Group Project

Math 151 TTh 3:00-4:40

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Part I:

Addition:

- **Definition-** Combining two numbers together to get a larger number. Joining something to something else to increase size. Put two or more things together to make a larger set.
- **Standard Algorithm-** When adding two numbers using the standard algorithm you must put the numbers on top of each other. The ones, tens, and hundreds place should line up. Start from the left in the ones place, add the top number to the bottom number, if the sum of the two numbers is greater than ten you must carry. If the sum of the two numbers is greater than 10 you must carry. If the sum of the two numbers in the ones place is 12, you put the 2 on the bottom and carry the 1 to the tenths place. You repeat this step for each place value and you will get your answer.
- **Important properties-** Important properties of addition include commutative which is when the sum is the same regardless of the order of addends. For example, 2+6=6+2. Associative property is also a property of addition which is when three or more numbers are added and the sum is the same regardless of the grouping of addends. For example, (4+8) +3=4+ (8+3). Last additive property which states that the sum of any number and zero is always the original number. For example, 5+0=5

Subtraction:

- **Definition-** Taking a smaller number away from a larger number, making a bigger number a smaller number.
- **Standard Algorithm-** Place numbers on top of each other, start from the right, if the top number cannot be subtracted by the bottom number then you must borrow from the next place value that has a number that is not zero. If you have 2-4 you know that you can't do that so you must go to the next place value and mark that number out and take one away from it and the 2 will now become 12. Once you get a number on the top that can have the bottom number subtracted from solve for that place value. Repeat those steps for each place value to get your answer.
- **Important properties-** Distributive property is the only one that will work with subtraction. For example, 5(4-2)=5*4-5*2 ; 5(2)=20-10

Multiplication:

- **Definition-** repeated addition, taking one number and adding it x amount of times, the area of a rectangle a units on one side, b units on the next.
- **Standard Algorithm-** put numbers on top of each other, first multiply the ones places together, write the second digit below the line the carry the first digit to the next line, multiple the bottom number in the ones place by every number in the top number, once you do that go to the next number to the left on the bottom number. Under the sums of the first rounds of numbers put a zero in the first place, Multiply that number by every number on the top. Then add the sums of both numbers together and then you will get your answer.
- **Important properties-** Commutative property which means you will get the same answer no matter what order. For example, 2*5=5*2. Associative property when three or more numbers are multiplied the product is the same regardless of the order. For example, (2*3)*4=2*(3*4). Multiplicative identity property which states that any number multiplied by one is the original number. For example, 5*1=5. Last, distributive property which states that the sum of two numbers times a third number is equal to the sum of each addend times the third number. For example, 4*(6+3)=4*6+4*3

Division-

- **Definition-** How many times a certain number can go into another number. How many collections of *b* objects can make *a* objects. How many objects are in each group if *a* objects are equally separated into *b* groups.
- **Standard Algorithm-** When dividing you set the numbers up smaller number on the outside of the division bar and the bigger on the inside. You then see how many times the number on the outside can go into the first number on the inside. When you get that answer you write that number on the top. You take the number on the outside times the number you wrote on the top and write it below the number on the inside of the division bar.
- **Important properties-** Zero property, any number divided by zero is zero. Zero divided by anything is unidentified.

Part II:

Addition-

- For lunch Stacey's mom packed her &@ (10) slices of apples and E@ (15) grapes. How much fruit does Stacey have altogether?

  The basic principle of addition is to combine two quantities and make them into one. For this problem the quantities we would be combing would be the number of apple slices, and the number of grapes. By combining the two quantities of fruits we are able to figure out the total number of fruits that Stacey has for lunch. In the problem when we add "&@ (10) + E@(15)" We would first need to add the values together that are in the ones place. By combining @ and @ we would simply get the same number which would be @ (zero). Although zero has no real value we would still need to put the number into our answer, because it serves as a place for the ones value place. The next step would be to add the numbers in the tenths place, which would be & + E. By combing the two we get the answer !@ (5). Since we can't have a number bigger than 4 (#) in our basic notation at this point, we must use the @ as a place holder again in the tenths place, and carry a ! over to the hundredths place. When we look at the number as a whole it reads !@@. This means there are zero quantities in the ones (value of 1 each) and tenths place (value of 5 each) and 1 quantity in the hundredths place (value of 25 each). Therefor when we look for our answer we can see that it is twenty-five because the only numerical value we have is the one 25. Because of this our answer to the question would be that, Stacey has 25 pieces of fruit.

Subtraction-

- There are !@@ (25) students in a classroom. #(4) leave to go to the restroom. How many students are left in the classroom?

  The basic principle of subtraction is to take away a smaller number from a larger number to figure out how much of a quantity is left. By doing this we are able to remove any amount of quantities we wish and still have an answer of how many are actually left. Like in addition we must start our problem in the ones place. Initially we have @-#. Since # is bigger than @ we are not able to do this part of the problem unless we borrow from another number. You must borrow anytime the number you are taking away is bigger than the number you are taking it away from. First we check the tenths place to see if there is anything we can borrow there. As we see it is also @ so we are unable to borrow from there as well. Then we move to the tenths place which has !. This means we can borrow from this number. However, we can not just jump back to the ones place, we must distribute a quantity to each place value we have passed as well. This means we will give the tenths place a # (giving 20) and then the ones place will be given !@ (5). We can then take # away from !@ resulting in ! left over. Then we can move to the tenths place which has # which is equal to twenty units. Our answer should read #!, which would translate to 21. Thus the answer to our word problem would be that, there are 21 students left in the classroom.

Multiplication-

- In a classroom there are five (!@) tables. 4 (#) children sit at each table. How many students are in the classroom?

  Although at first multiplication seems to be a lot harder than the other forms we have learned, it is nothing more than repeated addition. By this we mean that you are simply adding five, four times. Thus your answer would be twenty. But to have a better understating we must use our place values and manipulatives. Like every problem we will start in the ones place. !@ will be on the top and # will be on the bottom. Our first item to solve is "# x @" One very important rule of multiplication is that anything times @ (zero) is also @. This is because zero groups of anything is simply zero. Just like in addition and subtraction the zero will be used as a placeholder in the ones place. We then multiple "# X !" another important rule of multiplication is that any number times one is itself. This is because adding one group of any number will result in the same number. Because of this our answer to "# X !" is #. Now our answer reads #@. This means we have four values in the tenths (worth 5 each) and zero in the ones place (worth one each." Thus our answer would be twenty. Our answer the question would be that, there are 20 students in the classroom.

Division-

- There are 24 (##) students in a class. The students need to be divided into groups of two (&) for a field trip. How many students will be in each group?

Like multiplication, division can seem like a hard concept to understand at first. But in a simple term division is simply how many times one number can go into another, or even simpler how many collections of *b* objects can make *a* objects. In our problem listed above we need to figure out how many groups of two (&) will go into 24 (##). Unlike the rest to the problems we have done, in division you don't start in the ones place, but rather in the highest place value you have, which for us would be the tenths (worth 5 each). Therefore the first thing we need to do is see how many times & can go into #. From multiplication or simple repeated addition we know that & can go into # & times. Our first number in our answer (which is in the tenths place) will be &. We then move the ones place (worth one each) and figure out how many times & can go into #. We know from the prior problem the answer is &. This & will go in the ones place, thus our answer would read &&. We know that the tenths place is worth five each and the ones is worth one each. So by simply adding five twice we can 10 and then adding one twice get two. Thus our answer would be twelve. The answer to our above question would be that, there would need to be 12 students in each group.

Part III:

1. Perform the following addition problem using manipulatives. Explain all exchanges.

E ! E
+& @ !

2.Perform the following subtraction problem using manipulative. Explain all exchanges.

E ! &
+# # E

3. Perform the following multiplication problem using manipulatives. Explain all exchanges.

E @ !
x # ! E

4. Perform the following long division problem using manipulatives. Explain all exchanges.

! @ # / &&@!

5. Perform the following addition problem via the standard algorithm. Explain how each step corresponds to a manipulation of manipulatives.

E @ !
–! # E

6. Perform the following subtraction problem via the standard algorithm. Explain how each step corresponds to a manipulation of manipulatives.

E ! &
-# # E

7. Perform the following multiplication problem via the standard algorithm. Explain how each step corresponds to a manipulation of manipulatives.

& & ! E
x& !

8. Perform the following long division problem via the standard algorithm. Explain how each step corresponds to a manipulation of manipulatives.

E @ &
×# ! E

9. Give a single picture that illustrates 6 groups of 3 and 3 groups of 6. Explain this picture's relationship to properties of multiplication.

10. What does it mean to say that multiplication distributes over addition. State one of the definitions of multiplications and use this definition to explain why multiplication distributes over addition.