Relative, absolute, mixed, structured, and R1C1 references in Excel

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Welcome

- this session is for 🌶🌶 intermediate Excel users
- we'll get going properly at 15.05
- you' need Excel of some sort to follow along
- you'll also need the exercise workbook
- if you can't access the chat, you might need to join our Teams channel: tinyurl.com/kindnetwork
- you can find session materials at tinyurl.com/kindtrp

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The KIND network

- a social learning space for staff working with **k**nowledge, **i**nformation, and **d**ata across health, social care, and housing in Scotland
- we offer social support, free training, mentoring, community events, …
- Teams channel / mailing list

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Forthcoming Excel sessions

Session	Date	Area	Level
Excel first steps	09:30-10:30 Tue 3rd September 2024	Excel	:beginner-level
References and names in Excel	09:30-10:30 Tue 10th September 2024	Excel	:beginner-level
Tidy data in Excel	09:30-10:30 Tue 17th September 2024	Excel	:beginner-level
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Session outline

- this is an intermediate-level review of referencing techniques in Excel
- it’s a technical session, so we’ll concentrate on the how of referencing
- A1 references
  - relative
  - absolute
  - mixed
- structured references
- R1C1

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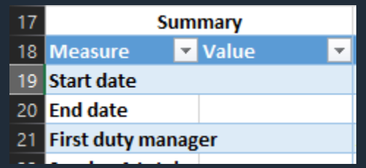
A1 references

- A1 references are the standard way that references are made in Excel
- A1 references are usually made up of a letter and a number (like **A2**, **B56**, …)
  - the letter stands for the column a cell is in
  - the number stands for the row
- we can use those references in formulas
  - `=A1` will copy the values from A1 into the current cell
- you can also use the `range operator` (`:`) to select several values - like `A1:A3`

References

Task

1. using A1 references, can you populate the first three rows of the summary table in the `A1 referencing` sheet?



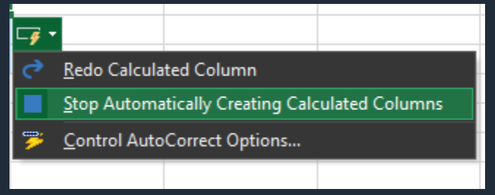
17	Summary	
18	Measure	Value
19	Start date	
20	End date	
21	First duty manager	

   a. Start date

   b. End date

   c. First duty manager

2. you might need to switch off **Calculated Columns** from the floatie



Absolute vs relative references

- by default, A1 references are **relative**
  - if the formula moves, the reference will change

Task

1. try copy/pasting your three summary values:
    1. a few columns across
    2. a few rows down
2. what happens to your values?

Absolute vs relative references

	Measure	Value
26		
27	Start date	44569
28	End date	0
29	First duty manage	Ajiana Calilynn

The effect of moving our summary cells down the sheet

- as you've seen, relative references can cause problems
- you can change relative references to absolute (=fixed) references using $
  - A1 refers to A1 **no matter what**
    - use this if you absolutely always want to refer to the same cell

Absolute vs relative references

Task

1. update your relative references in the summary table to absolute references by adding * before both the column letter, and the row number

Note

- if you click in the formula bar, F4 toggles absolute/relative

Mixed references

- `$A1` will be absolute in the column, but relative in the rows
- `A$1` will be relative in the row, but absolute in the column
- take care with these - they’re pretty confusing (and we’ll look at a much better way of doing the same thing below)

Structured referencing

- most objects in Excel can be named - including cells, tables, and ranges
- structured referencing is a special case
  - `Table[Column]` syntax
  - shared across Power BI, PowerQuery…

Task

1. please switch to the `Structured referencing` sheet
2. sum up each of the three service columns in the summary table

- `=SUM(SR_table[service_a])` / `=SUM(SR_table[service_b])` / `=SUM(SR_table[service_c])`

Implicit intersection

- you can convert a structured reference to a column to refer to a single value
- that's done using the **implicit intersection** operator `[@col]`
  - (if you're using an older version of Excel, you might also see this written as `[@[Service_duration]]`)
- if you pick reference locations with the mouse, this is how Excel will render your references

Task

1. please try populating the `daily_total` by summing with implicit intersection

- `=SUM(SR_table[@[service_a]:[service_c]])`

R1C1

- R1C1 gives an alternative way of referring to cells
- slightly more complicated, but more precise, and less confusing
- largely encountered in VBA, but available and helpful in standard Excel

R1C1

Task

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R1C1

- column letters (A, B, C,…) are replaced by numbers
- row numbers remain as row numbers
  - R1C1 = A1
  - R2C8 = H2

Task

1. Have another look at the formula in the `First name` column - it should be much easier to conclude that this is the same formula in every row

Types of R1C1 referencing

- three kinds of R1C1 reference:
  - absolute reference = specify a row and column number (`R2C2`)
  - relative reference by adding a numeric offset in square brackets (`R2C[-6]`)
  - implicit intersection-like “give me this row’s column 2” by using a bare R/C (`RC2`)
- a much nicer way of doing mixed referencing

Task

1. in R16C4, please populate the four rows of the Age column in the summary table using R1C1

Why bother with R1C1?

- R1C1 adds a bit of complexity to simple formulas
- but it makes complicated formulas (and repeated formulas) **much** easier to understand
- this is a big help when working with more complex Excel documents - particularly if you're debugging something that's gone wrong

Why bother with R1C1?

- R1C1 gives the same formulas for the same work across different columns
- we have to work this out by hand with A1 referencing - the row number would be different each time
- this helps us understand quickly when and where a formula is repeated
- (apparently) faster with very complex sheets - but given that Excel benchmarking is a closed book to me, I've been unable to find any solid information about this anywhere.

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Feedback and resources

- please can I ask for some feedback - takes less than a minute, completely anonymous, helps people like you find the right training for them

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