	5	\$925.00	\$11.10		
6	Tax Rate							
7	Interest Rate	1.20%	12.00%					
8								

Absolute references: fixing rows

The screenshot shows a spreadsheet interface with a toolbar at the top. The formula bar displays "F2:F5" and the formula "= E2 * B\$7". The main table has columns labeled A through H. Rows 1 through 5 contain data for different banks: Bank of America, HSBC, US Bank, and Santander. Row 6 is a header for interest rates. Row 7 contains the values 1.20% and 12.00%. Row 8 is empty. The formula in F2, which is highlighted with a blue border, is $= E2 * B$7$. The cell B\$7 is also highlighted.

	A	B	C	D	E	F	G	H
1	Bank	Account Fee	Start date	Fixed Period	Base Payment	Interest	Tax	
2	Bank of America	\$3,000.00	2022-07-01	5	\$900.00	\$10.80		
3	HSBC	\$2,000.00	2022-08-01	7	\$850.00	\$10.20		
4	US Bank	\$3,500.00	2022-07-29	5	\$875.00	\$10.50		
5	Santander	\$2,500.00	2022-08-31	5	\$925.00	\$11.10		
6			Tax Rate					
7	Interest Rate	1.20%	12.00%					
8								

Absolute references: fixing rows

The screenshot shows a spreadsheet interface with a toolbar at the top. The formula bar displays "F2:G5" and the formula "= E2 * B\$7". The main table has columns labeled A through H. Rows 1 through 5 contain data for different banks: Bank of America, HSBC, US Bank, and Santander. Row 6 is a blank header row. Row 7 contains the labels "Interest Rate" and "Tax Rate". Row 8 contains the values "1.20%" and "12.00%". The cell F2 contains the formula "= E2 * B\$7", where B\$7 is an absolute reference to the value in cell B7. The table is styled with bold headers and some cells are highlighted with blue borders.

	A	B	C	D	E	F	G	H
1	Bank	Account Fee	Start date	Fixed Period	Base Payment	Interest	Tax	
2	Bank of America	\$3,000.00	2022-07-01	5	\$900.00	\$10.80	\$1.30	
3	HSBC	\$2,000.00	2022-08-01	7	\$850.00	\$10.20	\$1.22	
4	US Bank	\$3,500.00	2022-07-29	5	\$875.00	\$10.50	\$1.26	
5	Santander	\$2,500.00	2022-08-31	5	\$925.00	\$11.10	\$1.33	
6	Tax Rate							
7	Interest Rate	1.20%	12.00%					
8								

Absolute references: fixing rows

The screenshot shows a spreadsheet interface with a toolbar at the top. The formula bar indicates the current cell is G2, and the formula = F2 * C\$7 is entered. The main table has columns labeled A through H. Rows 1 through 5 contain data for different banks: Bank of America, HSBC, US Bank, and Santander. Row 6 is a header for tax rates. Row 7 contains interest rate values. Row 8 is empty. A blue selection box highlights the cell G2, which contains the formula.

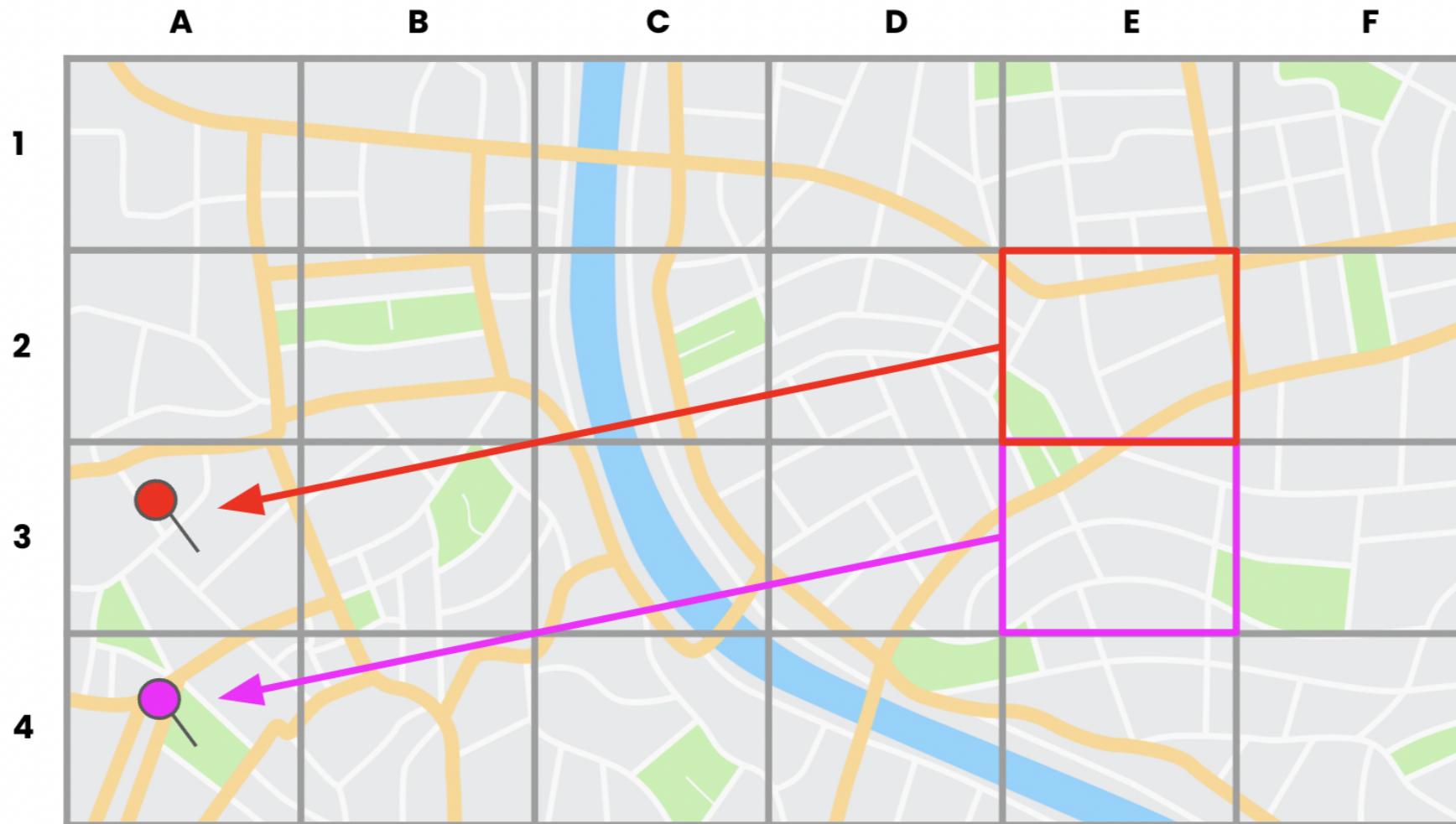
	A	B	C	D	E	F	G	H
1	Bank	Account Fee	Start date	Fixed Period	Base Payment	Interest	Tax	
2	Bank of America	\$3,000.00	2022-07-01	5	\$900.00	\$10.80	\$1.30	
3	HSBC	\$2,000.00	2022-08-01	7	\$850.00	\$10.20	\$1.22	
4	US Bank	\$3,500.00	2022-07-29	5	\$875.00	\$10.50	\$1.26	
5	Santander	\$2,500.00	2022-08-31	5	\$925.00	\$11.10	\$1.33	
6	Tax Rate							
7	Interest Rate	1.20%	12.00%					
8								

Absolute references: fixing rows

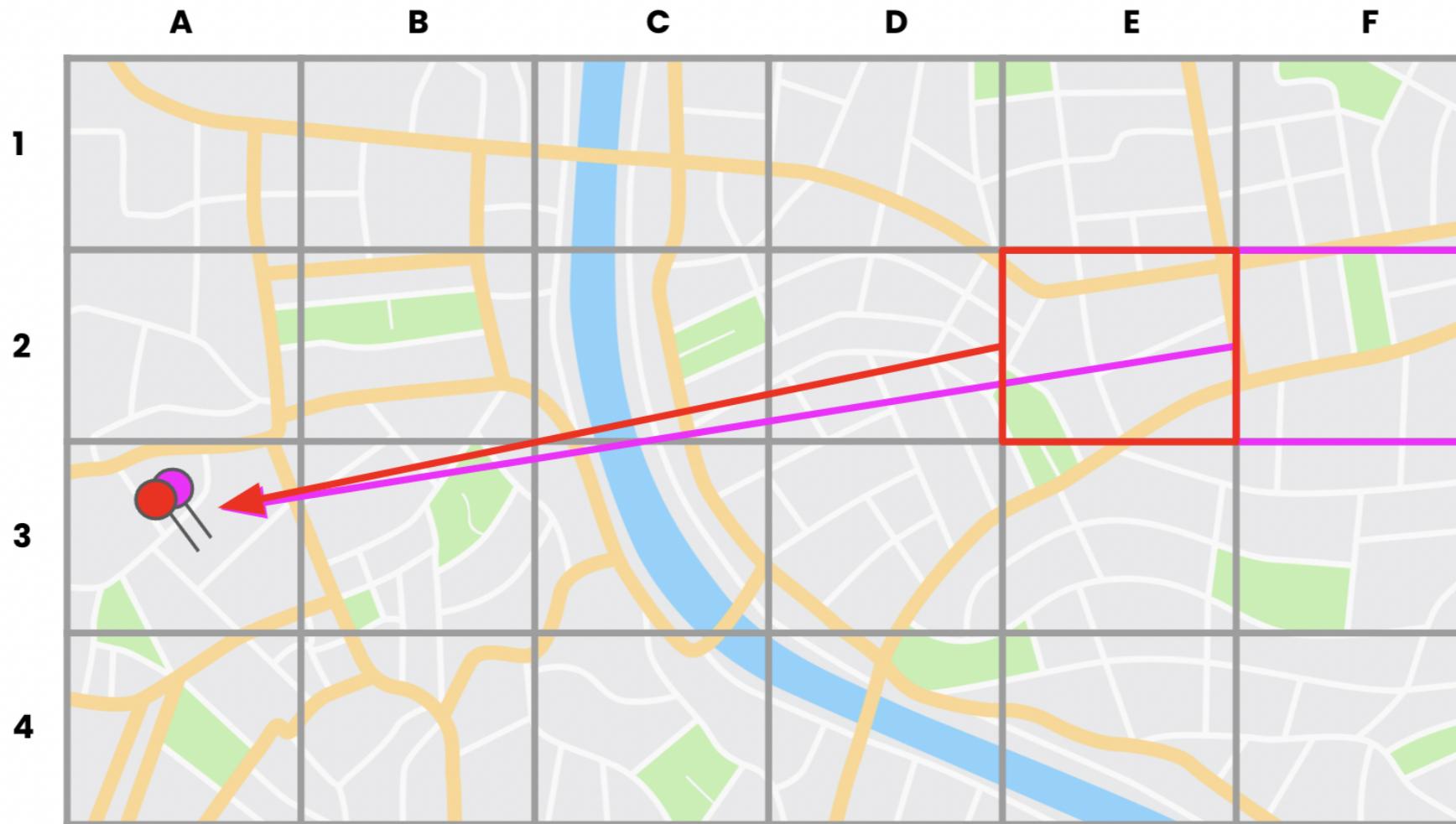
The screenshot shows a spreadsheet interface with a toolbar at the top. The formula bar indicates the current cell is G3, and the formula = F3 * C\$7 is entered. The table below has columns labeled A through H. Rows 1 through 5 contain data for different banks: Bank of America, HSBC, US Bank, and Santander. Row 6 is a header for tax rates. Row 7 contains the interest rates 1.20% and 12.00%. Row 8 is empty. The cell G3, which contains the formula, is highlighted with a blue border.

	A	B	C	D	E	F	G	H
1	Bank	Account Fee	Start date	Fixed Period	Base Payment	Interest	Tax	
2	Bank of America	\$3,000.00	2022-07-01	5	\$900.00	\$10.80	\$1.30	
3	HSBC	\$2,000.00	2022-08-01	7	\$850.00	\$10.20	\$1.22	
4	US Bank	\$3,500.00	2022-07-29	5	\$875.00	\$10.50	\$1.26	
5	Santander	\$2,500.00	2022-08-31	5	\$925.00	\$11.10	\$1.33	
6			Tax Rate					
7	Interest Rate	1.20%	12.00%					
8								

Absolute references: fixing columns



Absolute references: fixing columns



Absolute references: fixing columns

- Use a \$ in front of the column index

The screenshot shows a spreadsheet interface with a formula bar at the top. The formula bar includes icons for back, forward, print, and search, followed by a zoom level of 100%, currency symbols (\$, %, .0, .00), and a dropdown for number formats. To the right of the formula bar are buttons for bold (B), italic (I), and underline (U). The active cell is C3, indicated by a grey background. The table below has columns labeled A through F and rows labeled 1 through 11. Cell C3 contains the formula `=A1+B1+C1`, which is highlighted with a blue border. The values in the table are:

	A	B	C	D	E	F	
1							
2							
3			13				
4			14				
5			15				
6			16				
7							
8							
9							
10							
11							

Let's practice!

INTRODUCTION TO SPREADSHEETS

Congratulations!

INTRODUCTION TO SPREADSHEETS



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What we've learned

Chapter 1

- Navigate spreadsheets
- Import data
- Perform calculations and comparisons
- Format cells

Chapter 2

- Cell references
- Copy references
- Calculations and comparisons with references
- Absolute references

What next?

- Data Analysis in Spreadsheets
 - Built-in functions:
 - Statistics
 - Lookups
- Try applying spreadsheets in projects
 - Personal finances/budgeting
 - Comparing travel or car prices

Congratulations!

INTRODUCTION TO SPREADSHEETS