

# Integers and Absolute Value

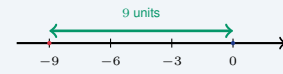
Name: \_\_\_\_\_ Date: \_\_\_\_\_ Score: \_\_\_\_\_ / 18

## Quick Review and Helpful Hints

The absolute value  $|n|$  is the distance of  $n$  from 0 on the number line, so it is never negative:  $|-7| = 7$  and  $|7| = 7$ . Watch a minus sign *outside* the bars – evaluate the absolute value first, then apply the sign:  $-|-5| = -(5) = -5$ . On the number line, numbers farther right are greater.

▶ **Example:** Evaluate  $-|-9|$ . **Work:** Work inside the bars first:  $|-9| = 9$  because  $-9$  is 9 units from zero. Then apply the minus sign outside.

★ **Answer:**  $-9$



$|-9| = 9$  (distance from 0).

### Practice Problems

Evaluate each expression.

- |            |       |                         |       |
|------------|-------|-------------------------|-------|
| 1. $ -8 $  | _____ | 8. $- -20 $             | _____ |
| 2. $ 15 $  | _____ | 9. $ 7  -  -7 $         | _____ |
| 3. $- -7 $ | _____ | 10. $ -13  +  -8 $      | _____ |
| 4. $ -34 $ | _____ | 11. $ -6  \cdot  -4 $   | _____ |
| 5. $- 12 $ | _____ | 12. $ -3 ^2$            | _____ |
| 6. $ 0 $   | _____ | 13. $ 8 - 15 $          | _____ |
| 7. $ -23 $ | _____ | 14. $ -100  \div  -25 $ | _____ |

### Word Problems

15. Diver A is at  $-340$  feet and Diver B is at  $-180$  feet. Using absolute value, who is closer to the surface, and by how much? \_\_\_\_\_
16. An account balance is  $-\$62$ . Write the amount owed as a positive number. \_\_\_\_\_
17. On a cold morning, one town is  $-5^\circ$  and another is  $3^\circ$ . Which town is colder? \_\_\_\_\_
18. Points  $P = -7$  and  $R = 5$  lie on a number line. Find  $|P| + |R|$ , the total distance of the two points from zero. \_\_\_\_\_



## Answer Keys

- |                                     |                                     |   |
|-------------------------------------|-------------------------------------|---|
| 1. <input type="text" value="8"/>   | 7. <input type="text" value="23"/>  | 13. <input type="text" value="7"/>            |
| 2. <input type="text" value="15"/>  | 8. <input type="text" value="-20"/> | 14. <input type="text" value="4"/>            |
| 3. <input type="text" value="-7"/>  | 9. <input type="text" value="0"/>   | 15. <input type="text" value="B, by 160 ft"/> |
| 4. <input type="text" value="34"/>  | 10. <input type="text" value="21"/> | 16. <input type="text" value="\$62"/>         |
| 5. <input type="text" value="-12"/> | 11. <input type="text" value="24"/> | 17. <input type="text" value="-5°"/>          |
| 6. <input type="text" value="0"/>   | 12. <input type="text" value="9"/>  | 18. <input type="text" value="12"/>           |

### Step-by-Step Explanations

1. Start by naming the process: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Absolute value is the distance from zero, and  $-8$  is 8 units away, so  $|-8| = 8$ . So the final answer is 8.
2. A good way to think about this is: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is 15 is already 15 units from zero, so  $|15| = 15$ . So the final answer is 15.
3. Step by step: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Work inside the bars first:  $|-7| = 7$ . Then the minus sign outside makes it  $-7$ . So the final answer is  $-7$ .
4. Take it one move at a time: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is The distance of  $-34$  from zero is 34. So the final answer is 34.
5. Start by naming the process: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Inside first:  $|12| = 12$ . The outside minus gives  $-12$ . So the final answer is  $-12$ .
6. A good way to think about this is: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Zero is 0 units from itself, so  $|0| = 0$ . So the final answer is 0.
7. Step by step: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is The distance of  $-23$  from zero is 23. So the final answer is 23.
8. Take it one move at a time: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Inside first:  $|-20| = 20$ . The outside minus gives  $-20$ . So the final answer is  $-20$ .
9. Start by naming the process: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Each absolute value is 7, so  $7 - 7 = 0$ . So the final answer is 0.
10. A good way to think about this is: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is  $|-13| = 13$  and  $|-8| = 8$ , so  $13 + 8 = 21$ . So the final answer is 21.
11. Step by step: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is  $|-6| = 6$  and  $|-4| = 4$ , so  $6 \times 4 = 24$ . So the final answer is 24.
12. Take it one move at a time: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is First take the absolute value:  $|-3| = 3$ . Then square it:  $3^2 = 9$ . So the final answer is 9.
13. Start by naming the process: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Simplify inside the bars first:  $8 - 15 = -7$ , and  $|-7| = 7$ . So the final answer is 7.
14. A good way to think about this is: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is  $|-100| = 100$  and  $|-25| = 25$ , so  $100 \div 25 = 4$ . So the final answer is 4.
15. Step by step: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Compare distances below the surface with absolute value:  $|-180| = 180$  and  $|-340| = 340$ . Since  $180 < 340$ , Diver B is closer, by  $340 - 180 = 160$  ft. So the final answer is B, by 160 ft.
16. Take it one move at a time: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is A balance of  $-\$62$  means  $\$62$  is owed, which is  $|-62| = \$62$ . So the final answer is  $\$62$ .
17. Start by naming the process: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is On the number line  $-5$  lies to the left of 3, so  $-5^\circ$  is the colder town. So the final answer is  $-5^\circ$ .
18. A good way to think about this is: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Find each point's distance from zero:  $|-7| = 7$  and  $|5| = 5$ , then add:  $7 + 5 = 12$ . So the final answer is 12.



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