

Fact families and the link between + and –

CURRICULUM ALIGNMENT

NUM.OPS.3

understand and apply flexibly the four operations; and the relationships between operations.

ALG.EXP.3

represent and express problems with known and unknown values in different ways to include the use of appropriate letter-symbols or words.

INTERACTIVES Number Bonds · challenge, display, explore

WHAT THIS LESSON TEACHES

A fact family is the set of four number sentences from the same three numbers: two additions and two subtractions. The biggest number is the whole and the other two are the parts that make it.

→ From 3, 5 and 8: $3 + 5 = 8$, $5 + 3 = 8$, $8 - 3 = 5$, $8 - 5 = 3$.

→ In the 4, 6, 10 family, 10 is the whole and 4 and 6 are the parts.

MODEL THIS ON THE BOARD

FACT FAMILY FOR 2, 7 AND 9

- ① The numbers are 2, 7 and 9. The whole is 9.
- ② Write both additions: $2 + 7 = 9$ and $7 + 2 = 9$.
- ③ Write both subtractions: $9 - 2 = 7$ and $9 - 7 = 2$.
- ④ Read each sentence aloud to check the balance stays true.

DISCUSSION STARTER

REFLECT

How does knowing one fact in a family help you write the other three?

LESSON ARC

Open by putting 3, 5 and 8 on the board and challenging pupils to make true sentences from just those three — hold out for a take-away, don't complete the family yet. Watch and Notice pivots on the number-bonds interactive: cover the whole to reveal the two adds, cover a part to reveal the take-away. Pupils build 4, 6 and 10 in their copies. The Class Challenge practice round runs missing-number bonds, ending on the flip where the whole itself is hidden.

TEACHING MOVES

1. **Getting Started.** Put 3, 5 and 8 up and give ten seconds of quiet think-time before any hands. Take three hands-up answers, not call-outs. When you get $3 + 5 = 8$, don't confirm — ask 'anyone got a take-away one?' and leave the family open.
2. **Watch and Notice.** On the number-bonds interactive, point at each part then the whole and ask 'which two sentences add up to the whole?'. Then cover the whole, then cover a part, so the class sees the add and the take-away come from the very same picture. On the 10 and 9 bonds, let a pupil read all four facts before you confirm.
3. **Try It Together.** Pupils take turns building the two parts on the steppers until the whole lights up, then read all four facts aloud before checking. Revoice a strong one: 'once you know 4 and 3 make 7, you already know 7 take 4 leaves 3.' Watch for take-aways written with the parts in the wrong order — steer back to the picture, whole first.

4. **Write the Fact Family in Your Copy.** Pupils write all four sentences for 4, 6 and 10, each take-away starting with the whole, 10. Walk the row glancing for the whole starting each subtraction and both add orders present — this is copybook practice, not marking.
5. **Class Challenge.** Reveal bonds one at a time and keep the board work brisk. For the first three, ask 'is the box a part or the whole?' — it's a part, so a take-away finds it. Flag the flip as the final bond appears: 'this time the box is the whole, not a part' — pause there and let the class add the two parts.
6. **What Did We Notice?.** Ask how knowing one fact handed them the other three without fresh working. Listen for 'the parts and whole stay the same — only the order and sign change', and revoice: 'so adding and taking away are just the same three numbers looked at two ways.'

COMMON MISCONCEPTIONS

⚠ A pupil writes the take-away starting with a part instead of the whole — ' $3 - 8$ ' or ' $5 - 8$ ' — because they copy the parts in the order they see them.

Send them straight back to the number-bonds picture: the big circle holds the whole, and a take-away always starts from the whole. Cover a part on the interactive and read it as 'whole, take the part you can still see'.

⚠ On the last Class Challenge bond, a pupil takes away — 'the whole is 8 take 3' — because every earlier box was a part, so they reach for a take-away out of habit.

Pause on the flip. Point out both small circles are filled (8 and 3) and the big circle is empty, so the missing number is the whole — we add the two parts to 11. A pupil unsure can put 11 back in and check both parts still reach the whole.

DIFFERENTIATION

EMERGING

- Give these pupils the whole and both parts already in the bond and ask only for the four facts — the harder step of finding a missing number waits.
- Let them place counters in the two part-circles and physically slide them together to see the whole, before writing any sentence.

DEVELOPING

- After the copybook family, hand them a whole with the two parts blank and ask which pairs of parts fit — how many different families share the same whole?
- Give a missing-number chain: $6 + ? = 10$, then $? - 6 = 4$, and ask which fact family they all belong to.

PROFICIENT

- While the class finishes the Class Challenge, pose: 'A fact family has only three facts, not four. What must be true about the two parts?' (equal parts, e.g. 4 and 4). Let them reason it out in their copy and explain why the fourth sentence repeats.

✂ **Cross-curricular:** Tie to money — take a €10 note and coins making 6c and 4c, and read the change as a take-away from the whole family.

ANSWER KEY

Scaffold: visual check on the page

Q1: $3 + 5 = 8$, $5 + 3 = 8$, $8 - 3 = 5$, $8 - 5 = 3$

Q2: $2 + 7 = 9$, $7 + 2 = 9$, $9 - 2 = 7$, $9 - 7 = 2$

Q3: $7 + 5 = 12$, $12 - 5 = 7$, $12 - 7 = 5$

Spot: $3 - 5 = 8$ is false (you cannot take 5 from 3 to get 8). The fourth family fact is $8 - 5 = 3$.

EXTENSION SHEET · STRETCH ANSWERS

S1: associative property