TEACHER RESOURCE BOOK · MATHS FOR 6TH CLASS

Lesson 10 NUMBER

Negative numbers in context and on the number line

CURRICULUM ALIGNMENT

NUM.PVT.4 investigate how decimals and percentages (and fractions) can be compared, ordered and expressed in related terms.

INTERACTIVES Number Line · display, explore | Word Problem · challenge

WHAT THIS LESSON TEACHES

A number less than zero is written with a minus sign in front of it such as −4. On a number line these sit to the left of zero.

→ A thermometer reading of −4 °C means four degrees below freezing.

→ A temperature falling from +2 °C to −5 °C is a drop of 7 degrees.

MODEL THIS ON THE BOARD

TEMPERATURE CHANGE ACROSS ZERO

1. Start at +2 °C and count down to zero: that is 2 degrees.
2. Then count from zero down to −5 °C: that is 5 more degrees.
3. Add the two parts: 2 + 5 = 7 degrees drop.

LESSON ARC

Open with the thermometer image reading −4 °C and pull for 'below zero', not just 'cold'. Move to the −10 to +10 number-line interactive and walk three snapshots — a static line, a lift ride from −3 to +9, and a Birr temperature fall that pivots on 'two down to zero, then five more, that's seven'. Pupils sketch and label their own line in copybook, then the class tackles temperature-change problems at the board. The negative-numbers Student Activity Book page is the seat-work.

TEACHING MOVES

1. **Getting Started.** Put the −4 °C thermometer up and give five seconds of silent think-time before any hands. Fish specifically for 'below zero' or 'below freezing' — if you hear 'very cold', ask 'how do we know it's below and not above?'
2. **Watch and Notice.** Walk the three snapshots one at a time on the interactive, saying each marker's distance from zero aloud ('eight to the left, six to the right'). On the Birr fall, count '2 down to zero, then 5 more' — pause before 'seven' and let a pupil land it. Say both cases aloud: crossing zero adds the two parts, staying one side counts within it.
3. **Try It Together.** Before each of −6, −9, +4 and 0 goes on the line, take a thumb-left / thumb-right prediction from the whole class so the back rows commit. Watch for 'the −9 is smaller so it's nearer zero' — revoice the fix: 'the bigger the digit after the minus, the further left it sits.'
4. **Sketch the Line in Your Copy.** As pupils sketch the −10 to +10 line, glance for two things only: is zero sitting in the middle, and do the negatives run left? A squashed or off-centre zero is the tell — no marking, just a quiet nudge to redraw.
5. **Class Challenge.** Keep the board turns brisk — pupils solve, the class confirms, move on. The one thing to protect: the first problem (−16 to −19) stays below zero so it's a plain 3-degree drop, while the rest cross zero and add two parts. Don't let a pupil apply the crossing rule to the freezer.

6. **What Did We Notice?.** Take real contexts — freezers, forecasts, lift buttons, being overdrawn. Head off 'negatives are just tiny numbers': revoice a strong answer as 'how far below zero, below ground, or below what we had.'

COMMON MISCONCEPTIONS

⚠ Pupils say −9 is closer to zero than −6 because 'nine is bigger, so it's a bigger number, so... no wait' — they rank negatives by digit size as if they were positive.

Place −6 and −9 on the interactive line and trace from zero to each. The bigger digit after the minus is further below zero, so it sits further left and is the smaller number. Say it as they watch: 'further left, further down, smaller.'

⚠ For a fall from +3 °C to −4 °C, pupils answer '1' — they subtract the digits (4 − 3) instead of counting across zero.

Stop and finger-trace the drop on the line: +3 down to zero is 3, then zero down to −4 is 4 more, total 7. Circle the zero as pupils count so they see the two parts join at the boundary.

⚠ Pupils apply the 'add the two parts' rule to the freezer problem (−16 to −19) and get 35, because they've generalised the crossing-zero rule to every question.

Ask 'does this one cross zero?' before any counting. Show on the line that both markers sit on the left, so it's a plain count within the negatives — a 3-degree drop. Make the class check for the zero crossing first every time.

DIFFERENTIATION

EMERGING

- Stay with a −5 to +5 stretch of the line so there are fewer markers to track, then extend once zero-as-middle is secure.
- For the copybook line, give pupils the zero and the two endpoints already marked so they only place the whole numbers in between.

DEVELOPING

- After the Class Challenge, ask pupils to write their own temperature-change problem that crosses zero and gives an answer of exactly 8 degrees.
- Pose a rise this time: from −7 °C to +2 °C — is the change the same size as the +2 to −7 fall? How do they know?

PROFICIENT

- Narrate a harder variant at the board: 'a lift goes from −3 to +9, then back down to +1 — how many floors did it travel in total?' Pull for the two-leg count (12 up, 8 down).
- Send fast finishers ahead into the negative-numbers Student Activity Book page and ask them to jot, in one line, the rule for spotting when a change crosses zero.

↗ **Cross-curricular:** Tie to Geography — pupils read a winter weather forecast for a few Irish towns and work out which had the biggest overnight temperature drop.

ANSWER KEY

c) 0; left: −8, −5, −3

Q1: 8 °C

Q2: 3 floors

Q3: 11 °C

a) Always — By definition negative numbers sit left of zero.

b) Never — −3 is always warmer than −8 because it is closer to zero.

c) Always — Any change from positive to negative must cross zero.

d) Never — It always crosses zero.

EXTENSION SHEET · STRETCH ANSWERS

S1: $-1 < 7 < 8 < 14$

S2: $-10 < -4 < 4 < 6$