Opposites and Absolute Value

Name: _____	Date: _____	Score: _____ / 24

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. $|6|$ _____
2. $|-6|$ _____
3. $|15|$ _____
4. $|-7|$ _____
5. $|0|$ _____
6. $|-23|$ _____
7. $|100|$ _____
8. $|-3/4|$ _____
9. $|-12.5|$ _____
10. $|8.2|$ _____
11. The opposite of 9 _____
12. The opposite of -9 _____
13. The opposite of 14 _____
14. The opposite of -25 _____
15. The opposite of 0 _____
16. $-(-5)$ _____
17. $-(-8)$ _____
18. $-(-(-5))$ _____
19. $|-3| + |4|$ _____
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. $\boxed{6}$
2. $\boxed{6}$
3. $\boxed{15}$
4. $\boxed{7}$
5. $\boxed{0}$
6. $\boxed{23}$
7. $\boxed{100}$
8. $\boxed{\frac{3}{4}}$
9. $\boxed{12.5}$
10. $\boxed{8.2}$
11. $\boxed{-9}$
12. $\boxed{9}$
13. $\boxed{-14}$
14. $\boxed{25}$
15. $\boxed{0}$
16. $\boxed{5}$
17. $\boxed{8}$
18. $\boxed{-5}$
19. $\boxed{7}$
20. $\boxed{8}$
21. $\boxed{90 \text{ feet}}$
22. $\boxed{\text{They are opposites}}$
23. $\boxed{\$45}$
24. $\boxed{8 \text{ degrees}}$

Step-by-Step Explanations

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

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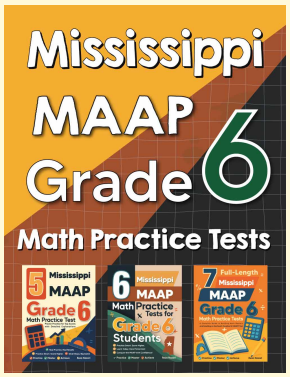

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