

**MATATAG**

Bansang Makabata



Batang Makabansa



BAGONG PILIPINAS

School
Logo

Name of School:		Quarter:	4th Quarter
Grade Level & Section:	Grade 7	Week:	Week 3 Day 3
Subject:	MATHEMATICS	Date and Time:	
Topic:		Teacher:	

I. CONTENT, STANDARDS AND LEARNING COMPETENCIES		ANNOTATIONS
A. CONTENT STANDARDS	The learners should have knowledge and understanding of the solution of simple equations.	
B. PERFORMANCE STANDARDS	By the end of the quarter, the learners are able to solve simple equations.	
C. LEARNING COMPETENCIES	Learning Competency The learners... 1. solve simple equations represented by bar models to find unknowns; 2. illustrate the properties of equality; and	
D. LEARNING OBJECTIVES		
I. CONTENT		
Solving Equations by Applying Properties of Equality		

II. LEARNING RESOURCES

A. REFERENCES

CueMath. (2024, January 15). Properties of equality. Cuemath.
<https://www.cuemath.com/algebra/properties-of-equality/>

National Repository of Online Courses (2023, December 17). Solving one-step equations using properties of equality. LibreTexts Mathematics.
[https://math.libretexts.org/Bookshelves/Applied_Mathematics/Developmental_Math_\(NROC\)/10%3A_Solving_Equations_and_Inequalities/10.01%3A_Solving_Equations/10.1.01%3A_Solving_One-Step_Equations_Using_Properties_of_Equality](https://math.libretexts.org/Bookshelves/Applied_Mathematics/Developmental_Math_(NROC)/10%3A_Solving_Equations_and_Inequalities/10.01%3A_Solving_Equations/10.1.01%3A_Solving_One-Step_Equations_Using_Properties_of_Equality)

Orines, F. B., et al. (2012). Next century mathematics 7. Quezon City, Philippines

Oronce, O. A., & Mendoza, M. O. (2010). E-math: Worktext in mathematics. Manila, Philippines

B. OTHER LEARNING RESOURCES

III. TEACHING AND LEARNING PROCEDURE

BEFORE/PRE-LESSON PROPER

ACTIVATING PRIOR KNOWLEDGE

REVIEW: Modeling Simple Equations Using Bar Models

Understanding the Concept:

A **bar model** is a visual or graphical method used to represent simple and complex equations. It helps in understanding the relationships between numbers in a **mathematical equation**.

1. **Bar Models** – A graphical representation of numerical relationships.
2. **Addition and Subtraction Bar Models** – Used to show the total and its parts.
3. **Multiplication and Division Bar Models** – Illustrates equal groups to represent number relationships.

	4. Equation Representation – A bar model can be converted into an algebraic equation.	
LESSON PURPOSE/INTENTION	Solving Equations by Applying Properties of Equality 1. Understand the Properties of Equality – Identify and explain the different properties of equality (Addition, Subtraction, Multiplication, and Division Properties of Equality). 2. Apply Properties of Equality – Use these properties to maintain balance in an equation while solving for an unknown variable. 3. Solve Linear Equations – Demonstrate step-by-step problem-solving strategies using the properties of equality. 4. Justify Solutions – Explain and verify the correctness of their answers through logical reasoning. 5. Develop Problem-Solving Skills – Apply the concepts to real-life situations where solving equations is necessary.	
LESSON LANGUAGE PRACTICE	1. Equation – A mathematical statement that shows two expressions are equal, using an equals sign (=). <i>Example: $3x + 5 = 20$</i> 2. Variable – A symbol, usually a letter, that represents an unknown number in an equation. <i>Example: x, y, or n</i> 3. Coefficient – The numerical factor of a term that contains a variable. <i>Example: In $4x$, the coefficient is 4.</i> 4. Constant – A fixed value that does not change. <i>Example: In the equation $x + 7 = 12$, the constant is 7 and 12.</i> 5. Properties of Equality – Rules that allow us to maintain the balance of an equation while solving for an unknown variable. These include: • Addition Property of Equality – Adding the same number to both sides keeps the equation balanced. <i>Example: If $x - 5 = 10$, add 5 to both sides: $x = 15$</i> • Subtraction Property of Equality – Subtracting the same number from both sides keeps the equation balanced. <i>Example: If $x + 8 = 20$, subtract 8 from both sides: $x = 12$</i> • Multiplication Property of Equality – Multiplying both sides of the equation by the same number keeps the equation balanced. <i>Example: If $x/4 = 3$, multiply both sides by 4: $x = 12$</i>	

	• Division Property of Equality – Dividing both sides of the equation by the same number keeps the equation balanced. <i>Example: If $5x = 25$, divide both sides by 5: $x = 5$</i> • 6.Inverse Operations – Operations that undo each other (addition vs. subtraction, multiplication vs. division). <i>Example: To solve $x + 3 = 10$, subtract 3 from both sides to find $x = 7$.</i> 7.Isolate the Variable – The process of solving for the unknown variable by performing inverse operations. <i>Example: In $2x = 10$, divide both sides by 2 to isolate x, giving $x = 5$.</i> 8.Balanced Equation – An equation where both sides remain equal after applying the properties of equality. 9.Solution – The value of the variable that makes the equation true. <i>Example: In $x + 4 = 9$, the solution is $x = 5$.</i> 10.Check the Solution – Substituting the solution back into the original equation to verify if it satisfies the equation. <i>Example: If $x = 3$ in $2x + 1 = 7$, substitute: $2(3) + 1 = 7$. Since it's true, $x = 3$ is correct!</i>	
DURING/LESSON PROPER		
READING THE KEY IDEA/STEM	What is an Equation? An equation is a mathematical statement that shows two expressions are equal. It contains a variable (unknown number) that we need to solve for. Example of an equation: $3x+5=20 \quad 3x + 5 = 20 \quad 3x+5=20$ Our goal is to find the value of x that makes this equation true. Properties of Equality To keep an equation balanced, we must apply the same operation to both sides. Here are the main properties: 1. Addition Property of Equality	

	- o If we add the same number to both sides, the equation remains true. - o <i>Example:</i> If $x-5=10$ $x - 5 = 10$$x-5=10$, add 5 to both sides: $x=15$ $x = 15$$x=15$ 2. Subtraction Property of Equality - o If we subtract the same number from both sides, the equation remains true. - o <i>Example:</i> If $x+8=20$ $x + 8 = 20$$x+8=20$, subtract 8 from both sides: $x=12$ $x = 12$$x=12$ 3. Multiplication Property of Equality - o If we multiply both sides by the same number, the equation remains true. - o <i>Example:</i> If $x=3$ $\frac{x}{4} = 3$$x=3$, multiply by 4 on both sides: $x=12$ $x = 12$$x=12$ 4. Division Property of Equality - o If we divide both sides by the same number, the equation remains true. - o <i>Example:</i> If $5x=25$ $5x = 25$$5x=25$, divide both sides by 5: $x=5$ $x = 5$$x=5$ Steps to Solve an Equation 1. Identify the operation being applied to the variable. 2. Use inverse operations to undo addition, subtraction, multiplication, or division. 3. Apply the same operation to both sides to maintain balance. 4. Simplify and solve for the variable. 5. Check your solution by substituting it back into the original equation.	
DEVELOPING and DEEPENING UNDERSTANDING OF THE KEY IDEA/STEM	1. Explicitation Translating, writing, and solving equations is an important component of mathematics. Algebraic equations help teachers and learners in solving problems in which quantities are unknown. A significant thing to remember in algebraic equations is that you can add or subtract the same quantity to both sides of an equation to maintain an equivalent equation. It	

is like a balance scale in our justice system wherein court judges are expected to weigh both sides of evidence, to practice fairness, and to ensure that justice is served.



Image Source: [10.1.1: Solving One-Step Equations Using Properties of Equality - Mathematics LibreTexts](#)

To solve equations algebraically, use the properties of equality. The objective is to make the equation true to the possible value of the variable. When the equation involves addition or subtraction, use the inverse operation to separate the variable.

Properties of Equality:

- **Reflexive Property of Equality**

For each real number a , $a = a$

Example: $a + b = a + b$, $-x = -x$

- **Symmetric Property of Equality**

For any real numbers a and b ,

if $a = b$ then $b = a$

Example: $x - 5 = 3$, then $3 = x - 5$.

- **Transitive Property of Equality**

For any real numbers a , b , and c

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

Example: $x = y$, $y = z$, then $x = z$.

- **Substitution Property of Equality**

For any real numbers a and b , if $a = b$, then a may be replaced by b , or b may be replaced by a , in any mathematical sentence without changing its meaning.

Example: If $x + y = 3$ and $x = 2$, then $2 + y = 3$.

2. Worked Example

For each of the procedures, identify the property of equality applied in the final step and state why it was used.

1. $8 = 2x$

$4 = x$ Divide both sides by 2

$x = 4$

Answer: Symmetric Property is being used to write the final equation with the variable on the left.

2. $C(x) = 3(x - 5)$

$= 3(x) - 3(5)$ Distributive Property

$= 3x - 15$

Answer: The transitive property is being used to relate the final expression.

3. Check if $x = 7$ is a solution for $2x - 6 = 8$

$2x - 6 = 8$

$2(7) - 6 = 8$ Substitution Property

$14 - 6 = 8$

$8 = 8$

Answer: The reflexive property is being used to conclude that $8 = 8$ is a true

AFTER AFTER/POST-LESSON		
MAKING GENERALIZATIONS AND ABSTRACTIONS	Worksheet Synthesis/Extended What you have learned In a one sheet of paper write something you understand about the lesson we discussed today.	
EVALUATING LEARNING	Multiple-Choice Quiz: Solving Equations by Applying Properties of Equality Directions: Choose the correct answer for each question. Write the letter of your answer. 1. Which property of equality is used in the equation below? $x+5=12 \Rightarrow x=12-5$ $x+5=12 \Rightarrow x=12-5$ A. Addition Property of Equality B. Subtraction Property of Equality C. Multiplication Property of Equality D. Division Property of Equality 2. What is the correct first step in solving the equation $4x=28$? $4x=28$ A. Add 4 to both sides B. Subtract 4 from both sides C. Multiply both sides by 4 D. Divide both sides by 4 3. What is the solution to the equation $x-9=15$? $x-9=15$ A. $x=6$ B. $x=24$ C. $x=-6$ D. $x=9$ 4. Which equation represents the use of the Multiplication Property of Equality? A. $x+4=12 \Rightarrow x=12-4$ $x+4=12 \Rightarrow x=12-4$ B. $x-3=8 \Rightarrow x=8+3$ $x-3=8 \Rightarrow x=8+3$ C. $5x=7 \Rightarrow x=\frac{7}{5}$ $5x=7 \Rightarrow x=\frac{7}{5}$ D. $x+2=10 \Rightarrow x=10-2$ $x+2=10 \Rightarrow x=10-2$	Answer 1.B 2.D 3.B 4.C 5.A

	5. What is the correct solution to the equation $2x+6=14$? A. $x=4$ B. $x=5$ C. $x=3$ D. $x=7$	
ADDITIONAL ACTIVITIES FOR APPLICATION OR REMEDIATION (IF APPLICABLE)	Directions: Solve the following equations step by step. Show your solutions clearly and apply the correct Properties of Equality for each step. Write your answers in your notebook. Problems: Solve for the variable. $x+7=15$ $4x=28$ $y-6=12$ $z=8$ $2x+3=11$ $3x-5=16$ $x+6=10$ $2(y-3)=14$ $5(x+2)=35$ $3a+4=5$	
REMARKS		
REFLECTION		

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