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BASIC 8

WEEKLY LESSON PLAN – WEEK 8

Strand:	Algebra		**Sub-Strand:**	Algebraic Expressions	
Content Standard:	B8.2.2.1 Solve problems involving algebraic expressions (including multiplication of binomial expressions) factorize given expressions and substitute values to evaluate algebraic expressions.				
Indicator (s)	B8.2.2.1.1 Use the distributive property to remove brackets and solve multiplication of binomial expression. B8.2.2.1.2 Perform addition, subtraction, multiplication and division of algebraic expressions including fractions. B8.2.2.1.3 Substitute values to evaluate algebraic expressions including fractions and use it these to solve problems. B8.2.2.1.4 Factorize given expressions involving the four operations and use it the experiences gained to solve problems.		**Performance Indicator:** Learners can solve addition, subtraction, multiplication and division of algebraic expressions.		
Week Ending	18-08-2023				
Class	B.S.8	**Class Size:**		**Duration:**	
Subject	Mathematics				
Reference	Mathematics Curriculum, Teachers Resource Pack, Learners Resource Pack, Textbook.				
Teaching / Learning Resources	Chart, Poster, picture, Video.		**Core Competencies:**	• Implement strategies with accuracy • Ability to combine Information and ideas from several sources to reach a conclusion • Implement strategies with accuracy	
DAY/DATE	**PHASE 1 : STARTER**	**PHASE 2: MAIN**			**PHASE 3: REFLECTION**

MONDAY	Review Learners knowledge on the distributive property of multiplication over addition by assisting them to identify examples.	1. Demonstrate for Learners to observe on the use of distributive property to multiply binomials. 2. Assist Learners to remove brackets from distributive properties. 3. Discuss examples of distributive property of multiplication with the Learners. 4. Learners brainstorm to Multiply binomial expressions. **Distributive Property of Multiplication Formula** The formula for the distributive property of multiplication is a(b + c) = ab + ac. This formula explains that we get the same product on both sides of the equation even when we multiply 'a' with the sum of 'b' and 'c' on the left-hand-side, or, when we distribute 'a' to 'b' and then to 'c' on the right-hand-side. Observe the following formula for the distributive property of multiplication. It is to be noted that this property is applicable to addition and subtraction. Distributive Property of Multiplication Formula cuemath THE MATH EXPERT $a(b + c) = ab + ac$ $a(b - c) = ab - ac$ **Distributive Property of Multiplication Over Addition** The distributive property of multiplication over addition states that multiplying the sum of two or more addends by a number gives the same result as multiplying each addend individually by the number and then adding or the products together. This property of multiplication over addition is used when we need to multiply a number by a sum. For example, let us solve the expression 7(9 + 3). If solve it in the usual order of operations, we will solve the brackets first and then we will multiply the number with the obtained result. 7(9 + 3) = 7(12) = 84	Learners in small groups to practice solving more examples of multiplying binomial expressions. **Exercise;** Solve the following expressions; 1. $-2x(-5 + 6y)$ 2. $-1(3 + x^2)$ 3. $6(2 + 4x)$ 4. $5(x-2)(x+3)$ 5. $3x(x+4)(x+1)(x-2)$

However, according to the distributive property of multiplication over addition, we multiply 7 by each addend. This is called distributing the number 7 to 9 and 3, and then we add each product. So, let us find the product of the distributed number: 7 × 9 and 7 × 3. This gives us: 7(9) + 7(3) = 63 + 21 = 84. This shows that we get the same product.

Observe the following equation which shows the usual method on the left-hand side and the distributive property of multiplication over addition on the right-hand side. Applying the distributive property, we distribute the number 7 to 9 and 3, then we multiply the respective numbers by 7 and add the results. In each case, the result is the same.

$7(9 + 3) = 7(9) + 7(3)$

$7(12) = 63 + 21$

$84 = 84$

Distributive Property of Multiplication Over Subtraction

The distributive property of multiplication over subtraction states that the multiplication of a number by the difference of two other numbers is equal to the difference of the products of the distributed number. The formula for the distributive property of multiplication over subtraction is: a(b - c) = ab - ac. For example, let us solve: 9(20 - 10).

Using the usual order of operations, we find the difference of the numbers given in brackets and then we multiply the result by 9.

$9(20 -10) = 9(10) = 90$

Now, let us use the distributive property of multiplication over subtraction to solve 9(20 - 10). We multiply 9 by each value inside the bracket and then find the difference of the products.

So, let us multiply: 9 × 20 and 9 × 10. This gives us: 9(20) - 9(10) = 180 - 90 = 90. The result is the same as the above.

Observe the following equation in which the usual method is shown on the left-hand side and the distributive property of multiplication is applied on the right-hand side. Applying the distributive property of multiplication over subtraction, we distribute the number 9 to 20 and 10, then we multiply the respective numbers by 9 and subtract the products. In both the cases, we get the same answer.

$9(20 - 10) = 9(20) - 9(10)$

$9(10) = 180 - 90$

$90 = 90$

Distributive Property of Multiplication Examples

- Example 1: Evaluate using the distributive property of multiplication: 8(10 + 2).

  Solution: We will solve the expression using the distributive property of multiplication over addition.

  $8(10 + 2) = 8(10) + 8(2) = 80 + 16 = 96$

- Example 2: Solve the expression with the help of the distributive property of multiplication: 5(9 - 4).

  Solution: Using the distributive property of multiplication over subtraction,

  $5(9 - 4) = 5(9) - 5(4) = 45 - 20 = 25$

- Example 3: Solve the following by using the distributive property of multiplication: 2(12 - 8).

  Solution: According to the distributive property of multiplication,

  $2(12 - 8) = 2(12) - 2(8) = 24 - 16 = 8$

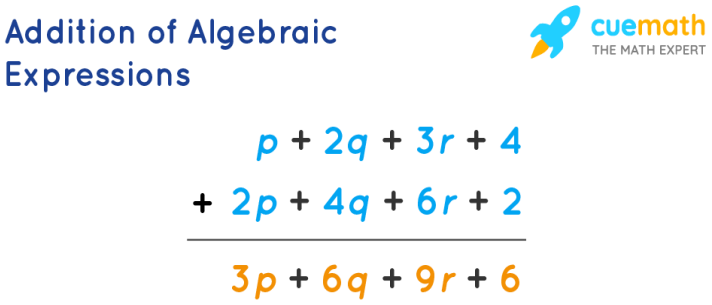
TUESDAY	Review Learners knowledge on how to add subtraction multiplication and division of fractions	1. Discuss the rules in adding, subtracting multiplying and dividing algebraic expression with the Learners. 2. Learners brainstorm to write an algebraic expression for multiplication 3. Assist Learners to multiply algebraic expressions with fractions. 4. Learners brainstorm to divide algebraic expressions by algebraic expressions. Addition and Subtraction of Algebraic Expressions While adding and subtracting algebraic expressions, we first categorize the terms into two types - like and unlike terms. The like terms are combined and then simplified. It should be noted that: • We can only combine like terms by adding or subtracting them with one another. • Unlike terms cannot be combined by adding or subtracting. The terms whose variables and exponents are the same are known as 'like terms' and the terms having different variables are 'unlike terms'. Let us understand this with an example. • Observe this expression: **$6x^2 + 7x + 8x^2 + 9 + 8y$** • Notice the variables of each term. There are two terms with the same variable (x^2): $6x^2$ and $8x^2$ • That means $6x^2$ and $8x^2$ like terms and thus can be added or subtracted from each other. • When adding or subtracting like terms, the coefficients are added (or subtracted) and the variable remains unchanged. So, the above expression can be simplified to: $14x^2 + 7x + 9 + 8y$ **How to do Addition and Subtraction of Algebraic Expressions**; **Horizontal method** Let us solve these expressions with the help of the horizontal method: (p + 2q + 3r + 4) + (2p + 4q + 6r + 2). To do this, we will	Reflect on the step-by-step approach to perform algebraic divisions. **Exercise;** Simplify, if possible. a) 13x + 7y – 8x + 20y b) 22x3 – 19 + 14x4 – 9x3 + 20 c) –2x3 y2 + 18y2 x3 – y2 + 2x3 d) 2a7 + 5b7 + 19a7 b7 e) –s3 q + 20qs2 –9qs3 + 2s2 – 34s2 q f) x2 + 7 + 6x + (x2 –3) g) 10x2 + 14 + 9x2 + 3 – 8x2 + 6 h) –x3 + 4y3 – 10x3 y + 7y3 –x3

first combine the like terms, write them together and add them to get the answer.

- Step 1: Open the brackets: p + 2q + 3r + 4 + 2p + 4q + 6r + 2
- Step 2: Combine the like terms to get the simplified expression: 3p + 6q + 9r + 6.

Column method

The column method requires the expressions to be written column-wise, one below the other, taking care that like terms are to be placed in the same column. Then, we add the numerical coefficient of each column (like terms) and write the sum below it followed by the common variable. Let's add the same expressions using the column method.



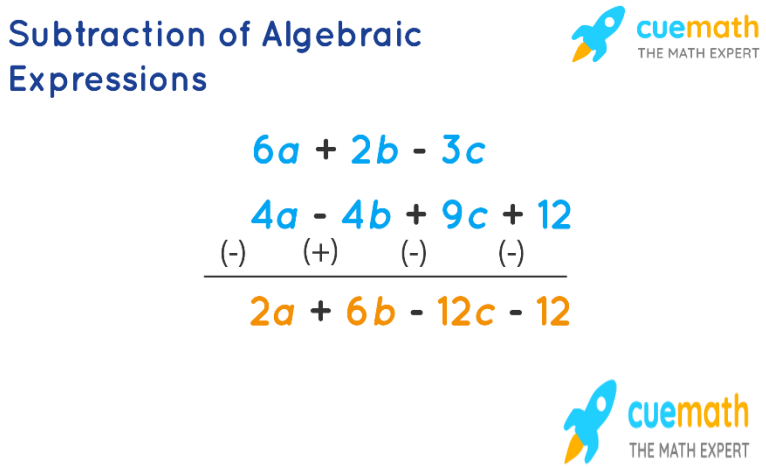
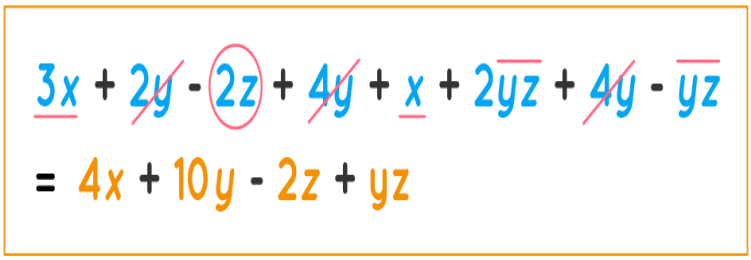
Subtraction of Algebraic Expressions

While subtracting one algebraic expression from another, we need to be careful with the signs. It should be noted that if there's a subtraction sign before the brackets, we need to reverse all the signs once we open the brackets.

Horizontal Method:

Let's solve: (6a + 2b - 3c) - (4a - 4b + 9c + 12) using the horizontal method.

- Step 1: Open the brackets: 6a + 2b - 3c - 4a + 4b - 9c - 12 (Observe the changed signs of the second expression)

		• Step 2: Combine the like terms to get the simplified expression: 2a + 6b - 12c - 12. **Column Method:** Let's subtract the same expressions using the column method. As we place the two expressions one below the other, we change all the signs of the second number as shown below and then we simplify the expressions as per their signs.  	
THURSDAY	Through questions and answers, conclude the lesson.	1. Discuss the concept of "Substitution" in algebraic fractions with the Learners. 2. Assist Learners to identify examples of substitution in algebraic expression 3. Demonstrate on evaluating expressions with two variables by substitution. 4. Learners brainstorm to evaluate algebraic expressions with fractions. **Evaluate Algebraic Expressions** In the last section, we simplified expressions using the order of operations. In this section, we'll evaluate expressions—again following the order of operations.	Through questions and answers, conclude the lesson. **Exercise;** Evaluate: 1. y+4 when i. y=6 ii. y=15 2. a−5 when i. a=9 ii. a=17

To **evaluate** an algebraic expression means to find the value of the expression when the variable is replaced by a given number. To evaluate an expression, we substitute the given number for the variable in the expression and then simplify the expression using the order of operations.

Evaluating Algebraic Expressions

The same set of rules for order of operations for whole numbers discussed in
Section 1.2 is also used with integers. The rules are restated here for easy
reference.

Rules for Order of Operations

1. Work within symbols of inclusion (parentheses, brackets, or braces),beginning with the innermost pair.

2. Evaluate the terms with exponents.

3. From left to right, perform multiplications and divisions as they appear.

4. From left to right, perform additions and subtractions as they appear.

Examples

1. $8\div4-3^2$

$8\div4-3^2=8\div4-9$ exponents

$=2-9$ division

$=-7$ subtraction

2. $(7+8)\div5\cdot4-20$

$(7+8)\div5\cdot4-20=15\div5\cdot4-20$ parentheses

$=3\cdot4-20$ division

$=12-20$ multiplication

$=-8$ subtraction

3. $4\cdot5-(6\cdot2-3)+4\div2$

3. x2 when x=10.

4. if $x=3$ and $y=-1$

i. $2x+3=2\cdot3+3=6+3=9$

ii . $y^2-2y+1=(-1)^2-2(-1)+1=1+2+1=4$

iii. $xy-y^2=3(-1)-(-1)^2=-3-1=-4$

iv. $x^2-y=3^2-(-1)=9+1=10$

v. $-x^2-y^2=-3^2-(-1)^2=-9-(1)=-9-1=-10$

		4·5-(6·2-3)+4÷2=4·5-(9)+4÷2 parentheses =20-9+2 multiplication and division =13 subtraction and addition 4. − 5-611+3 (− 5) − 5-611+3 (− 5)=− 1111+3 (− 5) fraction bar is a symbol of inclusion =− 1+(− 15) division and multiplication =− 16 addition	

Name of Teacher: ***School:*** ***District:***