Equations and Inequalities Problem Solving

Lesson 7-7

Name: _____ Date: _____ Class: _____

Key Vocabulary Level 1 support

Picture first, then the word, then a plain-language meaning. Say each word out loud.

'Twice a number is 18' → 2n = 18 — the equation models the words

Model

To show a real-life situation with an equation or inequality.

x + 5 = 12 — exactly one answer: x = 7

Equation

A math sentence with an equal sign showing both sides are the same.

x + 5 > 12 — many answers: x = 8, 9, 10, …

Inequality

A math sentence that compares two sides with <, >, ≤, or ≥.

If the problem asks for a number of people and you get x = −3, that is NOT reasonable

Reasonableness

Checking if your answer makes sense.

Key Ideas & Notes

- Detective Santos is closing a complex case.
- She has collected equations and inequalities from different parts of the investigation.
- One clue says: 'The total value of stolen items divided equally among 4 accomplices gave each person $85.' Another says: 'The lookout earned less than $50.' She must model both clues mathematically and check if the answers are reasonable.
- Can you help?
- Read each word problem. Decide if it needs an equation or an inequality. Write the mathematical model, solve it, and check your answer for reasonableness.

Think About It

- Which clue leads to an equation and which leads to an inequality?
- What operation does 'divided equally among 4' suggest?
- What does 'less than $50' tell you about the inequality symbol?

My Notes

Guided Examples

Example 1

A museum has some paintings. After adding 12, they have 45. Which equation models this?

Solution: 'Adding 12' to the original number gives 45: $p + 12 = 45$. Solve: $p = 33$.

Answer: A. $p + 12 = 45$

Example 2

A detective needs more than 8 hours to finish the investigation. She has already worked 3 hours. Which inequality represents the additional hours h she needs?

Solution: 3 hours plus additional hours h must be more than 8: $3 + h > 8$. Solve: $h > 5$.

Answer: A. $3 + h > 8$

Example 3

Which model is correct for: 'A number divided by 6 equals 7'?

Solution: Divided by 6 is $n / 6$. Equals 7 means $= 7$. So $n / 6 = 7$.

Answer: A. $n / 6 = 7$

Write About the Math

The Writing Revolution

I can explain my reasoning using the words model, equation, inequality, and reasonableness.

1. Kernel Sentence

subject + verb

Model: Equation is a math sentence with an equal sign showing both sides are the same.
Ecuación es una oración matemática con un signo igual que muestra que ambos lados son iguales.

Write a kernel sentence about equation. Use a subject and a verb.
Escribe una oración base sobre ecuación. Usa un sujeto y un verbo.

2. Sentence Expansion

because · but · so

Kernel: Equation matters in math
Ecuación importa en matemáticas

Expand the kernel three ways. Add a reason, a contrast, and a result.

because *porque*

Equation matters in math because ____.
Ecuación importa en matemáticas porque ____.

but *pero*

Equation matters in math, but ____.
Ecuación importa en matemáticas, pero ____.

so *entonces*

Equation matters in math, so ____.
Ecuación importa en matemáticas, entonces ____.

3. Sentence Types

4 ways to write a math idea

Statement
Afirmación

Tell one true fact about equation.
Di un hecho verdadero sobre equation.

Equation ____.

Question
Pregunta

Ask a question about equation.
Haz una pregunta sobre equation.

How does ____ ?
¿Cómo ____ ?

Exclamation
Exclamación

Show excitement about equation.
Muestra entusiasmo sobre equation.

Wow, ____ !
¡Guau, ____ !

Command
Mandato

Tell a partner what to do with equation.
Dile a un compañero qué hacer con equation.

First, ____ .
Primero, ____ .

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4. Explain Your Reasoning

use a sentence starter

My plan was to ____.
Mi plan fue ____.

I knew to ____ because ____.
Supe ____ porque ____.

This is like when ____.
Esto es como cuando ____.

Try It

Solve on your own. Check the answer key when you are done.

1. A bus can carry at most 48 passengers. There are already 31 on board. Which inequality shows how many more can board?

A. $31 + p \leq 48$

B. $31 + p > 48$

C. $31 + p = 48$

D. $p - 31 \leq 48$

Show your work:

2. A student solved $4n = 52$ and got $n = 13$. Is the answer reasonable if n represents the number of notebooks in a box?

A. Yes — 13 notebooks per box is reasonable

B. No — 13 is too many notebooks

C. No — the answer should be 48

D. Yes — but only if n is a fraction

Show your work:

Stretch Your Thinking

Level 2 enrichment

Challenge task — explain your reasoning in full sentences.

Create two word problems about the same situation: one that requires an equation and one that requires an inequality. Solve both and explain why the models are different.

Sentence starter: Equation problem: ____. Model: ____. Solution: ____. Inequality problem: ____. Model: ____. Solution: ____. The models are different because ____.

Show your work:

Reflect — Exit Ticket

A box of donuts has some donuts. After giving away 7, there are fewer than 5 left. Which inequality represents the starting number of donuts d?

A. $d - 7 < 5$

B. $d + 7 < 5$

C. $d - 7 > 5$

D. $d - 7 = 5$

Your answer:

Answer Key & Teacher Guide

1. **Try It 1:** A. 31 + p ≤ 48 — *'At most 48' means the total must be ≤ 48. So 31 + p ≤ 48. Solve: p ≤ 17.*
2. **Try It 2:** A. Yes — 13 notebooks per box is reasonable — *4 × 13 = 52 ✓. 13 notebooks per box is a reasonable whole number answer.*
3. **Exit Ticket:** A. d − 7 < 5 — *Starting with d donuts and giving away 7 leaves fewer than 5: d − 7 < 5. Solve: d < 12. ✓*

Writing (TWR) — what to look for

- **Kernel sentence:** A complete sentence needs a subject and a verb. Example: Equation is a math sentence with an equal sign showing both sides are the same.
- **Expansion:** *because* gives a reason, *but* shows a contrast or exception, *so* shows a result. Answers vary; each must keep the kernel idea and add the correct kind of detail.
- **Sentence types:** Statement ends with a period, question with "?", exclamation with "!", and a command starts with an action verb (a "bossy" verb).