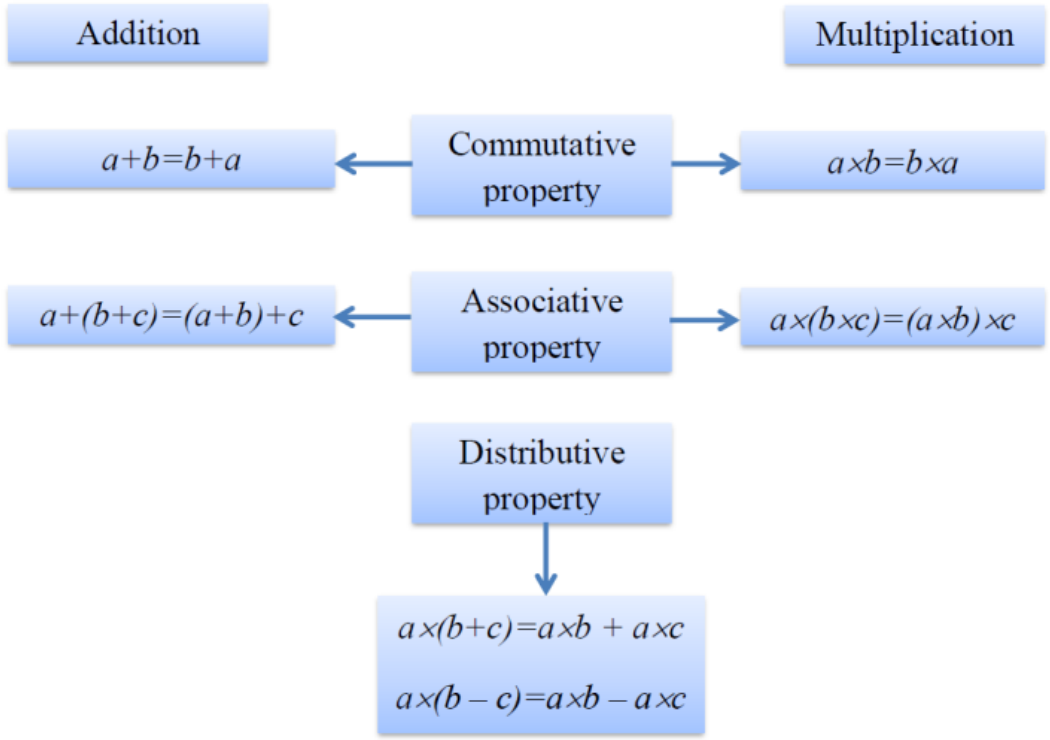
Math 4 b. Homework 3

Properties of the arithmetic operations.



The distributive property can be explained with the definition of multiplication.

Let's have an example:

$$2 \cdot (3 + 7) = (3 + 7) + (3 + 7) = 3 + 3 + 7 + 7 = 2 \cdot 3 + 2 \cdot 7$$

We can do it the other way around as well:

$$2 \cdot 3 + 2 \cdot 7 = 3 + 3 + 7 + 7 = 3 + 7 + 3 + 7 = (3 + 7) + (3 + 7) = 2 \cdot (3 + 7)$$

The distributive property can be illustrated by the following problems:

Problem 1

Farmer put green and red grapes into boxes. Each box contains 5lb of grapes. How many pounds of green and red grapes altogether did 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 $5 \times (10 + 8)$, or we can find out the weight of white and red grapes in the boxes and then add it $5 \times 10 + 5 \times 8$.

$$5 \times (10 + 8) \ \ or \ \ 5 \times 10 + 5 \times 8$$

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

Problem 2

For the party John bought 7 identical boxes of chocolates, 20 candies in each box. Guests ate 12 candies from each box. How many chocolates are left after the party?

Again, two numerical expression can be written to describe the problem:

$$7 \cdot (20 - 12) \text{ and } 7 \cdot 20 - 7 \cdot 12.$$

For both examples we can write the equality:

$$7 \cdot (20 - 12) = 7 \cdot 20 - 7 \cdot 12$$
$$5 \cdot (10 + 8) = 5 \cdot 10 + 5 \cdot 8$$

Using the distributive property, we can also **factor out the common factor** of two terms of the expression, for example:

$$6 \cdot 7 + 6 \cdot 3 = 6(7 + 3) = 6 \cdot 10 = 60$$

These equalities are numerical representation of the distributive property, which can be written in the general form as

$$a \cdot (b + c) = a \cdot b + a \cdot c$$

Homework

1. Compute (what is the best way to compute it?). Hint: use the distributive property.

a) $23 \times 15 + 77 \times 15$;

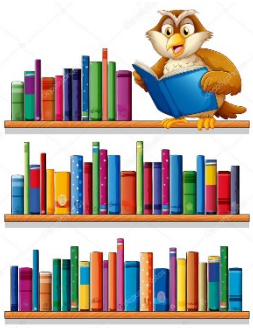
b) $79 \times 21 - 69 \times 21$;

c) $340 \times 7 + 40 \times 7$;

d) $250 \times 61 - 25 \times 390$;

e) $67 \times 58 + 33 \times 58$;

f) $55 \times 682 - 45 \times 682$;



2. On the first shelf there are 5 more books than on the second shelf and 5 less than on the third shelf. There are 105 books altogether. How many books are there on each shelf?

3. Using the distributive property fill the empty spaces:

Example: $5\cdot(\square+7) = 40+\square$

In your notebook: $5\cdot (8+7) = 5\cdot 8+5\cdot 7=40+35$

a) $(\square-\square)\cdot 2=18-8$

b) $11\cdot(2+\square)=\square+77$;

c) $\square+10=2\cdot(2+\square)$;

d) $\square\cdot(35-5)=70-\square$

e) $34-\square=17\cdot(\square-1)$

4. How many vans are needed to take 30 students on a field trip if a van can take 6 students?

5. How many vans are needed to take 32 students on a field trip if a van can take 6 students? What is the maximal number of vans that can be fully occupied by these students?

6. The summer vacation is 73 days long. Which day of the week will be last day of vacations if the first day was Tuesday?

7. You have a 3-gallon and a 5-gallon jug that you can fill from a fountain of water. How you can fill one of the jugs with *exactly* 4 gallons of water?

8. If you didn't draw the dinosaur from the previous HW **with the ruler on the quadrille paper**, do it in this HW. I attached the quadrille paper.