

Chapter 5 — Integer Sense

Teacher Chapter-at-a-Glance

Materials

A number line, printed or drawn on the board. No other materials required.

Talk Prompt

Ask the class which is greater, -8 or -3 , before teaching the method. Many will pick -8 because 8 is the bigger digit. Let that guess stand until the number line settles it.

If Ready-to-Learn Reveals a Gap

If two or more Ready-to-Learn items reveal a gap, stop and rebuild number-line sense and whole-number comparison before moving into negative numbers. Every idea in this chapter depends on both.

Mastery Decision Guide

What a missed Tripwire item actually means, and what to do about it before moving on.

Missed Tripwire #1 → Thinking a larger digit makes a greater negative number (Mistake 1).

A comparison answer that picks the negative number with the larger digit as greater signals this exact error. Review before the next chapter.

Missed Tripwire #2 → Confusing opposite and absolute value (Mistake 3). *A negative number given as an answer to an absolute value question signals this error immediately, since absolute value is never negative. Review before the next chapter.*

Ready-to-Learn Check

Quick check before starting. A wrong answer below points to a specific gap worth closing first, not just a miss to shrug off.

1. Compare: 15 ____ 9

Correct answer: $15 > 9$

Likely wrong answer: $15 < 9$

Misconception: Reverses the direction of the inequality symbol.

Next move: Have the student say which number is bigger in words first, then choose the matching symbol.

2. On a number line, how many spaces apart are -5 and 5?

Correct answer: 10

Likely wrong answer: 5

Misconception: Counts the distance from zero to one side only, instead of the full span between both points.

Next move: Have the student count the tick marks one at a time from -5 to 5.

3. Which is greater, 8 or 3?

Correct answer: 8

Likely wrong answer: 3

Misconception: Unsure which comparison word points which direction.

Next move: Have the student picture both numbers on a number line before answering.

Common Mistakes

Students often run into the same kinds of trouble with this topic. Recognizing these patterns helps avoid them.

Comparing 0.86 and 0.809 by Place Value

	Ones		Tenths	Hundredths	Thousandths
0.86	0	.	8	6	0
0.809	0	.	8	0	9

Ones tie. Tenths tie. Hundredths decide it: $6 > 0$, so $0.86 > 0.809$.

-9 is farther from zero than -4, which makes -9 the smaller number.

Mistake 1: Thinking a larger digit makes a greater negative number

What students do: Comparing -9 and -4 and picking -9 as greater because 9 is a bigger digit than 4.

Why this happens: For positive numbers, a bigger digit always means a bigger value, so it feels safe to keep using that rule once negative numbers show up.

What to do instead: Picture both numbers on a number line. The one farther right is greater, no matter which digit looks bigger.

Diagnostic trigger: A comparison answer that picks the negative number with the larger digit as greater signals this exact error.

Mistake 2: Calling zero positive

What students do: Treating zero as a positive number, or including it when listing positive integers.

Why this happens: Zero feels like part of the counting numbers, so it's easy to assume it belongs with the positives.

What to do instead: Zero is neither positive nor negative. It is the starting point everything else is measured from.

Diagnostic trigger: Zero included in a list of positive numbers, or labeled positive directly, signals this error.

Mistake 3: Confusing opposite and absolute value

What students do: Answering -6 when asked for the absolute value of -6 , or answering -6 when asked for the opposite of 6 , mixing up which operation was asked for.

Why this happens: Both ideas involve flipping a sign or measuring against zero, so the two questions can blur together.

What to do instead: Opposite flips the sign and keeps the same distance from zero. Absolute value drops the sign entirely and gives only the distance.

Diagnostic trigger: A negative number given as an answer to an absolute value question signals this error immediately, since absolute value is never negative.

Mistake 4: Writing absolute value as negative

What students do: Writing $|-7| = -7$.

Why this happens: The number inside the bars is negative, so it feels natural for the answer to stay negative too.

What to do instead: Absolute value measures distance, and distance cannot be negative. The bars strip the sign away entirely.

Diagnostic trigger: Any negative number written as the result of an absolute value expression signals this error.

Mistake 5: Ordering negatives backward

What students do: Listing negative numbers from least to greatest by writing the smallest digit first, for example writing -2, -6, -9 instead of -9, -6, -2.

Why this happens: Reading digits left to right in the order they'd be read as positive numbers feels natural, but it is backward for negatives.

What to do instead: The most negative number is the least. Start with whichever number is farthest left on the number line, not whichever digit is smallest.

Diagnostic trigger: A least-to-greatest order that starts with the negative number closest to zero, rather than the most negative one, signals this error.

Practice

Teacher solutions follow this practice set.

1. Is -6 an integer?
2. Is 3.5 an integer?
3. Is 0 an integer?
4. What is the opposite of 12?
5. What is the opposite of -15?
6. Evaluate $|-8|$.
7. Evaluate $|11|$.
8. Compare: -3 ____ 5
9. Compare: -7 ____ -2
10. Compare: 0 ____ -6
11. Order from least to greatest: -10, -3, 0, 4, 7
12. Order from greatest to least: -2, 5, -9, 0, -14

13. Which is closer to sea level: -12 m or -25 m?
14. Which temperature is warmer: -5°C or -11°C ?
15. Explain why -3 is greater than -8 .

Practice Solutions

Use these concise solutions to check the method as well as the final answer.

1. Is -6 an integer?

Solution: Yes. -6 is a whole number and its opposite sign does not change that it is an integer.

2. Is 3.5 an integer?

Solution: No. 3.5 has a fractional part, so it is not an integer.

3. Is 0 an integer?

Solution: Yes. Zero is an integer.

4. What is the opposite of 12 ?

Solution: The opposite of 12 is -12 .

5. What is the opposite of -15 ?

Solution: The opposite of -15 is 15 .

6. Evaluate $|-8|$.

Solution: $|-8| = 8$ because absolute value is distance from zero.

7. Evaluate $|11|$.

Solution: $|11| = 11$.

8. Compare: -3 ____ 5

Solution: $-3 < 5$ because every negative integer is less than every positive integer.

9. Compare: -7 ____ -2

Solution: $-7 < -2$ because -7 lies farther left on the number line.

10. Compare: 0 ____ -6

Solution: $0 > -6$.

11. Order from least to greatest: $-10, -3, 0, 4, 7$

Solution: Least to greatest: $-10, -3, 0, 4, 7$.

12. Order from greatest to least: $-2, 5, -9, 0, -14$

Solution: Greatest to least: $5, 0, -2, -9, -14$.

13. Which is closer to sea level: -12 m or -25 m?

Solution: -12 m is closer to sea level because $|-12| = 12$, which is less than $|-25| = 25$.

14. Which temperature is warmer: -5°C or -11°C ?

Solution: -5°C is warmer because $-5 > -11$.

15. Explain why -3 is greater than -8 .

Solution: -3 lies to the right of -8 and is closer to zero, so $-3 > -8$.

Tripwire Check

These questions test whether the thinking is solid — not just whether the procedure was memorized. Each wrong answer below points to a specific misconception, not just "try again."

1. Which is greater, -13 or -6 ?

Correct answer: -6 . It sits closer to zero, so it is farther right on the number line.

Likely wrong answer: -13 , because 13 is a bigger digit than 6.

Misconception: Assumes a bigger digit means a bigger negative number.

Next move: Re-teach with a number line, marking both points and reading which one sits farther right.

2. Which has the greater absolute value: -10 or -6 ?

Correct answer: -10 . $|-10| = 10$, $|-6| = 6$.

Likely wrong answer: -6 , from confusing greater ABSOLUTE VALUE with greater VALUE.

Misconception: Treats 'greater absolute value' as the same question as 'greater value,' when the two questions can have opposite answers for negatives.

Next move: Have the student answer both questions separately for the same pair of numbers, then compare the two answers.

Answer Key — Worksheets (Full Diagnostic)

Worksheet A: Guided Practice

1. Is -8 an integer?

1. Yes. Likely wrong answer: No (assumes only positive whole numbers count as integers). Misconception: Negative whole numbers are not recognized as belonging to the set of integers.

2. What is the opposite of 7?

2. -7. Likely wrong answer: 7 (states the number itself instead of its opposite).

Misconception: The opposite is confused with the original number, missing the sign flip.

3. Evaluate $|-6|$.

3. 6. Likely wrong answer: -6 (keeps the negative sign in the absolute value).

Misconception: Absolute value is confused with the original signed number, and the sign is not dropped.

4. Compare: -5 ____ -10

4. $-5 > -10$. Likely wrong answer: $-5 < -10$ (assumes the larger digit makes the greater negative number). Misconception: A bigger digit is mistaken for a bigger value even though both numbers are negative.

5. Is $5/2$ an integer?

5. No. Likely wrong answer: Yes (assumes any number written as a fraction of two whole numbers is an integer). Misconception: A number is judged an integer without checking that it's a whole number with no fractional part.

6. What is the opposite of -13 ?

6. 13. Likely wrong answer: -13 (states the number itself instead of its opposite).

Misconception: The opposite is confused with the original number, missing the sign flip.

7. Evaluate $|17|$.

7. 17. Likely wrong answer: -17 (keeps a negative sign that was never there).

Misconception: The absolute value symbol is misread as introducing a negative sign rather than removing one.

8. Compare: -12 ____ -3

8. $-12 < -3$. Likely wrong answer: $-12 > -3$ (assumes the larger digit makes the greater negative number). Misconception: A bigger digit is mistaken for a bigger value even though both numbers are negative.

9. Is -100 an integer?

9. Yes. Likely wrong answer: No (assumes negative numbers cannot be integers).
Misconception: Negative whole numbers are not recognized as belonging to the set of integers.

10. Compare: -9 ____ 0

10. $-9 < 0$. Likely wrong answer: $-9 > 0$ (assumes any number that 'has more to it' is greater). Misconception: A negative number is mistakenly judged greater than zero.

11. Compare: -8 ____ -2

11. $-8 < -2$. Likely wrong answer: $-8 > -2$ (assumes the larger digit makes the greater negative number). Misconception: A bigger digit is mistaken for a bigger value even though both numbers are negative.

12. Order from least to greatest: $-6, 3, 0, -1$

12. $-6, -1, 0, 3$. Likely wrong answer: $-1, -6, 0, 3$ (orders by digit size instead of position on the number line). Misconception: Negative numbers are ordered by their digit size instead of their actual position on the number line.

13. Order from greatest to least: $-2, 4, -9, 0$

13. $4, 0, -2, -9$. Likely wrong answer: $-9, -2, 0, 4$ (orders least to greatest instead of greatest to least). Misconception: The requested order (greatest to least) is reversed.

14. Which temperature is warmer: -3°C or -10°C ?

14. -3°C . Likely wrong answer: -10°C is warmer (assumes the larger digit means warmer). Misconception: A bigger digit on a negative temperature is mistaken for a warmer reading.

15. Which is closer to sea level: -9 m or -16 m?

15. -9 m. Likely wrong answer: -16 m is closer (assumes the larger digit means closer to sea level). Misconception: A bigger digit below sea level is mistaken for being closer to the surface.

Worksheet B: Independent Practice

1. Is -21 an integer?

1. Yes. Likely wrong answer: No (assumes negative whole numbers cannot be integers). Misconception: Negative whole numbers are not recognized as belonging to the set of integers.

2. What is the opposite of 19?

2. -19. Likely wrong answer: 19 (states the number itself instead of its opposite). Misconception: The opposite is confused with the original number, missing the sign flip.

3. Evaluate $|-21|$.

3. 21. Likely wrong answer: -21 (keeps the negative sign in the absolute value). Misconception: Absolute value is confused with the original signed number, and the sign is not dropped.

4. Compare: -5 ____ -11

4. $-5 > -11$. Likely wrong answer: $-5 < -11$ (assumes the larger digit makes the greater negative number). Misconception: A bigger digit is mistaken for a bigger value even though both numbers are negative.

5. Is 34 an integer?

5. Yes. Likely wrong answer: No (assumes only single-digit numbers or a specific range count as integers). Misconception: A whole number is not recognized as an integer regardless of its size.

6. What is the opposite of -27?

6. 27. Likely wrong answer: -27 (states the number itself instead of its opposite). Misconception: The opposite is confused with the original number, missing the sign flip.

7. Evaluate $|26|$.

7. 26. Likely wrong answer: -26 (keeps a negative sign that was never there). Misconception: The absolute value symbol is misread as introducing a negative sign rather than removing one.

8. Compare: -17 ____ -8

8. $-17 < -8$. Likely wrong answer: $-17 > -8$ (assumes the larger digit makes the greater negative number). Misconception: A bigger digit is mistaken for a bigger value even though both numbers are negative.

9. Is 0.8 an integer?

9. No. Likely wrong answer: Yes (assumes any number written with digits and a decimal point can still count as an integer). Misconception: A number with a fractional part is not recognized as excluded from the integers.

10. What is the opposite of 0?

10. 0. Likely wrong answer: says zero has no opposite. Misconception: Zero is assumed to be a special case with no opposite, rather than being its own opposite.

11. Evaluate $|0|$.

11. 0. Likely wrong answer: says zero has no absolute value or leaves it blank. Misconception: Zero is assumed to be a special case for absolute value rather than having a distance of exactly 0.

12. Compare: 9 ____ -9

12. $9 > -9$. Likely wrong answer: $9 < -9$ (assumes any negative-looking number must be bigger). Misconception: The negative sign is misread as making a number automatically larger.

13. Is -6.4 an integer?

13. No. Likely wrong answer: Yes (assumes any number with a decimal point can still be an integer). Misconception: A number with a fractional part is not recognized as excluded from the integers.

14. Compare: 0 ____ -3

14. $0 > -3$. Likely wrong answer: $0 < -3$ (assumes any negative-looking number must be bigger). Misconception: The negative sign is misread as making a number automatically larger.

15. Order from least to greatest: $-13, 4, -9, 0, 7, -3$

15. $-13, -9, -3, 0, 4, 7$. Likely wrong answer: orders by digit size instead of number-line position. Misconception: Negative numbers are ordered by their digit size instead of their actual position on the number line.

16. Order from least to greatest: $6, -6, 2, -2, 0$

16. -6, -2, 0, 2, 6. Likely wrong answer: orders positives and negatives separately instead of together on one line. Misconception: Positive and negative numbers are sorted as two separate groups instead of one combined ordering.

17. Order from greatest to least: -14, -4, 10, -2, 0, 5

17. 10, 5, 0, -2, -4, -14. Likely wrong answer: reverses the requested order (least to greatest instead of greatest to least). Misconception: The requested order (greatest to least) is reversed.

18. Which temperature is warmer: -7°C or -14°C ?

18. -7°C . Likely wrong answer: -14°C is warmer (assumes the larger digit means warmer). Misconception: A bigger digit on a negative temperature is mistaken for a warmer reading.

Worksheet C: Mixed Application

1. A student says $-14 > -6$. Explain the mistake.

1. -6 is actually greater. -14 is farther from zero than -6. Likely wrong answer: agrees $-14 > -6$. Misconception: A bigger digit is mistaken for a bigger value even though both numbers are negative.

2. Explain why $|-9| = 9$.

2. Absolute value is distance from zero. -9 is 9 spaces from zero, and distance is never negative. Likely wrong answer: explains it by saying negatives just become positive, without mentioning distance. Misconception: The explanation states the sign change without connecting it to the meaning of distance from zero.

3. Which is warmer: -4°C or -12°C ?

3. -4°C . Likely wrong answer: -12°C is warmer (assumes the larger digit means warmer). Misconception: A bigger digit on a negative temperature is mistaken for a warmer reading.

4. Which submarine is closer to sea level: -85 m or -140 m?

4. -85 m. Likely wrong answer: -140 m is closer (assumes the larger digit means closer to sea level). Misconception: A bigger digit below sea level is mistaken for being closer to the surface.

5. Which balance has less debt: -42 or -70?

5. -42. Likely wrong answer: -70 has less debt (assumes the larger digit means less debt). Misconception: A bigger digit on a negative balance is mistaken for representing less owed.

6. Order from least to greatest: -22, 7, -4, 0, 9, -17

6. -22, -17, -4, 0, 7, 9. Likely wrong answer: orders by digit size instead of number-line position. Misconception: Negative numbers are ordered by their digit size instead of their actual position on the number line.

7. Order from greatest to least: -19, 13, 0, -3, 6, -8

7. 13, 6, 0, -3, -8, -19. Likely wrong answer: reverses the requested order (least to greatest instead of greatest to least). Misconception: The requested order (greatest to least) is reversed.

8. Give three integers less than -5.

8. Example: -6, -7, -8 (any three integers less than -5 work). Likely wrong answer: gives integers greater than -5 instead of less than. Misconception: The direction of the inequality (less than) is reversed when choosing example integers.

9. Give three integers greater than -5.

9. Example: -4, -3, -2 (any three integers greater than -5 work). Likely wrong answer: gives integers less than -5 instead of greater than. Misconception: The direction of the inequality (greater than) is reversed when choosing example integers.

10. In golf, which score is better: -4 or 3?

10. -4. In golf, a lower score is better, and -4 is lower than 3. Likely wrong answer: 3 is better (assumes a positive score always beats a negative one). Misconception: The context-specific rule (lower is better in golf) is overridden by the general assumption that positive beats negative.

11. Explain the difference between -7 and $|-7|$.

11. -7 is the number itself, 7 spaces left of zero. $|-7|$ is its distance from zero, 7, always positive. Likely wrong answer: says they are the same since both involve the number 7.

Misconception: The distinction between a signed number and its distance from zero is not addressed.

12. Explain why zero is neither positive nor negative.

12. Zero is neither positive nor negative; it is the boundary between the two sets on the number line. Likely wrong answer: calls zero positive. Misconception: Nonnegative is being confused with positive. Next move: Locate zero, +1, and -1 on a number line and name the two sides.

13. Are opposite and absolute value the same thing? Explain with an example using -8.

13. They are different ideas. The opposite of -8 is 8, while $|-8| = 8$; they coincide here, but the opposite of 8 is -8 while $|8| = 8$. Likely wrong answer: says they are always the same. Misconception: Directional opposite is confused with distance from zero. Next move: Compare opposite and absolute value for both +8 and -8.

14. Order by distance from zero, closest first: 7, -2, -9, 4, -6

14. -2, 4, -6, 7, -9. Likely wrong answer: orders by the numbers' face value instead of their distance from zero. Misconception: The requested ordering criterion (distance from zero) is replaced with ordinary numerical order.

15. Order temperatures from coldest to warmest: -16°C, 5°C, -3°C

15. -16°C, -3°C, 5°C. Likely wrong answer: orders by digit size instead of actual temperature value. Misconception: Negative and positive temperatures are ordered by digit size instead of their actual value.

Answer Key — Exit Ticket

1. -9.
2. 17.
3. $-8 > -15$.