

Integer Moves Mission

Build models, write equations and explain signs

GRADE 6 • 6.CE.2

6.CE.2 "The student will estimate, demonstrate, solve, and justify solutions to problems using operations with integers, including those in context. Demonstrate/model addition, subtraction, multiplication..."

NAME _____

DATE _____

BUILD UNDERSTANDING

Use two-color counters, or draw circles labeled + and -. Each counter represents +1 or -1; one of each forms a zero pair. Adding or removing a zero pair preserves the total. Addition combines counters; subtraction removes the stated counters, adding zero pairs first if needed. Positive groups repeat a signed amount; division can share a signed total equally. Label every group.

WORKED EXAMPLE

Build one positive and one negative counter. Explain why adding this pair to a model leaves its value unchanged.

1. The two signed values cancel: $+1 + (-1) = 0$.
2. Adding zero changes no total.

Answer: A zero pair has value 0; it can be added when a take-away model needs more counters of a sign.



One zero pair: $+1 + (-1) = 0$

PRACTICE 5 problems

- 1** Model $7 + (-10)$ in the box with signed counters. Show the starting counters, cancel zero pairs, and give the sum with an equation.

Combine and cancel

- 2** Model $(-3) - (-5)$ as taking away five negative counters. Show the starting value, any zero pairs added, and what remains. Write the equation.

Show the take-away model



- 3** Model 3 times (-4) with equal groups of signed counters. Label each group and find the product.

Show three equal groups



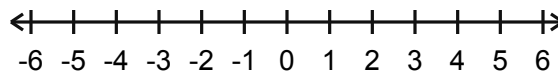
- 4** Model $(-12) \div 3$ by sharing twelve negative counters among three equal groups. Find the signed value of one group and verify with multiplication.

Share the signed total



- 5** Simplify $|-5| + (-8)$. Plot its result on this number line and explain the difference between the distance $|-5|$ and the final signed result.

Plot the final result



APPLY IT Show your work

- 1** Jalen starts with -18 points and earns 6 points in each of 5 rounds. Estimate by replacing -18 with -20. Then calculate the exact final score and justify both equations.

- 2** A club balance is -\$63. Seven members each pay an equal positive amount to reach \$0. Estimate by replacing the debt magnitude 63 with 70, then find the exact payment per member and check the new balance.

CHALLENGE One step up

Model $(-3) \times (-2)$ as removing three groups of two negative counters from zero. First show enough zero pairs, then cross out the removed negatives. Give the product and explain its sign.

Remove groups from zero



Require student-created signed models in every model task, including intermediate zero pairs and grouping boundaries. Counter signs must remain explicit in monochrome printing. For negative multipliers the stated removal-of-groups interpretation starts at zero; for negative divisors the quotient counts groups with the stated negative value. A sign-rule answer without the required model is incomplete.

PRACTICE 1

Seven positive and ten negative counters form seven zero pairs; three negative counters remain. $7 + (-10) = -3$.

PRACTICE 2

Begin with 3 negative counters; add 2 zero pairs. Now remove 5 negatives, leaving 2 positives. $(-3) - (-5) = 2$.

PRACTICE 3

Three groups of four negative counters give twelve negatives. $3 \times (-4) = -12$.

PRACTICE 4

Each group has four negatives, value -4. $(-12) / 3 = -4$; $3 \times (-4) = -12$.

PRACTICE 5

$|-5| = 5$; $5 + (-8) = -3$. Plot -3. Absolute value gives nonnegative distance 5; adding -8 makes the final expression negative.

APPLY IT 1

Estimate: $-20 + 5 \times 6 = 10$ points. Exact: $-18 + 30 = 12$ points. Multiplication counts five equal gains. Accept an equivalent justified solution with the required model or recorded evidence.

APPLY IT 2

Estimate \$10 each from $70 / 7$. Exact \$9 each from $63 / 7$. Check: $-63 + 7 \times 9 = 0$ dollars. Accept an equivalent justified solution with the required model or recorded evidence.

CHALLENGE

Start with 6 zero pairs. Remove 3 groups of 2 negatives, leaving 6 positives. $(-3) \times (-2) = 6$; removing a negative amount increases the value.