Understanding Positive and Negative Numbers

Positive and negative numbers: Mistakes and missing information

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QUICK REVIEW

Choose a reference value called zero. Above zero is positive and below zero is negative. A depth 7 m below sea level is -7 m; 4 m above is $+4$ m. On a number line $-7 < 0 < 4$. A negative sign indicates direction, not just a small size.

Worked example

Write the signed elevation of a point 12 m below sea level and compare it with 3 m above.

1. Below the zero reference is negative, so the first elevation is -12 m.
2. Above it is $+3$ m; the separation is $12 + 3 = 15$ m, with -12 left of 3.
Answer: -12 m and $+3$ m; $-12 < 3$.

Practice Problems

Show your thinking.

1. A student labels 6 m below sea level as $+6$. Correct it.

2. A location is 9 units from zero on its negative side. Recover its signed coordinate.

3. A student says -10 is warmer than -3 because $10 > 3$. Correct the comparison.

4. Write a signed change for losing 14 game points. What gain would cancel it?

5. Is zero positive or negative? Use $-1, 0, 1$ to explain.

6. A bank display labels a debt of 18 dollars as $+18$. Repair the sign and give the amount needed to reach zero.

7. A student labels losing 6 points as $+6$. Correct the sign and give a cancelling change.

8. A marker is 4 units from zero on the positive side. Recover its coordinate and the opposite-side coordinate.

Answer Key

1. -6 m.
2. -9.
3. $-10 < -3$; $-3°$C is warmer.
4. -14; gain 14.
5. Neither.
6. -18 dollars; pay 18 dollars.
7. -6; cancellation $+6$.
8. 4 and -4.

Step-by-Step Solutions

Follow each calculation, then check your own work.

Problem 1

1. Below the zero reference uses a minus sign: -6.
2. $-6 + 6 = 0$ checks that rising 6 m reaches sea level.

Problem 2

1. The negative side selects -9, not 9.
2. $|-9| = 9$ checks the stated distance.

Problem 3

1. -10 is 10 units below zero, while -3 is only 3 below.
2. $-3 - (-10) = 7$, so -3 is 7 degrees warmer.

Problem 4

1. Losing 14 is the change -14.
2. $-14 + 14 = 0$, so $+14$ cancels it.

Problem 5

1. -1 is one unit below 0 and 1 is one above.
2. $-1 + 1 = 0$; zero is the dividing reference, not a positive or negative displacement.

Problem 6

1. A debt is below a zero balance, so -18.
2. $-18 + 18 = 0$; 18 dollars restores zero.

Problem 7

1. Loss means the negative change -6.
2. $-6 + 6 = 0$, so a gain of 6 cancels it.

Problem 8

1. Positive side selects $+4$ because $|4| = 4$.
2. The opposite-side point is -4; $4 + (-4) = 0$.

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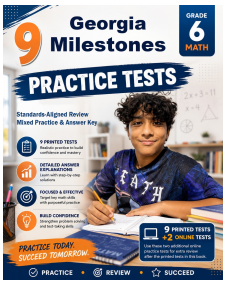

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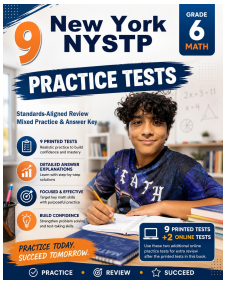

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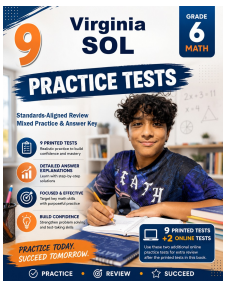

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