

Solving One-Step Equations Class Work

🦋 **You will be able to...** solve one-step equations & justify your solutions, rearrange formulas to highlight a desired variable, and model and solve real world situations with one-step equations

★ Consider This...

The scales are in balance, because each star weighs the same amount! 😊



Each block weighs one ounce. How can you figure out how many ounces a star weighs? Support your answer.



The scales are balanced. What does that mean about each circle?



Each block weighs one ounce. How can you determine the weight of one circle? Support your answer



8 Solving One-Step Equations

* When solving equations for an unknown quantity (variable), you will be essentially trying to keep the equation **in balance**, the way you tried to when balance the scales!

* In solving equations, you must find the value for the unknown quantity that will make the equation **true**. We call this a **solution** to the equation.

Let's go back and write an equation to represent each situation with the scales.

* We used _____ operations (operations that **undo** each other) to balance the scales, the same way we will apply _____ operations to solve equations.

✍ What is the inverse of addition? _____

✍ What is the inverse of subtraction? _____

✍ What is the inverse of multiplication? _____

✍ What is the inverse of division? _____

Important Properties: These properties will help you justify each step involved with solving equations. (a , b , and c are all real numbers)

◆ Addition Property of Equality

If $a = b$, then $a + c = b + c$

Ex. $8 = (1 + 7)$, so $8 + 2 = (1 + 7) + 2$

"Adding the same value to both sides of an equation will keep the equation in balance."

◆ Subtraction Property of Equality

If $a = b$, then $a - c = b - c$

Ex. $8 = (1 + 7)$, so $8 - 3 = (1 + 7) - 3$

"Subtracting the same value from both sides of an equation will keep the equation in balance."

◆ Multiplication Property of Equality

If $a = b$, then $a * c = b * c$

Ex. $8 = (1 + 7)$, so $8 * 2 = (1 + 7) * 2$

"Multiplying by the same value on both sides of an equation will keep the equation in balance."

◆ Division Property of Equality

If $a = b$, then $a / c = b / c$

Ex. $8 = (1 + 7)$, so $8 / 2 = (1 + 7) / 2$

"Dividing both sides of an equation by the same value will keep the equation in balance."

 **Guided Examples:** SOLVING ONE-STEP EQUATIONS

Solve each equation, and check and justify your solution.

A. $x + 3 = 10$

B. $28 = -7y$

C. $100 = r \div 10$

D. $\frac{3}{4}x = 60$

 **Now You Try Some!**

1. Solve each equation, and check and justify your solution.

a. $-2p = 20$

b. $4 + h = 16$

c. $f - 9 = -2$

d. $\frac{1}{2}w = 100$

$$e. -3 + d = 13$$

$$f. b + 2 = -5$$

$$g. t/9 = -4$$

$$h. 5 = m/3$$

$$i. -v = -7$$

$$j. -q = 10$$

$$k. \frac{1}{4}s = 9$$

$$l. 77 = -11c$$

$$m. 3 + s = 21$$

$$n. w - 5 = 28$$

☞ Solving Problems With the Help of One-Step Equations

In many cases, you can model situations with algebraic equations – you have done this in the past! ☺ Today, you will model situations with equations, explain your equations, and solve and check your answers. Always remember to check for correctness, reasonableness, and clarity within your work! Showing these three aspects is a great way to justify your reasoning.

☞ Guided Example: SOLVING PROBLEMS WITH THE HELP OF ONE-STEP EQUATIONS

Write an equation to model the situation. Then solve and check.

Nora withdrew \$25 from her bank account. The slip she received stated that her new balance is \$234.89. How much money was in Nora's bank account before the withdrawal?

 Now You Try Some!

2. Model each situation with an equation. Then solve and check each problem. Justify your equation and solution.
 - a. Emily's puppy will not stand still on the scale at the vet! Emily, who weighs 123 pounds, steps on a scale with her puppy. The scale reads 134 pounds. How much does the puppy weigh?

 - b. Joseph is 17 years old, which is four years younger than his brother, Tony. How old is Tony?

c. You work for 4.5 hours at an hourly rate, and are given \$54. How much money do you earn per hour?

d. Logan, the German Shepherd weighs three times the amount of a smaller dog, Yoda. How much does Yoda weigh if Logan is 84 pounds?

e. A stock increases in value by a steady rate over the course of four days. The overall change in value of the stock is positive \$5.20. How much did the stock increase per day?

∞ Rearranging Formulas

Some equations (especially formulas) involve more than one variable. However, such equations can be rearranged to isolate a desired variable. Rearranging such equations involves the same process as solving equations, except you will be operating mostly on variables rather than numbers. Let's look at an example...

Example: The formula $A = bh$ can be used to find the area (A) of a rectangle with height h units and base b units. Rearrange this formula to write a formula that can be used to determine the base of the rectangle.

Essentially we need to isolate "b."

$$A = bh$$
$$/h \quad /h$$

$$A/h = b, \quad \text{so} \quad b = A/h$$

∞ Guided Example: REARRANGING FORMULAS

The formula $d = rt$ can be used to find a distance traveled (d), given the rate (r) and time (t). Rearrange the formula so that it can be used directly to determine the rate traveled.

 **Now You Try Some!** 3. Rearrange each formula to highlight the desired variable.

a. Rearrange $A = bh$ to highlight height (h).

b. Rearrange the formula for diameter ($d = 2r$) so that it can be used directly to find the radius (r).

c. The number of hits a baseball player makes (h) combined with the number of times the player is walked (w) equals the number of times the player is on base (n). Rearrange the formula to highlight the variable w.

$$h + w = n$$

d. Solve for g. $g - p = r$

e. Solve for j. $j/a = q$

f. Solve for b. $bx = c$

Homework Section 1:

Check Understanding: p. 75 #1 and 2 – Choose **one** part (a, b, OR c) from each problem

Check Understanding: p. 77 #4 and 6 – Choose **one** part (a, b, OR c) from each problem

p. 77 #3-15 odds

p. 78 #21-25 odds and #41-45 odds

p. 79 #75

Homework Section 2:

p. 77 #4-14 evens

p. 78 #27-31 odds, #45-51 odds, 55, 59, 64, and 68

p. 79-80 #80, 82 (Just for Fun! 😊) and 87-90

Homework Section 3:

p. 78-79 #19, 20, 70, 73

p. 113-114 #6, 9, 10, 17-20, 26, and 29

Exit Slip Day 1:

Solve each equation, and justify your solution.

1. $x + 5 = -3$

2. $-4x = -32$

When you are done, please add to the “How Are You Doing?!” self-assessment.

Exit Slip Day 2:

1. Write an equation to model the situation. Then solve your equation, and justify your answer.

Jason earns an hourly rate for mowing lawns. He works for 3 hours and earns \$45. What is his hourly rate?

2. Write any one question you still have regarding your work today. If you do not have any questions, create a one-step equation OR a problem that could be solved using a one-step equation.

3. When you are done, please add to the “How Are You Doing?!” self-assessment.

Exit Slip Day 3:

Rearrange the formula to highlight the variable, m.

1. $bm = a$

When you are done, please add to the “How Are You Doing?!” self-assessment, and write any questions you have regarding tomorrow’s quiz.