

Date, Time & Number Functions and Named Ranges

Work confidently with dates and times (DATE, EOMONTH, EDATE, WORKDAY, NETWORKDAYS, WEEKDAY, WEEKNUM, DATEDIF, fiscal quarters), clean up numbers with INT, MOD, ROUND, CEILING and FLOOR, and make formulas readable with static and dynamic named ranges and LET.

● Live classes 7–8

✦ Excel for Microsoft 365, 2026

Intermediate

🕒 120 min

By the end of this lesson you can

- Explain how Excel stores dates and times, and do date arithmetic correctly
- Extract parts of dates, find month ends, add months, and count working days with holidays
- Calculate age, tenure and fiscal-year quarters (Indian April–March and US October–September)
- Use INT, MOD, ROUND, ROUNDUP, ROUNDDOWN, MROUND, CEILING.MATH, FLOOR.MATH, SQRT, POWER and ABS
- Create static and dynamic named ranges and simplify long formulas with LET

Datasets used

superstore_sales.csv

employees_small.csv

Dates and times are numbers

Excel stores a date as the number of days since **1 January 1900** (that day is 1). A time is a **fraction of a day**: 12:00 noon is 0.5 and 06:00 is 0.25. A date with a time is simply a whole number plus a fraction.

X What is really stored

	A	B	C
1	You see	Stored as	Explanation
2	27-04-2026	46139	Days since 1-Jan-1900
3	12:00	0.5	Half a day
4	06:30	0.2708	6.5 hours ÷ 24
5	27-04-2026 18:00	46139.75	Date + time

B2 =A2

B3 =TIME(12,0,0)

B4 =TIME(6,30,0)

B5 =DATE(2026,4,27)+TIME(18,0,0)

This is why date arithmetic works:

X Date arithmetic

	A	B	C	D	E
1	Order date	Ship date	Days to ship =B2-A2	Due date (+30 days)	Overdue? (as of 15-Jun-2026)
2	27-04-2026	02-05-2026	5	27-05-2026	Overdue
3	20-05-2026	21-05-2026	1	19-06-2026	OK
4	01-06-2026	08-06-2026	7	01-07-2026	OK

C2 =B2-A2

D2 =A2+30

E2 =IF(DATE(2026,6,15)>D2,"Overdue","OK")

Each pattern is copied down/across to the other cells in its column.

TIP TODAY() and NOW()

=TODAY() returns today's date and =NOW() the date and time. They are **volatile**: they recalculate every time the workbook changes, so results move every day. For reports that must not change, type the "as of" date into a cell and refer to it, as in the overdue example above. Shortcuts: Ctrl + ; types today's date as a fixed value.

Building and taking apart dates

Function	Returns	Example (A2 = 27-04-2026)	Result
DATE(y, m, d)	A date from parts	=DATE(2026,4,27)	27-04-2026
YEAR, MONTH, DAY	Parts of a date	=MONTH(A2)	4
WEEKDAY(date, 2)	1 = Monday ... 7 = Sunday	=WEEKDAY(A2,2)	1
WEEKNUM(date, 2)	Week of the year (weeks start Monday)	=WEEKNUM(A2,2)	18
ISOWEEKNUM(date)	ISO 8601 week number	=ISOWEEKNUM(A2)	18
TEXT(date, "mmm")	Month name as text	=TEXT(A2,"mmm")	April
EOMONTH(date, n)	Last day of the month n months away	=EOMONTH(A2,0)	30-04-2026
EDATE(date, n)	Same day n months later	=EDATE(A2,3)	27-07-2026
DATEVALUE(text)	Converts date text to a real date	=DATEVALUE("27-Apr-2026")	46139

X

Date parts and month boundaries

	A	B	C	D	E	F	G	H
1	Date	Year	Month	Day	Weekday (Mon=1)	Month end	First of month	+3 month
2	27-04-2026	2026	4	27	1	30-04-2026	01-04-2026	27-07-2026
3	31-01-2026	2026	1	31	6	31-01-2026	01-01-2026	28-02-2026
4	29-02-2024	2024	2	29	4	29-02-2024	01-02-2024	28-02-2025

B2

=YEAR(A2)

C2

=MONTH(A2)

D2

=DAY(A2)

E2

=WEEKDAY(A2,2)

F2

=EOMONTH(A2,0)

G2

=EOMONTH(A2,-1)+1

H2

=EDATE(A2,3)

Each pattern is copied down/across to the other cells in its column.

Notice that EDATE handles month ends correctly: 31-Jan + 1 month = 28-Feb (2026 is not a leap year), and 29-Feb-2024 + 12 months = 28-Feb-2025.

Working days

Function	Use
NETWORKDAYS(start, end, [holidays])	Count Mon–Fri days between two dates (inclusive) minus holidays
NETWORKDAYS.INTL(start, end, weekend, [holidays])	Choose weekend days: 11 = Sunday only, "0000011" = Sat + Sun
WORKDAY(start, days, [holidays])	The date after adding n working days
WORKDAY.INTL(start, days, weekend, [holidays])	Same with a custom weekend

X SLA and delivery planning (holidays in G2:G4)					
	A	B	C	D	E
1	Ticket	Opened	Closed	Working days =NETWORKDAYS(B2,C2,\$G\$2:\$G\$4)	Due (+5 working days)
2	T-101	10-08-2026	18-08-2026	7	17-08-2026
3	T-102	16-10-2026	23-10-2026	5	26-10-2026
4	T-103	06-11-2026	10-11-2026	4	12-11-2026

D2	=NETWORKDAYS(B2,C2,\$G\$2:\$G\$4)
E2	=WORKDAY(B2,5,\$G\$2:\$G\$4)
D3	=NETWORKDAYS(B3,C3,\$G\$2:\$G\$4)
E3	=WORKDAY(B3,5,\$G\$2:\$G\$4)
D4	=NETWORKDAYS.INTL(B4,C4,11,\$G\$2:\$G\$4)
E4	=WORKDAY.INTL(B4,5,11,\$G\$2:\$G\$4)

T-103 uses a **Sunday-only weekend** (code 11), common in Indian factories and retail. The holiday on 15-Aug-2026 falls on a Saturday, so it does not change T-101's count of working days.

Age, tenure and durations

DATEDIF(start, end, unit) is a hidden function (no tooltip) that returns complete years, months or days between two dates.

Unit	Returns
"y"	Complete years
"m"	Complete months
"d"	Days
"ym"	Months after removing complete years
"md"	Days after removing complete months

X Tenure as of 31-Mar-2026 (in F1)

	A	B	C	D	E	F
1	Employee	Join date	Years	Months after years	Tenure label	31-03-2026
2	Kavya Iyer	28-02-2016	10	1	10 yrs 1 mths	
3	Imran Reddy	14-12-2019	6	3	6 yrs 3 mths	
4	Saanvi Rao	18-02-2025	1	1	1 yrs 1 mths	

C2 =DATEDIF(B2,\$F\$1,"y")

D2 =DATEDIF(B2,\$F\$1,"ym")

E2 =C2&" yrs "&D2&" mths"

Each pattern is copied down/across to the other cells in its column.

(Cell F1 holds the date 31-03-2026.) For fractional years use =YEARFRAC(B2,\$F\$1), for example 10.09 years.

Fiscal years and quarters

Calendar quarter: ="Q"&ROUNDUP(MONTH(A2)/3,0). Many organisations use a different financial year:

Year type	Q1	Formula for the quarter number
Calendar	Jan– Mar	=ROUNDUP(MONTH(A2)/3,0)
India (FY Apr–Mar)	Apr– Jun	=ROUNDUP(MOD(MONTH(A2)-4,12)/3+0.01,0) or =CHOOSE(MONTH(A2),4,4,4,1,1,1,2,2,2,3,3,3)
US federal (FY Oct–Sep)	Oct– Dec	=CHOOSE(MONTH(A2),2,2,2,3,3,3,4,4,4,1,1,1)

X Calendar, Indian FY and US FY quarters

	A	B	C	D	E
1	Date	Calendar Q	India FY quarter	India FY label	US FY quarter
2	10-02-2026	Q1	Q4	FY26	Q2
3	27-04-2026	Q2	Q1	FY27	Q3
4	03-11-2026	Q4	Q3	FY27	Q1

B2 ="Q"&ROUNDUP(MONTH(A2)/3,0)

C2 ="Q"&CHOOSE(MONTH(A2),4,4,4,1,1,1,2,2,2,3,3,3)

D2 ="FY"&(YEAR(A2)+(MONTH(A2)≥4))-2000

Each pattern is copied down/across to the other cells in its column.

In the Indian convention, 27-Apr-2026 falls in **FY27** (April 2026 – March 2027), quarter Q1.

Times

Function	Example	Result
TIME(h, m, s)	=TIME(14,30,0)	14:30
HOUR, MINUTE, SECOND	=HOUR(A2)	14
Duration in hours	=(end-start)*24	8.5
Duration beyond 24 h	Format [h]:mm	37:30
Shifts past midnight	=MOD(end-start,1)	Works when end is the next day

A very common clean-up task: a system exports times as plain numbers like 1430 meaning 14:30. Convert them with INT and MOD:

X Convert 1430-style numbers into real times					
	A	B	C	D	E
1	Raw	Hours =INT(A2/100)	Minutes =MOD(A2,100)	Time =TIME(INT(A2/100),MOD(A2,100),0)	Shift length
2	930	9	30	09:30	
3	1430	14	30	14:30	
4	2245	22	45	22:45	
5	5	0	5	00:05	
6	1815	18	15	18:15	

B2

=INT(A2/100)

C2

=MOD(A2,100)

D2

=TIME(INT(A2/100),MOD(A2,100),0)

E2

=MOD(D6-D2,1)*24

Each pattern is copied down/across to the other cells in its column.

Number functions

Function	What it does	Example	Result
INT(n)	Rounds down to the integer	=INT(-7.6)	-8
TRUNC(n, [d])	Cuts off decimals (towards zero)	=TRUNC(-7.6)	-7
ROUND(n, d)	Normal rounding	=ROUND(7.456,2)	7.46
ROUNDUP(n, d)	Always away from zero	=ROUNDUP(7.401,0)	8
ROUNDDOWN(n, d)	Always towards zero	=ROUNDDOWN(7.99,0)	7
ROUND(n, -3)	Round to thousands	=ROUND(123456, -3)	123000
MROUND(n, m)	Nearest multiple	=MROUND(17,5)	15
CEILING.MATH(n, m)	Up to the next multiple	=CEILING.MATH(23,7)	28
FLOOR.MATH(n, m)	Down to the previous multiple	=FLOOR.MATH(23,7)	21
MOD(n, d)	Remainder	=MOD(28,3)	1
QUOTIENT(n, d)	Integer part of a division	=QUOTIENT(28,3)	9
ABS(n)	Absolute value	=ABS(-450)	450
SIGN(n)	-1, 0 or 1	=SIGN(-450)	-1
SQRT(n)	Square root	=SQRT(144)	12
POWER(n, p)	Power (same as ^)	=POWER(25,2)	625

X

Rounding functions side by side

	A	B	C	D	E	F	G	
1	Value	INT	ROUND 0	ROUNDUP 0	ROUNDDOWN 0	ROUND 2	CEILING.MATH to 5	FLOOR.
2	7.456	7	7	8	7	7.46	10	
3	-7.456	-8	-7	-8	-7	-7.46	-5	
4	23.5	23	24	24	23	23.5	25	

B2

=INT(A2)

C2

=ROUND(A2,0)

D2

=ROUNDUP(A2,0)

E2

=ROUNDDOWN(A2,0)

G2

=CEILING.MATH(A2,5)

H2

=FLOOR.MATH(A2,5)

Each pattern is copied down/across to the other cells in its column.

Practical uses

- **Packaging:** boxes needed for 523 items at 24 per box = `=CEILING.MATH(523,24)/24` or `=ROUNDUP(523/24,0) → 22`.
- **Price points:** round prices up to the next 99: `=CEILING.MATH(A2,100) - 1` turns 1,234 into 1,299.
- **Split profit and loss** into two columns with ABS:

X Profit and Loss columns

	A	B	C	D
1	Store	Profit / Loss	Profit	Loss
2	Pune	45200	45200	0
3	Delhi	-12800	0	12800
4	Kochi	3300	3300	0
5	Patna	-7600	0	7600
6	Total	28100	48500	20400

C2 `=IF(B2>0,B2,0)`

D2 `=IF(B2<0,ABS(B2),0)`

B6 `=SUM(B2:B5)`

C6 `=SUM(C2:C5)`

D6 `=SUM(D2:D5)`

Each pattern is copied down/across to the other cells in its column.

Named ranges

A **name** is a label for a cell, a range, a constant or a formula. `=SUM(Sales)` is easier to read and audit than `=SUM(Data!$0$2:$0$6324)`.

Static named ranges

Method	How
Name Box	Select the range, click the Name Box (left of the formula bar), type GST_Rate, press Enter
Define Name	Formulas → Define Name: set the name, scope (workbook or one sheet) and comment
Create from Selection	Select a table with headers → Formulas → Create from Selection (Ctrl + Shift + F3) → Top row: one name per column
Name Manager	Formulas → Name Manager (Ctrl + F3) to edit, delete or find broken names

Rules: names start with a letter or underscore, contain no spaces (use _), cannot look like a cell address (Q1 or FY26 are not allowed) and are not case-sensitive.

X Formulas with names (GST_Rate = F1, Qty and Price are named columns)

	A	B	C	D	E	F
1	Qty	Price	Amount =Qty*Price	With GST =Qty*Price*(1+GST_Rate)		18%
2	4	1250	5000	5,900.00		
3	10	299	2990	3,528.20		
4	2	8999	17998	21,237.64		

C2 =A2*B2
D2 =A2*B2*(1+\$F\$1)
C3 =A3*B3
D3 =A3*B3*(1+\$F\$1)
C4 =A4*B4
D4 =A4*B4*(1+\$F\$1)

(F1, the yellow cell, is named GST_Rate. With names defined, the formula in D2 reads =Qty*Price*(1+GST_Rate).)

Dynamic named ranges

A static name like =\$B\$2:\$B\$100 does not grow when you add row 101. A **dynamic** named range expands automatically, which keeps charts, validation lists and formulas up to date.

Method	Refers to	Notes
Excel Table (best)	=tblSales[Amount]	Automatic, no formula needed
OFFSET + COUNTA	=OFFSET(Data!\$B\$2,0,0,COUNTA(Data!\$B:\$B)-1,1)	Classic; volatile (recalculates often)
INDEX + COUNTA	=Data!\$B\$2:INDEX(Data!\$B:\$B,COUNTA(Data!\$B:\$B))	Not volatile; preferred over OFFSET
Spill reference	=Data!\$H\$2#	Points to a dynamic- array result

Static: =B2:B6

1	Sales	
2		120
3		95
4		140
5		88
6		132
7		101
8		

new row 7 is missed

Dynamic: =B2:INDEX(B : B,COUNTA(B : B))

1	Sales	
2		120
3		95
4		140
5		88
6		132
7		101
8		

grows to row 7

A static range stays fixed; a dynamic range grows with the data.

LET: names inside one formula

LET (Microsoft 365) assigns names to values **inside** a formula. It makes long formulas readable and faster, because each part is calculated once.

Without LET:

```
=IF(SUMIFS(F:F,C:C,"Finance")/COUNTIFS(C:C,"Finance")>90000,"High","Normal")
```

With LET:

Excel formula

```
=LET(
  total, SUMIFS(F:F, C:C, "Finance"),
  heads, COUNTIFS(C:C, "Finance"),
  avg,   total / heads,
  IF(avg > 90000, "High", "Normal")
)
```

LAMBDA goes one step further and lets you create your own reusable functions; see Lesson 12.

Case: date analysis on Superstore

How long do orders take to ship, by ship mode, and which weekday gets the most orders? In Excel you would add columns =ship_date-order_date and =TEXT(order_date,"ddd") and pivot them. Here are the real answers:

Python

```
import pandas as pd
s = pd.read_csv("superstore_sales.csv", parse_dates=["order_date", "ship_date"])
orders = s.drop_duplicates("order_id").copy()
orders["days_to_ship"] = (orders.ship_date - orders.order_date).dt.days           # =C2-B2
orders["weekday"] = orders.order_date.dt.day_name().str[:3]                     #
=TEXT(B2,"ddd")
orders["fy"] = "FY" + (orders.order_date.dt.year + (orders.order_date.dt.month ≥
4)).astype(str).str[2:] # Indian FY
print(orders.groupby("ship_mode")["days_to_ship"].agg(["mean", "min",
"max"]).round(1).to_string())
print()
print(orders.groupby("fy").size().rename("orders").to_string())
```

OUTPUT

	mean	min	max
ship_mode			
First Class	1.5	1	2
Same Day	0.0	0	0
Second Class	3.0	2	4
Standard Class	5.5	4	7

fy	
FY23	169
FY24	952
FY25	1114
FY26	965

Summary

KEY TAKEAWAYS

- Dates are whole numbers (days since 1-Jan-1900); times are fractions of a day. Subtract dates to get days; multiply time differences by 24 for hours.
- EOMONTH and EDATE handle month ends correctly; NETWORKDAYS and WORKDAY (with .INTL for custom weekends) handle working days and holidays.
- DATEDIF gives complete years/months; build fiscal quarters with CHOOSE(MONTH(...), ...).
- INT rounds down, TRUNC cuts towards zero, ROUNDUP/ROUNDDOWN force direction, CEILING.MATH/FLOOR.MATH round to multiples, MOD gives remainders.
- Named ranges make formulas readable; use Tables or INDEX-based names for dynamic ranges, and LET for names inside a formula.

Quick quiz

6 questions · tap an answer to check it

1. A1 contains 27-04-2026 and B1 contains 02-05-2026. What does =B1-A1 return?

A 5 days as text

B 5

C 0.05

D
VALUE!

Answer: B. Dates are numbers, so subtracting gives the number of days.

2. Which formula returns the last day of the month for the date in A2?

A =DATE(YEAR(A2),MONTH(A2),31)

B =EOMONTH(A2,0)

C =EDATE(A2,1)-1

D =MONTH(A2)+30

Answer: B. EOMONTH(date,0) returns the month end; the other options fail for 30-day months or February.

3. What does =INT(-3.2) return?

A -3

B -4

C 3

D -3.2

Answer: B. INT always rounds down (towards minus infinity). TRUNC(-3.2) would give -3.

4. Which formula converts the number 1745 into the time 17:45?

A =TIME(1745)

B =1745/24

C =TIME(INT(A2/100),MOD(A2,100),0)

D =TEXT(1745,"hh:mm")

Answer: C. INT(1745/100) = 17 hours and MOD(1745,100) = 45 minutes.

5. Why is an INDEX-based dynamic named range often preferred to OFFSET?

A It works only in Excel 365

B OFFSET is volatile and recalculates on every change, which can slow large workbooks

C INDEX cannot refer to whole columns

D OFFSET does not grow with the data

Answer: B. Both grow, but OFFSET is volatile.

6. In the Indian financial year, which quarter is 15-January?

A Q1

B Q2

C Q3

D Q4

Answer: D. FY runs April–March, so January–March is Q4.

EXERCISE HR date calculations

Using `employees_small.csv` and an "as of" date of 31-03-2026 in a cell: (1) tenure in complete years; (2) the probation end date (6 months after joining); (3) the first working day after the probation end; (4) the joining quarter in the Indian FY.

Show solution (worked answer)

With join date in E2 and the as-of date in \$J\$1: (1) `=DATEDIF(E2,$J$1,"y")` (2) `=EDATE(E2,6)` (3) `=WORKDAY(EDATE(E2,6)-1,1)` (the first working day on or after the probation end) (4) `"Q"&CHOOSE(MONTH(E2),4,4,4,1,1,1,2,2,2,3,3,3)`

INTERVIEW CORNER Questions you may be asked

Q: How does Excel store dates and times? Dates as serial numbers counting days from 1-Jan-1900; times as fractions of a day. This makes arithmetic, sorting and formatting consistent.

Q: How do you count working days between two dates excluding holidays?
`NETWORKDAYS(start, end, holidays)` or `NETWORKDAYS.INTL` with a custom weekend code.

Q: What is a dynamic named range and when do you need one? A name whose range grows with the data, built with an Excel Table, `INDEX/COUNTA` or `OFFSET/COUNTA`. It keeps charts, validation lists and formulas current as data is added.

Practise more online

Free, trusted places to test yourself on this topic. Links open the original site in a new tab.