

Opposites and Absolute Value

Name: _____ Date: _____ Score: _____ / 24

Q Quick Review

Two numbers are **opposites** if they are the same distance from 0 but on different sides — like 7 and -7 . The opposite of a number just flips its sign, and the opposite of 0 is 0. The **absolute value** of a number, written $|x|$, is its *distance* from 0 on the number line, so it is never negative. For example, $|-7| = 7$ and $|7| = 7$ because both are 7 units from zero. Watch the signs carefully: $-(-9)$ means “the opposite of -9 ,” which is 9.

◇ **Example:** Find $|-12|$ and the opposite of -12 .

⇒ Start with absolute value. $|-12|$ asks: how far is -12 from 0 on the number line? It is 12 units away, so $|-12| = 12$. Distance is never negative. Now the opposite: the opposite of a number is found on the other side of 0, the same distance away. The opposite of -12 is 12. Interesting — for this number the absolute value and the opposite turned out the same, because -12 is negative.

Answer: $|-12| = 12$, opposite = 12

PRACTICE

Find each value.

- | | | | |
|--------------|-------|---------------------------|-------|
| 1. $ 6 $ | _____ | 11. The opposite of 9 | _____ |
| 2. $ -6 $ | _____ | 12. The opposite of -9 | _____ |
| 3. $ 15 $ | _____ | 13. The opposite of 14 | _____ |
| 4. $ -7 $ | _____ | 14. The opposite of -25 | _____ |
| 5. $ 0 $ | _____ | 15. The opposite of 0 | _____ |
| 6. $ -23 $ | _____ | 16. $-(-5)$ | _____ |
| 7. $ 100 $ | _____ | 17. $-(-8)$ | _____ |
| 8. $ -3/4 $ | _____ | 18. $-(-(-5))$ | _____ |
| 9. $ -12.5 $ | _____ | 19. $ -3 + 4 $ | _____ |
| 10. $ 8.2 $ | _____ | 20. $ -10 - 2 $ | _____ |

◆ Word Problems

21. A submarine is at a depth represented by -90 feet. What is its distance from sea level? _____
22. Two towns sit on a number line: one at -15 and one at 15 (in miles from the city center). How are these two positions related?

23. A bank account balance is $-\$45$ (overdrawn). How much money is owed? _____
24. On a cold morning the temperature was -8 degrees. Later it was the opposite of that. What was the later temperature?



Answer Keys

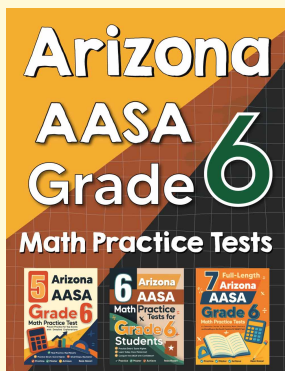
- | | |
|--------------------------------------|---|
| 1. <input type="text" value="6"/> | 13. <input type="text" value="-14"/> |
| 2. <input type="text" value="6"/> | 14. <input type="text" value="25"/> |
| 3. <input type="text" value="15"/> | 15. <input type="text" value="0"/> |
| 4. <input type="text" value="7"/> | 16. <input type="text" value="5"/> |
| 5. <input type="text" value="0"/> | 17. <input type="text" value="8"/> |
| 6. <input type="text" value="23"/> | 18. <input type="text" value="-5"/> |
| 7. <input type="text" value="100"/> | 19. <input type="text" value="7"/> |
| 8. <input type="text" value="3/4"/> | 20. <input type="text" value="8"/> |
| 9. <input type="text" value="12.5"/> | 21. <input type="text" value="90 feet"/> |
| 10. <input type="text" value="8.2"/> | 22. <input type="text" value="They are opposites"/> |
| 11. <input type="text" value="-9"/> | 23. <input type="text" value="\$45"/> |
| 12. <input type="text" value="9"/> | 24. <input type="text" value="8 degrees"/> |

Step-by-Step Explanations

- | | |
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| <p>1. 6 is 6 units from 0, so $6 = 6$.</p> <p>2. -6 is 6 units from 0, so $-6 = 6$.</p> <p>3. 15 is 15 units from 0, so $15 = 15$.</p> <p>4. -7 sits 7 units from 0, so $-7 = 7$.</p> <p>5. 0 is 0 units from itself, so $0 = 0$.</p> <p>6. -23 is 23 units from 0, so $-23 = 23$.</p> <p>7. 100 is 100 units from 0, so $100 = 100$.</p> <p>8. $-\frac{3}{4}$ is $\frac{3}{4}$ unit from 0, so the absolute value is $\frac{3}{4}$.</p> <p>9. -12.5 is 12.5 units from 0, so $-12.5 = 12.5$.</p> <p>10. 8.2 is 8.2 units from 0, so $8.2 = 8.2$.</p> <p>11. The opposite flips the sign, so the opposite of 9 is -9.</p> <p>12. The opposite of -9 flips the sign to 9.</p> <p>13. Flipping the sign of 14 gives -14.</p> | <p>14. Flipping the sign of -25 gives 25.</p> <p>15. 0 is its own opposite — it sits right at the center.</p> <p>16. $-(-5)$ means the opposite of -5, which is 5.</p> <p>17. $-(-8)$ means the opposite of -8, which is 8.</p> <p>18. Work outward: the opposite of -5 is 5, and the opposite of 5 is -5.</p> <p>19. $-3 = 3$ and $4 = 4$, so the sum is $3 + 4 = 7$.</p> <p>20. $-10 = 10$ and $2 = 2$, so $10 - 2 = 8$.</p> <p>21. Distance from sea level is the absolute value: $-90 = 90$ feet. Distance is always positive.</p> <p>22. 15 and -15 are the same distance from 0 but on opposite sides, so they are opposites.</p> <p>23. The amount owed is the absolute value of the balance: $-45 = 45$, so \$45 is owed.</p> <p>24. The opposite of -8 flips the sign, giving 8 degrees.</p> |
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