

**MATATAG**

Bansang Makabata



Batang Makabansa



BAGONG PILIPINAS

School
Logo

Name of School:		Quarter:	4th Quarter
Grade Level & Section:	Grade 7	Week:	Week 4 Day 1
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 AND OBJECTIVES	Learning Competency The learners... 1. Illustrate the properties of equality. 2. Solve problems involving algebraic expressions and formulas.	
I. CONTENT		
Algebraic Equation (Week 4)		
2.2 Solving Equations by Applying Properties of Equality		
II. LEARNING RESOURCES		
A. REFERENCES	Department of Education. (2020). Mathematics quarter 2 – module 4: algebraic expressions. (1). k-to-12-grade-7-learning-material-in-mathematics-quarter-3.pdf - Google Drive	

	CK-12 Foundation. (2024, January 11). Evaluating algebraic expressions and equations. https://flexbooks.ck12.org/cbook/ck-12-algebra-ii-with-trigonometry-concepts/section/1.4/primary/lesson/evaluating-algebraic-expressions-and-equations-alg-ii/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	
B. OTHER LEARNING RESOURCES		
III. TEACHING AND LEARNING PROCEDURE		
BEFORE/PRE-LESSON PROPER		
ACTIVATING PRIOR KNOWLEDGE	Short Review 1. Alexa has 24 photo cards. She gives 4 photo cards to each of her friends. How many friends receive the photo cards? 2. Sonny has 6 packs of shuttlecocks. There are 8 shuttlecocks in each pack. How many shuttlecocks are there? 3. Eldan has 4 boxes of pens. Each box has 10 pens. He gives the pen to 8 of his friends. How many pens does each of his friends receive? 4. Henry has 24 one-piece stickers in his collection. Ted has 6 times as many	This section of the review focuses on solving word problems using the bar method. The review can be performed individually or in pairs; For individuals, the learners will prepare their bar modeling to solve the problems. For pair activity: The teacher will give each learner a strip of paper where one set is a problem and the other set is for the answer using bar modeling. The learners will be roamed

	stickers as Henry. How many stickers does Ted have? How many stickers do they have altogether? 5. If John has 26 cards and Tim has 12 more than John's cards, how many cards does Tim have? How many cards are there altogether?	around to find their partner.
LESSON PURPOSE/INTENTION	Math problems have different ways of solving them, just like how we can share our knowledge and help those who are in need. Translating verbal phrases to algebraic equations is also a tool that will help facilitate the use of different methods in solving unknown values in an algebraic equation. One way of solving a problem that involves algebraic equations is through the use of applying the properties of equalities and some formulas to solve the problems.	In this part, the teacher will introduce the lesson and its application to daily life.
LESSON LANGUAGE PRACTICE	Unlocking Content Vocabulary 1. Algebraic Expression – an expression that is made up of variables and constants along with algebraic operations (addition, subtraction, multiplication, and division). 2. Algebraic Equations – can be defined as a mathematical statement in which two expressions are set equal to each other. 3. Bar model – is one such tool that helps us visualize the given math problem using rectangles or bars. 4. Variable – is a letter or symbol that represents an unknown number. 5. Equation – is a mathematical statement that two expressions are equal. 6. Expressions - are made up of terms, and the number of terms in each expression in an equation may vary.	
DURING/LESSON PROPER		

**READING THE KEY
IDEA/STEM**

**Solving Equations by Applying Properties of
Equality**

Explicitation

Translating, writing, and solving equations are crucial aspects of mathematics.

Algebraic equations enable teachers and learners to solve problems involving unknown quantities. A key principle in working with algebraic equations is that you can add or subtract the same quantity from both sides of an equation to maintain its balance. This concept is analogous to a balance scale used in the justice system, where equal weight must be given to both sides to ensure fairness and uphold justice for everyone.



Properties of Equality

Addition Property of Equality (APE)

For all real numbers a , b , and c , $a = b$ if and only if $a + c = b + c$ if we add the same number to both sides of the equal sign, then the two sides remain equal.

Example: $10 + 5 = 15$ is true if and only if $10 + 5 + 8 = 15 + 8$

Multiplication Property of Equality (MPE)

For all real numbers a , b , and c , where $c \neq 0$, $a = b$ if and only if $ac = bc$

The teacher will explain why there is no subtraction and division property of equality. Even though subtracting or dividing the same number from both sides of an equation preserves equality, these cases are already covered by APE and MPE. Subtracting the same number from both sides of an equation is the same as adding a negative number to both sides of an equation. Also, dividing the same number from both sides of an equation is the same as multiplying the reciprocal of the number to both sides of an equation.

	If we multiply the same number to both sides of the equation, then the two sides remain equal. Example: $3(5) = 15$ is true if and only if $(3)(5) 2 = 15 (2)$ Finding the solutions to equations using properties of equality means finding the unknown so that the equation becomes true. In the given equation $x - 8 = 15$, what value of x will make the expression equal? Solution: <table> <tr> <td>$x - 8 = 15$</td> <td>Given</td> </tr> <tr> <td>$x - 8 + 8 = 15 + 8$</td> <td>APE (Adding 8 to both sides)</td> </tr> <tr> <td>$x + 0 = 23$</td> <td>Simplify</td> </tr> <tr> <td>$x = 23$</td> <td>Simplify</td> </tr> </table> In the equation $3x = 42$, what is x? <table> <tr> <td>$\frac{3x}{3} = \frac{42}{3}$</td> <td>MPE (Multiply $\frac{1}{3}$ on both sides)</td> </tr> <tr> <td>$x = 14$</td> <td>Simplify</td> </tr> </table>	$x - 8 = 15$	Given	$x - 8 + 8 = 15 + 8$	APE (Adding 8 to both sides)	$x + 0 = 23$	Simplify	$x = 23$	Simplify	$\frac{3x}{3} = \frac{42}{3}$	MPE (Multiply $\frac{1}{3}$ on both sides)	$x = 14$	Simplify	Checking: $x - 8 = 15$ $23 - 8 = 15$ $15 = 15$ True Checking: $3x = 42$ $3 (14) = 42$ $42 = 42$ True
$x - 8 = 15$	Given													
$x - 8 + 8 = 15 + 8$	APE (Adding 8 to both sides)													
$x + 0 = 23$	Simplify													
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$x = 14$	Simplify													
DEVELOP NG and DEEPENING UNDERSTANDING OF THE KEY IDEA/STEM	Worked Example Here are more examples of solving equations applying properties of equality. Example No. 1. Solve for the value of x in the equation: $x - 28 = 46$ Solution:	Checking: $x - 28 = 46$ $74 - 28 = 46$ $46 = 46$ True												

	$x - 28 = 46$ Given $x - 28 + 28 = 46 + 28$ APE (Add 28 on both sides) $x = 74$ Simplify Example No. 2. Find the value of the unknown on the equation: $x + 15 = -44$ Solution: $x + 15 = -44$ Given $x + 15 - 15 = -44 - 15$ APE (Add -15 on both sides) $x = -59$ Simplify Example No. 3. In the given equation, find the unknown value of the variable. Solution: $4x = 128$ $4x \left(\frac{1}{4} \right) = 128 \left(\frac{1}{4} \right)$ MPE (Multiply $\frac{1}{4}$ on both sides) $x = 32$ Simplify Example No. 4 In the given equation, $2x + 15 = x - 3$, what value of x will make the equation true? Solution: $2x + 15 = x - 3$ Given $2x - x + 15 = x - x - 3$ APE (Add $-x$ on both sides) $x + 15 = -3$ Simplify $x + 15 - 15 = -3 - 15$ APE (Add -15 on both sides) $x = -18$ Simplify	Checking: $x + 15 = -44$ $-59 + 15 = -44$ $-44 = -44$ True Checking: $4x = 128$ $4(32) = 128$ $128 = 128$ True Checking: $2x + 15 = x - 3$ $2(-18) + 15 = -18 - 3$ $-36 + 15 = -21$ $-21 = -21$ True Checking: $5x - 14 = 3x + 12$ $5(8) - 14 = 3(8) + 12$ $40 - 14 = 24 + 12$ $36 = 36$ True
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	Example No. 5 Solve for the unknown variable in the given equation. $5x - 14 = 3x + 12$ Given $5x - 3x - 14 = 3x - 3x + 12$ APE (Add -3x on both sides) $2x - 14 = 12$ Simplify $2x - 14 + 14 = 12 + 14$ APE (Add 14 on both sides) $2x = 16$ Simplify $x = 8$ MPE (Multiply $\frac{1}{2}$ both sides) Example No. 6 In the given equation $6 = 2(x - 4)$, what is the value of x? $6 = 2(x - 4)$ $6 = 2(x) - 2(4)$ Multiply 2 by the terms inside the parenthesis $6 = 2x - 8$ Simplify $6 - 6 = 2x - 8 - 6$ APE (Add -6 on both sides) $0 = 2x - 14$ Simplify $0 - 2x = 2x - 2x - 14$ APE (Add -2x on both sides) $-2x(\frac{1}{2}) = -14(\frac{1}{2})$ Simplify and MPE (Multiply – $\frac{1}{2}$ on both sides) $x = 7$ Simplify Lesson Activity A. Quality Time. Paste all the equations with a solution in the boxes below. Arrange the equations in order by their solutions from least to greatest. Then write	Checking: $6 = 2(x - 4)$ $6 = 2(7 - 4)$ $6 = 2(3)$ $6 = 6$ True Lesson Activity Answer: A. $S = 2x + 4 = 18$ $x = 7$ $E = 3x + 2 = 20$ $x = 6$ $N = 3x - 2 = 13$ $x = 5$ $A = 2x + 1 = 3$ $x = 1$ $S = 4x + 5 = 3x + 15$ $x = 10$
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	the letters in order on the lines below to form the word hidden. <table border="1"> <tr><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td></tr> </table> _____ _____ Equations: <table> <tr> <td>S $2x + 4 = 18$</td><td>E $3x + 2 = 20$</td><td>N $3x - 2 = 13$</td></tr> <tr> <td>A $2x + 1 = 3$</td><td>S $4x + 5 = 3x + 15$</td><td>F $12x = -144$</td></tr> <tr> <td>R $6x + 5 = 4x + 13$</td><td>I $6 = 3(x - 1)$</td><td></td></tr> </table>										S $2x + 4 = 18$	E $3x + 2 = 20$	N $3x - 2 = 13$	A $2x + 1 = 3$	S $4x + 5 = 3x + 15$	F $12x = -144$	R $6x + 5 = 4x + 13$	I $6 = 3(x - 1)$		$F = 12x = -144$ $x = -12$ $R = 6x + 5 = 4x + 13$ $x = 4$ $I = 6 = 3(x - 1)$ $x = 3$ $F = -12$ $A = 1$ $I = 3$ $R = 4$ $N = 5$ $E = 6$ $S = 7$ $S = 10$
S $2x + 4 = 18$	E $3x + 2 = 20$	N $3x - 2 = 13$																		
A $2x + 1 = 3$	S $4x + 5 = 3x + 15$	F $12x = -144$																		
R $6x + 5 = 4x + 13$	I $6 = 3(x - 1)$																			

AFTER AFTER/POST-LESSON		
MAKING GENERALIZATIONS AND ABSTRACTIONS	In solving equations, we apply the Properties of Equality to maintain balance and find the unknown value. The Addition Property of Equality (APE) allows us to add the same number to both sides, while the Multiplication Property of Equality (MPE) allows us to multiply both sides by the same nonzero number. By following these properties, we ensure that the equation remains true, just like a balance scale in justice. This principle helps us systematically solve problems involving unknown quantities in algebra.	
EVALUATING LEARNING	Solve fo x. 1. $X - 2 = 13$ 2. $X + 9 = 21$ 3. $\frac{1}{2}(x) - 3 = 4$	ANSWER W/SOLUTION: 1. $X - 2 + 2 = 13 + 2$ $X = 15$ 2. $X + 9 - 9 = 21 - 9$ $X = 12$ 3. $\frac{1}{2}(x) - 3 = 4$ $\frac{1}{2}(x) = 7$ $x = 14$

		3. $x - 3 + 3 = 4 +$ 3 $\frac{1}{2} x = 7$ $\frac{1}{2} x (2) = 7 (2)$ $x = 14$
ADDITIONAL ACTIVITIES FOR APPLICATION OR REMEDIATION (IF APPLICABLE)		
REMARKS		
REFLECTION		

Prepared by:

Subject Teacher
Teacher

Reviewed by:

Master Teacher/Head