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The Equations and their Effects

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Abstract

The study aims to explain the different effects between the multiplication, addition, division and subtraction equations. In this sense, multiplication and addition equations develop a new element or fact, meanwhile, division equations express information within the element or fact, subtraction is the selection of element or fact. Furthermore, for a multiplication and addition equation results in the new element or fact, it is necessary to depend on specific physical concepts, without extreme alteration, as it would result in the alteration of the element or fact. It is worth highlighting the importance of fixed values in the equation to describe the specific nature of the element or fact. The study makes it possible to understand open equations (without solutions) in mathematics and physics, in addition to understanding existing equations. The study makes reference to the theory of obligatory necessity and the theory of differences between elements.

***Keywords:** Multiplication and addition equations; Division equations; Subtraction equations; Physical concepts*

Introduction

Multiplication and addition equations are different from division equations, given that multiplication and addition equations allow for a new element or fact (Note: Additions and multiplication with specific values can result in different elements or facts), while division equations contain information within the element or fact. Subtraction makes it possible to select an element or fact, making it possible to determine the element or fact.

Furthermore, to develop the new element or fact, the intensity of the specific physical concept is necessary, without extreme changes, that is, the smooth or non-smooth equations depend on the physical concepts. In relation to equations, it is necessary to highlight the importance of fixed values within these equations in order to accurately describe the nature of the element or fact [1]. To observe patterns of occurrence and confirm the study presented, it is necessary to use multiplication, addition, division and subtraction equations in the areas of mathematics and physics. In addition to observing patterns of chemical reactions or bonds that depend on physical concepts [2].

The multiplication, addition, division and subtraction equations are represented:

Multiplication or addition
EF=PE × (ICx+ICy+ICz+…..) or EF=PE × ICx
EF=Fact Element
PE=Permanence
ICx, ICy or ICz=Intensity of the specific physical concept

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Division

$IEF=(PE \times ICx) \div (PE \times ICy)$
IEF=Element or Fact Information
PE=Permanence
ICx or ICy=Intensity of the specific physical concept

Subtraction

$SEF=(PE \times ICx)–(PE \times ICy)$
SEF=Selection of the Element or Fact
PE=Permanence
ICx or ICy=Intensity of the specific physical concept

Examples of multiplication and addition equations in mathematics

1) Rafael went to the market and bought R$200 worth of goods. When he returned to the house, he saw that his brother had also gone to the market and bought R$300 worth of goods. How much did the two of them spend together?

$200+300=500$

In other words, the relations of 200 and 300 resulted in the new element or fact which is the total 500, the 500 does not convey exact information, considering that the equation for the result 500 could be sums of 100+400=500 or 250+250=500. In a division there is direct information because if: 10÷ 5=2 it means in every division where the result (quotient) is 2 the information is obtained that the dividend is greater than or equal to the divisor ÷ This implies knowing the intensity of the quantity between the dividend and the divisor, that is, information is obtained from the element or fact. This information is not possible in the sum.

2) At a beverage company, an order came from a customer for 15 packs of a certain drink. Knowing that in each package there are 10 bottles of 2 liters each, then is the quantity of this drink in liters present in this order the same?

$10 \times 2=20$
$15 \times 20=300$

In this situation, it is clear that the multiplication resulted in the total element or fact of 300 in liters of drink, it is not possible to have information about the multiplicand and the multiplier, given that it is possible to have other relationships to provide the product of 300 liters, for example:

2×1020
$20 \times 15=300$
Or
$5 \times 4=20$
$20 \times 15=300$

It is possible to reach product 300 through numerous limited possibilities, that is, exact information on the quantity of the product's origins is not obtained, thus, multiplication and addition only develop new elements or facts.

3) Rafael works at a store and receives a monthly salary of R$5,000.00. Furthermore, for each featured product sold, he earns a 5% commission. If he sold 200 pieces in the store, what will Rafael's salary be?

$f(x)=0.05.\ 200+5000$
$f(x)=10+5000$
$f(x)=5010$

Rafael's total salary was determined by the actions of the fixed salary and by each piece sold, the total salary is a new reality developed by the actions, and not contained in parts within the fixed value, thus, it is not possible to determine the intensity of the quantity of the fixed salary and for each piece sold, since multiplication and sum can be changed in quantity resulting in the same element or fact [3].

What is the area of a rectangle whose length is 50 meters and width is 20 meters?

A=b h
A=20·50
A=1000 m

In this way, multiplication describes the new element or fact, which in this case is the area developed by the base and height.

Literature Review

Examples of division equations in mathematics

1) At a certain sports championship event at a school, the physical education teacher decided to divide the 30 students into groups. Knowing that each team for this sport must be made up of 5 people, how many teams did the teacher manage to form?

30 ÷ 5=6

The division provided information about the element or fact, where the result (quotient) 6 means that 6 groups of 5 people each are possible. Furthermore, it is observable that result 6 is not the new development of the element or fact.

Furthermore, the divisor must be less than or equal to the dividend to result in the element or fact 6. This implies that divisor 5 has fewer people than the dividend group quantity 30, thus, it is possible to have quotient 6 [4]. If there is a in the case where the divisor is greater than the dividend, the result will not be possible to have the number 6.

2) A bag contains 10 identical balls, but with different colors: Three blue balls, four red balls and two green balls. A ball is drawn at random. What is the probability that the ball drawn is blue?

P=3/10
P=30%

The 30% result obtained by division indicating possible information within the element or fact, where 30% makes evident the intensities of greater or lesser quantity between dividend and divisor.

Examples of subtraction equations in mathematics

1) A shirt store has 300 shirts in stock and receives an order from a customer for 50 shirts. How many units of shirts are left in stock after delivering this order?

300-50=250

In this sense, there was a selection of the element or suit of 50 shirts out of a total of 300, leaving an element or suit selection of 250 units of shirts in stock, therefore, the selection helps to determine an element or suit.

2) A championship trained 2200 people in the city where 1200 are male. How many people were in the city for this championship, female?

2200-1200=1000

The selection of the element or fact of 1200 men among a total of 2200 people resulted in the selection of the element or fact of 1000 women.

Examples of multiplication and addition equations in physics

1) In a situation where the acceleration of gravity on Earth is equal to 9.8 m/s^2 and on the Moon the value of this acceleration is approximately 1.6 m/s^2, what is the weight of a person with a mass equal to 50 kg on both Earth and Moon? (P=weight, M=mass, G=gravity) (EF=element or fact, PE=permanence. IC=intensity of the specific physical concept)

In the land:

P= M. G	EF=(ICx × PE) x (ICy × PE)
P=50. 9.8	EF=(50 × 1) × (9.8 × 1)
P=490 N	EF=490 N

On the moon:

P=M. G	EF=(ICx × PE) × (ICy × PE)
P=50. 1.6	EF=(50 × 1) × (1.6 × 1)
P=80 N	EF=80 N

In this sense, it is observable that when equating a result of 490 N on the earth and 80 N on the moon, the intensity of the specific physical concept and the idea of permanence were introduced, in this way, the phenomena generated require the intensity of the specific physical concept and permanence. The extreme alteration of these physical concepts would imply the new result of the element or fact [5]. And it is not possible to change permanence in such a context, as it is linked to the actions of the intensity of specific physical concepts.

2) On a normal day, a vehicle takes 10 minutes to cross a bridge, moving at a speed of 20 m/s. Based on the information, calculate the length of this bridge, in km?

(Vm=average speed. ΔS=displacement. Δt=time interval)
(EF=element or fact. PE=permanence. IC=intensity of the specific physical concept)

ΔS=Vm. Δt	EF=(ICx × PE) × (ICy × PE)
ΔS=20. (10.60)	EF=(20 × 1) × (10 × 60)
ΔS=12 km	EF=12 km

Displacement is not a part of the average speed or time, but rather a result of the actions of the average speed and the time interval.

3) A car with a constant speed of 40 m/s starts at position 7 m on a numbered straight line and moves in the positive direction of the straight line. What is the position of the car after 20 s of movement? (S: final position, S0: initial position, v: speed, Δt: time interval) (EF=element or fact, PE=permanence, IC=intensity of the specific physical concept)

S=S0+vt	EF=(ICx × PE) + (ICy × PE)
S=7+40.20	EF=(7 × 1) + (40 × 20)
S=807 m	EF=807m

The final position is a fact developed by the equation S=S0+vt in which the action of each variable with another variable determines the fact of the final position, and this fact is not information contained in parts but rather a set of actions in the equation.

4) A car moves on a horizontal road at constant speed. Each tire has a diameter of D=0.40 m and a frequency of 600 rpm. The speed of the car is? (v: speed, ω: angular velocity, R: radius of curvature of the trajectory).
(EF=element or fact, PE=permanence, IC=intensity of the physical concept)

v=w. R	EF=(ICx × PE) × (ICy × PE)

v=2. π. f. R EF=(20 × 1) × (0.20 × 1)
v=2. π. 10. 0.20 EF=4 π m/s
v=4 π m/s

5) A body with a mass of 20 kg is at rest on a flat horizontal surface. Consider Earth's gravity of 9.8 m/s^2. what is the result?

(FR: resultant force, m: mass, a: acceleration)
(EF=element or fact, PE=permanence, IC=intensity of the physical concept)

FR=m. a EF=(ICx × PE) × (ICy × PE)
FR=20 .9.8 EF=(20 × 1) × (9.8 × 1)
FR=196 N EF=196 N

The resulting force is a new element or fact developed by the actions of mass interacting with acceleration.

6) A spring has an elastic constant whose value is 25 N/m. If we compress it by 20 cm, what is the value of the elastic force obtained?
(fel: elastic force, k: spring elastic constant, x: spring deformation)

(EF=Element or Fact, PE=permanence, IC=intensity of the physical concept)

fel=k. x EF=(ICx × PE) × (ICy × PE)
fel=25. 0.2 EF=(25 × 1) × (0.2 × 1)
fel=5 N EF=5 N

The elastic force is not information contained in parts of the actions of the multiplicative equation, but rather motivated by the elastic constant actions with deformation of the spring resulting in a new reality that elastic force.

Examples of division equations in physics

1) A force of 220 N is applied to an area of 0.04 m^2. Is the pressure exerted on this area equal?
(p: pressure, F: force, A: area) (IEF=information about the element or fact, PE=permanence, IC=intensity of the physical concept)

P=F/A IEF=(PE × ICx)/(PE × ICy)
P=220/0.04 IEF=220/0.04
P=5500 IEF=5500

In this situation, the value of division 5500 provides information about the element or fact of the relationships that resulted in the origin of 5500, the divisor (area) must be less than or equal to the dividend (force) to give the value IEF (pressure)=5500.

2) What is the density in g/cm^3 of a solution with a volume equal to 2 L and a mass of 1000 g:

d=m/v IEF=(PE × ICx)/(PE × ICy)
d=1000g/2000cm^3 IEF=1000/2000
d=0.5 g/cm^3 IEF=0.5

In this context, note that it is possible to obtain knowledge of the intensity of the physical concepts of mass and volume, that is, it is possible to know which is the largest and smallest between mass and volume just by the result IEF(density)=0.5.

Examples that reinforce the existence of EF, IEF and SEF

After observing equations, some multiplication and addition equations, divisions, it is necessary to use other means of observing the undeniable existence of the EF=Element or Fact, IEF=Information of the Element or Fact, and SEF=Selection of the Element or Fact

- $2 \times 5 = X$ of multiplications, the value x must be greater than 2 and 5, with the appearance of new elements or facts being observed. The equation mentioned is $2 \times 5 = 10$. Note: The values in equations 2 and 5 can represent the intensity of specific physical concepts, while the value 10 is the new element or fact.
- $2 \times z=10$, the highlighted z value, as in the previous case, is also a single value, since there are some definitions of the equation that is 2 and 10, so it is necessary to define z as a value of 5 to equate the emergence of the new element or fact EF=10, thus, the equation is expressed $2 \times 5=10$. Note: The values of equation 2 and 5 may represent intensity of specific physical concepts, while, the value 10 is the new element or fact.
- $n \times r=15$, values can take on countless values but are limited and cannot take on any random value. Example: $3 \times 5=15$. Note: Values 3 and 5 presented may represent intensity of the specific physical concept, while value 15 represents development of the new element or fact.
- $20/5=x$, the value x is the information of the element or fact. where if the dividend is greater than the divisor, thus, the quotient is less than the dividend, and if the divisor is greater than the dividend this implies the quotient is less than 1. The fixed values 20 and 5 imply the information of the fact element that is 4 developing an equation $20/5=4$. Note: The values 20 and 5 can represent intensity of the specific physical concept and the value 4 is the information of the element or fact [6].
- $20/x=4$, the value of x can be determined due to the definitions of the value 20 and 4, that is, the equationIt is $20/5=4$, this equation can represent $IEF = (IC \times PE)/(IC \times PE)$.
- $x/5=4$, the value x can be determined by the values 5 and 4. Thus, x is worth 20, making $20/5=4$ and can represent $IEF=(IC \times PE)/(IC \times PE)$.
- $x/y=4$, the value 4 which is the quotient that can represent the IEF=information of the element or fact provides information on the intensity of x and y, that is, which is the smallest and largest of x and y, where x is greater than y of positive numbers, because if y were greater than x, then the quotient appears to be less than 1. The equation $20/5=4$ in which it is possible to represent $IEF = (IC \times PE)/(IC \times PE)$.
- $8-5=z$, selecting element or fact 5 from a total of 8 implies that there are selections of element or fact 5 and z=3, because adding up all selections forms the value 8.
- $8-y=5$, if element or fact 5 was selected among the total of 8, it is correct to say that another selection is 3 since the sum of selections 3 and 5 forms the value 8.

Discussion

Essential fixed values in the equation

The area of a triangle that is 20 cm high and has a base measuring 5 cm is?
(A: area of the triangle. b: measurement of the base. h: measurement of the height relative to the base)

$A=b.h/2$
$A=20.5/2$
$A=50$

In this context, the fixed 2 helps to describe the formation of the triangle, the absence of 2 would not describe the nature of the formation of the triangle, in fact the absence of 2 would describe the nature of another object which is the rectangle, as the rectangle is multiplication of a multiplicand and a resulting multiplier.

Furthermore, even the presence of 2 as a divider, the formula presented may still be able to create a new element or fact, as 2 appears naturally to describe the element or fact, that is, it is a different case before the other cases presented in this article, but there are more cases of fixed numbers within equations in physics and mathematics [7].

Physical concepts in chemistry

In addition to physical concepts, it influences the intensities and existence of physical phenomena, it also influences chemical phenomena, considering the cases of chemical reactions or bonds, where chemical reactions or bonds are influenced by physical concepts such as temperature, position, force and pressure. An example is the formation of water: $2h2+o2 \rightarrow 2h2o$, where gases 2h2

and o2 react due to the conditions of the physical concepts forming a liquid 2h2o, in addition, it is observed that the physical concepts changed from the gaseous state to the liquid state. These occurrences of chemical reactions and bonds are common.
In this way, specific physical concepts imply the element or fact that expresses new physical concepts. +o2→

Equations opened

Based on the general information presented in this article, smooth or non-smooth equations depend on physical concepts, as they are related to the development of physical and chemical phenomena, that is, smooth equations only occur if the conditions of the physical concepts allow it. The study helps to understand cases of equations such as Navier-Stokes and Yang-Mills [8].

The Navier-Stokes equations, as they deal with fluid mechanics, depend on physical concepts to provide physical and chemical phenomena. The Yang-Mills equations also depend on physical concepts as they involve interaction between elements. Furthermore, the open equations should only have fixed values within the equations if necessary describes a specific nature of the element or fact, all this is said because the standard of current existing equations demonstrate how the relationships within the open equations should be (without solution).

Conclusion

Therefore, it is understood that the excess of examples and additional information from some areas of science demonstrates a pattern of occurrence, that is, the study is coherent in stating and explaining the differences between the multiplication, addition, division and subtraction equations. Furthermore, the study is coherent in showing the relationship between physical concepts and the development of elements or facts. The study also shows that fixed values in certain equations are essential to describe the specific nature of the element or fact. Furthermore, the article makes it possible to understand whether equations are open or not.

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