

Forming an equation from a story

CURRICULUM ALIGNMENT

ALG.EXP.4

articulate, represent and solve mathematical situations through the use of expressions and equations that include letter-symbols.

ALG.PRR.4b

represent mathematical structures in multiple ways, including verbal expressions, diagrams and symbolic representations.

INTERACTIVES

Function Machine · display, explore

Word Problem · challenge

WHAT THIS LESSON TEACHES

A letter stands for the number we do not yet know and holds its place in the equation. Words in the story tell which operation to write with that letter.

→ Niamh started with b books; her sister gave 4 more and she now has 11, so $b + 4 = 11$.

→ Conor had s sweets, ate 3 and has 9 left, so $s - 3 = 9$.

MODEL THIS ON THE BOARD

CONOR'S SWEETS STORY

- 1 Let s stand for the sweets Conor started with.
- 2 Ate 3 becomes take away, so write $s - 3$.
- 3 Has 9 left becomes equals 9, so the equation is $s - 3 = 9$.
- 4 The letter s holds the place of the unknown start number.

LESSON ARC

Open with Niamh's book story on the IWB and hold pupils on writing $b + 4 = 11$ without resolving it. Run four stories through the function-machine interactive, drawing out the signal word each time (more, left, equal pieces, shared equally). Feed Conor's sweets through together, then solve two more on the board without the machine. Pupils write a three-line solution — name the letter, equation, solve — in their maths copy, then work the Class Challenge bank together.

TEACHING MOVES

1. **Getting Started.** Give five seconds of quiet think-time before hands go up, and take two or three hands, not call-outs. Steer toward $b + 4 = 11$ as the shape you want — but don't resolve it to 7 yet. If a pupil blurts the answer, say 'that's where we're heading, but first — what did Niamh start with? We don't know it, so give it a letter.'
2. **Watch and Notice.** Run all four stories through the function-machine interactive, but before you reveal each output, ask 'what number goes into the machine to leave this?' On Tara's ribbon and Ben's stickers especially, pause on the signal word — 'equal pieces' and 'shared equally' — and have the class predict the input before you show it.
3. **Try It Together.** Feed Conor's sweets through the machine (it's set to subtract 3, so it only fits that story). For Saoirse's savings and the shelf story the machine's rule wouldn't match — keep those on the board: ask for the signal word, name the letter, write and solve without the machine. Revoice a strong answer: 'the story said left, and that told us to take away.'
4. **Write the Equation in Your Copy.** Walk the room glancing at the three-line layout — name the letter, equation, solve. Watch specifically for pupils who skip the 'Let $s = \dots$ ' line and jump to an answer; that

line is what makes the next lesson's two-step work readable. Only the shelf story is theirs to write, so timing is comfortable.

5. **Class Challenge.** Brisk practice — pupils take turns at the board, check each answer, class confirms before moving on. The interactive grades the operation as well as the answer, so fold the ✓ into your narration: 'yes — it wanted altogether, so add, and 21 is right.' On the Football teams problem, hold the class on the signal words before anyone types.
6. **What Did We Notice?.** Display-only talk. Listen for pupils naming signal words, then head off the trap that 'more' always means add — a story can ask 'how many more do you need' and want subtraction. Revoice: 'so each by itself isn't enough — we have to read whether we know how many groups or how many in a group.'

COMMON MISCONCEPTIONS

⚠ For Aoife's voucher ("...has €12 left"), pupils see the story as growing and add rather than subtract — they write the spend onto the leftover.

Send it through the function-machine interactive both ways so the class sees adding gives the wrong output. Anchor on the word 'left': 'left means something was taken away — so the machine takes away.'

⚠ Pupils treat 'more' as an automatic add signal, so on 'how many more do you need to reach 20' they add when the story wants a subtraction.

During What Did We Notice?, read that exact phrasing aloud and ask the class to act it out — you have some, you need to get to 20, what's the gap? Show it's the missing part, so we take away.

⚠ Pupils skip the 'Let $s = \dots$ ' line and write only the equation and answer, so it's unclear what the letter stands for.

Stop and point at the two worked layouts on the board. 'If I read only your middle line, do I know what s is?' Make the naming line non-negotiable — it's the habit that carries into next lesson's two-step work.

DIFFERENTIATION

EMERGING

- Give these pupils only the add and subtract stories in the copybook round; feed each through the function-machine interactive with them at the teacher table before they write.
- Pre-write the 'Let $___ = \dots$ ' line so they fill the blank and focus on choosing the operation, not inventing the whole layout.

DEVELOPING

- After the shelf story, ask them to invent their own sharing story that hides a division, then swap the numbers so the answer is a two-digit input.
- Give a missing-number twist: $5 \times w = 45$ written first, and ask them to write a Saoirse-style savings story that matches it.

PROFICIENT

- Pose: write one story where the word 'more' appears but the operation is subtraction — then read it to the class and see if they get caught. This pins down the signal-word trap from the maths-talk step.
- Pull them ahead into the pencil taster from What's Next: 3 pencils cost €1.20 — can they write an equation with the letter and describe the two jobs the machine would do?

✂ **Cross-curricular:** Tie to English — pupils underline the signal word in each story sentence, the way they'd underline a key word when comprehending a passage.

ANSWER KEY

a) $b + 4 = 11$

b) $n - 2 = 6$

c) $5 \times 7 = c$

Q1: $b + 4 = 11$; $b = 7$

Q2: $s - 3 = 9$; $s = 12$

Q3: $s + 8 = 25$; $s = 17$

Q4: $b - 12 = 18$; $b = 30$

Q5: $1 + 9 = 16$; $1 = 7$

Q6: $s / 5 = 7$; $s = 35$

a) **Always** : More tells us to add a number to the letter for the unknown.

b) **Never** : Any letter can hold the place of the number we do not yet know.

c) **Always** : Left signals that we take away from the starting amount.

d) **Sometimes** : The letter sits wherever the unknown amount belongs in the story.

EXTENSION SHEET · STRETCH ANSWERS

S1: $x = 12$

S2: $x = 8$

S3: $x = 14$

S4: $x = 10$

S5: $x = 14$