PERIOD-BASED PIVOT REPORTS

Grouping Dates in Periodic Pivot Reports



OFFICE & ADMINISTRATION

Grouping Dates in Periodic Pivot Reports

Learning outcomes

- Group valid dates into year-aware months and quarters.
- Identify missing periods without treating missing evidence as zero.
- Prove that grouping preserves the source total.
- Separate event, load and report-observation clocks.
- Create year-aware month and quarter keys and verify half-open boundaries.
- Use a calendar spine with complete, partial, test-only and unknown coverage.
- Diagnose year collapse, invalid-date rollover and period reallocation with exact records.

Practical office learning with wholly fictional records. No certification, compliance opinion, or authorization to act on real records is implied.

Study the foundations, work through the applied units, complete the practice tasks, and then attempt the assessment. Use only the supplied fictional practice data. Keep your original inputs and your revised work separate.

Core concepts

Dates are values, not just labels

A date-looking string can sort as text or fail grouping. Import the ISO dates using an explicit year-month-day interpretation and inspect at least one early, late and year-boundary record. Do not split a date into a month name and discard its year. December followed by January is a chronological sequence across two years, not an alphabetical sequence. A reliable reporting key can be a real first-of-month date or a Year plus Month pair. Preserve the original event date so an unusual bucket can be traced back to a receipt.

Choose a period hierarchy

Use UsedOn as the grouping field and Quantity as the sum. Where supported, group by Years and Months together, then by Years and Quarters for the alternate view. The hierarchy prevents the same month in different years from collapsing into one label. If the application cannot group dates, calculate explicit year-month and year-quarter fields and use them as categories. Calendar quarters in this exercise are January-March, April-June, July-September and October-December. Do not apply an unstated fiscal calendar. Label the report with the calendar definition and date coverage.

Test boundaries and completeness

Check dates immediately before and after 1 January and 1 April. A period report is correct when each source record belongs to exactly one bucket and the bucket sums equal the ungrouped total. Keep a calendar spine if readers need to see periods with no activity. However, distinguish an observed zero from a period missing from the supplied extract. A zero claim requires complete coverage. Test the year labels again after moving between monthly and quarterly views; showing only Q1 can conceal which year is being summarized.

Worked example

Scenario: A mini-extract has 2025-12-31 quantity 2, 2026-01-01 quantity 7 and 2026-04-01 quantity 3.

Walkthrough

The monthly buckets are 2025-12:2, 2026-01:7 and 2026-04:3. Calendar quarter buckets are 2025 Q4:2, 2026 Q1:7 and 2026 Q2:3. Both sum to 12. A label "January" without year is insufficient once another year is added; the year belongs in the grouping key, not merely in a nearby title.

Foundation practice

ReceiptID	UsedOn	Department	ResourceType	Quantity
U01	2025-12-02	Design	Guide	4
U02	2025-12-14	Support	Guide	3
U03	2025-12-20	Design	Template	2
U04	2026-01-03	Support	Template	5
U05	2026-01-07	Design	Guide	6
U06	2026-01-09	Support	Guide	4
U07	2026-01-12	Design	Template	3
U08	2026-02-01	Support	Template	7
U09	2026-02-04	Design	Guide	5
U10	2026-02-11	Support	Guide	2
U11	2026-02-18	Design	Template	4
U12	2026-02-22	Support	Template	6

Context

Fictional learning-resource desk. One row records one receipt; Quantity counts resource units, not people. All dates are Gregorian ISO dates, with no time zone conversion.

Types

- text identifier
- date
- text category
- text category
- whole number of resource units

Boundary append

Field 1	Field 2	Field 3	Field 4	Field 5
U13	2026-03-31	Design	Guide	8
U14	2026-04-01	Support	Template	9

Coverage statement

The twelve baseline rows are the complete receipt population from 2025-12-01 through 2026-02-28. The two additions are a boundary test, not a claim of complete March or April coverage.

Foundation tasks

- Create monthly and calendar-quarter views for the baseline extract.
- Append the two boundary tests, identify their buckets and preserve the grand total.

Foundation capstone

Task: Submit switchable monthly/quarterly reporting and a period-membership audit.

Criteria

- Years remain visible in both views.
- Each receipt is assigned once.
- The April boundary is correct.
- Partial-period test data are labeled and not presented as complete monthly usage.

01 Define the reporting clock before the reporting period

The fictional Willow Archive scans small batches of practice pages. Each row represents one completed scanning batch. Pages is the number of pages in that batch. The source contains fifteen synthetic records across several calendar boundaries, including repeated January months in different years. The task is to group these event dates into year-aware months and calendar quarters without changing which pages are included.

CompletedOn is the event date used for reporting. LoadedOn is the date the record was entered into the reporting file. The two fields are deliberately different. For A09, scanning completed on 2026-03-31 and the record was loaded on 2026-04-02. A completion-based report assigns it to March and the first quarter, even though the file received it in April. Grouping the wrong date field can preserve the grand total while misrepresenting the timing.

All main-case dates are Gregorian local dates with no time component and no time-zone conversion. The calendar year runs January through December. Calendar quarters are January-March, April-June, July-September and October-December. No fiscal year rule is implied. A later optional exercise supplies a separate fiscal rule explicitly so you can see why a calendar label must not be guessed.

The all-source population is fifteen batches totaling 73 pages. A separate calendar-spine report covers December 2025 through July 2026 and includes twelve of those batches totaling 56 pages. These are different scopes. Keep both named so a correct window total is not mistaken for a failed reconciliation to the entire source. The three outside-window records are A01, A14 and A15.

A period report has three contracts: which event clock it uses, how it divides time into buckets, and which source records are within scope. Write all three before selecting a grouping option. A display that says January is not enough to define a bucket when several years are present. A total that matches 73 is not enough to prove that A09 was assigned to the right quarter.

Contract	Main-case rule
Grain	One completed scanning batch
Measure	Sum of Pages; batch count is a companion control
Reporting clock	CompletedOn, not LoadedOn
Calendar	Gregorian calendar years and calendar quarters
All-source scope	All 15 supplied batches
Spine scope	2025-12-01 inclusive to 2026-08-01 exclusive
Time zone	Date-only local values; no conversion

E01-X1 Specify the date-grouping contract

State the grain, measure, event clock, calendar and two population scopes. Assign A09 to its completion month and quarter and explain why LoadedOn does not control that assignment.

Submit: A reporting specification and one traced boundary record.

02 Inspect dates as stored values

The file archive_batches.csv preserves the fifteen source records in a portable text format. periodic_pivot_lab.xlsx stores the event and load columns as numeric Excel dates with an explicit yyyy-mm-dd display format. In the workbook, Archive occupies Source!A1:J16, including five supplied fields and five derived period helpers. The original fields are A:E; the helpers are F:J.

A date-looking string is not necessarily a date value. The characters 2026-03-31 can be stored as text, while a numeric serial can display the same calendar date. Grouping, comparison and sorting depend on the underlying representation. Applying a date format to text does not by itself create a valid date. Inspect types and compare year, month and day against the original source.

For this exercise, import CSV column B and C using an explicit year-month-day interpretation. Preserve BatchID as text and Pages as a whole number. Do not allow a locale guess to interpret a slash date such as 03/04/2026 without knowing whether it means March 4 or April 3. The supplied ISO strings avoid that ambiguity, but a conversion still needs verification.

Check the earliest event, the latest event, the last day of March and the first day of April. These are A01, A15, A09 and A10. Their values test the year span and a quarter boundary. A sample of only mid-month dates could miss a conversion or grouping defect exactly where it matters. Also check that no source date is blank, because a blank date cannot be assigned to a justified period.

Date validation has two parts. Type validation establishes that the cell is a date-compatible numeric value. Plausibility validation establishes that it corresponds to the intended calendar date and falls within a sensible source scope. A random number can pass ISNUMBER and still represent the wrong year. The approved CSV is the evidence for each event date, not the fact that the cell displays a recognizable month name.

BatchID	CompletedOn	LoadedOn	Desk	Pages
A01	2025-01-15	2025-01-16	Blue	7
A02	2025-12-31	2026-01-01	Gold	5
A03	2026-01-01	2026-01-02	Blue	4
A04	2026-01-15	2026-01-16	Gold	6
A05	2026-01-31	2026-02-01	Blue	3
A06	2026-02-01	2026-02-02	Gold	8

BatchID	CompletedOn	LoadedOn	Desk	Pages
A07	2026-02-28	2026-03-01	Blue	2
A08	2026-03-01	2026-03-02	Gold	9
A09	2026-03-31	2026-04-02	Blue	1
A10	2026-04-01	2026-04-02	Gold	5
A11	2026-04-15	2026-04-16	Blue	4
A12	2026-06-30	2026-07-01	Gold	6
A13	2026-07-01	2026-07-02	Blue	3
A14	2026-12-31	2027-01-01	Gold	2
A15	2027-01-01	2027-01-02	Blue	8

03 Keep a date key separate from its display label

A period key identifies a bucket; a display label makes it readable. For a month, a real first-of-month date is a useful key. CompletedOn 2026-03-31 maps to MonthStart 2026-03-01, which can display as Mar 2026 or 2026-03 without losing its underlying year and chronological order. The key is not the first event observed in the month; it is the defined calendar start.

Use =DATE(YEAR(B2),MONTH(B2),1) in Source!F2 and fill through F16. Source!G2 contains =YEAR(B2). Source!H2 contains =MONTH(B2). These helpers retain the event date in B while making the grouping attributes explicit. They do not alter Pages and they do not turn a partial month into a complete one.

A label produced by MONTH alone ranges from one to twelve and repeats every year. Grouping on that field alone merges January 2025, January 2026 and January 2027. In this source, those Januaries contain seven, thirteen and eight pages respectively. Their combined 28 is a valid across-years January total only if that is the question. It is not a chronological monthly report.

Text labels can be safe when they include a four-digit year and a consistently padded month, such as 2026-03. However, a real date key is usually easier to compare with date boundaries and format consistently. A label such as Mar-26 may be readable, but the two-digit year can be less explicit in long-lived files. Keep the full year in the underlying key and use a clear display.

Do not sort months alphabetically. April, February, January is a lexical order, not a calendar sequence. Sorting the MonthStart date ascending gives the intended order across year boundaries. If a report displays only month names for visual simplicity, ensure an adjacent or

parent Year field keeps each bucket identifiable. A concise label should not discard the information needed to interpret it.

```
Source!F2 =DATE(YEAR(B2),MONTH(B2),1)
Source!G2 =YEAR(B2)
Source!H2 =MONTH(B2)
Fill each formula through row 16.
F2:F16 display format: yyyy-mm
```

E03-X1 Recover three January buckets

Using A01, A03-A05 and A15, give the three year-aware January page totals. Calculate the misleading combined total produced by grouping MonthNo=1 alone. State the correct MonthStart keys.

Submit: Three dated buckets, a combined value and a key explanation.

04 Build calendar quarters from an explicit rule

Calendar quarter number can be calculated from the month as INT((month-1)/3)+1. Subtracting one makes January, February and March occupy zero-based positions zero, one and two, which all divide into quarter index zero before adding one. April starts index one and therefore quarter two. The formula handles the exact month boundaries without a list of twelve nested conditions.

Source!I2 contains =INT((MONTH(B2)-1)/3)+1. A year-aware quarter start in J2 is =DATE(YEAR(B2),3*I2-2,1). For A09 on March 31, the quarter number is one and the start is January 1. For A10 on April 1, the quarter number is two and the start is April 1. Retain the year alongside the quarter number or use QuarterStart as the key.

A label Q1 by itself repeats every year, just like January. In the source, 2025 Q1 contains seven pages, 2026 Q1 contains 33 and 2027 Q1 contains eight. A quarter-only grouping combines these into 48. That may answer a seasonal comparison but does not answer a periodic chronological report. The correct report must distinguish the years.

Quarter totals are additive across their constituent months when scope is the same. For 2026 Q1, January thirteen plus February ten plus March ten equals 33. If an April boundary record appears in Q1, the total would become 38, revealing a classification error. The grand total could still remain 73 because the record was moved rather than lost, so boundary checks are essential.

Do not substitute ninety days for a calendar quarter. Calendar quarters have different lengths, and leap years affect the first quarter. The stated quarter definition uses month boundaries. A rolling ninety-day window is a different interval question. Both can be useful, but they should not share a label or be compared as if they included the same dates.

Boundary date	MonthStart	Quarter number	QuarterStart
2025-12-31	2025-12-01	4	2025-10-01
2026-01-01	2026-01-01	1	2026-01-01

Boundary date	MonthStart	Quarter number	QuarterStart
2026-03-31	2026-03-01	1	2026-01-01
2026-04-01	2026-04-01	2	2026-04-01
2026-06-30	2026-06-01	2	2026-04-01
2026-07-01	2026-07-01	3	2026-07-01

05 Choose native grouping or explicit helper fields

Where the Excel version supports date grouping for your source, create a PivotTable from Archive, place CompletedOn in Rows and sum Pages. Use the grouping controls to retain Years with Months for a monthly view, or Years with Quarters for a quarterly view. Inspect the resulting hierarchy rather than assuming automatic grouping retained the year you need.

The exact interface and automatic behavior vary by platform and version. This course therefore also supplies explicit helper fields. MonthStart can be used as a row category for monthly reporting, while QuarterStart can be used for quarter reporting. These helpers express the same calendar rule in visible formulas and do not depend on a particular native grouping dialog being available.

The helper approach is not evidence that native grouping was executed. It is an alternative implementation of the period logic. Record which method you actually used. If you build both versions, compare bucket labels, counts and page totals. They should agree for the same source population, date field and scope. A discrepancy calls for inspection of those conditions before changing the data.

Do not group LoadedOn simply because it is the first date field you notice. Do not select MonthNo alone merely because its values are tidy. The field names in the source make these mistakes plausible, so the specification should guide the field selection. A report can look well organized and still use the wrong reporting clock.

Keep the all-source monthly report separate from the eight-month calendar-spine report. The native pivot from all Archive rows should sum to 73. The spine window should sum to 56 because it excludes three outside-window records. Comparing their grand totals without acknowledging scope would create a false error. First align the population, then compare grouping methods.

Implementation	Rows or grouping	Expected all-source total
Native monthly grouping	CompletedOn grouped by Years and Months	73
Explicit monthly helper	MonthStart as row category	73
Native quarterly grouping	CompletedOn grouped by Years and Quarters	73

Implementation	Rows or grouping	Expected all-source total
Explicit quarterly helper	QuarterStart as row category	73
Eight-month spine	MonthStart December 2025 through July 2026	56

06 Use half-open intervals to avoid boundary gaps

A precise month interval includes its start and excludes the next month's start. March 2026 is CompletedOn greater than or equal to 2026-03-01 and less than 2026-04-01. This half-open convention assigns each event to exactly one adjacent period. A date on April 1 belongs to April, not March, while March 31 remains in March.

The same convention works if a future source contains times. An inclusive end condition of less than or equal to March 31 can accidentally exclude March 31 at 14:00 because the literal date usually represents midnight at the start of that day. Using less than April 1 includes the entire final day without guessing the last representable second. The main source is date-only, but the interval rule is robust to this common extension.

For the workbook's Calendar sheet, A5 holds 2025-12-01 and B5 holds 2026-01-01. C5 uses =SUMIFS(Archive[Pages],Archive[CompletedOn],">="&A5,Archive[CompletedOn],"<"&B5). D5 uses COUNTIFS with the same two criteria. Subsequent rows use each month's start and next start. The formula counts or sums the same interval, preventing the two controls from silently using different boundaries.

Do not combine greater than at both ends or less than or equal to at both shared boundaries without thinking through membership. A strict greater-than start would omit events exactly on the first day. Inclusive adjacent endpoints can include a boundary event in two periods if the end is the next start. Test the boundary itself, not only dates comfortably inside the month.

A useful invariant is that each in-scope record belongs to one and only one monthly bucket. The sum of bucket counts should equal twelve for the spine window, and the sum of pages should equal 56. If a boundary record is counted twice, counts and amounts both increase. If a record is shifted into the wrong bucket but remains included once, the grand total stays correct, so the bucket assignments must also be checked.

```
Calendar!C5
=SUMIFS(Archive[Pages],Archive[CompletedOn],">="&A5,
        Archive[CompletedOn],"<"&B5)
Calendar!D5
=COUNTIFS(Archive[CompletedOn],">="&A5,
          Archive[CompletedOn],"<"&B5)
```

E06-X1 Test the March interval

For the half-open interval 2026-03-01 <= CompletedOn < 2026-04-01, list included BatchIDs, batch count and pages. Classify March 31 at 23:59 and April 1 at 00:00 in a separate timestamp thought experiment using the same local clock.

Submit: Exact source membership plus two boundary classifications.

07 Reconcile every monthly bucket to its records

The all-source monthly report has ten nonempty year-month buckets. January 2025 contains A01 and seven pages. December 2025 contains A02 and five pages. January 2026 contains A03-A05 and thirteen pages. February contains A06-A07 and ten pages. March contains A08-A09 and ten pages. April contains A10-A11 and nine pages. June and July contain boundary-test records with six and three pages. December 2026 and January 2027 contain two and eight pages.

These totals sum to 73, but they do not all have the same coverage status. A bucket's numerical sum describes supplied records in that period. It does not independently prove that the period is complete. Keep the coverage table available when interpreting a report. This distinction prevents a partial April total from being compared casually with a complete March total as if both represented closed months.

Trace the busiest monthly bucket, January 2026, to its three records: four, six and three pages. Trace the year boundary from A02 on December 31 to A03 on January 1. Their dates are adjacent, but their MonthStart and Year helpers differ. The pair tests whether a month grouping accidentally retained only the month name or whether an end boundary was entered incorrectly.

A monthly bucket count is also informative. January has three batches, while February, March and April each have two. If January's page total is thirteen but the batch count is two, one record may be missing and another amount altered. Do not treat a correct sum as proof of complete membership. Counts and identifier traces test different aspects of the source.

Print or retain the source IDs in the verification notes rather than repeating the full source table for every bucket. The reader should be able to move from a reported month to the small set of contributing batches and back to their original event dates. This preserves traceability while keeping the report compact enough to read.

Year-month	BatchIDs	Batches	Pages
2025-01	A01	1	7
2025-12	A02	1	5
2026-01	A03, A04, A05	3	13
2026-02	A06, A07	2	10
2026-03	A08, A09	2	10

Year-month	BatchIDs	Batches	Pages
2026-04	A10, A11	2	9
2026-06	A12	1	6
2026-07	A13	1	3
2026-12	A14	1	2
2027-01	A15	1	8
All supplied records	A01-A15	15	73

E07-X1 Produce the all-source month ledger

Construct a year-month ledger for all fifteen batches, including each month key, contributing IDs, batch count and page sum. Reconcile the ledger to the source total and explain why a missing month label is not automatically a zero claim.

Submit: Ten nonempty buckets and a coverage caveat.

08 Reconcile quarterly views without double-counting subtotals

The quarterly report changes the bucket size, not the source population. The all-source quarter totals are 2025 Q1 seven, 2025 Q4 five, 2026 Q1 thirty-three, 2026 Q2 fifteen, 2026 Q3 three, 2026 Q4 two and 2027 Q1 eight. They sum to the same 73 pages as the monthly view. The number of displayed buckets changes from ten nonempty months to seven nonempty quarters.

For 2026 Q2, April contributes nine and June six. May has no source rows, but the coverage table separately declares May complete with zero activity. The quarter's supplied total is fifteen. The quarter is not a fully closed operational quarter because April is partial and June contains only a boundary test. Adding the numbers is mathematically valid; interpreting them as complete quarter performance is not.

A hierarchical pivot may show month detail, quarter subtotals and a grand total together. Do not add all visible numerical rows. The subtotal repeats the quantity already represented by its child months, and the grand total repeats the whole population. To verify the grand total, sum either nonoverlapping monthly details or nonoverlapping quarter totals, not both.

The first-quarter boundary pair A09 and A10 is especially useful. A09 contributes one page to 2026 Q1, while A10 contributes five to Q2. If both fall in Q1, Q1 becomes 38 and Q2 becomes ten, yet the all-source total stays 73. This shows why preserving the grand total is necessary but not sufficient for correct grouping.

When switching from months to quarters, retain the event clock, population and year labels. If you also change a filter or use LoadedOn, any difference has more than one possible cause.

Change one reporting choice at a time, compare results, and then document the new view. Controlled comparisons make a grouping error easier to locate.

Quarter	Included months in supplied data	Batches	Pages
2025 Q1	January	1	7
2025 Q4	December	1	5
2026 Q1	January, February, March	7	33
2026 Q2	April, June	3	15
2026 Q3	July	1	3
2026 Q4	December	1	2
2027 Q1	January	1	8
All	Same source population	15	73

09 Use a calendar spine to show meaningful absence

A calendar spine is an explicit list of expected reporting periods. The supplied Calendar sheet lists December 2025 through July 2026, even when a period has no source rows. Each row contains MonthStart, NextStart, supplied Pages, batch count and a coverage status. This separates the presence of a period label from the presence of event records.

May 2026 is declared complete through May 31 with no batches. Its zero is therefore an observed zero under the exercise's coverage statement. April is partial through April 15, so its nine pages are supplied activity to that date, not a full-month total. June and July are boundary-test periods only. Their six and three pages are test evidence, not operational month totals.

Do not infer these statuses from the earliest or latest event date. A last event on March 31 does not prove that every March record has arrived, and a last event on April 15 does not by itself prove partial coverage. The separate coverage declaration is the evidence. In this case it is explicitly supplied as a teaching input, so you may use it; in a real workflow it would need an authoritative source.

The spine is not a license to fill every unknown period with zero. If a requested month had no coverage statement, show Not supplied or Unknown and distinguish its numeric result from a confirmed zero. A SUMIFS over no matching rows returns zero arithmetically, but that zero means no matching supplied quantities, not necessarily no real-world activity.

Keep coverage notes next to the period totals. A footnote far from the report can be missed when a table is copied. A compact status column is often enough: Complete, Partial, Boundary test or Not supplied. These labels make the report more honest without making it harder to read. The number and its evidence status together form the result.

Month	Supplied pages	Batches	Coverage interpretation
2025-12	5	1	Complete
2026-01	13	3	Complete
2026-02	10	2	Complete
2026-03	10	2	Complete
2026-04	9	2	Partial through April 15
2026-05	0	0	Complete, confirmed no batches
2026-06	6	1	Boundary test only
2026-07	3	1	Boundary test only

E09-X1 Write defensible period labels

For April, May and June 2026, write the page value, batch count and coverage label that should appear on the spine report. Explain why May zero is justified but June six is not a complete-month result.

Submit: Three period rows and a coverage explanation.

10 Handle invalid dates without rolling them into another month

Date construction functions can normalize out-of-range components. For example, constructing a date from year 2026, month 2 and day 30 can roll into March rather than rejecting the impossible February date. A returned date is therefore not sufficient proof that the original components were valid. This matters when parsing imported text into year, month and day parts.

Use a round-trip check when constructing dates from components. After DATE(year,month,day), compare YEAR, MONTH and DAY of the result with the original components. For 2026-02-30, the resulting date does not have month two and day thirty, so the input fails validation. Do not silently accept the rolled date as a March event. Preserve the raw text and flag the record for correction.

Leap years provide another boundary. February 29, 2024 is a valid Gregorian date, while February 29, 2025 is not. The first maps to MonthStart 2024-02-01 and calendar 2024 Q1. These mini-cases are not part of Archive and must not be appended. They test the date-validation method without changing the source population or totals.

A blank event date is also invalid for period assignment. Do not replace it with the load date, the first of the current month or a zero serial merely to make grouping work. Those substitutions invent event timing. A missing-date record can be held in an unresolved bucket for reconciliation, but it cannot be assigned to a justified month without evidence.

When native grouping fails, inspect the source types, blanks and invalid values before rebuilding the report. A failure may have more than one cause, and application features can differ. The helper-field approach gives you a transparent alternative once the dates themselves are valid. It does not make malformed source dates acceptable.

Test input	Validation result	Safe treatment
2024-02-29	Valid leap day	Group into 2024-02 and 2024 Q1
2025-02-29	Invalid date	Reject; do not roll forward
2026-02-30	Invalid date	Reject using component round trip
Blank CompletedOn	Missing event timing	Keep unresolved; do not borrow LoadedOn
Text 2026-03-31	Valid characters, wrong stored type	Convert explicitly and verify components

E10-X1 Validate boundary inputs

Classify the five inputs in the validation table. For the valid leap day and converted ISO date, give MonthStart and QuarterStart. State why DATE returning a number does not prove the original components valid.

Submit: A validation ledger with two period assignments.

11 Keep timestamps and time zones in their own declared model

The main Archive case uses local date-only values, so no time-zone conversion is needed. A separate mini-case introduces timestamps to show why the reporting clock must be declared before grouping. Its source timestamp is 2026-03-31T23:30:00Z, and the reporting rule explicitly uses a fixed offset of UTC+02:00 with no daylight-saving adjustment. The local timestamp is April 1 at 01:30.

Under that supplied rule, the event belongs to April and calendar Q2 in the reporting clock, although its UTC date is March 31 and Q1. Neither grouping is inherently wrong; they answer different clock definitions. A report must name which clock it uses. Do not strip the Z and treat the remaining characters as local time, because that changes the meaning without applying the required conversion.

This fixed-offset exercise is intentionally limited. A real location may have daylight-saving rules or historical offset changes. Adding two hours is not a universal solution for a named city or region. If such a rule is needed, use a documented timezone-aware conversion process and verify boundary cases. The course does not ask you to implement that broader system.

For timestamp data, convert to the reporting clock first, then derive the local date and period keys. If you group by UTC month before conversion, an event near midnight can remain in

the wrong local month even if a displayed timestamp is later adjusted. The order of transformations is part of the calculation, not a cosmetic choice.

Keep the original timestamp alongside the derived reporting date for traceability. A reviewer should be able to see the source instant, the declared offset and the resulting period. Do not append this mini-case to Archive or mix its clock model with the date-only records. Its role is to teach a boundary that a recurring report may encounter when its source format changes.

Separate timestamp case	UTC value	Declared reporting rule	Reporting period
T1	2026-03-31T23:30:00Z	Fixed UTC+02:00	2026-04, 2026 Q2
T2	2026-04-01T00:15:00Z	Fixed UTC-03:00	2026-03, 2026 Q1
Main Archive	Local dates only	No conversion	Use CompletedOn directly

12 Distinguish calendar, fiscal and rolling periods

A calendar quarter is defined by the January start of the calendar year. A fiscal quarter depends on an organization's declared fiscal calendar. A rolling window depends on an anchor date and interval length. These are different grouping rules even when they sometimes include the same records. The main report uses calendar quarters throughout.

For a separate extension, define a fiscal year that starts on April 1 and is named by its ending year. Under this explicit rule, March 31, 2026 belongs to FY2026 Q4, while April 1, 2026 belongs to FY2027 Q1. The fiscal year label advances at April, not January. Without the stated naming convention, FY2026 could be ambiguous because some organizations name fiscal years by their starting year instead.

A helper for this extension can use fiscal month number MOD(MONTH(date)-4,12)+1. Fiscal quarter is INT((fiscal_month-1)/3)+1. The ending-year label is YEAR(date)+IF(MONTH(date)>=4,1,0). These formulas apply only to the supplied simple April-start fiscal calendar. They do not implement a 4-4-5 calendar, a 53-week year or special closing adjustments.

A rolling ninety-day report ending at an anchor is not automatically the same as Q1. You must state whether the anchor is included and whether the start is inclusive. The half-open interval pattern can be used, but the endpoints come from the rolling-window definition rather than calendar month starts. Do not call a rolling result a quarter total merely because it covers approximately three months.

When a stakeholder asks for quarterly reporting without a fiscal definition, use the explicitly agreed calendar rule or ask for the missing definition. Do not infer a fiscal calendar from a company name or the newest transaction. In this exercise, the main rule is already supplied, so no ambiguity remains. The fiscal extension is a separate comparison, not a replacement for the required calendar report.

Date	Calendar label	April-start fiscal label, ending-year convention
2026-03-31	2026 Q1	FY2026 Q4
2026-04-01	2026 Q2	FY2027 Q1
2026-12-31	2026 Q4	FY2027 Q3
2027-01-01	2027 Q1	FY2027 Q4

E12-X1 Apply only the supplied fiscal rule

For March 31 and April 1, 2026, provide calendar quarter and the separate April-start fiscal quarter named by ending year. Give the fiscal-month and fiscal-year formulas for a date in B2.

Submit: Four labels and two exact formulas.

13 Separate late arrival from a change in event timing

A09 was completed on March 31 and loaded on April 2. In a completion-based report, it is a late-arriving March record. A report produced before the load might not contain it, while a report produced after the load should include it in March once the source and dependent summary are updated. The event date has not changed; the available evidence has.

Suppose a March report was prepared on April 1 from records available then. It could show nine pages from A08 alone. After A09 arrives, the same completion-period report shows ten. Calling that difference April activity would confuse intake timing with event timing. Calling the earlier report fraudulent would also overstate what the data establishes; it may simply reflect an earlier as-of state.

A reproducible report records both event coverage and data availability. CompletedOn determines the bucket. LoadedOn helps explain when a record entered the source. A separate observation timestamp records when the report was refreshed or inspected. These are three different clocks. The workbook's file-modified timestamp is not a reliable substitute for all of them.

If an event date itself is corrected, the effect is different. A hypothetical authorized correction moving A09 from March 31 to April 1 would shift one page from Q1 to Q2 while preserving the all-source total. That is a source-fact change, not merely a late arrival. It would need evidence and a correction record. The main exercise does not authorize such a change.

When comparing two versions of a monthly report, first align their as-of state and scope. Then distinguish newly available records from corrected dates and changed grouping rules. A total difference can have several causes, and a stable grand total can conceal a period reallocation. Exact BatchIDs make these distinctions auditable without a long narrative.

Change type	A09 example	Effect on March	Effect on all-source total
Late arrival added to previously incomplete source	Same completion date, now available	9 to 10 pages	Increases by 1 relative to earlier source
Date correction in hypothetical copy	March 31 to April 1	10 to 9 pages	Unchanged at 73
Grouping changed to LoadedOn	No source fact changed	Different clock, not same report	Unchanged if population same
Refresh only after source current	No additional fact change	Brings cache into agreement	Should match current source

14 Make completeness visible in comparisons

A monthly comparison is meaningful only when its periods have comparable coverage. Complete March has ten pages, while April has nine supplied through April 15. It is arithmetically possible to subtract nine from ten, but describing the result as a full-month decline would be unsupported. The periods do not represent equivalent observation windows.

Do not automatically extrapolate April to a full month by doubling its partial total. The source does not establish a uniform scanning rate, operating-day schedule or expected future workload. An extrapolation would be a forecast with additional assumptions, not a grouped actual result. Keep the observed nine and its coverage label unless a separate forecasting task supplies those assumptions.

A complete zero month is different. May is explicitly complete with no batches, so zero is a supported actual result within this synthetic case. You can compare it descriptively with complete March, while still noting that the case does not explain why activity differed. A zero tells you the recorded amount, not the cause of the absence.

The quarter comparison is even more constrained. Q1 contains complete January, February and March, totaling 33 pages. Q2 contains partial April, complete-zero May and a June boundary test, totaling fifteen supplied pages. The two sums are correct, but Q2 is not a comparable closed quarter. A good report presents the supplied total with a coverage caveat rather than hiding it or claiming a performance change.

Coverage metadata should travel with copied tables. If a stakeholder exports only the numeric columns and drops the status column, the result becomes easier to misread. Design the report so the coverage label is adjacent to the period and amount. The purpose is not to discourage comparison, but to ensure that a comparison answers a question the evidence can support.

15 Diagnose a wrong-period report using invariants

Suppose a report still totals 73 pages but shows 2026 Q1 as 38 and Q2 as ten. The grand total passes, yet the quarter allocation is wrong. The five-page A10 record on April 1 has likely been assigned to Q1. This is a useful hypothesis because the difference between expected and observed quarter totals is exactly five in opposite directions. Confirm it by inspecting the record and grouping boundary.

Another report shows January as 28 with no year hierarchy. That result is the sum of the three supplied January years. The arithmetic is not random; the grouping key lost the year. A third report shows March eleven and April ten because it uses LoadedOn: A07 moves from February into March, while A09 moves from March into April. Each defect produces a recognizable numerical pattern, but the pattern should guide inspection rather than replace it.

A source with a text event date may behave differently again. If A09's CompletedOn is unrecognized text, native grouping may fail or a formula may omit it from date comparisons, depending on the path. Do not make a universal claim about every application response. Check the type, validate the exact date and use explicit helpers once the representation is correct.

The most useful invariants are population count, page total, one-bucket membership and boundary assignment. A dropped row changes count and amount. A misclassified row preserves count and grand amount but shifts buckets. A duplicated boundary changes count and amount. A yearless key reduces the number of distinct periods while preserving the total. These patterns help you identify where to look first.

After a repair, repeat both the total reconciliation and the relevant boundary tests. Correcting A10 should restore Q1 to 33 and Q2 to fifteen while leaving 73 unchanged. Restoring year-aware January keys should produce seven, thirteen and eight in three separate periods. A repair is complete when the observed change matches the diagnosed cause, not merely when the report looks plausible.

Observed defect	Likely cause	Specific check
Q1 38, Q2 10, total 73	A10 moved to wrong quarter	April 1 boundary and QuarterStart
January 28 without years	Month-only grouping	Year field or MonthStart key
March 11, April 10	LoadedOn used instead of CompletedOn	A07 and A09 plus the selected clock
14 batches, 72 pages	A09 omitted	ID membership and date type
16 batches, 74 pages	A09 duplicated	BatchID occurrences

E15-X1 Diagnose three reports

For the Q1/Q2 swap, yearless January and fourteen-batch/72-page reports, identify the likely issue and the exact record or key to inspect. Give the expected corrected figures without claiming the hypothesis is proven before inspection.

Submit: Three diagnostic records with expected outcomes.

16 Write a period report that another person can reproduce

A useful period-report title identifies the event and calendar, such as Completed scanning pages by calendar month. The scope note identifies the included source and as-of state. The column labels distinguish supplied pages, batch count and coverage. Together they tell a reader what was grouped, how it was grouped and how complete the evidence is.

The workbook's Calendar sheet has rows 5 through 12 for the eight-month spine. Column A is MonthStart, B is NextStart, C is supplied pages, D is batch count, E is coverage and F is the stated coverage-through date. Row 14 totals the numeric spine measures. The all-source controls on Control show fifteen batches and 73 pages. Keeping these controls separate prevents accidental comparison of different populations.

If you create a native pivot, save its source and grouping settings in your observation record. State whether it uses CompletedOn with native Years/Months grouping or the explicit MonthStart helper. Record actual refresh and reopening observations only when performed in Excel. The supplied workbook has formula helpers and controls, not a claimed completed native date-grouped PivotTable.

Do not report a hidden application check as passed merely because the expected arithmetic is known. Independent Python calculations can verify period assignments from the CSV, and inspecting saved formulas can verify the workbook's intended logic. Neither executes the native grouping interface. These checks are valuable when labelled correctly, and they leave a clear next action for a learner with the target application.

A compact handoff should include the 73-page all-source reconciliation, the 56-page spine reconciliation, the A09/A10 boundary trace and the April/May/June coverage distinction. Those four pieces of evidence address the most consequential traps in this case. They are more useful than a long list of menu clicks that does not state what the resulting report means.

E16-X1 Deliver monthly and quarterly views

Prepare all-source monthly and quarterly reports, plus the December-July calendar spine with coverage. Include exact formulas for MonthStart and QuarterStart, both total reconciliations, A09/A10 traces and a truthful execution record.

Submit: Three labelled views and a reproducibility note.

17 Extend the calendar safely after a new period appears

A recurring period report must handle dates beyond the current visible calendar. The source already contains A14 on December 31, 2026 and A15 on January 1, 2027, while the spine stops before August 2026. Their absence from the spine is intentional scope exclusion, not missing table membership. If the reporting window is extended later, add the required calendar rows and their coverage evidence rather than assuming the existing eight rows will display new months automatically.

The helper keys already assign A14 to MonthStart 2026-12-01 and QuarterStart 2026-10-01, and A15 to MonthStart and QuarterStart 2027-01-01. A year-aware native grouping or helper-based pivot should keep them separate. An extension test should inspect both records because they cross a calendar year and a quarter at the same time.

Do not fill August through November with confirmed zeros merely because no events are supplied. Those months have no coverage declaration in this case. If you extend a continuous spine through January 2027, mark them Not supplied unless new evidence establishes completeness. A numerical SUMIFS result of zero can remain a supplied-data result, but its interpretation must carry the status.

A grouping dialog may have start and end bounds. If a source gains dates outside those bounds, inspect how the report displays them and revise the grouping or helper approach as needed. Do not assume an old grouping range proves that new dates were included correctly. Explicit helper keys make the intended assignment visible, while native behavior still needs an application test.

The safe extension procedure is therefore: confirm new source dates and types, derive year-aware keys, extend the calendar's expected periods, attach coverage evidence, refresh any dependent pivot and reconcile both the full source and the intended window. Each step addresses a different boundary. The report is reusable because those boundaries are understood, not because future dates have been prefilled as blank records.

Record	CompletedOn	MonthStart	QuarterStart	Current spine status
A14	2026-12-31	2026-12-01	2026-10-01	Outside current window
A15	2027-01-01	2027-01-01	2027-01-01	Outside current window
No supplied August-November records	Not supplied	Expected calendar rows if extended	Coverage unknown	Do not assert confirmed zero

18 Build a record-to-period bridge before trusting subtotals

A record-to-period bridge lists each source identifier with its derived period keys. It is not another copy of the full source. Its purpose is to show the assignment decision that sits between event records and grouped totals. For Archive, the bridge contains BatchID, MonthStart, QuarterStart and Pages. Each BatchID should appear once, with one month and one quarter.

The bridge makes several checks possible without inspecting a pivot interface. Count its identifiers and compare with the source. Sum its Pages and compare with 73. Compare each MonthStart with the first day of that record's CompletedOn month. Compare QuarterStart with the quarter formula. A record with a missing key is unresolved, not a record to drop silently from the reconciliation.

Use a conservation statement: assigned pages plus unresolved pages equals all source pages. In the clean supplied case unresolved pages are zero and assigned pages are 73. If a hypothetical blank date affects A09, retain its one page in an unresolved category until the date is restored from evidence. The dated period total would be 72, but the source still contains 73 pages. This statement prevents missing dates from disappearing into an apparently smaller business population.

The same logic applies to batch counts. Fourteen assigned batches plus one unresolved batch equals fifteen source batches. A report that shows only fourteen and omits the unresolved record has lost evidence, even if it never displays an error. A report that assigns the unresolved batch to the load month has invented timing. The bridge lets you preserve both the source amount and the uncertainty about its period.

This is a diagnostic extension, not a request to make the clean source incomplete. Use the supplied correct keys below to review the formula columns and to understand what a failure would look like. The final accepted workbook retains all fifteen valid event dates. A useful verification method should be able to explain an invalid case without manufacturing that invalid case in the deliverable.

BatchID	MonthStart	QuarterStart	Pages
A01	2025-01-01	2025-01-01	7
A02	2025-12-01	2025-10-01	5
A03	2026-01-01	2026-01-01	4
A04	2026-01-01	2026-01-01	6
A05	2026-01-01	2026-01-01	3
A06	2026-02-01	2026-01-01	8
A07	2026-02-01	2026-01-01	2

BatchID	MonthStart	QuarterStart	Pages
A08	2026-03-01	2026-01-01	9
A09	2026-03-01	2026-01-01	1
A10	2026-04-01	2026-04-01	5
A11	2026-04-01	2026-04-01	4
A12	2026-06-01	2026-04-01	6
A13	2026-07-01	2026-07-01	3
A14	2026-12-01	2026-10-01	2
A15	2027-01-01	2027-01-01	8

E18-X1 Reconcile an unresolved event date

In a hypothetical copy, A09 has a blank CompletedOn but retains its known one page. Do not substitute LoadedOn. Calculate assigned batches/pages, unresolved batches/pages and all-source totals. State the evidence needed to restore period assignment.

Submit: A conservation ledger and a supported repair rule.

19 Audit the wrong clock with a complete alternative ledger

A wrong-clock report can be internally consistent. Grouping every Archive row by LoadedOn produces fifteen batches and 73 pages, exactly matching the source totals. Its monthly allocations differ because several records were loaded after a month or year boundary. This is why a total-only test cannot establish that the report answers a completion-based question.

The load-month ledger contains January 2025 seven pages, January 2026 fifteen, February eleven, March eleven, April ten, July nine and January 2027 ten. December 2025 disappears because A02 loads on January 1. June 2026 disappears because A12 loads on July 1. December 2026 disappears because A14 loads on January 1, 2027. These are coherent intake-month results, but they are not completion-month results.

Compare the two 2026 Q1 totals. Completion grouping gives 33 pages. Load grouping gives 37 because A02 brings five prior-year completion pages into the load quarter and A09 moves one completion page out into April. The net difference is four. Changes inside the quarter, such as A05 moving from January to February, alter month totals but not the quarter total. This decomposition distinguishes cross-month from cross-quarter effects.

A report using LoadedOn could be useful for a separate question about data arrival workload. If that question is requested, label it accordingly and retain the completion report separately. The problem is not that load dates are illegitimate; it is that silently substituting one clock for

another changes the question. Two valid reports can have different period allocations when their clocks are explicit.

To review a suspicious report, select boundary records that separate the clocks. A02 tests the year boundary, A05 the January-February boundary, A07 February-March, A09 the quarter boundary and A12 the June-July quarter boundary. Mid-month records such as A04 have the same month under both clocks and cannot reveal the substitution. Deliberately choosing discriminating examples makes testing efficient and precise.

Load month, separate analysis	BatchIDs	Pages
2025-01	A01	7
2026-01	A02, A03, A04	15
2026-02	A05, A06	11
2026-03	A07, A08	11
2026-04	A09, A10, A11	10
2026-07	A12, A13	9
2027-01	A14, A15	10
All load months	All 15 batches	73

E19-X1 Explain the four-page quarter difference

Calculate completion-based and load-based 2026 Q1 pages. Identify the records crossing into or out of that quarter and show the net adjustment. Keep both reports explicitly named by clock.

Submit: Two totals and an ID-level bridge.

Assessment

Choose one best answer per question. Questions 1–10 check the foundation concepts; questions 11–20 apply the extended study units. Complete and submit the practical tasks separately. A strong quiz score does not replace correct practical work.

1. Why retain Year alongside Month in the foundation report?

A. To count each receipt once per year it appears

B. To distinguish the same month in different years

C. To replace the original event date

D. To sort month names alphabetically

2. Under the stated calendar-quarter rule, where does 2026-04-01 belong?

A. 2026 Q2

B. 2025 Q4

C. 2026 Q4

D. 2026 Q1

3. Native date grouping fails. Which source check is most relevant?

A. Whether quantities have a percent format

B. Whether dates are valid typed values and contain blanks or text

C. Whether month names are abbreviated

D. Whether the source is sorted by quantity

4. The foundation December quantities are 4, 3 and 2. What is December total?

A. 9

B. 51

C. 18

D. 24

5. Foundation January is 18 and February 24. What is supplied 2026 Q1 quantity before boundary additions?

A. 24

B. 51

C. 18

D. 42

6. Which key preserves chronological month identity across years?

A. Month name alone

B. Month number alone

C. Quarter number alone

D. A real first-of-month date with its year

7. May is absent from a partial extract with no coverage declaration. What is defensible?

A. Report a confirmed zero

B. Copy April as an estimate without labelling it

C. Label coverage incomplete rather than inventing activity

D. Treat the last supplied date as proof of full coverage

8. Foundation baseline quantity 51 gains boundary records of 8 and 9. What is the new total?

A. 68

B. 51

C. 60

D. 59

9. When switching monthly to quarterly views with identical scope, which invariant should hold?

A. Exact row labels

B. Number of visible buckets

C. Grand quantity total

D. Number of rows displayed

10. No fiscal calendar is supplied, but calendar quarters are explicitly defined. Which rule applies?

A. A fiscal year inferred from the file name

B. The stated calendar quarters

C. A quarter starting at the first receipt

D. A rolling ninety-day window

11. A09 completed March 31 and loaded April 2. In the completion-based report, where does it belong?

A. April, because that is when it became available

B. Both months to reflect both dates

C. March 2026 and calendar Q1

D. An undated bucket

12. What total results from grouping all January records by month number alone?

A. 13

B. 28

C. 20

D. 8

13. Which March timestamp rule includes the whole month without including April 1?

A. Timestamp > March 1 and < March 31

B. Timestamp > March 1 and <= April 1

C. Timestamp >= March 1 and <= March 31 midnight

D. Timestamp >= March 1 and < April 1

14. Why is May 2026 zero a justified claim in the spine?

A. The supplied coverage statement declares May complete with no batches

B. The month follows a partial month

C. Every SUMIFS zero proves full coverage

D. The workbook has a row labelled May

15. Which statement about 2026 Q2 is accurate for the source?

A. 9 pages because June should be discarded silently

B. 15 pages proves the quarter is complete

C. 15 supplied pages, but not a fully closed operational quarter

D. 0 pages because any partial coverage invalidates addition

16. Why validate components after using DATE to parse 2026-02-30?

A. DATE always stores text

B. All February dates are ambiguous

C. A numeric result proves the input was valid

D. DATE can normalize impossible components into a different date

17. Under the separate fixed UTC+02:00 rule, 2026-03-31T23:30:00Z belongs to which local period?

A. March 2026 Q1

B. April 2026 Q2

C. March 2026 Q2

D. April 2025 Q2

18. Under an April-start fiscal year named by ending year, April 1, 2026 is what?

A. FY2026 Q1

B. FY2026 Q4

C. 2026 calendar Q1

D. FY2027 Q1

19. A report shows 2026 Q1=38, 2026 Q2=10 and an all-source total of 73. Which record is the first boundary suspect?

A. A10, five pages on April 1

B. A01, seven pages in January 2025

C. A15, eight pages in January 2027

D. A06, eight pages on February 1

20. What is the correct comparison between all-source and December-July spine totals?

A. Both must be 73

B. Both must be 56

C. 73 and 56 are correct for different declared populations

D. The 17-page difference proves duplicate rows

Sources and further reading

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