

PART I GET STARTED

Today's Mathematics

We will use inverse operations and the meaning of equality to solve one-step equations and verify solutions.

Essential Question

How can inverse reasoning undo an operation while keeping an equation balanced?

DO NOW

Complete these on graph paper. Be ready to explain one choice.

1. Evaluate $18 - 3(4)$.
2. Find $6 + (-9)$.
3. What operation undoes multiplication by 5?
4. What number is one-third of 18?

SEE IT

A balanced scale has one sealed bag and 7 counters on the left. It has 19 counters on the right.

1. What could you remove from both sides and still keep the scale balanced?
2. After that removal, what must be inside the bag? Write an equation that represents the situation.

QUICK WRITE | 2 MINUTES

Describe the move you made to the balance. Why did it preserve equality?

PART II INVESTIGATE

UNDO WITHOUT GUESSING

For each equation, first name the operation acting on the variable. Then undo it on both sides and check by substitution.

Equation	Operation on the variable	Inverse on both sides	Solution and check
$x + 7 = 19$			
$x - 5 = -2$			
$4x = -28$			
$\frac{x}{3} = 5$			

LOOK FOR STRUCTURE

1. Solve $-3n = 18$. How is the negative coefficient reflected in your solution?
2. Solve $\frac{r}{-4} = 7$. Write the substitution check as a complete equation.
3. Compare your work with a partner. Identify one step that preserved equality in both solutions.

MATH NOTES

Complete the sentence: An equation stays balanced when

PART III MAKE SENSE AND PRACTICE

WHAT WE CAN CONCLUDE

- Use an inverse operation to isolate the variable.
- Apply the same operation to both sides so equality is preserved.
- Substitute the result into the original equation to check it.

WORKED MODEL

Solve $-13 + x = -25$.

$$\begin{aligned} -13 + x &= -25 \\ -13 + x + 13 &= -25 + 13 \quad \text{add 13 to both sides} \\ x &= -12 \end{aligned}$$

Check: $-13 + (-12) = -25$, so the solution makes the original equation true.

TRY IT

1. Solve $a - \frac{3}{4} = -2$. Show the inverse operation on both sides.

2. Solve $-6q = 54$ and check your solution by substitution.

MATH WRITE | 5 MINUTES

Explain why the same operation must be performed on both sides when solving an equation. Use one equation from this page as evidence.

PART IV PUZZLE PRACTICE

Homework

Name _____

Date _____

DID YOU HEAR ABOUT...

Complete each exercise. Match its answer to the word in the answer bank. Write that word on the blank with the same exercise letter.

- A. $x + 9 = -12$

B. $-8 + k = -17$

C. $-0.3 + r = 4.7$

D. $f + 3\pi = 12\pi$

E. $d - 6\pi = -\pi$

F. $\frac{1}{8} = s - \frac{3}{4}$

G. $m - \frac{1}{4} = -\frac{1}{3}$

H. $-0.8b = 10.4$

I. $46.2 = 4.2p$

J. $-7\pi h = 98\pi$

K. $12.5 = \frac{t}{\pi}$

L. $3.9r = 17.55$

M. $\frac{3}{8}q = -\frac{1}{2}$

N. $-\frac{5}{6} = \frac{2}{3}w$
- O. Your dog weighs 28.5 pounds more than your cat. Your dog weighs 37.8 pounds. What is your cat’s weight?
- P. Nathaniel’s sister has $\frac{5}{6}$ as many songs as he has. She has 35 songs. How many songs does Nathaniel have?

ANSWER BANK

- | | | | |
|----------------------|-------------|----------------------|----------------------|
| 5 WHO | 7.2 HOW | −9 MAN | −13 SOUP |
| − $\frac{4}{3}$ IT | −14 HE | $\frac{3}{4}$ ARE | $\frac{7}{8}$ IN |
| 42 SOMETHING | 4.5 WASH | 9.3 WITH | 5 π SOAP |
| 12.5 π COULD | 8 π WAS | − $\frac{1}{12}$ HIS | 9 π PUT |
| − $\frac{5}{4}$ DOWN | 11 SO | −21 THE | − $\frac{3}{5}$ THAT |

CRACK THE CODE

A _____ B _____ C _____ D _____ E _____ F _____ G _____ H _____

I _____ J _____ K _____ L _____ M _____ N _____ O _____ P _____