

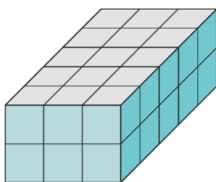
Math 4. Addition and multiplication properties

Classwork:

	Commutative	Associative	Identity
Addition	$a + b = b + a$	$(a + b) + c = a + (b + c)$	$a + 0 = a$
Multiplication	$a \cdot b = b \cdot a$	$(a \cdot b) \cdot c = a \cdot (b \cdot c)$	$a \cdot 1 = a;$ $a \cdot 0 = 0$
Distributive property of multiplication over addition	$a \cdot (b + c) = a \cdot b + a \cdot c$		

The commutative property of multiplication can be also illustrated by calculating of the area of a rectangle:

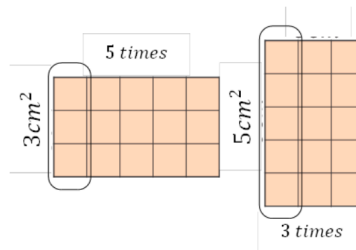
$$S = 3\text{cm}^2 \times 5\text{times} = 5\text{cm}^2 \times 3\text{times} = 15\text{cm}^2$$



The associative property can be shown by calculating of the volume of parallelepiped. How many cubed are stacked together into the parallelepiped?

First, we can multiply five by three to find out how many cubes are in the horizontal slice, and then multiply by 2 (the number of slices). Or multiplication of three by two will provide the number of cubes on the front slice, and there are five such slices.

$$(3 \cdot 5) \cdot 2 = (2 \cdot 5) \cdot 3 = (2 \cdot 3) \cdot 5 = 2 \cdot 3 \cdot 5 = 24$$



Distributive property can be illustrated with the following problem:

The farmer put green and red grapes into boxes. Each box contains 5lb of grapes. How many pounds of green and red grapes altogether did the farmer put into boxes if he had 10 boxes of green and 8 boxes of red grapes? We can first find out how many boxes of grapes the farmer has altogether and multiply it by 5lb in each box, or we can find out the weight of white and red grapes in the boxes and then add it.

$$5 \times (10 + 8) \text{ or } 5 \times 10 + 5 \times 8$$

$$5 \times 18 = 50 + 40; \quad 90 = 90$$

Homework:

Please do all the calculations carefully, step by step on a separate sheet of paper. Do not use this page for the answers.

1) Fill the empty boxes in the table (draw the table in your notebook)

a	16	28	44		49			
b	7	13		18		12	23	
$a + b$			60	67			833	72
$a - b$					35	60		0

2) Calculate the most convenient way:

Example: $3 \cdot 2 \cdot 7 \cdot 8 \cdot 5 = 2 \cdot 5 \cdot 3 \cdot 7 \cdot 8 = 10 \cdot 21 \cdot 8 = 10 \cdot 194 = 1680$

a. $72 + 59 + 97 + 28 + 41$;

b. $32 + 34 + 36 + 38$;

c. $5 \cdot 19 \cdot 5 \cdot 3 \cdot 2 \cdot 2$;

d. $715 - 99 - 101$;

3) Evaluate (what is the best way to compute it? Hint: use the distributive and/or commutative properties):

Example: $17 \cdot 55 + 45 \cdot 17 = 17 \cdot (55 + 45) = 17 \cdot 100 = 1700$

a. $23 \cdot 15 + 15 \cdot 77$;

b. $79 \cdot 21 - 69 \cdot 21$;

c. $340 \cdot 7 + 16 \cdot 70$;

d. $250 \cdot 61 - 25 \cdot 390$;

4) Fill the empty spaces in the magic square³ so that all the columns, rows, and diagonals have the same sum of numbers:

a.

2		6
	5	1
4		

b.

3		15	14
13	16		
10	11		
8		12	9

5) A farmer prepared 12 liters of strawberry jam for the winter, raspberry jam — 4 liters less than strawberry, and apple jam — 2 times more than strawberry and raspberry together. How many liters of jam did farmer prepare in total for the winter?