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Reproduction. The Laws of Reproduction

Usmonov Makhsud

Tashkent University of Information Technologies, Karshi branch 3rd year student
+99891 947 13 40
maqsudusmonov22@gmail.com

Abstract: The concept of product of whole non-negative numbers can be defined differently, we will define them as follows.

Keywords: multiplying a number ending in zero, the monotony of multiplication, multiplying any number by a three-digit number, multiplying any number by a two-digit number.

INTRODUCTION

1. Goals and objectives of the topic.

1- example. Each children's coat should have 4 buttons. How many buttons do you need to sew 6 coats like that?

2- example. A = {a; b; c}, B = {x; y; z; t} so, find the elements of the AxB Cartesian product?

3- example. If there are 3 students in each class, how many students are in the same group of 4?

4- example. Find the product 2 • 7 • 5 • 9?

5- example. Check the equation 2 • 5 = 5 • 2?

6- example. 125 • 15 • 6 • 8 Find the value of the expression?

7- example. 3 • Find the value of the expression (5 • 2) in different ways?

METHODS

2. Methods of problem solving.

Definition 1. For all negative numbers a and b:

1) when b> 1 is colored, a • b = a + a + ... + a (Ma is added);

2) In the case of b = 1, a • 1 = a \ 3) In the case of 6 = 0, the number a • b that satisfies the conditions a • 0 = 0 is said to be the product of the numbers a and b, where the multiplied numbers are multipliers called

If each of the sets Av Av ..., Ab has an element a and none of them intersects, then do not connect

the combination is known to have a • b elements. Hence, the product a • b is the number of elements at the intersection of b sets that do not intersect with a pair, each of which has an element from a. The equations a-l = avaa-0 = 0 are conditionally accepted.

Definition 2. Let a, b be G N. is the product of a and b, each of which is equal to a

ab = a + a + ... + a

b is called the sum of times.

This definition is based on the regularity of counting the elements of the AxB Cartesian product multiplied by a = n (A), b = n (B), A C \ B = 0.

based on

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3. Solutions Department.

1- example. Each children's coat should have 4 buttons. How many buttons do you need to sew 6 coats like that?

Y e c h i s h. 1- method. To solve the problem, you need to determine the number of elements in a combination of 6 sets, each with 4 elements. By definition, this number is found by multiplying: 4 • 6 = 24 (button).

2- example. A = {a; b; c}, B = {x; y; z; t} so, find the elements of the AxB Cartesian product?

Solution. The Cartesian product AxB is written in the following table:

(a; x) (a; y) (a; z) (a; t)

(b; x) (b; y) (b; z) (b; t)

(c; x) (c; y) (c; z) (c; t)

If we count the elements of the Cartesian multiplication by columns, we get 3x4 = 3 + 3 + 3 + 3 = 12.

3- example. If there are 3 students in each class, how many students are in the same group of 4?

Yec h ish. 1- method. Given the sets A = (x; y; z) and B = (n; t; r, s). The Cartesian product of the link is found. This summary is written in the form of a rectangular table:

u Satr »(x; ri), (x; t), (x; r), (z; s);

? (y; ri), (y; t), (y; r), (y; s);

n (z; n), (z; t), (z; r), (z; s);

All pairs in each row of the table have the same first constituents, and pairs in each column have the same second constituents. In this case, no two lines have at least one pair. It follows that the number of elements in the AxB Cartesian product is 3 + 3 + 3 + 3 = 12.

2- method. Since n (A) = 3, n (B) = 4 and 3 • 4 = 12, the number of elements in the Cartesian product of the given sets A and B is n (A) • n (B). the equation arises, that is, if A and B are finite sets, then n (AxB) = n (A) xn (B).

The product of all non-negative numbers a and b can be thought of as elements of the Cartesian product of the set A and B, which n (A) = a, n (B) = b, that is:

a- b = n (AxB), where n (A) = a, n (B) = b.

4- example. Find the product 2 • 7 • 5 • 9.

Solution. By definition of the product 2 • 7 - 5 • 9,

2 • 7 • 5 • 9 = (2 • 7 • 5) • 9 = ((2 • 7) • 5) • 9 = (14 • 5) • 9 = 70 • 9 = 630.

5- example. Check the equation 2 • 5 = 5 • 2.

Solution. Method 7 2 + 2 + 2 + 2 + 2 = 10 and 5 + 5 = 10.

So, 10 = 10.

2- method. n (A) = 5 and n (B) = 2 colored A = {a; b; c; d; We construct the Cartesian product of the set e}, B = {1; 2}:

AxB = {(a; \), (a; 2), (b; 1), (b; 2), (c; 1), (c; 2), (d; 1), (d; 2) , (e; 1), (e; 2)}. The number of Cartesian multiplication elements is 10 for color 5 • 2 = 10.

6- example. 125 • 15 • 6 • 8 Find the value of the expression.

Y e c h i s h. 1- method. To find the value of the expression 125 • 15 • 6 • 8, the positions of the multipliers 15 and 6 are replaced according to the law of substitution of multiplication, and 125 • 6 • 15 • 8 is formed.

This is the grouping law of multiplication according to (125 • 6) ■ (15 • 8). Now the numbers 750 * 120 are multiplied. To do this, 750 can be expressed as the sum of two numbers 700 and 50, i.e. (700 + 50) • 120 and each multiplier is multiplied by 120 according to the law of division. distributed:

700 • 120 + 50 • 120 = 8400 + 600 = 90000.

2- method. 125 • 15 • 6 • 8 The value of the expression is found:

125-15-6-8 = 125- (15-6) -8 = 125 * 90-8 = 125-8-9 = = (125 • 8) ■ 90 = 1000 ■ 90 = 90000. a group of 15-6 multipliers was separated on the basis of the law of substitution, then 125 • 8 were executed, and the positions of 90 and 8 multipliers were changed.

7- example. 3 • Find the value of the expression (5 • 2) in different ways.

Solution. It can be one of the following:

1- method. 3 • (5 • 2) = 3 • 10 = 30;

2- method. 3 • (5 • 2) = (3 • 5) • 2 = 15 • 2 = 30;

3- method. 3 • (5 • 2) = (3 • 2) • 5 = 6 • 5 = 30.

RESULTS

Law 1. For any non-negative integers a and b, the equation a - b = b - a is valid (substitution law).

I s b o t. a = n (A), b = n (B) boisin. In that case, by the definition of the product, a-b = n (AxB). However, the sets AxB and BxA are equally powerful because each pair in the set AxB (a; b) can be matched to a single pair (b; a) from the set BxA, and vice versa. Hence n (AxB) = n (BxA) and therefore a 'b = n (AxB) = n (BxA) = b- a.

Law 2. For any non-negative integers a, b, c, the equation (am b) • c = o • (b 'c) is valid.

Proof. a = n (A), b = n (B), c = n (C) boisin. In this case, according to the definition of the product, (a 'b)' c = n ((AxB) xC), a '(b' c) = n (Ax (Bx Q).

(AxB) xCva Ax (Bx C) sets consist of pairs of the form ((a • b) 'c) and (a- (b' c), where a GA, b E B. However (AxB) xCva The sets Ax (Bx C) are of equal power. Therefore, n ((AxB) xQ = n (Ax (BxC) and hence (ab) 'c = = a - (b - c).

Law 3. For any non-negative cones a, b, the equation (a + b) c = ac + bc is appropriate.

I s b o t. It is known that (A U B) x C = (A x Q U (B x C) (*).

Let A = n (A), b = n (B), c = n (Q and ADB = 0. Then, according to the definition of the product, (a + b) • c = n ((AUB) x C.

Hence the equation (*) is the sum of n ((AUB) xC = n ((AxQ UU (Bx Q)) and by the definitions of the product, n ((Ax C) UU (Bx Q) = n (Ax Q + n (Bx Q = ac + bc is formed.

Law 4. For any non-negative integer a, b, c (a * b), the equation (a ~ b) -c = a-c-b'c is valid.

Proof. This law (A \ B) is derived from the equation xC = (AxQ \ (BxQ) and is proved similar to the above law.

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The laws of distribution make the connection between multiplication and addition and subtraction. Based on these laws, open parentheses in expressions of the form (a + b) -c and (a - b) -c, as well as if the expression is in the form ac - bc or a-c + bc, the multiplier out of parentheses occurs.

Law 5. To multiply a number ending in zero, multiply it without paying attention to zero, and then write down how many zeros there are in the product on the right.

Law 6. Monotony of multiplication:

(Va, b, c £ N, c * 0); a> b => ac> bc;

(Va, b, c G N) \ a> b => ac> bc;

(Vn, b, c E N, c * 0); a <b => ac <icboladi.

Proof. We prove the first of your sentences.

a> b => B ~ A, CA,

where, n (A) = a, n (B) = b, A & 0, B # 0. In that case, BxC ~ (AtxC) C (AxQ.

Hence, n (Bx C) = n (A ^ x Q <n (Ax Q => bc <ac.

Law 7. The reduction of the product is: (Va, b, cC N, c * 0) a • c = b 'c => a = b.

Proof. Suppose the opposite is true: a b. In that case it must be a <b or a> b. If a <b, then a • c <b • c, which is unconditional. So, a = b.

Law 8. To multiply any number by a two-digit number, multiply this number first by the number in the one-digit room, then by the number in the decimal room, and the resulting product is added, resulting in the decimal place. The desired product is written by moving a room to the left.

Law 9. To multiply any number by a three-digit number, the resulting product is added by multiplying this number by each number in the unit, decimals, and hundreds room, where the numbers in the decimal room are one room. , the numbers in the hundreds cell are written by shifting the two cells to the left.

DISCUSSION

To multiply any number by a two-digit number, multiply this number first by the number in the one-digit room, then by the number in the decimal room, and the resulting product is added, resulting in the decimal place. The desired product is written by moving a room to the left.

The laws of distribution make the connection between multiplication and addition and subtraction. Based on these laws, open parentheses in expressions of the form (a + b) -c and (a - b) -c, as well as if the expression is in the form ac - bc or a-c + bc, the multiplier out of parentheses occurs.

CONCLUSION

The multiplication does not change as the positions of the multipliers change.

To multiply any number by a three-digit number, multiply that number by each number in the unit, decimals, hundreds, and so on. an multiplication is added, where the numbers in the decimal place are written one room, and the numbers in the hundreds place are written two rooms to the left.

To multiply a number ending in zero, multiply it without paying attention to zero, and then write down how many zeros there are in the product on the right.

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