

GRADE 6 · THE NUMBER SYSTEM · ANSWER KEY

FACTORING WITH THE DISTRIBUTIVE PROPERTY

Today's goal: I can use the distributive property to express a sum of two whole numbers 1-100 with a common factor as a multiple of a sum of two whole numbers with no common factor.



How to use this key. Problem numbers match the student sheets. Each answer shows the steps and the slip Mr DJ sees most, so a wrong answer tells you what to reteach. Pepper levels: **Mild** warm-up, **Medium** stretch, **Spicy** challenge, **Extra Spicy** big brain.

Practice

8 problems + Mr DJ's worked example

Use: During the lesson after the mini-lesson/deck. Every application item has a tempting smaller common factor — that is deliberate. **Timing:** 15–25 min · pairs or independent · circulate on 7–9. Items 1–3 fluency, 4–6 application, 7–9 reasoning. Item 7 is correct-as-written; students who reflexively 'fix' it are pattern-matching, not checking.

- 1 $5(3 + 5)$ 2 $4(3 + 5)$ 3 $9(2 + 3)$ 4 $8(5 + 2)$ 5 $15(3 + 2)$ 6 $12(5 + 4)$; check $12 \times 9 = 108 = 60 + 48$
 7 Yes — 7 is the GCF and 4 and 5 share no common factor 8 $25(2 + 3)$ — because 2 and 3 have no common factor

1 **MILD** $15 + 25?$

$5(3 + 5)$

- GCF = 5; $15 \div 5 = 3$, $25 \div 5 = 5$.
- Check: $5 \times 8 = 40$.

Watch for: Divided one addend $\rightarrow 5(3 + 25)$.

2 **MILD** $12 + 20?$

$4(3 + 5)$

- GCF = 4; $12 \div 4 = 3$, $20 \div 4 = 5$.
- Check: $4 \times 8 = 32$.

Watch for: Used 2 $\rightarrow 2(6 + 10)$; 6 and 10 still share 2.

3 **MEDIUM** $18 + 27?$

$9(2 + 3)$

- GCF = 9; $18 \div 9 = 2$, $27 \div 9 = 3$.
- Check: $9 \times 5 = 45$.

Watch for: Used 3 $\rightarrow 3(6 + 9)$; 6 and 9 still share 3.

4 **MEDIUM** $40 + 16?$

$8(5 + 2)$

- GCF = 8; $40 \div 8 = 5$, $16 \div 8 = 2$.
- Check: $8 \times 7 = 56$.

Watch for: Used 4 $\rightarrow 4(10 + 4)$; 10 and 4 still share 2.

5 MEDIUM 45 + 30?

15(3 + 2)

1. GCF = 15; $45 \div 15 = 3$, $30 \div 15 = 2$.
2. Check: $15 \times 5 = 75$.

Watch for: Used 5 $\rightarrow 5(9 + 6)$; 9 and 6 still share 3.

6 SPICY 60 + 48, with check?

12(5 + 4); check $12 \times 9 = 108 = 60 + 48$

1. GCF(60, 48) = 12.
2. $60 \div 12 = 5$, $48 \div 12 = 4$.
3. $12(5 + 4)$; multiply back: $12 \times 9 = 108$. And $60 + 48 = 108$.
✓

Watch for: Used 6 $\rightarrow 6(10 + 8)$, or 4 $\rightarrow 4(15 + 12)$ — both true, neither finished.

7 SPICY Theo: $28 + 35 = 7(4 + 5)$ fully factored?

Yes — 7 is the GCF and 4 and 5 share no common factor

1. Check the equation: $7 \times 9 = 63 = 28 + 35$. ✓
2. GCF(28, 35) = 7.
3. 4 and 5 share only 1, so nothing can be pulled out. Fully factored.

Watch for: Said no out of habit — this one IS correct. The test is whether the numbers inside share a factor, not whether the outside number 'looks big enough.'

8 EXTRA SPICY 50 + 75, and why is it finished?

25(2 + 3) — because 2 and 3 have no common factor

1. GCF(50, 75) = 25.
2. $50 \div 25 = 2$, $75 \div 25 = 3$.
3. $25(2 + 3)$. 2 and 3 share only 1, so no further factoring is possible. Check: $25 \times 5 = 125$.

Watch for: Used 5 $\rightarrow 5(10 + 15)$ and called it done; 10 and 15 still share 5.

Homework

7 problems + Mr DJ's worked example

Use: Parallels the practice sheet one-to-one. Item 7 mirrors the exit ticket's true-but-unfinished item. **Timing:** ~15 min at home · independent · review item 7 as the next-day warm-up.

1 8(2 + 3)

2 3(3 + 7)

3 7(4 + 5)

4 7(3 + 7)

5 15(3 + 2)

6 12(5 + 4); $12 \times 9 = 108 = 60 + 48$

7 True, but NOT fully factored — GCF is 10, so $10(2 + 3)$

1 MILD 16 + 24?

8(2 + 3)

1. GCF = 8; 2 and 3.
2. Check: $8 \times 5 = 40$.

Watch for: Used 4 $\rightarrow 4(4 + 6)$; 4 and 6 still share 2.

2 MILD 9 + 21?

3(3 + 7)

1. GCF = 3; $9 \div 3 = 3$, $21 \div 3 = 7$.
2. Check: $3 \times 10 = 30$.

Watch for: Divided one addend $\rightarrow 3(3 + 21)$.

3 MEDIUM 28 + 35?

7(4 + 5)

1. GCF = 7; 4 and 5.
2. Check: $7 \times 9 = 63$.

Watch for: Missed 7; 28 and 35 look unrelated until you check 7.

4 MEDIUM 21 + 49?

7(3 + 7)

1. GCF = 7; $21 \div 7 = 3$, $49 \div 7 = 7$.
2. Check: $7 \times 10 = 70$.

Watch for: Wrote $7(3 + 49)$ — divided only one addend.

5 MEDIUM 45 + 30?

15(3 + 2)

1. GCF = 15; 3 and 2.
2. Check: $15 \times 5 = 75$.

Watch for: Used 5 $\rightarrow$ 5(9 + 6); 9 and 6 still share 3.

6 SPICY 60 + 48 with check?

12(5 + 4); $12 \times 9 = 108 = 60 + 48$

1. GCF(60, 48) = 12.
2. 5 and 4 share no factor.
3. Check: $12 \times 9 = 108$. ✓

Watch for: Used 6 or 4 — true but not fully factored.

7 SPICY Priya: $20 + 30 = 5(4 + 6)$?

True, but NOT fully factored — GCF is 10, so 10(2 + 3)

1. Check: $5 \times 10 = 50 = 20 + 30$. TRUE.
2. But 4 and 6 still share a factor of 2.
3. GCF(20, 30) = 10 $\rightarrow$ 10(2 + 3).

Watch for: Called it simply right (it is true) or simply wrong (the equation holds). Name both: true, not finished.

Exit Ticket

4 problems

Use: End of the distributive-factoring lesson. 5–8 min, independent. Builds on GCF (the “GCF & LCM” sheet (Grade 6)).

Timing: 5–8 min · independent. Item 4 separates ‘is the equation true?’ from ‘is it fully factored?’ — students often conflate them.

1 4(9 + 2)

2 6(4 + 3)

3 10(2 + 3)

4 True, but NOT fully factored — the GCF is 12, so 12(2 + 3)

1 MILD 36 + 8 factored?

4(9 + 2)

1. GCF(36, 8) = 4.
2. $36 \div 4 = 9$ and $8 \div 4 = 2$.
3. $4(9 + 2)$. Check: $4 \times 11 = 44$.

Watch for: Divided only one addend $\rightarrow$ 4(9 + 8). Both numbers must be divided by the factor.

2 MEDIUM 24 + 18 factored?

6(4 + 3)

1. GCF(24, 18) = 6.
2. $24 \div 6 = 4$, $18 \div 6 = 3$.
3. $6(4 + 3)$. Check: $6 \times 7 = 42$.

Watch for: Used 2 or 3 $\rightarrow$ 2(12 + 9) or 3(8 + 6) — true equations, but not fully factored.

3 MEDIUM 20 + 30 factored?

10(2 + 3)

1. GCF(20, 30) = 10.
2. $20 \div 10 = 2$, $30 \div 10 = 3$.
3. $10(2 + 3)$. Check: $10 \times 5 = 50$.

Watch for: Used 5 $\rightarrow$ 5(4 + 6); 4 and 6 still share a factor of 2, so it is not finished.

4 SPICY Nia: $24 + 36 = 2(12 + 18)$?

True, but NOT fully factored — the GCF is 12, so 12(2 + 3)

1. Check the equation: $2 \times 30 = 60 = 24 + 36$. So it is TRUE.
2. But 12 and 18 still share a factor of 6.
3. GCF(24, 36) = 12 $\rightarrow$ 12(2 + 3). Now 2 and 3 share nothing.

Watch for: Said ‘wrong’ because it isn’t fully factored, or said ‘done’ because it is true. Both matter: true AND fully factored.

Lesson slides

teaching notes & timing

Slide	Time	What to do
1	0:00	Frame the skill: this is GCF put to work. Assumes yesterday’s GCF lesson.
2	1:00	Hook — don’t resolve. Someone will offer 4; ask how they know it’s the biggest.
3	3:00	Name the move: find GCF, divide BOTH, write it as a product. The ‘both’ is where students slip.

4	5:00	WE1 — resolve the hook. Model the multiply-back check every single time; it should become automatic.
5	7:00	WE2 — the key distinction. Show a TRUE but unfinished factoring next to the finished one. This is the #1 misconception.
6	11:00	The two stopping checks. A student who runs both can self-assess without the teacher.
7		Show the problem and the slip. Pairs: what went wrong, and what is the right answer? Take two answers before moving on.
8		Solve it together, one step at a time. It is also the worked example at the top of the practice sheet, so students can look back at it.
9	9:00	CFU — all-student response. Answer $10(2 + 3)$. Watch for $5(4 + 6)$. Whiteboards: everyone tries Mild, then climbs. These are #1, #3, #6 on the practice sheet.
10		Fingers up: 3 = got it, 2 = almost, 1 = not yet. Pull the 1s for a quick reteach while everyone else starts the practice sheet.
11	13:00	Launch the in-class practice sheet. Launch the practice sheet. Exit ticket in the last 5–8 minutes.