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What is commutative property in math

The commutative property states that changing the order of terms in an expression does not change its value. It applies to addition and multiplication, but not to subtraction and division.The commutative property states that changing the order in which numbers are added or multiplied does not affect the outcome. While the commutative property applies to addition and multiplication, it does not work for subtraction and division. It applies to most numbers, but there are some sets that are excluded.The commutative property of addition states that for all real numbers a and b, a+b = b+aThe commutative property of multiplication states that for all real numbers a and b, a×b = b×aThe commutative property applies to:Whole NumbersIntegersFractionsReal NumbersComplex NumbersIrrational NumbersIt does not apply to matrix multiplication, vector cross products, or function composition, which are non-commutative operations.3 + 4 = 4 + 3 = 77 + (−7) = (−7) + 7 = 0½ + ⅓ = ⅓ + ½5 × 6 = 6 × 5 = 30⅔ × ¾ = ¾ × ⅔(2+i) × (3+2i) = (3+2i) × (2+i)Note that you can't combine the property for expressions that include both addition and multiplication because of the order of operations. For example:1 + 2 x 3 ≠ 2 + 1 x 37 ≠ 5The commutative property does not apply to subtraction and division. In other words, subtraction and division are non-commutative.a−b ≠ b−aExample: 5−2 ≠ 2−5b/a ≠ a/bExample: 4/2 ≠ 2/4Students often confuse the commutative and associative properties. While the commutative property deals with the order in which numbers are added or multiplied, the associative property deals with the grouping of numbers. The associative property states:Addition: (a+b)+c = a+(b+c)Multiplication: (a×b)×c = a×(b×c)Both the commutative and associative properties apply to addition and multiplication, but not to subtraction and division.Here are examples of the commutative property for various types of numbers:Addition: 4+5 = 5+4Multiplication: 6×7 = 7×6Addition: −3+4 = 4+(−3)Multiplication: −2×3 = 3×(−2)Addition: ⅔+¼ = ¼+⅔Multiplication: ⅔×½ = ½×⅔Addition: a+b = b+aMultiplication: ac = caAddition: π+e = e+πMultiplication: π×e = e×πAddition: (2+3i) + (4+5i) = (4+5i) + (2+3i)Multiplication: (2+3i) × (4+5i) = (4+5i) × (2+3i)Addition: √2 + √3 = √3 + √2Multiplication: √2 ×√3 = √3 × √2Which of the following shows the commutative property for multiplication?2 + 4 = 4 + 21 x 3 x 5 = 5 x 3 x 1(1 x 3) x 5 = 1 x (3 x 5)2 + 4 x 1 ≠ 1 x 4 + 2The correct answer is 1 x 3 x 5 = 5 x 3 x 1The first expression involves addition and not multiplication. The third expression illustrates the associative property. The last equation did not illustrate the property for multiplication.Alice and Bob went grocery shopping together. Alice bought 2 apples and 4 bananas, while Bob bought 5 apples and 3 bananas. Would it have made a difference if they had bought their groceries in a different order? Using the commutative property, prove whether the total number of each type of fruit they bought would be different if they switched the order.Alice's PurchaseAlice bought 2 apples and 4 bananas.Bob's PurchaseBob bought 5 apples and 3 bananas.Apply the commutative property to the word problem:For apples:Alice + Bob = 2 + 5 = 7Bob + Alice = 5 + 2 = 7Both scenarios yield 7 apples.For bananas:Alice + Bob = 4 + 3 = 7Bob + Alice = 3 + 4 = 7Both scenarios yield 7 bananas. Switching the order of purchasing has no effect on the total number of fruit.Copi, Irving M.; Cohen, Carl; McMahon, Kenneth (2014). Introduction to Logic (14th ed.). Essex: Pearson Education. ISBN 9781292024820.Durbin, John R. (1992). Modern Algebra: An Introduction (3rd ed.). New York: Wiley. ISBN 978-0-471-51001-7.Gregory, D. F. (1840). "On the real nature of symbolical algebra". Transactions of the Royal Society of Edinburgh. 14: 208–216.Hungerford, Thomas W. (1974). Algebra (1st ed.). Springer. ISBN 978-0387905181.Related Posts The Commutative property is a basic math rule that helps make calculations easier. It states that the result of an operation between two numbers remains the same irrespective of the position of the numbers. For example, 2 + 3 is the same as 3 + 2, and 4 × 5 is the same as 5 × 4. It is an important property of mathematics. Which is satisfied by the addition(+) and multiplication(×) operations.In this article, we will explore the commutative property, its definition, and examples, in detail.What is Commutative Property?Commutative Property is the property according to which the sequence of two operands does not change the result. In commutative property the switching of the operands does not affect the result of the given expression.The commutative property is the property in which the order of the two operands does not affect the result of the expression. The commutative word is derived from the word commute which means switching. The arithmetic operator addition and multiplication satisfies the commutative property.Commutative Property DefinitionExamples,4 + 7 = 7 + 4 = 115 + 4 = 4 + 5 = 94 × 7 = 7 × 4 = 285 × 4 = 4 × 5 = 20Commutative Property FormulaCommutative property is satisfied by the addition and multiplication arithmetic operators only. For two numbers P and Q, the commutative property formula is given by:P + Q = Q + PP × Q = Q × PCommutative Property of AdditionAccording to the Commutative property for addition the order of two operands related with addition operator does not affects the result of addition. Commutative Property for Addition FormulaFor addition of two numbers X and Y, the commutative property for addition formula is given below:X + Y = Y + XCommutative Property of Addition ExamplesFollowing are some examples for the commutative property for addition:4 + 9 = 9 + 4(-12) + 5 = 5 + (-12)8/9 + 1/3 = 1/3 + 8 / 9Commutative Property of MultiplicationThe commutative property for multiplication states that the order of two operands related with multiplication operator has no affect in the result of multiplication. Commutative Property for Multiplication FormulaFor multiplication of two numbers X and Y, the commutative property for addition formula is given below:X × Y = Y × XCommutative Property of Multiplication ExamplesFollowing are some examples for the commutative property for addition:4 × 9 = 9 × 4(-12) × 5 = 5 × (-12)(8 / 9) × (1 /3) = (1 / 3) × (8 / 9)Non-Commutative Operations - Division And SubtractionNon-Commutative operations refers to those operations that do not follow the commutative property and changing the order of the numbers in the operations changes the result of the operation. The arithmetic operators subtraction and division does not satisfy the commutative property as changing the order of the operands changes the result of the expression, and this can be explained by the given examples.For two operands R and S,R - S ≠ S - RR / S ≠ S / RExample 1: Suppose we take two numbers 12 and 3 then dividing 12 by 3 and dividing 3 by 12 gives the separate results, i.e.Example 2: Let's take two numbers 15 and 35 then subtracting 15 from 35 and subtracting 35 from 15 gives the separate results, i.e.35 - 15 = 2015 - 35 = -20Commutative Property vs Associative PropertyThe differences between commutative property and associative property is explained in the table below,Commutative PropertyAssociative PropertyCommutative property states that the order of the number in some operations(such as multiplication and addition) dose not effects the results of the operation.Associative property states that grouping various number in different operations (such as multiplication and addition) does not changes the result of the operation.Commutative Formula:A + B = B + AA × B = B × AAssociative Formula:A + (B + C) = (A + B) + C = (A + C) + BA × (B × C) = (A × B) × C = (A × C) × BExample: 4 + 5 = 5 + 4 = 9Example: (3 + 4) + 5 = 3 + (4 + 5) = 12Read More,Solved Examples on Commutative PropertyExample 1: Which of the following satisfies the commutative property:(i) 4 × 5(ii) 7 + 8(iii) 9 / 2(iv) 15 - 6 Solution: 4 × 5 = 20 5 × 4 = 20Commutative Property Satisfies7 + 8 = 158 + 7 = 15Commutative Property Satisfies8 / 2 = 42 / 8 = 1 / 44 ≠ 1/4 Commutative Property Does Not Satisfies15 - 6 = 96 - 15 = -99 ≠ -9Commutative Property Does Not SatisfiesExample 2: Prove that p + q = q + p if p = 9 and q = 7.Solution:p + q = 9 + 7 = 16q + p = 7 + 9 = 16p + q = q + pHence provedExample 3: Prove that p × q = q × p if p = 10 and q = 3.Solution:p × q = 10 × 3 = 30 q × p = 3 × 10 = 30p × q = q × pHence ProvedPractice Problems On Commutative Property Problem 1: Which of Following Satisfies Commutative Property42 × 1512 + 723 / 325 - 8 Problem 2: Prove x + y = y + x if x = 10 and y = 17Problem 3: Prove x × y = y × x if x = 2 and y = 23Problem 4: Apply the commutative property of addition to rearrange and simplify the expression : 3a + 4b + 2a + 5b. Conclusion The commutative property is a helpful math rule that makes adding and multiplying numbers easier. It means you can change the order of the numbers, and the answer will stay the same! For example, 2 + 3 is the same as 3 + 2, and the same rule applies for multiplication 5 × 6 = 6 × 5. But remember, this doesn't work for subtraction or division. Knowing this property is super useful when solving math problems and makes math feel a lot less tricky In mathematics, commutative property or commutative law explains that order of terms doesn't matter while performing arithmetic operations. Commutative property is applicable only for addition and multiplication processes. Thus, it means we can change the position or swap the numbers when adding or multiplying any two numbers. This is one of the major properties of integers. For example: 1+2 = 2+1 and 2 x 3 = 3 x 2. Commutative Property: A + B = B + A (Addition) A x B = B x A (Multiplication) What is Commutative Property? As we already discussed in the introduction, as per the commutative property or commutative law, when two numbers are added or multiplied together, then a change in their positions does not change the result. Examples 2+3 = 3+2 = 5 2 x 3 = 3 x 2 = 6 5 + 10 = 10 + 5 = 15 5 x 10 = 10 x 5 = 50 So, there can be two categories of operations that obeys commutative property: Commutative property of addition Commutative property of multiplication History Although the official use of commutative property began at the end of the 18th century, it was known even in the ancient era. The word, Commutative, originated from the French word 'commute or commuter' means to switch or move around, combined with the suffix '-ative' means 'tend to'. Therefore, the literal meaning of the word is tending to switch or move around. It states that if we swipe the positions of the integers, the result will remain the same. Commutative Property of Addition According to the commutative property of addition, when we add two integers, the answer will remain unchanged even if the position of the numbers are changed. Let A and B be the two integers, then; Examples of Commutative Property of Addition 1 + 2 = 2 + 1 = 3 3 + 8 = 8 + 3 = 11 12 + 5 = 5 + 12 = 17 Commutative Property of Multiplication As per the commutative property of multiplication, when we multiply two integers, the answer we get after multiplication will remain the same, even if the position of the integers are interchanged. Let A and B be the two integers, then; Examples of Commutative Property of Multiplication 1 × 2 = 2 × 1 = 2 3 × 8 = 8 × 3 = 24 12 × 5 = 5 × 12 = 60 Important Facts Of Commutative Property Commutative property is only applicable for two arithmetic operations: Addition and Multiplication Changing the order of operands, does not change the result Commutative property of addition: A + B = B + A Commutative property of multiplication: A.B = B.A Other Properties The other major properties of addition and multiplication are: Associative Property Distributive Property Now, observe the other properties as well here: Associative Property of Addition and Multiplication According to the associative law, regardless of how the numbers are grouped, you can add or multiply them together, the answer will be the same. In other words, the placement of parentheses does not matter when it comes to adding or multiplying. Hence, A + (B + C) = (A + B) + C A.(B.C) = (A.B).C Examples: 1 + (2+3) = (1+2) + 3 → 6 3 x (4 x 2) = (3 x 4) x 2 → 24 Distributive Property of Multiplication The distributive property of Multiplication states that multiplying a sum by a number is the same as multiplying each addend by the value and adding the products then. According to the Distributive Property, if a, b, c are real numbers, then: a x (b + c) = (a x b) + (a x c) Example: 2 x (5 + 8) = (2 x 5) + (2 x 8) 2 x (13) = 10 + 16 26 = 26 There are certain other properties such as Identity property, closure property which are introduced for integers. Non-Commutative Property Some operations are non-commutative. By non-commutative, we mean the switching of the order will give different results. The mathematical operations, subtraction and division are the two non-commutative operations. Unlike addition, in subtraction switching of orders of terms results in different answers. Example: 4 – 3 = 1 but 3 – 4 = -1 which are two different integers. Also, the division does not follow the commutative law. That is, 6 ÷ 2 = 3 2 ÷ 6 = 1/3 Hence, 6 ÷ 2 ≠ 2 ÷ 6 Solved Examples on Commutative Property Example 1: Which of the following obeys commutative law? 3 × 12 4 + 20 36 ÷ 6 36 – 6 -3 × 4 Solution: Options 1, 2 and 5 follow the commutative law Explanation: 12 x 3 = 36 => 3 x 12 = 12 x 3 (commutative) 20 + 4 = 24 => 4 + 20 = 20 + 4 (commutative) 6 ÷ 36 = 0.167 => 36 ÷ 6 ≠ 6 ÷ 36 (non commutative) 6 – 36 = – 30 => 36 – 6 ≠ 6 – 36 (non commutative) 4 x -3 = -12 => −3 × 4 = 4 x -3 (commutative) Q.2: Prove that a+ b = b+a if a = 10 and b = 9. Sol: Given that, a = 10 and b = 9 LHS = a+b = 10 + 9 = 19 .....(1) RHS = b + a = 9 + 10 = 19 .....(2) By equation 1 and 2, as per commutative property of addition, we get; LHS = RHS Hence, proved. Q.3: Prove that A.B = B.A, if A = 4 and B = 3. Sol: Given, A = 4 and B = 3. A.B = 4.3 = 12 ..... (1) B.A = 3.4 = 12 .....(2) By eq.(1) and (2), as per the commutative property of multiplication, we get; LHS = RHS A.B = B.A Hence, proved. Practice Questions Find which of the following is the commutative property of addition and multiplication. 3 + 4 = 4 + 3 10 x 7 = 7 x 10 8 x 9 = 9 x 8 6 + 4 = 4 + 6 To solve more problems on properties of math, download BYJU'S – The Learning App from Google Play Store and watch interactive videos. In Mathematics, a commutative property states that if the position of integers are moved around or interchanged while performing addition or multiplication operations, then the answer remains the same. Examples are: 4+5 = 5+4 and 4 x 5 = 5 x 4 9 + 2 = 2 + 9 and 9 x 2 = 2 x 9When two numbers are added together, then if we swap the positions of numbers, the sum of the two remains the same. For example, 3+4 = 4+3 = 7When two numbers are multiplied together and if we interchange their positions, then the product of the two remains the same. For example, 5 x 3 = 3 x 5 = 15The four major properties in Maths are: Identity property, commutative property, associative property and Distributive propertyCommutative property holds regardless of order of numbers while addition or multiplication. Whereas associative property holds regardless of grouping of numbers. The commutative property applies to the arithmetic operations of addition and multiplication. It means that changing the order or position of two numbers while adding or multiplying them does not change the end result. For example, 4 + 5 gives 9, and 5 + 4 also gives 9. The order of two numbers being added does not affect the sum. The same concept applies to multiplication too. The commutative property does not hold for subtraction and division, as the end results are completely different after changing the order of numbers. What is Commutative Property? The word 'commutative' originates from the word 'commute', which means to move around. Hence, the commutative property deals with moving the numbers around. So mathematically, if changing the order of the operands does not change the result of the arithmetic operation then that particular arithmetic operation is commutative. Let us discuss the commutative property of addition and multiplication. Commutative Property Formula For any two numbers, A and B, the formula of the commutative property of numbers is expressed as follows. A + B = B + A A × B = B × A A - B ≠ B - A A ÷ B ≠ B ÷ A The commutative property formula states that the change in the order of two numbers while adding and multiplying them does not affect the result. However, while subtracting and dividing any two real numbers, the order of numbers are important and hence it can't be changed. Commutative Property of Addition The commutative property of addition says that changing the order of the addends does not change the value of the sum. If 'A' and 'B' are two numbers, then the commutative property of addition of numbers can be represented as shown in the figure given below. Let us take an example of the commutative property of addition and understand the application of the above formula. Example: Let us check the Commutative property by adding 10 and 13. Let us add the given numbers 10 and 13. So, 10 + 13 = 23 and 13 + 10 = 23. Therefore, 10 + 13 = 13 + 10 which proves the commutative property of addition. Commutative Property of Multiplication The commutative property of multiplication says that the order in which we multiply two numbers does not change the final product. The figure given below represents the commutative property of the multiplication of two numbers. If 4 and 6 are the numbers, then 4 × 6 = 24, and 6 × 4 is also equal to 24. Thus 4 × 6 = 6 × 4. Therefore, the commutative property holds true for the multiplication of numbers. Note: The commutative property does not hold for subtraction and division operations. Let us take the example of numbers 6 and 2. 6 - 2 = 4, but 2 - 6 = -4. Thus, 6 - 2 ≠ 2 - 6. 6 ÷ 2 = 3, but 2 ÷ 6 = 1/3. Thus, 6 ÷ 2 ≠ 2 ÷ 6 Commutative Property of Subtraction The commutative property is not applicable to subtraction. The commutative law only applies to addition and multiplication. Let us see why it does not apply on subtraction. For example, 8 - 5 = 3, but 5 - 8 = -3. Thus, 8 - 5 ≠ 5 - 8. Commutative Property vs Associative Property Let us learn the difference between the associative and commutative property. Both associative property and commutative property state that the order of numbers does not affect the result of addition and multiplication. So, what is the difference between the two? Let us find out. Observe the table given below to see the comparison of commutative property vs associative property. Commutative Property Associative Property The word 'commutative' is derived from 'commute' which means move around, switch, or swap the numbers. The word 'associative' is derived from 'associate' which deals with the grouping of numbers. It does not affect the result of addition and multiplication of two numbers without changing the final result. The grouping of numbers can be changed in the case of addition and multiplication of three numbers without changing the final result. Formula: A + B = B + A A × B = B × A Formula: A + (B + C) = (A + B) + C = (A + C) + B A × (B × C) = (A × B) × C = (A × C) × B Important Notes: Some key points to remember about the commutative property are given below. The commutative property states that 'changing the order of the operands does not change the result'. The commutative property for addition is A + B = B + A. The commutative property for multiplication is A × B = B × A. ☛ Related Topics Check out some interesting articles related to the commutative property in math. Cuemath is one of the world's leading math learning platforms that offers LIVE 1-to-1 online math classes for grades K-12. Our mission is to transform the way children learn math, to help them excel in school and competitive exams. Our expert tutors conduct 2 or more live classes per week, at a pace that matches the child's learning needs. Example 1: Jacky's mother asked him whether the addition of two natural numbers is an example of the commutative property. Can you help Jacky find out whether it is commutative or not? Solution: We know that the commutative property of addition states that changing the order of the addends does not change the value of the sum. If we take any two natural numbers, say 2 and 5, then 2 + 5 = 7 = 5 + 2. Therefore, the addition of two natural numbers is an example of commutative property. Example 2: Find the missing value: 132 × 121 = ___ × 132. Solution: The commutative property of multiplication states that if there are two numbers 'a' and 'b', then a × b = b × a. If you observe the given equation carefully, you will find that the commutative property can be applied here. If a = 132, and b = 121, then we know that 132 × 121 = 121 × 132. ∴ The missing number is 121. Example 3: State whether the given statement is true or false. "Division of 12 by 4 satisfies the commutative property." Solution: The commutative property does not hold true for division. So, the given statement is false. Let us verify it. 12 ÷ 4 = 3 4 ÷ 12 = 1/3 = 0.33 ⇒ 12 ÷ 4 ≠ 4 ÷ 12 ∴ The given statement is false. View More > go to slidego to slidego to slide Breakdown tough concepts through simple visuals. Math will no longer be a tough subject, especially when you understand the concepts through visualizations. Book a Free Trial Class FAQs on Commutative Property The commutative property states that if the order of numbers is interchanged while performing addition or multiplication, the sum or the product obtained does not change. It is to be noted that the commutative property holds true only for addition and multiplication and not for subtraction and division. For example, 6 + 7 is equal to 13 and 7 + 6 is also equal to 13. Similarly, 6 × 7 = 42, and 7 × 6 = 42. What is the Commutative Property of Addition? According to the commutative property of addition, when two numbers are added in any order the sum remains the same. For example, 3 + 9 = 9 + 3 = 12. What is the Commutative Property of Multiplication? According to the commutative property of multiplication, the order of multiplication of numbers does not change the product. For example, 4 × 5 is equal to 20 and 5 × 4 is also equal to 20. Though the order of numbers is changed, the product is 20. Can Commutative Property be Used for Subtraction and Division? The commutative property cannot be applied for subtraction and division, because the changes in the order of the numbers while doing subtraction and division do not produce the same result. For example, 5 - 2 is equal to 3, whereas 2 - 5 is not equal to 3. In the same way, 10 ÷ 2 = 5, whereas, 2 ÷ 10 ≠ 5. Therefore, the commutative property is not applicable for subtraction and division. What is the Difference Between Commutative Property and Associative Property? The commutative property states that the change in the order of two numbers in an addition or multiplication operation does not change the sum or the product. The commutative property of addition is expressed as A + B = B + A. The commutative property of multiplication is expressed as A × B = B × A. The associative property states that the grouping or combination of three or more numbers that are being added or multiplied does not change the sum or the product. The associative property of addition is written as: (A + B) + C = A + (B + C) = (A + C) + B. The associative property of multiplication is written as (A × B) × C = A × (B × C) = (A × C) × B. What is the Difference Between Commutative Property and Distributive Property? The commutative property states that the change in the order of numbers for the addition or multiplication operation does not change the result. The commutative property of addition for two numbers 'A' and 'B' is A + B = B + A. The distributive property means multiplying a number with every number inside the parentheses. The numbers inside the parentheses are separated by an addition or a subtraction symbol. The distributive property of addition for two numbers 'A', 'B' is: A(B + C) = AB + AC. How are the Commutative Property of Addition and Multiplication Alike? In the commutative property of addition and multiplication, the order of numbers does not affect the sum or product. For example, in the commutative property of addition, 7 + 8 = 8 + 7 = 15. Similarly, in the commutative property of multiplication, 6 × 5 = 5 × 6 = 30. So, the commutative property holds true with addition and multiplication operations. How to Teach the Commutative Property of Addition? The best way to teach the commutative property of addition is by using real-life objects such as pebbles, dice, seeds, etc. Give 3 marbles to student A and then give 5 marbles to student B. Ask them to count the total number of marbles which will be 8. Then repeat the same process by giving 5 marbles to student A and 3 marbles to student B. Now, ask them to tell the total number of marbles again which will result in 8. Use the commutative property of addition worksheets to examine their understanding. What are Commutative Laws? Commutative law is another word for the commutative property that applies to addition and multiplication. The commutative law of addition states that the order of adding two numbers does not change the sum (A + B = B + A). The commutative property of multiplication states that the order of multiplying two numbers does not change the product (A × B = B × A). What is an Example of Commutative Law? The Commutative law of addition states that the result of the addition of any two numbers remains the same even when the positions of these numbers are interchanged. For example, 4 + 7 = 11 and 7 + 4 = 11. The same rule applies to multiplication as well. This means that as per the commutative law of multiplication, the result of the multiplication of any two numbers remains the same even when the positions of these numbers are interchanged. For example, 3 × 7 = 21 and 7 × 3 = 21. Here you will learn about the commutative property, including what it is, and how to use it to solve problems. Students will first learn about the commutative property as part of operations and algebraic thinking in 3rd grade. The commutative property states that when you add or multiply numbers, you can change the order of the numbers and the answer will still be the same. For example, When adding, you can change the order of the addends: Notice that even with a different order, the sum is the same. This is also true when multiplying numbers. For example, When multiplying, you can change the order of the numbers: Notice that even with a different order, the product is the same. The commutative property can be used to create friendly numbers when solving. Friendly numbers are numbers that are easy to add or multiply mentally – like multiples of 10. For example, \begin{aligned} & 3+25+7 \\\\ & =3+7+25 \hspace{0.3cm} \text{ **Change the order of 25 and 7} \\\\ & =10+25 \hspace{0.65cm} \text{ **Adding 3 and 7 first, gives us 10 - a friendly number} \end{aligned} The commutative property lets us change the order and create friendlier numbers. 10 + 25 is easier to solve mentally than 3 + 25 + 7 = 28 + 7. For example, \begin{aligned} & 2 \times 8 \times 5 \\\\ & =2 \times 5 \times 8 \hspace{0.3cm} \text{ **Change the order of the 8 and 5}\\\\ & =10 \times 8 \hspace{0.65cm} \text{ **Multiplying 2 and 5 first, gives us 10 - a friendly number} \end{aligned} The commutative property lets us regroup and create friendlier numbers. 10 \times 8 is easier to solve mentally than 2 \times 8 \times 5=16 \times 5. The commutative property can also be referred to as the commutative property of addition and the commutative property of multiplication, or more generally as the commutative law. How does this relate to 3rd grade math? Grade 3 – Operations and Algebraic Thinking (3.OA.B.5)Apply properties of operations as strategies to multiply and divide. Examples: If 6 \times 4 = 24 is known, then 4 \times 6 = 24 is also known. (Commutative property of multiplication.) 3 \times 5 \times 2 can be found by 3 \times 5 = 15, then 15 \times 2 = 30, or by 5 \times 2 = 10, then 3 \times 10 = 30. (Associative property of multiplication.) Knowing that 8 \times 5 = 40 and 8 \times 2 = 16, one can find 8 \times 7 as 8 \times (5 + 2) = (8 \times 5) + (8 \times 2) = 40 + 16 = 56. (Distributive property.) Use this worksheet to check your 3rd grade students' understanding of commutative property. 15 questions with answers to identify areas of strength and support! DOWNLOAD FREE x Use this worksheet to check your 3rd grade students' understanding of commutative property. 15 questions with answers to identify areas of strength and support! DOWNLOAD FREE In order to use the commutative property: Check to see that the operation is addition or multiplication. Change the order of the numbers and solve. Give an example of the commutative property using 4 + 9. Check to see that the operation is addition or multiplication. All the numbers are being added, so the commutative property can be used. 2Change the order of the numbers and solve. 4 + 9 = 13 \; \longrightarrow \; 9 + 4 = 13 Changing the order in the equation does not change the sum. Give an example of the commutative property using 10 \times 6. Check to see that the operation is addition or multiplication. All the numbers are being multiplied, so the commutative property can be used. Change the order of the numbers and solve. 10 \times 6 = 60 \; \longrightarrow \; 6 \times 10 = 60 Changing the order in the equation does not change the product. Use the commutative property to create a friendly number and solve 6 + 32 + 14. Check to see that the operation is addition or multiplication. All the numbers are being added, so the commutative property can be used. Change the order of the numbers and solve. \begin{aligned} & 6+32+14 \\\\ & =6+14+32 \hspace{0.3cm} \text{ *Change the order of 32 and 14} \\\\ & =20+32 \hspace{0.8cm} \text{ *Adding 6 and 14 first gives us 20 - a friendly number} \\\\ & =52 \end{aligned} Use the commutative property to create a friendly number and solve 3 \times 8 \times 3. Check to see that the operation is addition or multiplication. All the numbers are being multiplied, so the commutative property can be used. Change the order of the numbers and solve. \begin{aligned} & 3 \times 8 \times 3 \\\\ & =3 \times 3 \times 8 \hspace{0.3cm} \text{ *Change the order of the 8 and 3} \\\\ & =9 \times 8 \hspace{0.8cm} \text{ *Multiplying 3 and 3 first gives a 9 - a single digit number} \\\\ & =72 \end{aligned} Notice that when multiplying, friendly numbers can also be single digit numbers. If you know your basic facts, it is easier to solve 9 \times 8 than solving 3 \times 8 \times 3=24 \times 3. Use the commutative property to create a friendly number and solve 41 + 17 + 9. Check to see that the operation is addition or multiplication. All the numbers are being added, so the commutative property can be used. Change the order of the numbers and solve. \begin{aligned} & 41+17+9 \\\\ & =41+9+17 \hspace{0.3cm} \text{ *Change the order of 17 and 9} \\\\ & =50+17 \hspace{0.8cm} \text{ *Adding 41 and 9 first gives us 50 - a friendly number} \\\\ & =67 \end{aligned} Use the commutative property to create a friendly number and solve 3 \times 5 \times 4. Check to see that the operation is addition or multiplication. All the numbers are being multiplied, so the commutative property can be used. Change the order of the numbers and solve. \begin{aligned} & 3 \times 5 \times 4 \\\\ & =3 \times 4 \times 5 \hspace{0.3cm} \text{ *Change the order of the 4 and 5} \\\\ & =12 \times 5 \hspace{0.7cm} \text{ *Multiplying 3 and 4 first gives a 12 - a basic fact} \\\\ & =60 \end{aligned} Notice that when multiplying, friendly numbers can also be numbers that are basic facts. If you have memorized the basic multiplication facts from 1-12, it is easier to solve 12 \times 5 than solving 3 \times 5 \times 4=15 \times 4. Be intentional about choosing problems where the commutative property makes solving easier, since it is not always useful or necessary in all solving situations. Instead of just telling students the commutative property definition, draw attention to examples of the commutative property when they naturally occur in daily math activities. Record the different examples you see in the classroom on an anchor chart. Over time, students will start recognizing and using the property on their own. Then, after there are sufficient examples, you can introduce students to the property name and definition by using their own examples. Include plenty of student discourse around this property so that students understand changing the order of numbers when adding or multiplying does not change the final result. This could include students sharing their thinking or critiquing the thinking of others. Using the commutative property for subtraction or divisionThe commutative property only works when changing the order of the numbers doesn't change the answer. This is not true for subtraction or division and they are considered non-commutative arithmetic operations.For example, 11-5 = 6 \; AND \; 5-11 = -6 Changing the order of the numbers, changes the answer. Thinking there is only one way to use the commutative property to solve with friendly numbersSometimes there is more than one way to use the commutative property when solving.For example, \begin{aligned} & 6 \times 4 \times 5 \hspace{2.1cm} 6 \times 4 \times 5 \\ & =5 \times 4 \times 6 \hspace{1.7cm} =6 \times 5 \times 4 \\ & =20 \times 6 \hspace{2.05cm} =30 \times 4 \\ & =120 \hspace{2.4cm} =120 \end{aligned} Confusing the order of operationsEquations are always solved moving from left to right. It is not necessary to formally introduce students to the order of operations, but they need to understand and read equations in this way. Otherwise the commutative property may not mean anything to them. 11 \times 6=(10+1) \times 6 11 \times 6=11+11+11+11+11+11 The commutative property says that changing the order in the equation does not change the product. 11 \times 6=66 \; \longrightarrow \; 6 \times 11=66 The commutative property says that changing the order in the equation does not change the sum. \begin{aligned} & 5+11+9 \hspace{0.7cm} \longrightarrow \hspace{0.7cm} 9+11+5 \\\\ & =16+9 \hspace{2.1cm} =20+5 \\\\ & =25 \hspace{2.65cm} =25 \end{aligned} \begin{aligned} & 2 \times 9 \times 5 \\ & =2 \times 5 \times 9 \\ & =10 \times 9 \end{aligned} \begin{aligned} & 2 \times 9 \times 5 \\ & = 2 \times(9 \times 5) \\ & = 2 \times 45 \end{aligned} \begin{aligned} & 2 \times 9 \times 5 \\ & =18 \times 5 \end{aligned} \begin{aligned} & 2 \times 9 \times 5 \\ & =(2 \times 9) \times 5 \\ & =18 \times 5 \end{aligned} The commutative property says that changing the order in the equation does not change the product. \begin{aligned} & 2 \times 9 \times 5 \\\\ & =2 \times 5 \times 9 \hspace{0.3cm} \text{ *Change the order of 9 and 5} \\\\ & =10 \times 9 \hspace{0.65cm} \text{ *Multiplying 2 and 5 first gives us 10 – a friendly number} \end{aligned} \begin{aligned} & 37+28+23 \\ & =37+(28+23) \\ & =37+51 \end{aligned} \begin{aligned} & 37+28+23 \\ & =37+23+28 \\ & =60+28 \end{aligned} \begin{aligned} & 37+28+23 \\ & =65+23 \end{aligned} \begin{aligned} & 37+28+23 \\ & =(37+28)+23 \\ & =65+23 \end{aligned} The commutative property says that changing the order in the equation does not change the sum. \begin{aligned} & 37+28+23 \\\\ & =37+23+28 \hspace{0.3cm} \text{ *Change the order of 23 and 28} \\\\ & =60+28 \hspace{1cm} \text{ *Adding 37 and 23 first gives us 60 – a friendly number} \end{aligned} \begin{aligned} & 8 \times 4 \times 5 \\ & =8 \times(4 \times 5) \\ & =8 \times 20 \end{aligned} \begin{aligned} & 8 \times 4 \times 5 \\ & =32 \times 5 \end{aligned} \begin{aligned} & 8 \times 4 \times 5 \\ & =(8 \times 4) \times 5 \\ & =32 \times 5 \end{aligned} \begin{aligned} & 8 \times 4 \times 5 \\ & =8 \times 5 \times 4 \\ & =40 \times 4 \end{aligned} The commutative property says that changing the order in the equation does not change the product. Friendly numbers are numbers that are easy to multiply mentally – like multiples of 10. \begin{aligned} & 8 \times 4 \times 5 \\\\ & =8 \times 5 \times 4 \hspace{0.3cm} \text{ *Change the order of 4 and 5} \\\\ & =40 \times 4 \hspace{0.6cm} \text{ *Multiplying 8 and 5 first gives us 40 – a friendly number} \end{aligned} \begin{aligned} & 16+18+22 \\ & = (16+18)+22 \\ & = 34+22 \end{aligned} \begin{aligned} & 16+18+22 \\ & =34+22 \end{aligned} \begin{aligned} & 16+18+22 \\ & =18+22+16 \\ & =40+16 \end{aligned} \begin{aligned} & 16+18+22 \\ & = 16+22+18 \\ & = 38+18 \end{aligned} The commutative property says that changing the order in the equation does not change the sum. Friendly numbers are numbers that are easy to multiply mentally – like multiples of 10. \begin{aligned} & 16+18+22 \\\\ & =18+22+16 \hspace{0.3cm} \text{ *Change the order of all the numbers} \\\\ & =40+16 \hspace{1cm} \text{ *Adding 18 and 22 first gives us 40 – a friendly number} \end{aligned} Do you have to use the commutative property when solving? No, you can solve the numbers as they appear in the equation, without changing the order. The commutative property just gives you flexibility to add or multiply in a different order. Does the commutative property work with other groupings of numbers besides natural numbers and whole numbers? Yes, the commutative property can be used with integers, rational numbers and any real number, as long as they are all being added or multiplied. How are the associative property of addition and the commutative property of addition different? The associative property of addition states that you can change the grouping of numbers when adding (using parentheses) and the sum will still be the same. The order of operations changes, but not the written order of the numbers in the equation. The commutative property of addition says you can change the written order of the numbers when adding and the sum will still be the same. What is the identity property? It is one of the properties of numbers for mathematical operations. This property states that any number added to 0 will still result in the same number (0 + a = a) or any number multiplied by 1 will still result in the same number (1 \times a=a). Addition and subtraction Multiplication and division Types of numbers At Third Space Learning, we specialize in helping teachers and school leaders to provide personalized math support for more of their students through high-quality, online one-on-one math tutoring delivered by subject experts. 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