

The link between $\times$ and $\div$ (multiplication and division)

CURRICULUM ALIGNMENT

NUM.OPS.3

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

ALG.PRR.3b

represent the relationships between quantities.

INTERACTIVES Equal Groups (Sharing) · challenge, display, explore

WHAT THIS LESSON TEACHES

Sharing a total back into equal groups undoes multiplying those groups together, so the same three numbers give both a times fact and a share fact.

→ 3 groups of 4 make 12, so 12 shared into 3 groups gives 4 back.

→ 2 rows of 5 counters make 10, so 10 shared into 2 groups gives 5.

MODEL THIS ON THE BOARD

GAME COUNTERS TIMES AND SHARE LINK

- 1 Set out 2 rows of 5 counters for a board game.
- 2 Multiply the groups: $2 \times 5 = 10$ counters in all.
- 3 Share the 10 counters back into 2 equal groups to undo it.
- 4 Each group has 5: so $10 \div 2 = 5$ uses the same three numbers.

DISCUSSION STARTER

REFLECT

Can a times fact help you solve a sharing problem? When does that work best?

LESSON ARC

Set out counters in four equal rows and pose the wondering: does sharing them back give us what we started with? Deal three sharings live on the equal-groups interactive, saying the matching times fact aloud each time. Pupils build the four Try-It-Together sets at their desks, then draw a 2-rows-of-5 array in copybook with all four facts. Class Challenge builds and shares four totals, writing the full fact family each time.

TEACHING MOVES

1. **Getting Started.** Take two or three answers to the counting question, then hold out for the wondering — 'if we scoop them up and share back into 4 rows, do we get anything we started with?' Treat it as a prediction; don't confirm the link yet.
2. **Watch and Notice.** Deal each sharing live on the equal-groups interactive. After every deal, point to the on-screen line and say both facts with the class: ' $12 \div 3 = 4$, and $3 \times 4 = 12$ — same three numbers.' On the second, draw out that 12 splits two ways (into 3 groups OR into 4).
3. **Try It Together.** A pupil sets each total and number of groups at the board while the class builds the same array in counters at their desks. After each deal, class says all four facts. Listen for the swap — ' 2×5 and 5×2 both make 10' — and revoice: 'so dividing gave back the number in each row.'
4. **Draw the Array in Your Copy.** Walk the room glancing at the dot arrays and the four facts — this is practice, not marking. Watch for pupils who write only the two times facts and forget the two shares.

5. **Class Challenge.** Keep it brisk — a pupil deals each total and presses Check, then the class calls the two times and two share facts. Slow down only on $18 \div 6$: it's the largest total and least-familiar table fact. Callout: 'which multiplication fact checks this share?'
6. **What Did We Notice?.** Listen for pupils naming the rows as the times fact and the sharing-back as the share fact in one picture. Revoice: 'so when I know $4 \times 3 = 12$, I already know $12 \div 3$ without doing new work.'

COMMON MISCONCEPTIONS

⚠ A pupil says $12 \div 3$ is a brand-new, harder sum they haven't learnt yet — they don't see it hiding inside $3 \times 4 = 12$.

Keep the array up and turn it a quarter-turn on the interactive. Point: the same 12 counters, the same 3 rows — dividing just reads the array backwards. 'The share is the times fact turned around, not a new sum.'

⚠ When writing the family from an array, pupils record only the two times facts (2×5 and 5×2) and forget the two shares.

At the copybook step, stop the class and cover the two times facts with a hand. 'The array holds four facts, not two — where are the shares hiding?' Have a pupil read $10 \div 2$ and $10 \div 5$ straight off the rows and columns.

⚠ On $18 \div 6$, a pupil deals unequal rows or guesses because the 6-times fact is unfamiliar.

Have them deal one counter to each group in turn on the interactive until the total runs out — equal rows appear by construction. Then read $6 \times 3 = 18$ off the array to confirm the share.

DIFFERENTIATION

EMERGING

- Stay with the 2-groups-of-5 and 3-groups-of-4 sets in counters; pupils deal alongside the teacher table before joining the larger totals.
- Give a copybook grid with the rows already dotted so pupils only read and write the four facts, not build the array.

DEVELOPING

- After the copybook array, ask pupils to find one array in the room's totals that makes only three different facts, not four — and say why (the square number).
- Hand a total like 20 with no groups given: how many different fact families can they build from 20 counters?

PROFICIENT

- During Class Challenge, narrate a harder variant — 24 shared into 4 — and ask a fast finisher to write its family, then predict the family for $24 \div 8$ without dealing.
- Ask them to explain to a younger pupil why 3×4 and $12 \div 4$ use the same picture, using only the array.

✂ **Cross-curricular:** Tie to PE — arrange the class into equal rows for a warm-up, then count the total and share back, saying the times-and-share family aloud.

ANSWER KEY

a) $6 \times 8 = 48$, $8 \times 6 = 48$, $48 \div 6 = 8$, $48 \div 8 = 6$

b) $3 \times 4 = 12$, $4 \times 3 = 12$, $12 \div 3 = 4$, $12 \div 4 = 3$

c) $5 \times 4 = 20$, $4 \times 5 = 20$, $20 \div 5 = 4$, $20 \div 4 = 5$

Q1: 56

Q2: 5

Q3: 63

Q4: 4

a) **Always** : Multiplying groups and sharing the total back always link the same three numbers.

b) **Always** : That is the exact link between multiplying and dividing.

c) **Never** : It works for any equal groups such as $3 \times 4 = 12$ and $12 \div 3 = 4$.

d) **Sometimes** : True for $2 \times 5 = 10$ and $5 \times 2 = 10$; false for $3 \times 3 = 9$, which has no partner.