MATH 151
Group Project
2-26-15

Part I

Addition

Definition:

Calculating the total of two or more objects or amounts.

Combining separate units together to the equal one-to-one correspondence.

The process of combining the total of 2 or more amounts resulting in the total number of all amounts or objects.

The sum of two numbers is the combined total number of objects from putting together two collections of objects.

Standard Algorithm:

To solve an addition problem using the standard algorithm, you start by lining up the numbers one on top of the other. Begin adding from right to left. Add the common place values. When adding, if the number is bigger than 9, then you must carry it over into the next highest place value. This algorithm gives yields the correct answer because by lining up the numbers one on top of the other and moving from right to left, it allows you to properly move through all the place values until there aren't anymore and the problem is solved.

Important Properties:

Addition is commutative. Changing the order of the numbers in the addition problem still yields that same correct answer.

The associative property of addition allows the order of the additions to be changed and still receive the same answer.

The Additive Identity applies to subtraction as you can add zero to any number and yield that number.

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Subtraction

Definition:

Regrouping

Repairing groups of objects

The process of finding the difference between two quantities

Standard Algorithm:

To solve a subtraction problem using the standard algorithm, you line the numbers up one on top of the other as you would with the standard algorithm for addition. Begin from right left and being subtracting from top to bottom. If you are trying to subtract a bigger number from a smaller number, you must borrow from the next highest place value that has a number big enough to borrow from. This algorithm yields the correct answer because moving through the different place values allows you to borrow when necessary so that you end up with the correct answer.

Important Properties:

The identity property of subtraction means subtracting zero from any number does not change the answer.

The equality property of subtraction states that if two numbers are equal and you subtract the same number from both sides of an equation then the equation is correct.

Multiplication

Definition:

Concise notation for repeated addition.

axb is the number of elements in a groups of b

axb is the area of a rectangle a units on one side and b units on the next

Standard Algorithm:

To solve a multiplication problem using the standard algorithm, you line up the numbers of the problem like you would with addition or subtraction. Begin on the right side with the ones place

and multiply that by all the other place values present. Make sure to add the numbers that got carried from another place value. After multiplying everything by the number in the ones place value, move on to the 10s place and multiply everything by that. In order to move to the next place value you must put a 0 in the place values before it to get the correct answer. Once you have correctly multiplied through all the place values, add everything up and that is your answer. This algorithm yields that correct answer because by placing zeros in the place of the place value you are no longer multiplying by, you move to the next place value. Without placing zeros in the place values that have already been multiplied by and then adding everything together, the algorithm would not yield the correct answer.

Important Properties:

Multiplication is commutative, therefore axb = bxa

Multiplication distributes over addition (Distributive Property)

ax(b+c) = (axb) + (axc)

Any number multiplied by one is that number. This is known as the Identity Property.

Any number multiplied by zero is zero. This is the Zero Product Property

The associative property applies to multiplication meaning you can group the numbers in any way you choose.

Division

Definition:

Take a and group it into sets of b with all groups having the same amount

The number of collections of b objects make a objects

The number of objects in each group if a objects are equally separated into b objects.

Standard Algorithm:

To solve a division problem using the standard algorithm, begin from the left and move to the right of the dividend. As you move from left to right, subtract the largest multiple of the divisor from the number you are trying to divide. The multiples are the numbers that will make up the answer. Once you have subtracted everything, the final difference is the remainder if the number cannot be evenly divided. This algorithm yields the correct answer because by starting on the left

side and moving to the right, you are able to divide the number is each place value, then subtract that answer to be able to move to the next place value.

Important Properties:

Knowing the difference between the dividend and the divisor to get the correct answer.

Division is not a commutative property. This meaning that the order of the numbers does alter your answer.

You cannot divide by zero.

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PART II

Addition

"William and Alice are trying to go to a movie, William knows that there are five movies already out in the theaters, and Alice knows that there are three more coming out today. How many movies do they have to choose from?"

Explanation: to solve this problem, the student would have to combine the number of movies already out to the number of the movies that are coming out. Addition is combining to quantities of units together to create one quantity. The student would take 5 and add 3 to get the total movies in theaters.

Subtraction

"Alice went to the library with her two friends, Amy and Julia. They looked at the computers and saw that over half of them were taken. There are ten computers open with six people sitting at them. With the number of people already sitting at some of the computers was there room for her and her two friends?"

Explanation: Subtraction would be used in this story. The student would have to take away the number of students at the computers from the number of total computers to get the number of available computers. Subtraction is taking a quantity of units away from a greater quantity of units. For this problem, the student would take 6 away from 10. Giving then 4; more than enough room for Alice and her two friends.

Multiplication

"Alice worked at the library and her boss asked her to find out the number of people sitting at the computers. A class was using the computers at the time and the students were working in groups of three. There are 8 computers total in the library which had one group at each. How many people did Alice report back to her boss?"

Explanation: Multiplication is used in this story. There are a number of groups with a certain number of items in each group. Alice would have to use the number of the computers and the number of the people in each group and use multiplication to find the result. The multiplication algorithm is to add a number to its self a certain number of times. Which means Alice would add 3 to its self 8 times.

Division

Henry was eating a bag of M&Ms, he only liked the red ones and was wondering how many red M&Ms he would be able to eat. He read the serving size on the back and it stated there were 60 pieces of candy, dispersed into 5 colors. Considering each flavor has the same amount of candies per package, how many red candies will Henry eat?

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Explanation: Division is when a person finds how many times a number of a specific quantity is in a larger quantity. Henry would have to see how many groups of 5 go into 60. The answer is 12.

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PART III

1. Solve and give a clear explanation of how to solve ## x & by using the understanding of multiplication as the area formula L x W = A.

2. Using the standard algorithm of addition, solve the problem below and discuss in detail why AND how the carrying process works as you progress through the problem.

   & E ! + # E # = _____

3. Solve !&! x &#! Using the expanded form of multiplication we went over in class. (This is format using the stars and star squared)

4. Draw out this problem in terms of manipulatives, showing your work and the final answer.

   #@!

   + !&&

5. Sally leaves her house to walk to school with && cookies that her mom made for her to share with friends. On the way to school Sally eats ! cookie and gives & to the mailman. While she is at school that day four of her friends each eat ! cookie, and two of her friends eat & cookies each. If Sally's mom drops off & x E extra cookies for Sally's Teacher and Sally plans to give the rest of the cookies that she didn't eat or give away throughout the day to her teacher, how many cookies will her teacher be given.

   Solve this word problem via the standard algorithms showing all your work and labeling each step with what was happening in the story.

6. Dan is filling up party bags with pieces of chocolate. He has #!@& pieces of chocolate and each bag is to contain E number of pieces. How many bags can Dan make for the party and how many pieces of chocolate will he have left over?

   Solve using the standard algorithm for division.

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7. #!@&& ÷ & =_____ Solve this problem in the one handed arithmetic system by illustrating the with manipulatives.

8. Explain in detail how the process of barrowing in the standard algorithm of subtraction does not change the value of the original number you began with.

9. Show/describe, though a worked and illustrated example (manipulatives), how multiplication is a commutative operation.

10. Use the given sets to complete the problems below

    A= {2, 4, 6, 8, 10, 12, 14, 16, 18}
    B= {x | x is prime}
    C= {x | x is odd}
    D= {x | x ≠ 4, 6, 12, 11}
    E= {1, 2, 3, 4, 5, 6}

    a.) B U E
    b.) B ∩ A
    c.) D ∩ E
    d.) (A U E) ∩ D