# Up or Down? Adding and Subtracting Integers

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|---|---|---|---|
| **Teacher** | | **Class** | Grade 7 |
| **Subject** | Math | **Topic** | Adding and subtracting integers |
| **Date** | | **Room** | |
| **Lesson length** | 60 minutes | **Country** | United States |

Students learn to add integers and subtract by adding the opposite. They model moves on horizontal and vertical number lines to find sums and differences.

## Curriculum links

- Apply and extend previous understandings of numbers to add and subtract rational numbers (Add and subtract rational numbers.) [2]
- Represent addition and subtraction on a horizontal or vertical number line [2]
- Understand subtraction of rational numbers as adding the additive inverse [5][2]

## Learning objectives

- Students will add integers using number line moves and absolute value.
- Students will subtract integers by rewriting subtraction as adding the opposite.
- Students will represent addition and subtraction on horizontal and vertical number lines.

## Success criteria

- I can model integer addition moves on a number line.
- I can rewrite subtraction as adding the opposite and solve.
- I can show moves on horizontal and vertical number lines.

## What students already know

Show 5 + (-5) and ask: what happens when a number and its opposite meet? Listen for 0 because a number plus its opposite cancels [20].

## Key words

| | |
|---|---|
| **integer** | a whole number that can be above zero, below zero, or zero |
| **absolute value** | how far a number is from zero, so 5 and -5 are both 5 away from zero [20] |
| **additive inverse** | the partner number that, when put together with the first number, makes 0 [20] |
| **zero pair** | a number and its partner together that cancel out completely, worth nothing [20][16] |
| **opposite** | the number the same distance from zero but on the other side, used when subtraction is rewritten as addition [5] |

## Materials

- long paper strips for vertical number lines, rulers, pencils
- laminated -10 to 10 number lines that can be turned vertical or horizontal
- Slides 1, 2, 3, 4, 7, 9, 10, 11, 12

## Before the lesson

- Print Worksheet Task D for each student and long paper strips, one per pair, with rulers and pencils
- Make floor space clear and test Slides 1-4, 7, 9-12 on the projector

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- Worksheet Task D (Number line: Use each number line to show the start and the result.)
- mini-whiteboards and markers
- Prepare laminated -10 to 10 lines for support and a teacher vertical tower example from -400 to 300 feet

## Lesson outline

**0–8 min** **Starter** 8 min · Whole class

*Connect prior opposite-number ideas to vertical movement and hook the tower task.*

YOU DO

1. Show Slide 1 Up or Down? Adding and Subtracting Integers [title] and Slide 2 objectives, and read the goals.
2. Use the hook: Build a tower where zero is ground level, up is positive, and down is negative.
3. Show Slide 4 photo: At dawn it was -9°F. By noon it rose 18 degrees to 9°F.
4. Model pointing up for rise and down for fall on a tall vertical sketch with 0 marked as ground level.

STUDENTS DO

1. Point or step up and down to show positive and negative moves from 0.
2. Tell a partner what -9 means on the thermometer and what rising 18 should do.
3. Vote thumbs up if the noon temperature should be above zero.

**Say:** Zero is ground level on our tower. Up means positive and warmer or higher. Down means negative and colder or lower. If we start below zero and go up, where will we land?

**Worked example:** Start at -9, rise 18: -9 + 18 = 9. Different signs, so subtract absolute values: 18 - 9 = 9, keep the sign of the larger absolute value, positive, so 9°F at noon [21].

**Ask:** Where is zero on a vertical line and which way is positive? (Zero is ground level; up is positive and down is negative.) · We start at -9 and rise 18. Will we end above or below zero? (Above zero, at 9, because the rise is larger than the distance from zero [21].)

**Check understanding:** Show mini-whiteboards with predicted noon temperature; if many miss, replay the up-18 count on the vertical sketch before moving on.

**Support:** Give a laminated -10 to 10 line to hold and turn vertical to track up and down moves [13]. **Stretch:** Ask students to write and solve a drop problem such as 8 - 12 = -4 [21].

Use: Slides 1-2, 4

8–20 min **Teaching** 12 min · Whole class

*Model how addition moves and subtraction as adding the opposite work on number lines.*

**YOU DO**

1. Show Slide 3 Adding vs. Subtracting and narrate start-at-first-number, positive move right or up, negative move left or down.
2. Show Slide 7: 5 + (-5) makes a zero pair and cancels out completely, linking to a number plus its opposite is 0 [20].
3. Show Slide 10 Rules that always work: same signs add absolute values, different signs subtract absolute values, minus a number add its opposite [21].
4. Model -5 + 8 on horizontal and vertical sketches, then rewrite 7 - 4 as 7 + (-4).

**STUDENTS DO**

1. Copy the two arrows and the keep-change-change steps on mini-whiteboards.
2. Chorally say the direction for add +6, add -6, subtract +6, subtract -6.
3. Explain to a partner why 5 + (-5) is 0 using zero-pair language [16][20].

**Say:** Start at the first number. Adding positive moves right or up, adding negative moves left or down. To subtract, keep the first number, change minus to plus, and change the second number to its opposite, then add [5].

**Worked example:** -5 + 8: start at -5 and move 8 to the right to land on 3 [14]. 7 - 4 = 7 + (-4): travel 4 places in the negative direction, ending at positive 3 [5]. Same signs like (-7) + (-2) = -9 add and keep the sign; different signs like (-7) + 4 = -3 use the sign of the larger number and subtract [3].

**Ask:** How do we add numbers with different signs, like 5 + (-3)? (Subtract the smaller absolute value from the larger, 5-3=2, keep positive sign, so 2 [3][21].) · What is 7 - 4 as an addition problem? (7 + (-4) = 3, because subtraction is addition of the opposite [5].)

**Check understanding:** Hinge with whiteboards: show -4 + (-6). If answers vary from -10, rebuild with chips where each +1, -1 pair will equal zero [16][21].

**Support:** Start with same-sign only, such as (-7) + (-2) = -9, where no canceling is needed [3]. **Stretch:** Ask why -2 - (-5) = 3 is greater than -2 even though it looks like subtraction [21].

Use: Slides 3, 7, 10

20–30 min **Paired practice** 10 min · Pairs

*Practice drawing arrows for addition and rewritten subtraction and checking with a partner.*

**YOU DO**

1. Show Slide 9 Your task: start at first number on -10 to 10 line, draw arrow for second number move, write sum and check with partner.
2. Assign in order: 5+(-3), -4+(-6), 8-12, 6-(-4), circulating to check arrow direction.
3. Remind pairs to circle the second number first to separate the subtraction sign from a negative sign [15].
4. Stop class to confirm 6 - (-4) = 10 with debt language and a number-line check [14].

**STUDENTS DO**

1. Draw horizontal arrows for the four problems and label start, move, and landing point.
2. Rewrite subtractions as adding the opposite before drawing, then compare answers with a partner.
3. Flag one problem where the direction felt tricky for class review.

**Say:** Put your pencil on the first number. Draw one arrow for the second-number move. Write the sum, then your partner checks the direction and the end point. Rewrite every minus first.

**Worked example:** 5 + (-3): 5 positives and 3 negatives make 3 zero pairs with 2 positives left, so 2 [3]. -4 + (-6) = -10 with no pairs to cancel [21]. 8 - 12 = 8 + (-12) = -4 [21]. 6 - (-4) = 6 + 4 = 10 [21].

**Ask:** For 8 - 12, what addition do you draw? (8 + (-12), move 12 left/down from 8 to -4 [21].) · For 6 - (-4), which way does the arrow now move and why? (Right/up to 10, because 6 - (-4) = 6 + 4, subtracting a negative is adding [21][14].)

**Check understanding:** Collect arrow sketches for 6 - (-4); if direction errors persist, remodel facing rules: adding or subtracting a positive face positives, adding or subtracting a negative face negatives [4].

**Support:** Keep a number line from -10 to 10 on the table for the first few problems to check direction [14].
**Stretch:** Add -8 - 15 as -8 + (-15) to reach -23 [5].

Use: Slide 9

30–50 min **Main activity** 20 min · Pairs

*Represent addition and subtraction moves on a vertical number tower to meet the diagram goal.*

**YOU DO**

1. Hand out long paper strips, rulers, and pencils and demo drawing a vertical scale with 0 as ground level.
2. Model the routine: locate the starting value, decide to move up or down, then move that many spaces, as with -4 + 6 where you locate -4 and move up 6 spaces to land on 2 [13].
3. Assign tower plots: submarine at -340 feet that rises 160 feet to -180 feet [21], then hiker at 200 feet who descends 350 feet to -150 feet [21].
4. Have pairs complete Worksheet Task D to show each start and result with labeled arrows, then label tower moves with expressions.

**STUDENTS DO**

1. Draw and label a vertical scale, then plot and arrow the submarine rise and hiker descent with start, move, and result.
2. Complete Worksheet Task D number lines to show the start and the result for each problem.
3. Write the matching equation under each arrow and check totals by absolute-value rules with a partner.

**Say:** Draw your tower tall and straight with zero in the middle. Find your start first. Up is add positive or subtract negative. Down is add negative or subtract positive. Draw the arrow the full distance and write the landing number.

**Worked example:** Submarine: -340 + 160 = -180 feet: start at -340, move up 160 to -180 [21]. Hiker: 200 - 350 = 200 + (-350) = -150 feet: start at 200, move down 350 to -150 [21]. This shows addition and subtraction on a vertical number line [2].

**Ask:** On the tower, how do you show -340 + 160? (Start at -340, move up 160 spaces to -180 [13][21].) · How do you show 200 - 350 on the same tower? (Start at 200, move down 350 to -150, same as 200 + (-350) [21][5].)

**Check understanding:** Walk towers to see arrows labeled with start, direction, and result; if moves are reversed, have students turn their -10 to 10 line vertical and re-walk the move [13].

**Support:** Let students keep a -10 to 10 line that can be turned vertical or horizontal for reference while they draw [13]. **Stretch:** Add a two-step dive such as 13 - 27 = 13 + (-27) = -14 shown with two arrows [5].

Use: Worksheet Task D

50–60 min **Plenary** 10 min · Whole class

*Explain why subtracting a negative increases the result and confirm quiz accuracy.*

**YOU DO**

1. Show Slide 11 Think, pair, share: Why does 4 - (-6) = 10 and not -2? Show it two ways.
2. Lead debt talk: losing debt as gaining overall net worth helps make sense of subtracting a negative [4], testing 5 - (-3) = 5 + 3 = 8 [3] and 4 - (-2) = 4 + 2 = 6 [9].
3. Show Slide 12 Quick quiz for final check and collect answers on whiteboards.
4. Restate success criteria and preview next work with rational numbers.

**STUDENTS DO**

1. Think, pair, share two ways to show 4 - (-6) = 10 using arrows and opposite-number reasoning.
2. Answer the four quiz items and compare reasoning with a partner.
3. Self-rate against I can model, I can add the opposite, I can show horizontal and vertical moves.

**Say:** Taking away a debt leaves you better off. Subtracting -6 removes a negative, so you go up by 6. Show it on a number line and as adding the opposite. Both ways must land on the same number.

**Worked example:** 4 - (-6) = 4 + 6 = 10, not -2 [14]. On the line start at 4 and move 6 right/up. As money, removing $6 of debt raises $4 to $10. Distance between 12 and -16 is 28 because 12 - (-16) = 28 [5].

**Ask:** Why does 4 - (-6) = 10 and not -2? (Subtracting a negative is the same as adding, 4 + 6 = 10, so the result is larger [14].) · What is the distance between -5 and -12 and which subtraction shows it? (7 units, shown by -5 - (-12) = -5 + 12 = 7, distance is absolute value of the difference [2][5].)

**Check understanding:** Use quiz whiteboards: -5+8=3, -4+(-6)=-10, 8-12=-4, 6-(-4)=10 [21][14]; reteach any missed rewrite with keep-change-change [5] in small group.

**Support:** Remind the group that subtracting a negative is the same as adding, using 4 - (-6) = 10 as a number-line check [14]. **Stretch:** Ask for two pairs with the same distance, one crossing zero and one not [2].

Use: Slides 11-12

## Common mistakes

| Mistake | How to spot it | How to fix it |
|---|---|---|
| Treating 4 - (-6) as 4 - 6 to get -2 | Arrow moves left/down instead of right/up from 4 | Rewrite as 4 + 6 = 10 and check on the line that subtracting a negative moves opposite, up by 6 [14][5]. |
| Thinking subtract always makes smaller, so 5 - (-3) must be less than 5 | Student argues answer 2 is correct for 5 - (-3) | Use debt removal: losing debt raises net worth, so 5 - (-3) = 5 + 3 = 8 is larger [4][3]. |
| Mixing signs when adding different signs, such as (-7) + 4 = -11 | Adds absolute values instead of subtracting for different signs | Subtract smaller absolute value from larger and take sign of larger: 7-4=3, larger is negative, so -3 [3][21]. |

## Support

- Let students keep a -10 to 10 line that can be turned vertical or horizontal for reference while they draw [13].

## Stretch

- Add a two-step dive such as 13 - 27 = 13 + (-27) = -14 shown with two arrows [5].
- Build a four-addend vertical sum 7 + (-14) + 12 + (-8) to prove -3 with zero pairs.

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- Have players circle the second number first to separate the subtraction sign from a negative sign [15].
- Start with same-sign totals like (-7) + (-2) = -9 before different-sign canceling [3].
- Write a drop problem such as 8 - 12 = -4 and its vertical tower explanation [21].

## For the LSE or teaching assistant

Sit with target pairs during tower drawing; prompt locate start, up or down, how far, and check Worksheet Task D arrows match equations.

## Check for understanding

| Question | Answer |
|---|---|
| -5 + 8 = ? Show the move. | 3, start at -5 and move 8 right/up [14]. |
| -4 + (-6) = ? | -10 [21] |
| 6 - (-4) = ? Rewrite first. | 10, because 6 + 4 = 10 [21]. |

## Homework

Draw a vertical tower for -10 + 4 = -6 and 5 - (-3) = 8 and label each arrow.

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