

12-hour and 24-hour time calculations

CURRICULUM ALIGNMENT

MEA.TIM.4

solve and pose practical tasks and problems involving the interpretation and calculation of time.

INTERACTIVES (Analog Clock Builder · challenge, display, explore)

WHAT THIS LESSON TEACHES

A way of writing the time that runs from 00:00 at midnight right through to 23:59, so the hour number alone tells you whether it is morning, afternoon or evening – no a.m. or p.m. needed.

→ A train board showing 16:45 means quarter to five in the afternoon.

→ 1:15 p.m. becomes 13:15 because $1 + 12 = 13$; 7:20 a.m. stays as 07:20.

MODEL THIS ON THE BOARD

CONVERT 3:45 P.M. TO 24-HOUR TIME

- 1 The hour is 3 in the afternoon so add 12 to get 15.
- 2 The minutes stay the same at 45.
- 3 Write it as 15:45.

LESSON ARC

Open with the train-board interactive showing 16:45 beside a kitchen clock reading quarter to five in the afternoon — pupils argue whether they match. Watch and Notice walks the inner 13–24 ring of the clock, pivoting on 'after midday, add twelve' and the make-or-break midnight/noon pair. Pupils build a two-column 12-hour/24-hour table in their copy, underlining every add-twelve row. Student Activity Book practice follows.

TEACHING MOVES

1. **Getting Started.** Take three hands-up answers only, not call-outs. You want the split surfaced — some pupils see 16:45 and 'quarter to five' as the same time, some as separate. Don't resolve it; that's the job of Watch and Notice.
2. **Watch and Notice.** Point at the inner 13–24 ring and the digital readout together on each clock. Say 'one plus twelve is thirteen' aloud for 13:15. Do NOT rush midnight/noon — ask the class to say both back ('midnight is zero-zero-zero-zero', 'noon stays twelve') before moving on.
3. **Try It Together.** Call one pupil up per time to set the clock; the rest work out the 24-hour form in their heads and say it aloud before the readout confirms. Listen for the p.m. slip — pupils saying 3:45 instead of 15:45. Revoice 'after midday, add twelve' each time.
4. **Build the Table in Your Copy.** Walk the room glancing for missing leading zeros — the common slip is writing 7:20 a.m. as 7:20, not 07:20. Check the underlined rows are exactly the afternoon ones. This is practice, not marking, so keep moving.
5. **Class Challenge.** Keep the board brisk — the bank rises from 08:05 (straight read) to 00:15 (the midnight trap) and finishes with 'twenty to midnight' going words-to-24-hour. Pupils check each answer as they go; the class confirms before the next. Don't re-explain each item.

6. **What Did We Notice?** Listen for pupils naming the ambiguity of '5:00' — could be morning or evening. Revoice a strong one: 'so the 24-hour clock never leaves any doubt about which 5 o'clock you mean.' Head off the idea that 24-hour time is harder.

COMMON MISCONCEPTIONS

⚠ Pupils read 00:15 as a quarter past noon ('twelve fifteen p.m.') because both midnight and noon read '12' on an ordinary clock.

Stop and revoice 'zero-zero hours is midnight — the day starting again from zero.' Set 00:00 on the analog clock and contrast it directly with 12:00 noon so pupils see the two different '12's side by side.

⚠ Pupils forget to add twelve to p.m. times — they say 3:45 p.m. is 3:45 in 24-hour form instead of 15:45.

Catch it in Try It Together. Point at the inner 13–24 ring on the clock and re-voice 'after midday we keep counting — three becomes fifteen.' Have the pupil restate the full rule before the readout confirms.

⚠ Pupils drop the leading zero, writing 7:20 a.m. as 7:20 rather than 07:20.

While walking the copybook table, point at the train-board format — every 24-hour time has two digits before the colon. Have pupils correct it in their copy on the spot so the four-character shape sticks.

DIFFERENTIATION

EMERGING

- Keep these pupils on a.m. times first (07:20, 08:30, 06:05) where the hour stays the same and only the leading zero changes — bring them into add-twelve once that's secure.
- Give a copybook table with the column headings and one worked row already filled, so pupils copy the pattern rather than invent the structure.

DEVELOPING

- After the copybook table, ask pupils to convert 24-hour back to 12-hour for two of their own rows — the reverse subtract-twelve move.
- Pose 'twenty past midnight' and 'ten to noon' as words-to-24-hour challenges before the Class Challenge bank reaches them.

PROFICIENT

- On the IWB during the Class Challenge, narrate a harder variant: 'a flight leaves at 23:50 and the gate closes ten minutes before — what 24-hour time is that?' Let them reason across the midnight boundary toward elapsed time.
- Ask: why does 24-hour time never need a.m. or p.m. but a 12-hour clock does? Have them explain it as if to a younger pupil in their copy.

✚ **Cross-curricular:** Tie to Geography — read a real Irish Rail or Bus Éireann timetable (e.g. Dublin to Cork departures) and convert the 24-hour times to 12-hour form.

ANSWER KEY

Scaffold: visual check on the page

Q1: 08:30

Q2: 06:05

Q3: 23:10

a) Always — Any p.m. time from 1:00 to 11:59 adds 12.

b) Never — 12:00 p.m. noon stays 12:00 while midnight is 00:00.

c) Sometimes — It keeps the zero only if the hour is less than 10.

d) Always — Minutes stay exactly the same in both forms.

EXTENSION SHEET · STRETCH ANSWERS

S1: 12:35 pm ↔ 12:35

S4: 3:35 pm ↔ 15:35

S2: 11:15 am ↔ 11:15

S5: 8:55 pm ↔ 20:55

S3: 12:50 pm ↔ 12:50