What We Mean by Enrichment Math Classes at SchoolPlus

We offer challenging **enrichmen**t math classes for students of all ages, capacities and interests. Our students have a wide variety of classes of all levels to choose from including classes to support their school Math class, classes to help them prepare for the SAT and other important exams, and classes for students who seek the challenge of Olympiad type math problems, which aren't often covered in school.

The popular notion of "enrichment," when associated with Mathematics, is that of an accelerated program, in which a vast breadth of material is covered at a faster pace than it usually would be, and only by students who can keep this pace. Perhaps one might also expect that a few "extra" topics will be added to the curriculum for this particular group of students.

But if we consider what the term "enrichment" actually means, we'll be struck with the realization that "enrichment" does not mean speeding through the material and leaving it in the rear view mirror as quickly as possible, and it doesn't mean that we just tack on a few "extra" topics, in the hopes of maintaining interest.

And we'll see that most importantly, enrichment is open to *all* students. So what does this word, "enrichment" mean?

"**Enrichment**" means to make something, in this case mathematics, more meaningful, substantial and rewarding. It means to make **improvements,** augmentation and fortification of a students' **mathematical education.**

By this definition, enrichment should be something that permeates a students' entire learning experience. Why should one wish to "improve, augment or fortify" one part of the curriculum, but not the complete program? Why should we not wish to make the entire experience more substantial meaningful?

In other words, "enrichment" can really be considered a *way* of learning, an *approach* to learning. And how is that achieved?

We believe that real learning and real enrichment comes when students study topics with rigor, and spending enough time to achieve real **depth** – real **understanding** – of the topic.

Achieving this understanding allows students to work with the mathematics from all angles and perspectives, not just do routine, rote problems. Having this **depth** is what gives students both the capacity and confidence to do well on any test they will face. In particular, he new **Common Core standards** require students to have a **deeper knowledge** of the standard Middle School Math Curriculum

At SchoolPlus, we believe that *all* students are entitled to such **enrichment**, and not as is commonly thought, just the students who are "**math enthusiasts**," or have a special propensity for Mathematics.

Teachers at SchoolPlus are highly educated and have taught for many years. We are confident in giving them the freedom to create classes that are uniquely designed for our students' capacities, needs and interests, while at the same time giving due diligence to the school curriculum.

We know it's crucial for kids to master the required school **Common Core Math Curriculum.** We have many years of experience to attest to the fact that the necessary material can be covered, with no sacrifice **of rigor** and **depth.**

We use the Singapore Math books in our Math classes. They use a "spiral" approach, meaning that at the same time new material is being presented, the old material is spiraled back upon, for repetition and deepening.

There's nothing like a few good examples to show what math enrichment means.

1. In 3rd grade children are mastering simple multiplication and division problems.

" 57 divided by 4 is 14 Remainder 1. 57 divided by 5 is 11 Remainder 2. 57 divided by 6 is 9 Remainder 3." All correct – well and good.

But what happens when the question is this?: "What is the smallest number that gives a remainder of 1 when it is divided by 4, a remainder of 2 when it is divided by 5 and a remainder of 3 when it is divided by 6?"

To do this children must have a perfect understanding of what it means to have a Remainder. Knowing that is the "left-over part" won't be enough to do this one. They must see that it is "left over" **after we have divided by the highest <u>multiple</u> of the divisor that we can fit into the dividend**, and then we might have something left over. It's crucial to start looking for multiples in this problem.

Taking the needed time to understand relationships like this will make it easier for a child to approach a problem this one.

2. 2nd and 3rd grade is also when kids begin learning about 3- digit and 4-digit numbers.

" 1,000 + 999 = 1,999. 2001 + 1 = 2002. What number is 1 more than 999? It is 1,000." Kids are doing it perfectly.

But look at this problem: "Two whole numbers differ by 1. If one number has 3 digits and the other has 4 digits, what is their sum?"

The numbers differ by 1. We go from the largest 3-digit number to the smallest 4-digit number.   So, we go from 999 to 1,000. The sum is 1,000 + 999 = 1,999.

If asked to add 1,000 + 999, most kids will get it right. But this problem requires real understanding of how the number system is built up, from hundreds to thousands in this case. Unless that has been developed slowly and carefully, most kids will shut down on a problem like this.

3. Moving into 4th and 5th grade, kids are now learning 2-digit multiplications.

1. Multiply 63 x 59. "9 x 3 is 27. I put down the 7 and carry the 2. 9 x 6 is 54 then plus 2 gives 56." And right through to the answer o 3,717. Learning the long multiplication algorithm takes time, even when problems are straight - forward like this one.

What about this problem?:   A field has an area of 3,717 square feet. What are its dimensions?

a) 77 ft. by 51 ft   b) 84 ft. by 39 ft.   c) 46 ft. by 78 ft.

Each of the choices gives a fairly good estimate, if the student realizes this is a useful approach. Most students will diligently begin multiplying out each possibility.

The problem can be immediately solved, however, by noticing that the one's digit of this area is 7. The only way to get the 7, is to pick choice a)

An understanding of how each place value is built up in a multiplication problem, he will know that the one's place can be determined very simply, and for this problem, it's all we need.

4. Fractions are the core of elementary school arithmetic and much time is spent learning the basic operations.

Which is the largest fraction in this list? 3/4, 2/5,   7/10,

Students know that they must find that common denominator, and express each of the fractions using that denominator in order to compare them. After some time on this topic, most students correctly determine that 3/4 is the largest fraction. Very good!!

Now consider this problem: Suppose that X and Y are 2 different numbers from 1 to 50 inclusive. What numbers should you choose for X and for Y, in order to make the largest possible value of the fraction X + Y/X – Y?   X and Y must be the same in both numerator and denominator.

   Unless the student understands *perfectly* that the numerator needs to be as big as we can get it, while the denominator needs to be as small as we can get it, he will likely spend a lot of time, trying random combinations.

   Again, understanding like this takes much time to develop. Fraction enrichment!!

5.   In 5th and 6th grades kids spend time on fractions, percentages and ratios.

 " 3: 4 is the same as the fraction 3/4. 4 : 3 means we have the fraction 4/3. If I take 10% of the number it means I'm taking 1/10.   10% of $40 is $4. The student has it all down correctly.

But now try these: "If A is 5% more than B, it must mean that B is 5% less than A." If the price of a coat goes up by 20% and then that price goes down by 20%, then there has been no change in the price of a coat." And, one of our favorites, "A number increases by 100%, and the new number is 100. What was the original number?"

Without deep understanding of ratio and percentage, it's almost certain that most kids will get problems like these wrong.

    There is an abundance of examples like these.

   At SchoolPlus we believe that students are happier when they have real understanding, and not just a superficial mastery of lots of material.

   The student looking to perform better on tests will almost surely do so; the math enthusiast will find delight in learning deeply. And any student will have real pride when he knows that he really *knows* his material

   We hope you'll join us here at SchoolPlus for Math enrichment in the true sense of the word!!!

Mary Marvin,
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