Adding and Subtracting Integers

Teacher Guide | Check • Teach • Recheck | Grades 7–8 | Free classroom pack

Diagnose. Reframe. Master.

One short check shows which of three integer difficulties each student may be showing. You teach the route that the student's answers point to, check the fix with a 3-question Clear-Check, then look again right away and a few days later.

Start here

1	**Give the Entry check and the Check** (student pp. 1–2), about 20 minutes. Read the working, not just the answers.
2	**Read the two maps.** Entry gaps: the Ghost Gap™ Map (teacher p. 2). Check errors: the Tripwire™ Error Map (teacher p. 3). A wrong answer points to a likely error and a route.
3	**Teach one route from its card** (teacher pp. 4–7) with the matching student page. Finish with the 3-question Clear-Check on mini whiteboards. 2 or 3 right: give the Recheck (student p. 7). 0 or 1 right: Watch Flag, reteach with the other model.
4	**Check again 3 to 7 days later** (student p. 8). This is evidence that the fix may have lasted.

Sort by the evidence

If this is wrong or unclear	The likely difficulty	Card and student page
Any part of E1–E5	Order, distance, opposites, zero pairs, small facts	Bridge Card (p. 4) | student p. 3
Any part of C1 or C2	Direction when adding; which side of zero	Route A Card (p. 5) | student p. 4
Any part of C3 or C4	Subtracting a positive; keeping the start	Route B Card (p. 6) | student p. 5
Any part of C5, C6, or C7	Operation sign vs number sign; keeping the first number	Route N Card (p. 7) | student p. 6

The Recalculation cycle in this pack

Diagnosis	Reframing	Reteaching	Retesting	Integration
Entry check and Check	Card: Say and Draw	Card models and route page	Clear-Check and Recheck	Check again, with D7 in context

Codes: I independent | **T** teach | **U** unclear, probe first (Appendix, p. 12). **Materials:** pencil, printed pages, optional + and − counters, mini whiteboards. No calculator. Directions may be read aloud without math hints.

Alignment: Grade 7 integers: adding and subtracting with number lines, counters and sign rules, with a Grade 8 review.

Rooted in the Ghost Gap™ framework from **Recalculating** by Carlington Matthie, M.Ed.

The Ghost Gap™ Map: entry skills

These are earlier-grade skills the routes depend on. A Tier 1 gap blocks a route, so bridge it before teaching the route it blocks. Tiers are planning priorities for this pack, not grade-level claims. A Tier 2 gap slows the work; bridge it if time allows.

Item	Skill	Tier	May show up as…
E1	Ordering integers	**Tier 2**	**call −6 greater than −2 and lose track of which way "right" is when checking an answer on the line.**
E2	Opposites and distance from zero	**Tier 1**	**treat −5 and 5 as unrelated, so they cannot see why 4 + (−4) = 0 or rewrite subtraction as adding the opposite.**
E3	Counting moves on a number line	**Tier 1**	**count the marks instead of the spaces and land one place off, most often when the move crosses zero.**
E4	Whole-number facts	**Tier 2**	**get the sign right and the size wrong, which hides whether the integer idea itself is secure.**
E5	A zero pair keeps the value	**Tier 1**	**think adding a zero pair changes the number, which blocks the counter model for subtracting a negative (Route N).**

How to use the map

One bridge at a time. If a student shows several entry gaps, bridge the highest-tier one first (Tier 1 before Tier 2). Note the rest and watch for them.

Whole-group threshold. If about a quarter or more of the class misses the same entry item, consider teaching that part to the whole group, after checking which students already show it.

Record it. Write the Bridge parts you taught on the class record, so later results are read fairly.

Entry answers at a glance

E1 −2 | E2 5 (both are 5 from zero) | E3 −1 | E4 5 and 8 | E5 Yes, both equal −2. Full working on teacher p. 8.

The Tripwire™ Error Map: the Check

Ask the question first and record what the student says before you help. One wrong answer is a clue, not a diagnosis.

Item and answer	Wrong	Named error	If not fixed, it may lead to...	60-second move	Route
C1a 3	−11	Added the sizes, kept the minus	**may add first and attach a sign, so every sum near zero comes out wrong.**	Put 4 negatives and 7 positives on the desk. Cancel pairs. "What is left?"	**A**
	−3	Sign of the first number wins	**may give the wrong sign whenever the bigger size comes second.**	"Which number pulls harder?" Start at −4 and walk right 7.	**A**
C2a −2	2	Found the gap, lost the direction	**may get the size right and the sign wrong on every sum that crosses zero.**	Start at 6, walk left 8. Stop at 0: "How far left is still to go?"	**A**
C2c −8	2 or −2	Same signs treated as different	**may subtract whenever a negative appears, so debts and drops shrink instead of grow.**	"You owe 3, then you owe 5 more. Do you owe more or less?"	**A**
	8	Dropped the sign	**may lose the negative whenever both numbers are negative.**	"Start at −3, walk left 5. Which side of zero are you on?"	**A**
C3a −3	3	Flipped it to avoid a negative	**may reverse every "small minus big" and refuse answers below zero.**	Start at 2 on the line, walk left 5, count out loud past zero.	**B**
C4 −5	1	Moved right from a negative start	**may move the wrong way whenever the start is below zero.**	Cover the start: "minus 3 means walk left 3." Uncover: start at −2.	**B**
C5 7	1	Subtracted the size, ignored the sign	**may treat 4 − (−3) as 4 − 3 every time.**	Build 4 with counters. "Where are the negatives to remove?" Add zero pairs, remove, count.	**N**
C6a −4	−8	Added the negative instead of removing it	**may give the same answer for "plus a negative" and "minus a negative".**	Build −6. Physically take away two negatives. Count what is left.	**N**
	8	Changed the first number too	**may rewrite −6 − (−2) as 6 + 2, changing where they start.**	Circle the first number: "This never changes." Then rewrite only the operation and the second number.	**N**
C7		Blends the operation sign and the number sign	**may misread every double sign in algebra, such as x − (−3).**	Read it in two parts: "subtract" and "negative 2". Route N even if C5 and C6 are right.	**N**

Other parts: C1 b −4, c 0 | C2 b 5 | C3 b 4, c 0 | C6 b 4, c 0. Read each wrong part for its own cause; use its Appendix probe.

Slip or pattern? Sound working with one wrong part: give the matching Appendix probe without coaching. Right: a likely slip, keep watching. Wrong again: teach the route.

Bridge Card: entry skills

Use when	Any part of E1–E5 is wrong or unclear. Teach only the parts the student needs, before teaching the route they block.
The gap	One or more earlier-grade integer skills: order, opposites, counting moves, zero pairs, or small facts.
Why it blocks	Every route uses the number line and counters. A student who cannot count a move or trust a zero pair cannot follow the route models.

The 8-minute route

Say	"Numbers get bigger as you go right. A move is counted in spaces, not marks. A plus and a minus counter together are worth zero."
Draw	A number line from −6 to 6. Put a finger on −3 and count four spaces right to 1, saying each space out loud. Then build −2 with two − counters, add a +/− pair, and count the value again.

Model 1: Order: which is greater, −7 or −3?

1. Mark both on the line.
2. −3 is farther right.
3. So −3 is greater.

Model 2: Zero pair: build −1, then add two zero pairs.

1. Start with one − counter.
2. Add + − and + −.
3. Now 2 positives and 3 negatives. Cancel pairs: one negative left. Value still −1.

If it does not land: Lay number cards in order on the floor and walk the moves. For facts, use real objects: make 7, remove 4, rebuild with 4 + 3.

Then: the student works the route page (student p. 3). Cover the examples for less support.

3-Question Clear-Check (mini whiteboards, no answers shown)

1. Circle the greater: −8 or −5 **2.** Start at 2, move left 4. Where do you land? **3.** Add one zero pair to −1. How many + and −? Value?

2 or 3 right: the entry skill is steady. Now teach the target route (teacher pp. 4–7) and run its own Clear-Check. **0 or 1 right:** set a **Watch Flag**, reteach with the other model, and watch that skill first thing next lesson.

Phases: Reframing → Reteaching → Retesting. Clear-Check answers are on teacher p. 9.

Route A Card: adding integers

Use when	Any part of C1 or C2 is wrong or unclear.
The gap	Chooses the wrong direction, or the wrong side of zero, when adding a negative or adding across zero.
Why it blocks	Every later integer skill runs through this move, including subtraction rewritten as adding the opposite.

The 8-minute route

Say	"The first number is where you stand. The second number tells you which way to walk and how far. Positive walks right. Negative walks left."
Draw	A number line from −10 to 10. Dot the start, draw one arrow for the move, and circle zero if the arrow crosses it.

Model 1: −2 + 9

1. Start at −2.
2. +9 means walk right 9.
3. Two steps reach 0.
4. Seven more reach 7.
5. −2 + 9 = 7

Model 2: −5 + (−1)

1. Start at −5.
2. −1 means walk left 1.
3. Same signs both pull left, so the answer moves farther from zero.
4. −5 + (−1) = −6

If it does not land: Use counters and cancel opposite pairs. For −2 + 6, two zero pairs leave four positives: 4. Then return to the line and connect both models.

Then: the student works the route page (student p. 4). Cover the examples for less support.

3-Question Clear-Check (mini whiteboards, no answers shown)

1. −7 + 10 **2.** 2 + (−9) **3.** −2 + (−8)

2 or 3 right: give the Recheck (student p. 7). **0 or 1 right:** set a **Watch Flag**: reteach with the other model and watch this skill first thing next lesson.

Phases: Reframing → Reteaching → Retesting. Clear-Check answers are on teacher p. 9.

Route B Card: subtracting a positive

Use when	Any part of C3 or C4 is wrong or unclear.
The gap	Moves right, reverses the subtraction, or refuses a negative answer when subtracting a positive.
Why it blocks	A student who flips 2 − 5 into 5 − 2 gets every "small minus big" wrong, which later breaks equations, temperature, and money problems.

The 8-minute route

Say	"Subtracting a positive always walks left. You can start anywhere, even below zero, but the walk is always left."
Draw	A number line. Dot the start, draw a left arrow labelled "− 5 means left 5", and write 2 − 5 = 2 + (−5) underneath.

Model 1: 4 − 9

1. Start at 4.
2. Walk left 9.
3. Four steps reach 0.
4. Five more reach −5.
5. 4 − 9 = −5

Model 2: −2 − 6

1. Start at −2. It is already below zero.
2. Walk left 6.
3. −2 − 6 = −2 + (−6) = −8

If it does not land: Counters for 1 − 5: one positive plus four zero pairs, then remove five positives. Four negatives remain: −4.

Then: the student works the route page (student p. 5). Cover the examples for less support.

3-Question Clear-Check (mini whiteboards, no answers shown)

1. 2 − 7 **2.** −5 − 4 **3.** 10 − 4

2 or 3 right: give the Recheck (student p. 7). **0 or 1 right:** set a **Watch Flag**: reteach with the other model and watch this skill first thing next lesson.

Phases: Reframing → Reteaching → Retesting. Clear-Check answers are on teacher p. 9.

Route N Card: subtracting a negative

Use when	Any part of C5, C6, or C7 is wrong or unclear.
The gap	Treats subtracting a negative like subtracting a positive, or changes the sign of the first number.
Why it blocks	This is the double-sign error that resurfaces in algebra, such as x − (−3), and in temperature-difference problems.

The 8-minute route

Say	"Subtract means take away. If we need negatives we do not have, we add zero pairs first. Zero pairs are worth nothing, so the first number has not changed."
Draw	Counters in three rows: build the first number; add the zero pairs you need; cross out what is taken away. Count what remains.

Model 1: −4 − (−1)

1. Build −4: four − counters.
2. Take away one − counter.
3. Three − counters remain.
4. −4 − (−1) = −3. Line check: keep −4, move right 1.

Model 2: 3 − (−4)

1. Build 3: three + counters.
2. There are no negatives to take away, so add four zero pairs. The value is still 3.
3. Take away four − counters.
4. Seven + counters remain: 3 − (−4) = 7

If it does not land: Rewrite as adding the opposite. For −6 − (−1), keep −6 and move right 1 to land on −5. Contrast −6 − 1, which moves left to −7.

Then: the student works the route page (student p. 6). Cover the examples for less support.

3-Question Clear-Check (mini whiteboards, no answers shown)

1. 5 − (−2) **2.** −9 − (−5) **3.** −3 − (−9)

2 or 3 right: give the Recheck (student p. 7). **0 or 1 right:** set a **Watch Flag**: reteach with the other model and watch this skill first thing next lesson.

Phases: Reframing → Reteaching → Retesting. Clear-Check answers are on teacher p. 9.

Answers: Entry, Bridge, Route A

Item	Answer and enough working
E1	−2 is greater; it is to the right of −6.
E2	5. Both are 5 units from zero. Distance is never −5.
E3	Start 2, three spaces left, land −1.
E4	9 − 4 = 5; 3 + 5 = 8.
E5	Yes. Both equal −2; Model Y is Model X plus one zero pair.
F1	−1 is greater than −4; it is farther right.
F2	Start 3, four spaces left, land −1.
F3	a) −3 b) and c) 1 positive, 4 negatives, value −3. Adding a zero pair keeps −3.
F4	3 remain; 4 + 3 = 7 checks 7 − 4 = 3.

Route A (student p. 4)

Item	Answer and enough working
A1	Start −6, move right 4, land −2.
A2	Start 3, move left 5, land −2.
A3	5. Three spaces to zero, five more right.
A4	5. Move left 4; never reaches zero.
A5	−3. Five spaces right do not reach zero.
A6	0. Six spaces left land exactly on zero.
A7	−8. Same signs: start −1, move left 7.
A8	A3 crosses zero and ends to the right of it. A5 moves right but stops before zero, so it stays negative.

Enough evidence: counters, a correctly labelled line, or a clear symbolic method. A right answer with a contradicting model still needs a conversation.

Answers: Routes B and N, Clear-Checks

Route B (student p. 5)

Item	Answer and enough working
B1	1 + (−6) = −5
B2	−3 + (−4) = −7
B3	5. Start 6, move left 1.
B4	−6. Start −4, move left 2.
B5	0. Start 9, move left 9.
B6	−8. Start −5, move left 3.
B7	Every move is left. Where you start and how far you move decide whether you land above, on, or below zero.

Route N (student p. 6)

Item	Answer and enough working
N1	3 zero pairs added; starting value still 2; value left 5.
N2	−5 + 2 = −3
N3	1 + 4 = 5
N4	−6 + 3 = −3
N5	−2 + 5 = 3
N6	−10 + 10 = 0
N7	Each zero pair is worth 0. Adding 0 does not change the value.

Clear-Check answers (cards, teacher pp. 4–7)

Card	Answers
Bridge	1) −5 2) −2 3) 1 positive, 2 negatives, value −1
Route A	1) −7 + 10 = 3 2) 2 + (−9) = −7 3) −2 + (−8) = −10
Route B	1) 2 − 7 = −5 2) −5 − 4 = −9 3) 10 − 4 = 6
Route N	1) 5 − (−2) = 7 2) −9 − (−5) = −4 3) −3 − (−9) = 6

Compare the three checks

Each row tests the same structure on the Check, Recheck, and Check-again. Look at the working as well as the answer.

Structure	Check (p. 2)	Recheck (p. 7)	Check again (p. 8)
A negative + positive	C1a: 3 C1b: −4 C1c: 0	R1a: 4 R1b: −7 R1c: 0	D1a: 2 D1b: −4 D1c: 0
A positive + negative	C2a: −2 C2b: 5	R2a: −3 R2b: 7	D2a: −4 D2b: 5
A negative + negative	C2c: −8	R2c: −10	D2c: −9
B positive − positive	C3a: −3 C3b: 4 C3c: 0	R3a: −4 R3b: 3 R3c: 0	D3a: −3 D3b: 6 D3c: 0
B negative − positive	C4: −5	R4: −7	D4: −9
N positive − negative	C5: 7	R5: 6	D5: 8
N negative − negative	C6a: −4 C6b: 4 C6c: 0	R6a: −3 R6b: 6 R6c: 0	D6a: −2 D6b: 5 D6c: 0

R7: the first number must stay −4. −4 − (−6) = −4 + 6 = 2. **D7:** −6 + 8 = 2°C. **D8** (optional): for example, −8 − (−1) = −7. D8 never lowers a code.

Recording rules

Independent first. Record the Check, Recheck, and Check-again before any hints. Supported results go in notes as **S+** (succeeded with support) or **S−** (not yet), with the model used. They never replace the independent code.

One route at a time, in this order: Bridge, A, B, N. Route N leans on direction (A) and zero pairs (E5).

Watch Flag. Set one when a Clear-Check is 0 or 1 right, or a Recheck is T. Reteach with the other model, then watch that exact skill first thing next lesson.

Whole-group threshold. If about a quarter or more of the class lands on the same route, consider teaching that route to the whole group, after checking which students already show it.

Answers and explanation must agree. If C7, R7, or a contrast explanation contradicts correct answers, do not record I yet; use U, or T if the difficulty is clear. A wrong D7 with sound addition is a setup issue, not a Route A issue.

Independent I means every part that tests the route is correct, and its working and contrasting explanation agree. If any part is missing or wrong, record T or U, not I.

The Clear-Check decides the next teaching step. It does not show that a skill is secure. Keep recording any missed structure, even when the student moves on.

I on the Recheck means the fix held right away. **I on the Check-again** adds evidence it may have lasted. Neither means every integer skill is mastered.

Class record

Class _____ Check _____ Recheck _____ Check again _____

Write C / R / D codes in order, e.g. T / I / I. **WF** = Watch Flag. Note Bridge use and any S+ or S−.

Student	Entry / Bridge	Route A C/R/D	Route B C/R/D	Route N C/R/D	WF / next step
		__/__/__	__/__/__	__/__/__	
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Copy this page as needed. Group students by what the evidence shows, and regroup as it changes.

Appendix: Going deeper

Use this page when a result is unclear (U), or when a student needs fresh items after reteaching.

Probe items (Q) and follow-up items (V)

Q = for an unclear first answer. Give the probe that matches the exact part that went wrong. **V** = after reteaching, as fresh evidence. Write only the expression on the board; never reuse an answered item as proof of improvement.

Structure	Probe Q and answer	Follow-up V and answer
1a neg + pos → positive	Q1a $-3 + 5 = 2$	V1a $-1 + 6 = 5$
1b neg + pos → negative	Q1b $-8 + 2 = -6$	V1b $-9 + 4 = -5$
1c neg + pos → zero	Q1c $-2 + 2 = 0$	V1c $-8 + 8 = 0$
2a pos + neg → negative	Q2a $1 + (-7) = -6$	V2a $3 + (-8) = -5$
2b pos + neg → positive	Q2b $6 + (-2) = 4$	V2b $7 + (-4) = 3$
2c neg + neg	Q2c $-3 + (-6) = -9$	V2c $-6 + (-2) = -8$
3a pos − pos, crosses zero	Q3a $1 - 4 = -3$	V3a $5 - 8 = -3$
3b pos − pos, stays positive	Q3b $9 - 5 = 4$	V3b $6 - 3 = 3$
3c pos − pos → zero	Q3c $2 - 2 = 0$	V3c $7 - 7 = 0$
4 neg − pos	Q4 $-1 - 4 = -5$	V4 $-6 - 4 = -10$
5 pos − neg	Q5 $2 - (-5) = 7$	V5 $1 - (-6) = 7$
6a neg − neg, stays negative	Q6a $-5 - (-3) = -2$	V6a $-8 - (-3) = -5$
6b neg − neg, crosses zero	Q6b $-2 - (-7) = 5$	V6b $-1 - (-7) = 6$
6c neg − neg → zero	Q6c $-1 - (-1) = 0$	V6c $-11 - (-11) = 0$

Using the result

One right probe suggests a slip on that structure only; look back at the original working too. To record I after reteaching, the student needs every relevant V part right plus a sound contrast explanation. Add the new result with its date; do not overwrite earlier codes. If the evidence conflicts, record U and keep watching.

The complete diagnostic loop

Where this pack fits

Ghost Gap™ (before the unit) → **Teach** → **Tripwire™** (during and after) → **Growth Dashboard™** (track)

This free pack runs the whole loop for one skill: the entry map finds the gaps from earlier grades, the error map catches the misconceptions, the cards teach the fix, and the matched checks show whether it held.

Alignment

Level	How this pack fits
Grade 7	Main target: adding and subtracting integers concretely, pictorially, and symbolically.
Grade 6	The integer ideas behind the Entry check.
Grade 8	Review before multiplying and dividing integers.

Sources

- NCETM. Secondary Mastery Professional Development 2.1, Arithmetic procedures (zero pairs, model-to-symbol links).
- OpenStax. Prealgebra 2e, section 3.3, Subtract Integers (counter models for subtraction).

Route A, more practice: Adding Integers, Pack 1 of the Integers Series from Matthie Assessment, gives extra same-sign and different-sign practice with the same models. Search Matthie Assessment on TPT.

Want this for every unit?

Grade 7 and Grade 8 Math Diagnostic Screeners	**Tripwire™ Diagnostics**
One starting picture across eight areas in 35 questions, so you know where to begin.	Short checks where each wrong answer points to a likely misconception and a 60-second fix.

Find both at **teacherspayteachers.com/store/matthie-assessment**. Follow the store to get the next free pack. More free tools: **thepragmaticteacher.ca**

Rooted in the Ghost Gap™ framework from **Recalculating** by Carlington Matthie, M.Ed.

Questions or feedback: thepragmaticteacher.ca

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