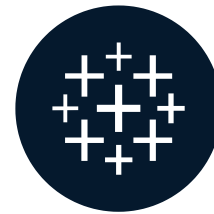# Introduction to calculations

CALCULATIONS IN TABLEAU

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Why do calculations?

> Calculations allow you to create new data from data that already exists in your data source and perform computations on your data

Typical use-cases:

- **Measure missing in original dataset:**
  - e.g. `Sales` and `Costs` but no `Profit` measure

- **Transforming existing data:**
  - e.g extracting `First name` from `First and Last name`

- **Categorizing the data:**
  - e.g. grouping `Age` into "Kids", "Teens", "Adults", based on age thresholds
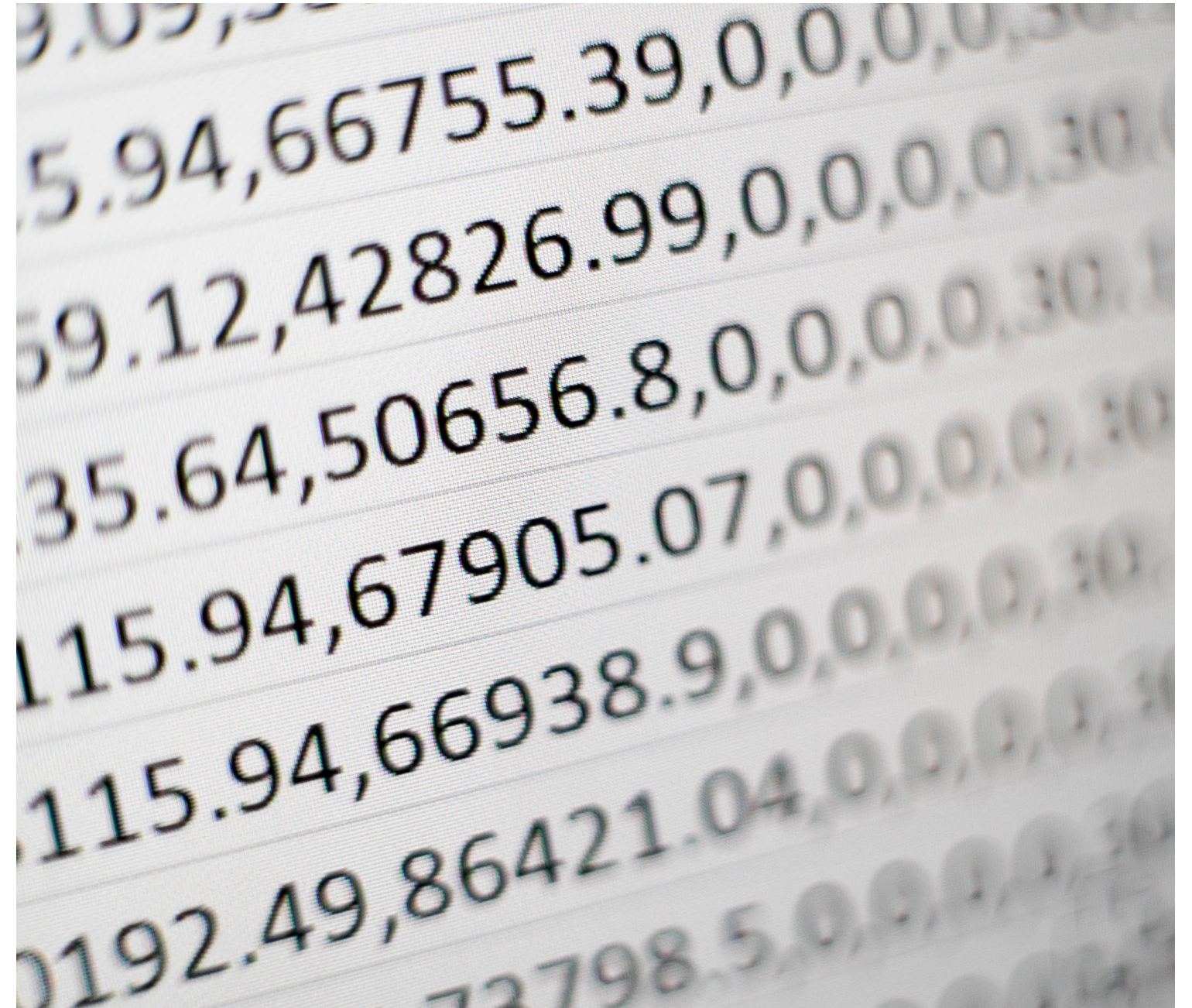
- ...

Types of calculations in Tableau

There are **four main types** of calculations:

Basic calculations:

- Row-level calculations

- Aggregate calculations

Advanced calculations:

- Level of Detail expressions

- Table Calculations

Row-level calculations vs. aggregations

- **Row-level calculations**
  - Performed on each individual row

  - e.g. `End Date` - `Start Date`

Start date	End date	Days between
05/03/2022	16/01/2022	48
17/03/2022	31/01/2022	45
23/02/2022	30/11/2021	85
07/03/2022	03/01/2022	63
13/02/2022	10/02/2022	3
25/02/2022	31/01/2022	25

- **Aggregate calculations** e.g. `SUM()` , `AVG()`
  - Performed on set of records defined by dimensions in the view

  - e.g `Sum of Profit` = `SUM(Sales)` - `SUM(Cost)`

  - Recalculated per dimension in the view

Sum of Profit
53.950

Region	Sum of Profit
Asia	18.286
Americas	12.074
Europe	11.823
Australia	11.767
Grand Total	**53.950**

Most common calculation errors

- Tableau has a built-in calculation validity check! The calculation is valid.

- Do **NOT** mix up row-level and aggregate calculations:

    SUM([Sales])/[Customer] Cannot mix aggregate and non-aggregate arguments with this function.

  - Use only row-level **or** aggregation calculation

- Do **NOT** apply calculations on incompatible data types:

    SUM([Activity Date]) SUM is being called with (date),did you mean (float)?

- Watch out for **syntax errors**:

  - Missing syntax elements, e.g. `ELSEIF` or `END` in an `IF()` statement

  - Missing an identifier, operator, comma, or parenthesis

  - Using incorrect bracket type `{}`, `[]`, `()`

Most common logical errors

Tableau **validity check does NOT eliminate all errors!**

Typical logical / mathematical errors:

- Applying mathematical operations in the wrong order

- Incorrect or missing brackets in `AND` and `OR` statements

- Wrong application of conditions in `IF` and `CASE` statements

- Summing the non-summable values, e.g. Customer IDs

- Averaging the average

- ...

Final analytical responsibility lies with you!
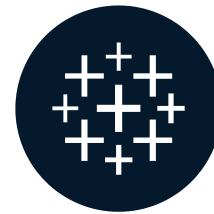
The dataset - Fitbit usage
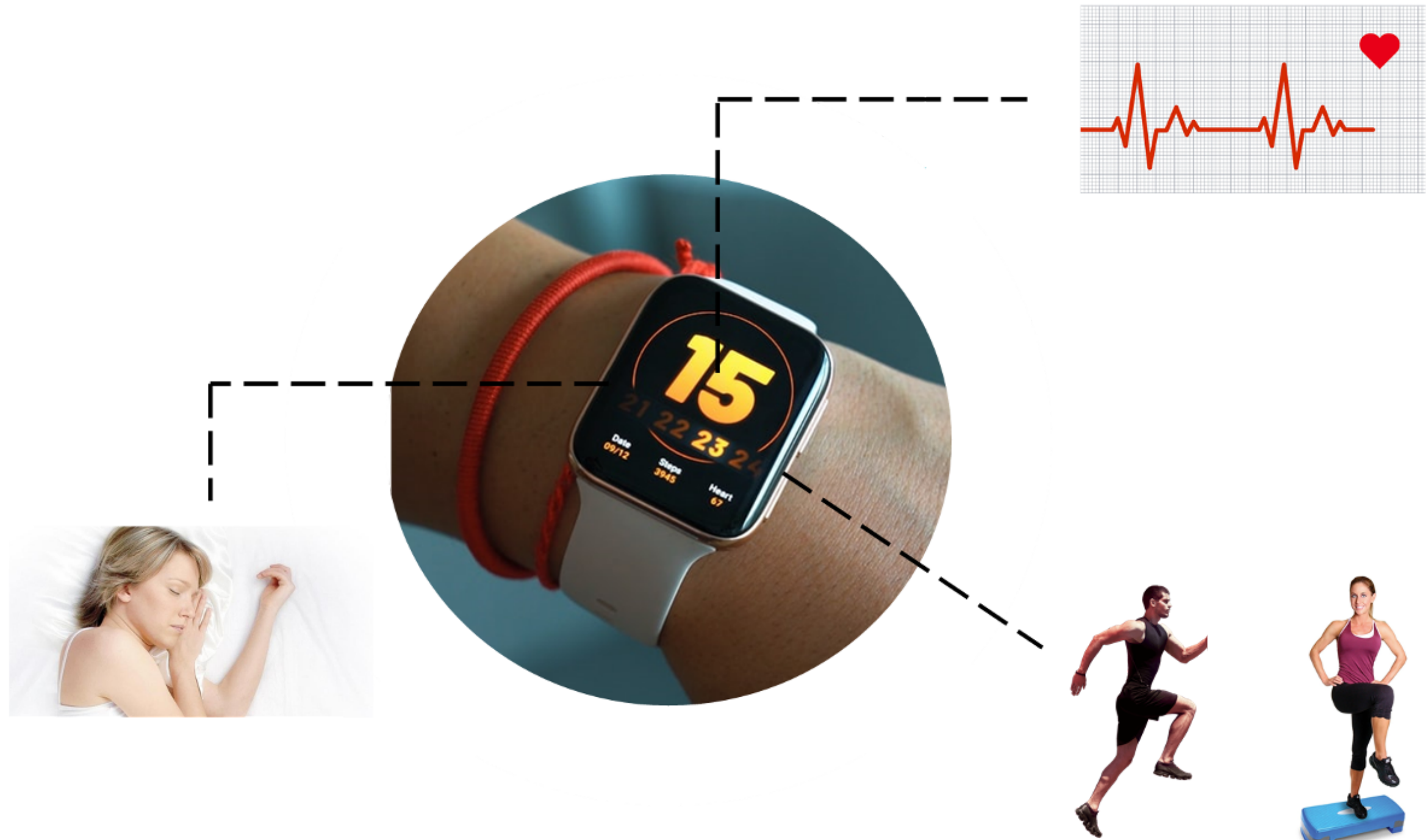
Let's practice!

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Start to calculate in Tableau

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Let's practice!

CALCULATIONS IN TABLEAU

String and Logical functions

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Overview of data types

Data type - an attribute of a piece of data that tells a computer how to interpret its value.

- String

- Date and Time

- Numeric

- Boolean (True / False)

- ...

Structured data sources: one column = one data type.

Icon	Data type
Abc	Text (string) values
📅	Date values
📅🕐	Date & Time values
#	Numerical values
T|F	Boolean values (relational only)
🌐	Geographic values (used with maps)

String data type

> **String** - a sequence of one or more letters, numbers or other characters.

Examples of string data:

- "Apple"

- "M. L. King"

- "Year 1992"

- "Female, 29 years old"

In calculations, string values are enclosed in `"  "` .

- e.g `IF [Word] = "Apple" THEN "Fruit" END`

String functions in Tableau

+ Concatenation - joining two or more strings end-to end:

First name	Last name	Concatenation
Adam	Appleton	Adam Appleton
	Banks	Adam Banks
	Barlow	Adam Barlow

`[First name] + " " +[Last name]`

`SPLIT()` - extracting parts of a string based on a delimiter:

Name	Split
Abbing, Mr. Anthony	Abbing
Abbott, Master. Eugene Joseph	Abbott

`SPLIT( [Name], ",", 1 )`

String functions in Tableau

`LEFT()` , `RIGHT()` , `MID()` - extract requested, fixed number of characters, based on the position in the string:

Fitbit version	LEFT()	RIGHT()	MID()
A11	A	11	1
B39	B	39	3
C45	C	45	4
D35	D	35	3
	LEFT([Fitbit version],1)	RIGHT([Fitbit version],2)	MID([Fitbit version],2,1)

Logical functions: Boolean (True/False)

> Logical functions allow to determine if a certain condition is true or false and returns a requested value based on evaluation.

Boolean (True/False) conditions:

- Top Athlete? : `[Low activity ratio] < 0.1` returns "TRUE" or "FALSE"

- Possible to include several checks in the same condition, adding AND OR statements:
  - `([Gender]="Female" AND [Age] = 30) OR ( [Gender]="Male" AND [Age] = 35 )`

- Negation:
  - `[Category] = "Busy Mum" AND NOT [Occupation] = "Clerk"`

  - `[Category] = "Busy Mum" AND [Occupation] != "Clerk"`

  - `[Category] = "Busy Mum" AND [Occupation] <> "Clerk"`

Logical functions: IF, IIF, CASE

IF function:

- `IF test1 THEN ____ END`

- `IF test1 THEN ____ ELSE ____ END`

- `IF test1 THEN ____ ELSEIF ____ THEN ____ ELSE ____ END`

IIF function

- `IIF (test, ____ , ____)`

CASE function

- `CASE ____ WHEN ____ THEN ____ WHEN ___ THEN ____ ELSE ____ END`

`IF` allows algebra conditions, e.g :

`IF [Heart Rate] >=60 THEN "OK" ELSE "NOT OK" END`

`IIF()` allows algebra conditions, e.g :

`IIF ([Heart Rate] >=60, "OK" , "NOT OK")`

`CASE` searches for an exact match, e.g :

```
CASE    [Fitbit version]
WHEN "A21" THEN "New"  WHEN "B16" THEN "Old" END
```

Other logical functions

ISNULL, ISDATE - checks if a value is "Null" or a date:

- `ISNULL([Steps])` returns "TRUE" or "FALSE"

- `ISDATE([Activity Date])` returns "TRUE"

IFNULL - checks if a value is "Null" and controls the output:

- `IFNULL ([Steps], 0)`

- `IFNULL ([Steps], "No steps")`
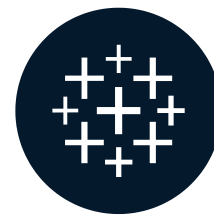
ZN - returns a `0` if a value is "Null"

- `ZN([Steps])` returns `0`

Let's practice!

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Practical use of string and logical functions

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Let's practice!

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