CCSS • 7.EE.3

Solving Multi-Step Problems with Rational Numbers

Name: _____	Date: _____	Score: _____ / 17

This is where all your algebra and rational-number skills team up! You may need to work with fractions, decimals, negatives, variables, and multiple operations in the same problem—but do not let that intimidate you. The best approach is to move slowly: define the variable, translate the situation into an equation or inequality, solve step by step, and check the result in context. The arithmetic is usually simple; it is the *setup* that decides the answer, so careful organization is your secret weapon!

Key Concepts & Quick Review

General strategy for multi-step equations with rationals: (1) Clear fractions by multiplying through by the LCD if helpful. (2) Distribute any parentheses. (3) Combine like terms on each side. (4) Move variable terms to one side, constants to the other. (5) Divide (or multiply) to isolate the variable.

Examples

① Solve: $\frac{3}{4}x - 2 = \frac{1}{2}x + 3$.

Think It Through: Fractions are easier to handle if you clear them first. The least common denominator of 4 and 2 is 4, so multiply every term by 4. That turns the equation into $3x - 8 = 2x + 12$. Now subtract $2x$ from both sides to get $x - 8 = 12$, and add 8 to find $x = 20$. Checking in the original equation confirms the answer works.

Answer: $x = 20$

② A weather station recorded temperature changes over three days: $-2\frac{1}{2}$ °F, $+1.75$ °F, and x °F. If the total change was -3.25 °F, write and solve an equation for x. Interpret your answer in context.

Think It Through: Rewrite the mixed number as a decimal so the arithmetic is easier: $-2\frac{1}{2} = -2.5$. Then write the total-change equation: $-2.5 + 1.75 + x = -3.25$. Combine the first two terms to get $-0.75 + x = -3.25$. Add 0.75 to both sides, which gives $x = -3.25 + 0.75 = -2.5$. In context, that means the temperature dropped $2.5°$F on the third day.

Answer: $x = -2.5°$F *(a drop of $2.5°$F on day three)*

Practice Problems

Solve each multi-step equation or inequality involving rational numbers.

1. $\frac{x}{2} + 3 = 7$ _____

2. $\frac{3}{4}n - 1 = 5$ _____

3. $0.5x + 1.2 = 3.7$ _____

4. $-\frac{2}{3}m + 4 = 10$ _____

5. $1.5k - 3.5 = 4$ _____

6. $\frac{x}{3} - \frac{1}{2} = \frac{5}{6}$ _____

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7. $2.4y + 1.6 = 10$ _____

8. $-\frac{3}{5}x + 2 = -4$ _____

9. $\frac{2x+1}{3} = 5$ _____

10. $\frac{x}{4} + \frac{x}{4} = 6$ _____

11. $0.3(x - 4) = 1.8$ _____

12. $\frac{3}{2}(x + 2) = 9$ _____

13. $-1.2x + 4.8 = -2.4$ _____

14. $\frac{5}{6}x - \frac{1}{3} = \frac{2}{3}$ _____

15. $2(0.5x - 3) = 4$ _____

Study Tips

- When fractions appear, multiply **every term** on both sides by the LCD to clear all fractions at once — it instantly turns a hard problem into an easy one.
- Organize your work **vertically** with one operation per line. Multi-step problems are where messy work causes the most errors.
- **Check your answer** in the *original* equation, not a simplified version — a check against a wrong intermediate step will give a false positive.

Word Problems

16. Two friends, Devon and Kenji, are saving money for a concert. Devon has $\$12.50$ and saves $\$8.75$ per week. Kenji has $\$30$ and saves $\$5.50$ per week. Write an equation and solve for the number of weeks w after which they will have saved the same amount. How much will each have at that point? Who saves faster, and by how much per week?

_____

17. A hiking trail descends at an average rate of $\frac{3}{8}\ mi$ per minute. A ranger starts at the top (elevation 0) and needs to reach a rescue point at elevation $-4\frac{1}{2}\ mi$ (below starting point). Write and solve an equation for the time t (in minutes) to reach the rescue point. If the ranger also needs $15\ min$ to set up equipment once there, and the total operation must be done in under $30\ min$, write and solve an inequality to check whether this is possible.

_____

Answer Keys

1) 8
2) 8
3) 5
4) -9
5) 5
6) 4
7) 3.5
8) 10
9) 7
10) 12
11) 10
12) 4
13) 6
14) $\frac{6}{5}$
15) 10
16) $\frac{70}{13} \approx 5.38$ weeks; about $59.62 each; Devon is $3.25/wk faster
17) $12\ min$; total $27\ min$; yes

Step-by-Step Explanations

Tutoring notes not found for this topic.

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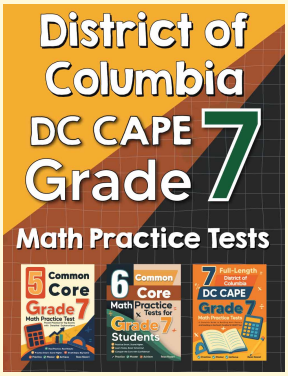

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