

Grade 7 Math – Art of Problem Solving**4.5 Solving Inequalities Using Addition or Subtraction**

Work in class. Show reasoning, examples, or diagrams that support your conclusions.

REASON ABOUT SOLUTIONS

1. Same solution set? Which inequalities have the same solution set as $u + \frac{1}{2} < -\frac{3}{2}$? Explain each decision.

A. $u < -2$

B. $u + \frac{3}{2} < -\frac{1}{2}$

C. $u \leq -2$

D. $-2 > u$

2. A moving boundary. In $x + c < 7$, c increases by 2. Describe how the boundary and solution set change. Explain without choosing c .

3. Room for supplies. A storage shelf supports at most 36 kilograms and already holds 17.4 kilograms. Find the possible added masses. A box weighs 18.6 kilograms; does it fit exactly or leave capacity?

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DEEPEN THE REASONING

4. Equivalent in reverse order. Explain why $4 \geq x + 7$ and $x - 2 \leq -5$ describe the same numbers. Check the endpoint.

5. Endpoint matters. Two students obtain $x < -3$ and $x \leq -3$. They agree on every integer they test except one. Which integer must it be, and why?

6. Build a counterexample. A student says subtracting a negative number reverses an inequality. Use $x - (-2) > 5$ to disprove the claim with algebra and a value that satisfies the original inequality.
