

6th Grade - Unit 6

Using Equations & Inequalities

In this unit, students determine that letters are used to represent specific but unknown numbers and are used to make statements or identities that are true for all numbers or a range of numbers.

Key Words

Number Sentence - a math sentence written using mathematical symbols and numerals.

Variable - a symbol for a specific number we don't know yet. It is usually a letter like a or b.

Equation - an equation is a statement of equality between two expressions.

Equality - a mathematical sentence that contains the symbols, $>$, \geq or, \leq .

Solution - a number or value for a variable that results in a true number sentence.

Symbol	What the Symbol Stands For	Example
=	Is equal to	$4\frac{7}{8} = 4.875$
>	Is greater than	$5\frac{1}{4} > 4\frac{7}{8}$
<	Is less than	$4\frac{1}{2} < 4\frac{7}{8}$
\geq	Is greater than or equal to	$4\frac{7}{8} \geq 4\frac{7}{8}$
\leq	Is less than or equal to	$4\frac{7}{8} \leq 5\frac{1}{4}$

How can I help at home?

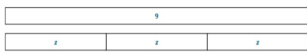
- ★ Ask your child what they learned in school and ask them to show you an example.
- ★ Ask your child to explain the difference between expressions and equations
- ★ Ask your child to explain the difference between equations and inequalities.
- ★ Discuss situations that could be represented using algebraic equations and inequalities. For example, when at the store if a box of pasta costs \$5.45 and you have \$25 ask your child to write an inequality and solve an inequality to determine the maximum number of boxes of pasta you can buy. ($5.45x \leq 25$; $x \leq 4.6$; the maximum number of boxes of pasta that can be purchased is 4)

Common Core Standards

- ★ Reason about and solve one-variable equations and inequalities.
 - Understand solving an equation or inequality as a process of answering a question; which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a given number in a specified set makes an equation or inequality true.
 - Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set.
 - Solve real-world and mathematical problems by writing and solving equations in the form $x+p=q$ and $px=q$ for cases in which p , q and x are all nonnegative rational numbers.
 - Write an inequality of the form $x>c$ or $x<c$ to represent a constraint or condition in a real-world mathematical problem. Recognize that inequalities of the form $x>c$ or $x<c$ have infinitely many solutions; represent solutions of such inequalities on number line diagrams.
- ★ Represent and analyze quantitative relationships between dependent and independent variables.
 - Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation.

Sample Problems

Solve $3z = 9$ using a tape diagram and algebraically; then check your answer.
First, draw two tape diagrams, one to represent each side of the equation.



If 9 has to be split into three equal groups, how big would each group be? **Answer:** 3
Demonstrate the value of z using tape diagrams.

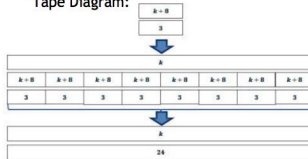


How can we demonstrate this algebraically?
 $3z = 9$
 $3z \div 3 = 9 \div 3$
 $z = 3$

Here is another example.

Equation:
 $\frac{k}{8} = 3$

Tape Diagram:



Algebraically:

$$\frac{k}{8} = 3$$

$$k = 24$$

Check: $\frac{24}{8} = 3$; $3 = 3$. This number sentence is true, so 24 is the correct solution.

Caleb has at least \$5. What amount of money could Caleb have? Write and graph an inequality to model the situation.

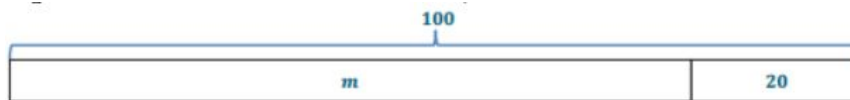
$c \geq 5$; Caleb could have 5 dollars or more.

To graph this situation, we circle the number 5 and color in the number line by darkening the arrow toward the right to indicate the solution is 5 and all the values to the right of 5. This graph models all numbers greater than or equal to 5.



Problem to Try at Home

Marissa has twice as much money as Frank. Christina has \$20 more than Marissa. If Christina has \$100, how much money does Frank have? Let f represent the amount of money Frank has in dollars and m represent the amount of money Marissa has. The tape diagram below represents the amount of money Christina has.



Coming Up Next...

Students will be introduced to ratios and rates and use ratio language and notation to solve real-world problems. Students will explore tape diagrams, double number lines, and ratio tables to develop deep understanding of ratio relationships.