



Adding & subtracting rational numbers

GRADE 7 MATH

Answer keys for the exit ticket, practice worksheet, and homework, plus notes for the lesson slides. Each answer shows the steps and the most likely wrong answer ("If wrong"), so you can tell what a mistake means, not just that it is one. Questions go from **fluency** to **application** to **reasoning**.

Exit Ticket — answer key

Use: End of the add/subtract lesson, opening G7 Number System. 5–8 min, independent. Item 2 is the diagnostic; item 4 separates two ideas students routinely merge.

Timing: 5–8 min · independent · number lines available. An answer of 2 on item 2 is the chant, and needs meaning rather than more practice.

1. $-8 + 3$? **FLUENCY**

Answer: **-5**

1. Start at -8 , move 3 to the right, landing on -5 .
2. Still negative, because you did not move far enough to reach 0 — you needed 8.

If wrong: Answered -11 by adding the sizes and keeping the sign. Adding a POSITIVE always moves right, so the answer must be greater than -8 .

2. $5 - (-3)$? **APPLICATION**

Answer: **8**

1. Subtracting means adding the opposite. The opposite of -3 is $+3$.
2. $5 - (-3) = 5 + 3 = 8$.
3. On the line: start at 5 and move 3 RIGHT, because you are adding a positive.

If wrong: Answered 2 by treating the two minus signs as an instruction to subtract 3. The second minus belongs to the number, not the operation.

3. $-4 - 6$, as an addition? APPLICATION

Answer: $-4 + (-6) = -10$

1. Subtracting 6 is the same as adding -6 .
2. $-4 + (-6) = -10$ — start at -4 and move 6 further LEFT.
3. Both numbers pull the same way, so the answer is more negative than either.

If wrong: Answered -2 or 2 by subtracting the sizes. Only subtract sizes when the signs are DIFFERENT; here both moves go left.

4. $-2\frac{1}{2} + 7\frac{1}{2}$, and the distance REASONING

Answer: **Sum is 5; the distance is 10**

1. Sum: start at $-2\frac{1}{2}$ and move $7\frac{1}{2}$ right. You reach 0 after $2\frac{1}{2}$, with 5 left to travel, so you land on 5.
2. Distance: from $-2\frac{1}{2}$ to $7\frac{1}{2}$ is $2\frac{1}{2} + 7\frac{1}{2} = 10$, because the two are on opposite sides of zero.
3. They differ because they ask different questions. The sum asks WHERE you end up; the distance asks HOW FAR APART two points are.
4. Distance is always positive and is found by subtracting: $7\frac{1}{2} - (-2\frac{1}{2}) = 10$.

If wrong: Gave 5 for both, or 10 for both. Landing point and separation are different quantities and only coincide when you start at zero.

Quick answers for fast checking:

#	Level	Answer
1	fluency	-5
2	application	8
3	application	-10
4	reasoning	sum 5, distance 10

Practice Worksheet — answer key

Use: During the lesson after the deck. Items 4 and 5 are a matched pair from the same start; item 6 makes students articulate the difference rather than just compute it.

Timing: 15–25 min · pairs or independent · number lines out. Circulate on 6 and 9. Insist every subtraction is rewritten as an addition first.

1. $-7 + 2$? FLUENCY

Answer: **-5**

1. Start at -7 , move 2 right $\rightarrow -5$.

If wrong: Answered -9 by adding sizes.

2. $-7 + 12$? FLUENCY

Answer: **5**

1. Start at -7 , move 12 right. Seven of those reach 0, leaving 5.

If wrong: Answered -5 . Moving 12 right from -7 passes zero, so the result is positive.

3. $6 - (-4)$? FLUENCY

Answer: **10**

1. Add the opposite: $6 + 4 = 10$.

If wrong: Answered 2. The minus in front of the 4 is part of the number.

4. $-6 - (-4)$? APPLICATION

Answer: **-2**

1. Add the opposite: $-6 + 4 = -2$.
2. Start at -6 , move 4 RIGHT because you are adding a positive.

If wrong: Answered -10 by treating it as $-6 - 4$. Subtracting a negative moves right, not left.

5. $-6 - 4$? APPLICATION

Answer: **-10**

1. Add the opposite: $-6 + (-4) = -10$.
2. Both moves go left.

If wrong: Answered -2 by subtracting sizes.

6. Which is larger, -2 or -10 , and why? REASONING

Answer: -2 — subtracting a negative moves right, subtracting a positive moves left

1. Question 4 gave -2 ; question 5 gave -10 . So -2 is larger.
2. The two problems start at the same place, -6 , and differ only in what is subtracted.
3. Subtracting -4 adds 4 and moves RIGHT. Subtracting 4 adds -4 and moves LEFT.
4. Opposite directions from the same start, so the results straddle -6 : one above, one below.
5. That is the whole content of the rule, and it is visible on the line without memorising anything.

If wrong: Said -10 is larger because 10 is bigger than 2. On a number line, further left is smaller — -10 lies below -2 .

7. $\frac{1}{2} - (-\frac{1}{4})$? APPLICATION

Answer: $\frac{3}{4}$

1. Add the opposite: $\frac{1}{2} + \frac{1}{4}$.
2. Common denominator: $\frac{2}{4} + \frac{1}{4} = \frac{3}{4}$.
3. Bigger than $\frac{1}{2}$, as it must be — you added something positive.

If wrong: Answered $\frac{1}{4}$ by subtracting. The same chant error, now with fractions.

8. $-\frac{3}{4} + \frac{1}{2}$? APPLICATION

Answer: $-\frac{1}{4}$

1. Common denominator: $-\frac{3}{4} + \frac{2}{4} = -\frac{1}{4}$.
2. Still negative, because $\frac{3}{4}$ is bigger than $\frac{1}{2}$ — you did not move far enough right to pass zero.

If wrong: Answered $\frac{1}{4}$ by dropping the sign, or $-\frac{5}{4}$ by adding the sizes.

9. $-\frac{7}{3} + \frac{7}{3}$ — what is special? REASONING

Answer: **The sum is 0; they are opposites**

1. $-\frac{7}{3} + \frac{7}{3} = 0$.
2. The two numbers are the same distance from zero on opposite sides, so moving one way then the other returns you to the start.
3. General rule: any number plus its opposite is 0. That pair is called additive inverses.
4. This is why ‘adding the opposite’ works for subtraction — subtracting undoes adding, and the opposite is exactly what undoes a move.

If wrong: Answered $1\frac{4}{3}$ by ignoring the signs. Opposite signs mean the moves cancel, not combine.

Quick answers for fast checking:

#	Level	Answer
1	fluency	-5
2	fluency	5
3	fluency	10
4	application	-2
5	application	-10
6	reasoning	-2 is larger
7	application	$\frac{3}{4}$
8	application	$-\frac{1}{4}$
9	reasoning	0, additive inverses

Homework — answer key

Use: Parallels the practice sheet. Items 4 and 5 repeat the matched pair with new numbers so the direction rule is not memorised from one instance.

Timing: ~15 min at home · independent · review item 8 as the next-day warm-up; the crossing-zero count is what makes it obvious.

1. $-9 + 4$? FLUENCY

Answer: **-5**

1. Start at -9, move 4 right → -5.

If wrong: Answered -13.

2. $-9 + 15$? FLUENCYAnswer: **6**

1. Move 15 right from -9 . Nine reaches 0, leaving 6.

If wrong: Answered -6 by keeping the sign of the larger-looking number.

3. $8 - (-5)$? FLUENCYAnswer: **13**

1. Add the opposite: $8 + 5 = 13$.

If wrong: Answered 3.

4. $-8 - (-5)$? APPLICATIONAnswer: **-3**

1. Add the opposite: $-8 + 5 = -3$.
2. Move 5 RIGHT from -8 .

If wrong: Answered -13 by moving left.

5. $-8 - 5$? APPLICATIONAnswer: **-13**

1. Add the opposite: $-8 + (-5) = -13$. Both moves go left.

If wrong: Answered -3 by subtracting sizes.

6. $\frac{2}{3} - (-\frac{1}{3})$? APPLICATIONAnswer: **1**

1. Add the opposite: $\frac{2}{3} + \frac{1}{3} = \frac{3}{3} = 1$.

If wrong: Answered $\frac{1}{3}$ by subtracting.

7. $-\frac{1}{2} + (-\frac{1}{4})$? APPLICATION

Answer: $-\frac{3}{4}$

1. Both negative, so both moves go left: $-\frac{2}{4} + (-\frac{1}{4}) = -\frac{3}{4}$.
2. Further from zero than either number alone.

If wrong: Answered $-\frac{1}{4}$ by subtracting the sizes. Same signs combine.

8. How far apart are -8 and 5 ? REASONING

Answer: **13 — and it is not 3 because they are on opposite sides of zero**

1. Distance = $5 - (-8) = 5 + 8 = 13$.
2. Count it: from -8 up to 0 is 8, then 0 up to 5 is 5. $8 + 5 = 13$.
3. An answer of 3 comes from computing $8 - 5$, which would be right if both numbers were on the SAME side of zero.
4. Because they straddle zero, the two journeys add rather than cancel.
5. Distance is always positive, and subtracting in the other order, $-8 - 5 = -13$, gives the same size with the opposite sign.

If wrong: Answered 3 by subtracting the digits. Sketching the line settles it faster than any rule.

Quick answers for fast checking:

#	Level	Answer
1	fluency	-5
2	fluency	6
3	fluency	13
4	application	-3
5	application	-13
6	application	1
7	application	$-\frac{3}{4}$
8	reasoning	13, they straddle zero

Lesson slides — teaching notes & timing

Mini-lesson deck: ~12–15 min, then the practice sheet. Opens G7 Number System. A projected number line, or one taped along the wall, does more work here than any slide.

Slide	~Time	Note
1/8	0:00	Frame it: every one of these is a position and a move. Nothing else.

2/8	1:00	Hook — poll 2 vs 8. Do NOT resolve. Both answers will have supporters, which is the useful part.
3/8	2:30	Establish direction before signs. Students who can point the direction rarely get the sign wrong.
4/8	4:30	WE1 — resolve the hook. Name the chant out loud and say why it fails: it treats the sign as an operation.
5/8	7:00	WE2 — the matched pair, same start. Walk it on a floor line if you have one; the two directions are the whole lesson.
6/8	9:30	CFU — all-student response. $-4 + (-6) = -10$. Watch for -2 , which is subtracting sizes.
7/8	11:30	Landing point versus distance. Students merge these constantly and it costs them on NS-03 word problems.
8/8	13:30	Launch the in-class practice sheet.