



Commute, Associate, Distribute



The properties are named after ordinary words. If you know the word, you know the rule.

Name _____

Date _____

PART A The word tells you the rule

Fill in the middle column in your own words. What does the everyday word mean? Then say what the numbers are allowed to do.

Property	What the everyday word means	What the numbers are allowed to do
Commutative (a parent commutes to work)		
Associative (a business associate)		
Distributive (distribute the worksheets)		

PART B Name that property

Write C (commutative), A (associative), D (distributive), I (identity), or N (inverse). Then circle adding or multiplying.

- | | | |
|--|-----------------|----------------------|
| 1. $9 + 4 = 4 + 9$ | Property: _____ | adding / multiplying |
| 2. $(3 \times 5) \times 2 = 3 \times (5 \times 2)$ | Property: _____ | adding / multiplying |
| 3. $6 \times (10 + 2) = 6 \times 10 + 6 \times 2$ | Property: _____ | adding / multiplying |
| 4. $12 \times 1 = 12$ | Property: _____ | adding / multiplying |
| 5. $7 + (-7) = 0$ | Property: _____ | adding / multiplying |
| 6. $8 \times 3 = 3 \times 8$ | Property: _____ | adding / multiplying |
| 7. $(1 + 9) + 5 = 1 + (9 + 5)$ | Property: _____ | adding / multiplying |
| 8. $5(x + 3) = 5x + 15$ | Property: _____ | adding / multiplying |

PART C Does it work? Test it with numbers

Work out both sides. Write = if they match and $\neq$ if they do not.

Test	Left side	= or $\neq$	Right side
Does it commute? Adding: $15 + 8$ vs. $8 + 15$			
Subtracting: $15 - 8$ vs. $8 - 15$			
Multiplying: 6×4 vs. 4×6			
Dividing: $6 \div 4$ vs. $4 \div 6$			
Does it associate? Adding: $(20 + 5) + 5$ vs. $20 + (5 + 5)$			
Subtracting: $(20 - 5) - 5$ vs. $20 - (5 - 5)$			
Multiplying: $(2 \times 6) \times 5$ vs. $2 \times (6 \times 5)$			
Dividing: $(40 \div 4) \div 2$ vs. $40 \div (4 \div 2)$			

Which two operations passed every test? _____ and _____. Those are the two operations of algebra.

PART D Use the property to make the math easy

Name the property and the everyday word it comes from, then give the answer.

Problem	Property + everyday word	Answer
1. $4 \times 17 \times 25$ (put 4 and 25 together first)		
2. $(38 + 17) + 3$ (partner 17 with 3 instead)		
3. $8 \times 23 = 8 \times 20 + 8 \times 3$		
4. $6(x + 4)$		
5. $3(y - 5)$		
6. Backwards: $7x + 21 = 7(\text{_____})$		
7. Disguise: $20 - 6 = 20 + (\text{_____}) = (\text{_____}) + 20$		
8. Disguise: $18 \div 3 = 18 \times \frac{1}{3} = \frac{1}{3} \times 18$		

PART E In your own words (exit ticket)

Use the math word and the everyday word.

1. Why is it called the commutative property? What does "commute" mean?

2. Show with your own numbers that subtraction is not commutative.

3. Why does algebra rewrite subtraction as adding the opposite, and division as multiplying by the reciprocal?



Answer Key



Accept any wording that names the property, the everyday word, and what the numbers may do.

PART A The word tells you the rule

Commutative: commute = travel back and forth between two places. The numbers may trade places; the answer stays the same.

Associative: associate = a partner, someone you pair up with. The numbers may change partners (move the parentheses); the answer stays the same.

Distributive: distribute = hand one out to everybody. The multiplier is handed to every term inside the parentheses.

PART B Name that property

1. C, add 2. A, mult 3. D, mult 4. I, mult 5. N (inverse), add 6. C, mult 7. A, add 8. D, mult

PART C Does it work?

Test	Left		Right
Addition commutes	23	=	23
Subtraction commutes	7	≠	-7
Multiplication commutes	24	=	24
Division commutes	$\frac{6}{4} = \frac{3}{2}$	≠	$\frac{4}{6} = \frac{2}{3}$
Addition associates	30	=	30
Subtraction associates	10	≠	20
Multiplication associates	60	=	60
Division associates	5	≠	20

Passed every test: **addition** and **multiplication**.

PART D Use the property

1. Commutative (commute, swap places): $4 \times 25 \times 17 = 100 \times 17 = \mathbf{1,700}$.

2. Associative (associate, change partners): $38 + (17 + 3) = 38 + 20 = \mathbf{58}$.

3. Distributive (distribute, hand out to every term): $160 + 24 = \mathbf{184}$.

4. $6x + 24$. 5. $3y - 15$ (the 3 is handed to y and to -5). 6. $7(x + 3)$, the distributive property run backwards.

7. $20 + (-6) = 14$, and $(-6) + 20 = 14$. Same answer: once subtraction is written as adding the opposite, it commutes.

8. $18 \times \frac{1}{3} = 6$, and $\frac{1}{3} \times 18 = 6$. Same answer: once division is written as multiplying by the reciprocal, it commutes.

PART E In your own words

1. Because the numbers commute: they travel back and forth, trading places, and the answer does not change.

2. Any pair, for example $9 - 2 = 7$ but $2 - 9 = -7$.

3. Addition and multiplication are the operations with the properties (they commute, associate, and multiplication distributes). Subtraction and division do not, so algebra rewrites them as adding the opposite and multiplying by the reciprocal. Then every property works.