

# Subtracting Integers

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Score: \_\_\_\_\_ / 18

Here is the secret to subtracting integers: *don't* treat it as something new! Every subtraction can be rewritten as **adding the opposite**:  $a - b = a + (-b)$ . After that one rewrite, you already know what to do—just use the integer-addition rules from the last section. Try it with  $-6 - (-9)$ : rewrite as  $-6 + 9$ , and the answer is 3. The more you practice this “add-the-opposite” move, the faster and more confident you will become with any integer subtraction problem.

## Key Concepts & Quick Review

**Subtraction Rule:**  $a - b = a + (-b)$       **Keep · Change · Change (KCC):** keep the first number, change subtraction to addition, change the sign of the second number.

**Examples:**  $7 - (-4) = 7 + 4 = 11$      $(-5) - 9 = (-5) + (-9) = -14$      $(-3) - (-10) = (-3) + 10 = 7$



## Examples

① Evaluate  $(-8) - (-11)$ .

**Think It Through:** Rewrite subtraction as addition of the opposite. So  $(-8) - (-11)$  becomes  $(-8) + 11$ . Now the signs are different, so subtract the absolute values:  $11 - 8 = 3$ . Since 11 has the larger absolute value, the answer is positive. Therefore the result is 3.

**Answer:** 3

② At sunrise the temperature was  $-9^\circ\text{F}$ . By noon it had risen to  $18^\circ\text{F}$ . By how many degrees did the temperature change from sunrise to noon?

**Think It Through:** Change means final minus initial, so write  $18 - (-9)$ . Use Keep-Change-Change: keep the 18, change subtraction to addition, and change  $-9$  to  $+9$ . That gives  $18 + 9 = 27$ . So the temperature rose  $27^\circ\text{F}$ .

**Answer:**  $27^\circ\text{F}$  increase

## Practice Problems

Find each difference.



- |                     |       |                          |       |
|---------------------|-------|--------------------------|-------|
| 1. $8 - 13 =$       | _____ | 9. $(-20) - (-20) =$     | _____ |
| 2. $(-5) - 7 =$     | _____ | 10. $(-3) - 14 =$        | _____ |
| 3. $(-9) - (-3) =$  | _____ | 11. $25 - (-13) =$       | _____ |
| 4. $4 - (-11) =$    | _____ | 12. $(-8) - (-15) =$     | _____ |
| 5. $(-12) - (-8) =$ | _____ | 13. $(-40) - (-25) =$    | _____ |
| 6. $0 - (-6) =$     | _____ | 14. $6 - (-6) - 3 =$     | _____ |
| 7. $(-15) - 9 =$    | _____ | 15. $(-11) - (-5) - 9 =$ | _____ |
| 8. $7 - (-7) =$     | _____ |                          |       |

**Study Tips**

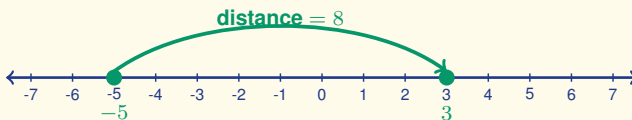
- 👉 Always apply **Keep · Change · Change** before simplifying: never skip the rewrite step.
- 👉 Subtracting a **negative** always increases the value:  $5 - (-3) = 5 + 3 = 8 > 5$ .
- 👉 For multi-step problems, rewrite *every* subtraction as addition first, then work left to right.

**Word Problems**

16. At 6:00 AM the temperature in a mountain town was  $-14^{\circ}\text{F}$ . By 3:00 PM the temperature had climbed to  $23^{\circ}\text{F}$ . Write a subtraction expression to find the total change in temperature, then evaluate it. By how many degrees did the temperature rise, and does the rise represent a gain or a loss? \_\_\_\_\_

17. A submarine began a mission at a depth of  $-520$  feet. It then descended further to  $-785$  feet. How many feet did the submarine descend during this maneuver? After reaching  $-785$  feet, the submarine ascended 310 feet. Write and evaluate a subtraction expression to find the submarine’s new depth after ascending. \_\_\_\_\_

18. This number line shows the difference  $3 - (-5)$  as a single arrow. Use the picture to (a) explain why  $3 - (-5)$  is the same as  $3 + 5$ , (b) give the value of the expression, and (c) determine the *distance* between the two endpoints. \_\_\_\_\_



## Answer Keys

- |  |   |
|--|---|
| <p>1) -5<br/>2) -12<br/>3) -6<br/>4) 15<br/>5) -4<br/>6) 6<br/>7) -24<br/>8) 14<br/>9) 0</p> | <p>10) -17<br/>11) 38<br/>12) 7<br/>13) -15<br/>14) 9<br/>15) -15<br/>16) 37°F gain<br/>17) Descended 265 <i>ft</i>; new depth -475 <i>ft</i><br/>18) (a) 3 + 5; (b) 8; (c) 8</p> |
|--|---|

### Step-by-Step Explanations

**Strategy:** For Subtracting Integers, rewrite subtraction as adding the opposite whenever signs get crowded, then combine the positive and negative parts carefully. For integer-subtraction, have students say the rule in words before they start calculating.

**Practice 1:**  $8 - 13 =$  **Answer:** -5

For the first sample, rewrite  $a - b$  as  $a + (-b)$ ; the second number changes sign before the integers are combined.

**Practice 15:**  $(-11) - (-5) - 9 =$  **Answer:** -15

Late in the set, check the sign of the number being subtracted first; taking the opposite is what keeps a double negative from slipping by.

**Word-problem notes:**

**16. Answer:**  $23 - (-14) = 37^\circ\text{F}$ ; a gain of  $37^\circ$ .

Use final minus initial:  $23 - (-14)$ . Subtracting a negative is the same as adding the opposite, so this becomes  $23 + 14 = 37$ . Because the temperature increased, the change is a gain of  $37^\circ\text{F}$ .

**17. Answer:** Descended 265 *ft*; new depth =  $-785 - (-310) = -475$  *ft*.

To find how much farther down the submarine went, subtract the starting depth from the new depth:  $-785 - (-520) = -785 + 520 = -265$ . The negative result tells you the movement was downward, so the submarine descended 265 feet. Then it ascends 310 feet, which means add 310:  $-785 + 310 = -475$ . So the new depth is -475 feet.

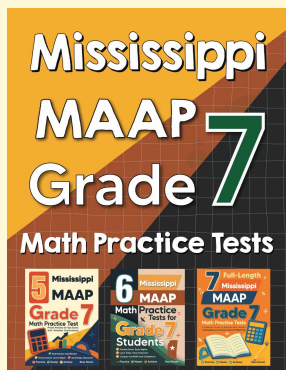
**18. Answer:** (a) Keep-Change-Change rewrites  $3 - (-5)$  as  $3 + 5$ ; (b) value = 8; (c) distance = 8.

Subtraction is the same as adding the opposite, so  $3 - (-5) = 3 + (+5) = 3 + 5 = 8$ . On the number line, the arrow shows that 3 is 8 units to the right of -5, which is exactly the distance between the two endpoints. The value of the expression equals the distance between the points.



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