Negatives in all four operations

Teacher		**Class**	Year 7
Subject	Maths	**Topic**	Calculating with negative numbers
Date		**Room**	
Lesson length	60 minutes	**Country**	United Kingdom

Pupils calculate with negative integers, decimals, fractions and mixed numbers. They use formal written methods and solve lift, temperature and money problems.

Curriculum links

- use the 4 operations, including formal written methods, applied to integers, decimals, proper and improper fractions, and mixed numbers, all both positive and negative

Learning objectives

- Students will add and subtract negative integers, decimals and fractions correctly.
- Students will multiply and divide positive and negative numbers including mixed numbers.
- Students will use formal written methods and decide the correct sign.

Success criteria

- I can add and subtract with negatives using a number line and columns.
- I can multiply and divide with negatives and explain the sign rule.
- I can use formal methods for decimals, fractions and mixed numbers.

What students already know

Show -4, -1, 0, 2 on a number line. Ask pupils to order them and work out 2 - 5, building on number lines and negative numbers met in key stage 2 [2].

Key words

integer	a whole count that can be below zero, zero, or above zero
decimal	a value with a point dividing ones from tenths and hundredths
directed number	a value with a plus or minus sign showing its side of zero
common denominator	a shared bottom part that lets two parts be added or compared
mixed number	a whole count joined with a part of a whole, such as one and a half

Materials

- problem cards for lift, temperature in °C and bank balance in pounds
- thermometers drawn on squared paper
- mini-whiteboards and pens
- squared paper, pencils and place-value grids
- Slides 1–12
- Worksheet Tasks B and C printed

Before the lesson

- Print problem cards, thermometer sheets and Worksheet Tasks B and C
- Test Slide 6 Video clip 1 KS3 add, subtract, multiply, divide negatives (0:00–2:59)
- Set out mini-whiteboards and arrange tables for groups of three or four

Lesson outline

0–5 min **Starter** 5 min · Whole class

To hook pupils with a directed-number problem and recall ordering negatives.

YOU DO

1. Show Slide 1 Plus or Minus? Calculating with negative numbers and Slide 2 objectives.
2. Say the hook: The lift is on floor -2. It goes down 3, up 7, then down 5. Where does it stop?
3. Ask pupils to write the journey as number sentences on mini-whiteboards.
4. Take two answers and draw jumps on a floor number line below and above zero.

STUDENTS DO

1. Write each lift move as a number sentence on mini-whiteboards.
2. Hold up the final floor and explain up or down moves.

Say: You are going to be lift engineers today. Down means subtract and up means add. Write each move and tell me where the lift stops and how you know.

Worked example: -2 - 3 = -5, then -5 + 7 = 2, then 2 - 5 = -3, so the lift stops on floor -3.

Ask: The lift is on floor -2 and goes down 3. Where is it now? (-5, 3 further below zero) · From -5 it goes up 7. Where does it stop? (2, move 7 up towards and past zero)

Check understanding: All boards up on the count of three. If many are wrong, model -2 to -5 on the board line before moving on.

Support: Give a -10 to 10 floor line and do one move at a time. **Stretch:** Ask pupils to write the whole journey as one line: -2 - 3 + 7 - 5 = -3.

Use: Slides 1–2

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5–17 min **Teaching: add and subtract** 12 min · Whole class

To model adding and subtracting negative integers and decimals with formal methods.

YOU DO

1. Show Slide 3 steps for spotting signs and operation first.
2. Model Slide 4 examples -5 + 8 = 3 as move up and -4 - 6 = -10 as move further down.
3. Play Video clip 1 (0:00–2:59) on Slide 6 about moving up or down and taking away a negative.
4. Model column layout for -3.6 - 2.4 with decimal points lined up, then decide the sign.

STUDENTS DO

1. Track each jump on printed number lines.
2. Discuss Slide 5 in pairs: A student says -2 - -5 = -7. Do you agree?
3. Write the corrected sentence and show the jump from -2 up 5 to 3.

Say: First look at the signs and the operation. Work out the size of the numbers, then decide if you move up or down the line. For decimals, line up the points in columns and work just like positive money in pounds.

Worked example: -3.6 - 2.4 = -6.0. Line up 3.6 over 2.4, add 36 tenths + 24 tenths = 60 tenths = 6.0. Both amounts are negative, so the answer is 6.0 below zero, -6.0.

Ask: Why is -2 - -5 not -7? (Subtracting a negative moves right, so -2 + 5 = 3) · For -4.25 + 6.80, how do you decide the sign? (Work out 6.80 - 4.25 = 2.55, the larger amount is positive so answer is +£2.55) · What does adding zero do to a negative? (Nothing, it stays the same [5])

Check understanding: Hinge on mini-whiteboards: show -24 + 13. Expect -11. Reteach with jumps if sign errors dominate.

Support: Keep to one decimal place on a large -10 to 10 line and use place-value grids for columns. **Stretch:** Predict and explain -9 + 4 - (-2) = -3 using a double-negative step.

Use: Slides 3–6, Video clip 1 (0:00–2:59)

17–30 min **Teaching: multiply, divide and fractions** 13 min · Whole class

To teach sign rules for multiplication and division and extend them to fractions and mixed numbers.

YOU DO

1. Show Slide 7 cards: -24 + 13 = -11, -3.6 + 1.2 = -2.4 and -2/3 + 5/6 = 1/6.
2. Teach the sign rule: same signs make positive, different signs make negative for multiply and divide, linked to Year 7 Four Operations [1].
3. Model -1 1/2 x 4 by changing to an improper fraction and using short multiplication.
4. Show Slide 10 fact that adding zero never changes a number, called the additive identity [5].

STUDENTS DO

1. Copy the sign rule and test it on -3 x 4 = -12 and -20 ÷ -5 = 4.
2. Convert -2/3 + 5/6 to -4/6 + 5/6 = 1/6 on fraction strips.
3. Practise changing 1 1/2, -2 1/4 and -3 1/2 to improper fractions.

Say: For times and divide, ignore the minus signs first, work out the numbers, then fix the sign. Same signs give a positive answer, different signs give a negative answer. For fractions to add or subtract, get a common bottom part first, then fix the sign.

Worked example: -1 1/2 x 4 = -3/2 x 4/1 = -12/2 = -6. Work out 3 x 4 = 12 and halve direction gives 6, different signs from negative and positive give negative. For division, -3 1/2 ÷ 2 = -7/2 x 1/2 = -7/4 = -1 3/4, using lengths in metres.

Ask: Why is -3 x 4 = -12 but -20 ÷ -5 = 4? (Different signs make negative, same negatives make positive) · How do you work out -2/3 + 5/6? (Use sixths: -4/6 + 5/6 = 1/6)

Check understanding: Cold-call two pupils to convert and multiply -2 1/4 x 1 1/5 steps. Correct whole-number and sign slips on the board.

Support: Provide conversion boxes for whole number, top number and sign, and limit divisors to whole numbers at first. **Stretch:** Ask pupils to calculate -2 x 3 x -4 = 24 and explain why two negatives make a positive.

Use: Slides 7 and 10

30–50 min **Main activity: Lift and Thermometer Challenge** 20 min · Groups

To solve multi-step problems with negatives using formal written methods.

YOU DO

1. Give out problem cards, thermometer sheets and Worksheet Tasks B and C for recording.
2. Set the task: choose the operation for each lift floor, temperature change in °C and bank balance in pounds, show formal column or fraction working, then check sense on the line [1].
3. Circulate, asking groups to read back working for -1.5 + (-2.5), -4 ÷ 2 and -1/2 - 3/4.
4. Stop halfway to model one fraction solution with equivalent fractions and sign fix.

STUDENTS DO

1. Solve cards such as -1.5 + (-2.5), -4 ÷ 2 and -1/2 - 3/4 with formal working.
2. Mark a partner's columns and fraction steps for layout and sign.
3. Present one solution on the board with units £, °C or floors.

Say: Work in threes. Read the card, decide add, subtract, multiply or divide, then show full columns or fraction steps. Use the thermometer line to check your landing point makes sense. Swap and mark for layout and sign.

Worked example: -1/2 - 3/4 = -2/4 - 3/4 = -5/4 = -1 1/4. Same bottom part of fourths, add sizes 2 + 3 = 5 fourths, both below zero so negative. On the thermometer that is 1 1/4 degrees below zero.

Ask: Bank balance is -£4.25, you pay in £6.80. Are you in credit? (Yes, -4.25 + 6.80 = £2.55) · Temperature is -3 °C and rises 4 degrees. What now and which operation? (-3 + 4 = 1 °C, addition)

Check understanding: Collect one marked sheet per group and check formal layout and signs. If columns are misaligned, re-model decimal points on the visualiser.

Support: Give a word bank for add, subtract, multiply and divide and start with integer-only cards. **Stretch:** Give a problem with a mixed number temperature change, such as -2 1/2 degrees plus -3 1/4 degrees.

Use: Slide 9, Worksheet Tasks B–C

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50–60 min **Plenary** 10 min · Whole class

To check fluency across integers, decimals and fractions and return to objectives.

YOU DO

1. Show Slide 11 mystery: the red line sits below zero at -4 °C, 4 degrees below zero, so a negative number.
2. Run Slide 12 quick quiz: -7 + 4, -2.4 - 3.6, -5/6 + 1/3 and -2 1/2 x 2.
3. Ask pupils to show formal jottings for each and explain any sign slip.

STUDENTS DO

1. Answer the four quiz questions on mini-whiteboards.
2. Self-mark and state which success criterion is now secure.

Say: Prove you have met all three targets. Work each quiz question with full columns or fraction steps. Tell your partner how you knew the sign before you show me.

Worked example: -5/6 + 1/3 = -5/6 + 2/6 = -3/6 = -1/2. -2 1/2 x 2 = -5/2 x 2 = -10/2 = -5.

Ask: -7 + 4 = ? How do you know the sign? (-3, move up 4 from -7 but stay below zero) · Why is -2 1/2 x 2 = -5? (5/2 x 2 = 5, different signs give negative)

Check understanding: Exit tickets on boards: -3, -6.0, -1/2, -5 expected. Keep pupils with two or more errors for same-day catch-up.

Support: Allow a number line to check each sign change and offer integer-only version first. **Stretch:** Add a two-operation star: -2 x 3 + 4 = -2, times before add.

Use: Slides 11–12

Common mistakes

Mistake	How to spot it	How to fix it
Writing -2 - -5 = -7 instead of +3	Answer more negative after subtracting a negative	Show jump right on the line: take away a negative turns to add, so -2 + 5 = 3 [2]
Giving a positive answer for different signs in multiplication	Says -3 x 4 = 12	Rehearse rule card: same signs make positive, different make negative, check with estimation
Adding fractions without a common denominator, e.g. -1/2 - 3/4 = -4/6	Bottom numbers added or unchanged halves and quarters mixed	Overlay fraction strips to see quarters needed: -2/4 - 3/4 = -5/4 [1]

Support

- Give a word bank for add, subtract, multiply and divide and start with integer-only cards.
- Use large -10 to 10 lines, place-value grids with £ and decimal point, and pre-shaded halves, quarters and eighths.
- Provide worked templates with boxes for whole number, top number and sign.

Stretch

- Give a problem with a mixed number temperature change, such as -2 1/2 degrees plus -3 1/4 degrees.
- Ask pupils to predict and test -9 + 4 - (-2) and three-factor products like -2 x 3 x -4.
- Set missing-digit columns like -3._4 + 1.2_ = -2.15 and divisions leaving a proper fraction.

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For the LSE or teaching assistant

Sit with the focus group during the main challenge. Prompt choice of operation from the word bank, check decimal points are lined up and fraction bottom parts match, and scribe the sign rule for pupils to repeat back.

Check for understanding

Question	Answer
-7 + 4 = ?	-3
-2.4 - 3.6 = ?	-6.0
-5/6 + 1/3 = ?	-1/2

Homework

Complete four Worksheet Task C fraction and mixed-number questions showing formal working.

Sources

1. Year 7 Maths - Curriculum Map · gosford-hill.oxon.sch.uk · https://gosford-hill.oxon.sch.uk/wp-content/uploads/2026/02/Year-7-Maths-%E2%80%93-Curriculum-Map.pdf
2. Year 7 Maths Curriculum Map - fishermore.lancs.sch.uk · fishermore.lancs.sch.uk · https://fishermore.lancs.sch.uk/wp-content/uploads/2026/09/Year-7-Curriculum-Map-Maths.pdf
3. Natural number · Wikipedia · https://en.wikipedia.org/wiki/Natural_number
4. Calculator · Wikipedia · https://en.wikipedia.org/wiki/Calculator
5. 0 · Wikipedia · https://en.wikipedia.org/wiki/0

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