Integers and Their Opposites

Apply the skill to decisions and designs

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QUICK REVIEW

Opposites are the same distance from zero on different sides. The opposite of -2 is 2, and $-2 + 2 = 0$. Absolute value is nonnegative distance: $|-2| = 2$. Zero is its own opposite.

Worked example

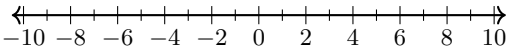
A lift is on floor -3. Which floor is opposite it across floor 0, and how many floors apart are they?

1. Negate the floor number: $-(-3) = 3$.
2. Both floors are 3 levels from zero: $|-3| = |3| = 3$.
3. Their separation is $3 - (-3) = 6$ levels.
Answer: Floor 3; 6 levels apart.

Practice Problems

Show your thinking.

1. A diver is 6 m below sea level. Write the signed elevation and its opposite; interpret the opposite.

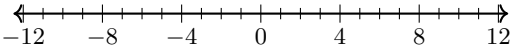


2. A bank adjustment of -10 dollars must be canceled exactly. What signed adjustment is needed?

3. Two floors are opposite signed levels, each 6 levels from the lobby. List the floors and their separation.

4. Interpret this statement: $x + (-16) = 0$. Find x and its distance from zero.

5. Four locations on an underground parking map have signed floor numbers $-10, 0, 6, -6$. List the levels from lowest to highest.



6. Design a zero-total pair: find two opposite integers with distance 12 between them.

7. Signal record: a balance starts at 50 dollars and receives adjustment -13 dollars. Find the adjustment that restores the starting balance.

8. Distance marker: a station is at elevation 17 m and another at the opposite elevation. Is 33 m enough to span their vertical separation? Find the shortage.

9. Balance check: two opposite integers are 38 units apart. Recover both integers, naming the positive one first.

10. Reference scale: list the pair 23 and its opposite, then find their distance apart.

Answer Key

1. -6 m; opposite 6 m above sea level.
2. $+10$ dollars.
3. Floors $-6, 6$; 12 levels apart.
4. $x = 16$; distance 16.
5. $-10 < -6 < 0 < 6$.
6. -6 and 6.
7. Adjustment 13 dollars.
8. No; short 1 m.
9. 19 and -19.
10. $23, -23$; distance 46.

Step-by-Step Solutions

Follow each calculation, then check your own work.

Problem 1

1. Below sea level is negative: $0 - 6 = -6$ m.
2. Opposite elevation $= -(-6) = 6$ m.
3. Separation $= 6 - (-6) = 12$ m.

Problem 2

1. Original adjustment is -10 dollars.
2. Canceling adjustment $= -(-10) = 10$ dollars.
3. $-10 + 10 = 0$ dollars net change.

Problem 3

1. Opposite levels are -6 and 6.
2. Each has distance 6 from level 0.
3. Separation $= 6 - (-6) = 12$ levels.

Problem 4

1. x must cancel -16.
2. $x = -(-16) = 16$.
3. Check $16 + (-16) = 0$; $|16| = 16$.

Problem 5

1. Because $10 > 6$, reversing signs gives $-10 < -6$.
2. Both are negative: $-10 < 0$ and $-6 < 0$.
3. $6 > 0$, so the ordered list is $-10, -6, 0, 6$.

Problem 6

1. Each distance from zero must be $12 \div 2 = 6$.
2. The two signed integers are -6 and 6.
3. Check separation $6 - (-6) = 12$ and sum 0.

Problem 7

1. After the first adjustment: $50 + (-13) = 37$ dollars.
2. Restoring adjustment $= 50 - (37) = 13$ dollars.
3. Check $37 + (13) = 50$ dollars.

Problem 8

1. Opposite elevation is -17 m.
2. Separation $= 17 - (-17) = 34$ m.
3. Shortage $= 34 - (33) = 1$ m.

Problem 9

1. Each distance from zero is $38/2 = 19$.
2. The integers are 19 and -19.
3. Check sum 0 and separation $19 - (-19) = 38$.

Problem 10

1. Absolute value $|23| = 23$.
2. Opposite $= -(23) = -23$.
3. Distance $= 23 - (-23) = 46$ units.

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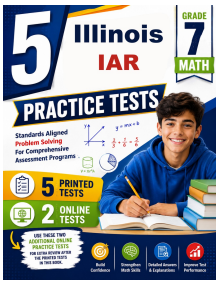

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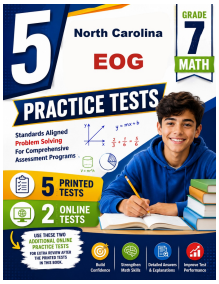

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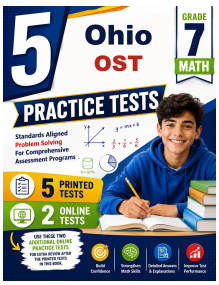

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