

# ABC Take-Off Courses 2008-2009

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## Mathematics: More Than Numbers

Under its regimented, rule-governed façade, mathematics holds a world of unsolved mysteries, elegant solutions and incredible beauty. Explore its hidden marvels – see math's role in art, in discovery, in revealing or concealing what we know, and discover a world that's so much more than numbers. This course will introduce students to unusual and interesting topics from the realm of mathematics such as counting systems, cryptography, creative solutions and ancient discoveries.

**Week 1: Introduction and Quirky Problems.** Students will be given a few interesting problems with unusual and interesting solutions to gauge their levels and fields of interest. Students will also be given a quirky problem that they'll get a special prize for solving by the end of the course.

**Week 2: Ancient Discoveries.** We will discuss several important discoveries in mathematics, such as the first accurate estimation of the circumference of the Earth, the Golden Ratio and the Fibonacci series which is found in nature. Students will be able to measure and find the Golden ratio in the human body and in pictures of animals, plants and buildings.

**Week 3: Numeral Systems 1.** Students will be introduced to numeral systems with the evolution of counting and representing numbers. We will talk about symbolic numeric systems (where each symbol always stands for a particular number) including the Egyptian and Roman systems. We will also solve Roman numeral puzzles using plastic sticks

**Week 4: Numeral Systems 2.** We will continue our discussion of numeral systems by introducing positional systems (like the decimal and binary systems), and also talk about the Mayan system. Students will see how position affects the value of a digit in numeric systems of different bases

**Week 5: Cryptography.** We will talk about the use of mathematics in making and breaking codes, cover some basic codes and ways to break them, and talk about prime numbers as keys to modern ciphers. Students will have a chance to make their own ciphers and talk about how secure they are.

**Week 6: Fermi Problems.** In the final week, we will discuss the power of common sense and estimation by doing several problems using the method of Italian physicist Enrico Fermi. Students will estimate things like how many pop cans can fit in the classroom, and how much recycling Canadians generate in a year. This will demonstrate that sometimes an exact answer is almost impossible to get, and also not necessary.

# Take the Stage: A Crash Course in Drama

The road from the first spark of inspiration to the standing ovation is a long and fascinating one. This course will engage students in games and group activities while covering acting basics such as voice, movement and stage presence, characterization and text reading. They will also learn about the process of putting on a production and create short scenes of their own.

**Week 1: Introduction.** We will play some basic warm-up games to learn each other's names, and several games to challenge students to think on their feet and be creative. Then, students will be assigned to prepare a very short presentation for the following class - it could be a joke, a poem, or anything else. This will show them what it is like to present something before an audience.

**Week 2: Acting Basics.** We will start the class by playing a quick warm-up game and seeing the presentations. Then, we will talk about the basic ideas of the stage - to be understood (voice, volume, position on stage), to assume the part of a character, and to take the audience along with you on the journey of the story.

**Week 3: Characters.** In the third week, students will explore getting into a character's shoes through various characterisation games where they'll have to guess others' characters and create ones of their own. They will also prepare brief scenes of neutral dialogue (so-called skeleton scenes) using a character of their choice. They will learn what makes a character believable to the audience.

**Week 4: Story.** After a creative game, students will be told that theatre is about telling stories and introduced to the main elements of a story - beginning, middle and end, buildup and climax, and conflict. In groups of two or three, they will have to come up with stories that they find engaging that have these elements in them. This story will form the basis for their final scene.

**Week 5: Rehearsal.** The class will start with some vocal warm-ups and games. Then we will briefly talk about the finishing touches of a scene such as props and costume. Then, students will have a chance to write their scripts and rehearse them.

**Week 6: Performance.** In the final class, students will present the scenes they have devised, with hints of props and costume. Then, they will receive constructive feedback from their peers as well as the instructor, and will engage in a few closing games.

## Ancient civilizations

How did humanity's first societies originate? What made them what they were? What aspects of our daily life did we inherit from them? This course will cover the dawn of civilization, from the valleys of the Nile and the Tigris, through the waves of the Aegean and the plains of China to the heart of the Italian peninsula – the rise of empires, the lives of their heroes and the reasons for their downfall. In our exploration will draw on sources from history, archaeology, mythology and literature.

## Methods and Mysteries of Mathematics

This course will explore several fundamental topics and unconventional problem-solving techniques that have multiple applications in the realm of mathematics. It will introduce students to the Pigeonhole principle, divisibility criteria and factorisation, games and game strategies, numeral systems and logical proof methods. This course is for students who would like a new perspective on math and problem solving.

## Foundations of Computer Programming

As computers become faster and more powerful, it is hard to imagine that under the hood, all computer programs can be understood using a set of universal, simple concepts. This course will introduce students to the rudiments of programming, manipulating and storing variables and performing operations on them. Using a free, easy to learn programming language the students can play with at home, they will write code that solves problems, interacts with the user, and builds to more complex applications and games. The course will also prepare students to study other programming languages and concepts, and to get creative writing their own programs.

## Strategy Game Creation

Are you a fan of playing strategy games? What about creating them? In this course we will start with a simple map of the Mediterranean, dotted with historical cities, and build a multiplayer strategy board game around it – you will work in teams to decide the rules of movement over land and sea, test different battle and trade mechanisms, set the types of resources used in the game and create technical trees, expansions and mission objectives. Finally, you will have a chance to play the game you've created with everyone in the group, and to keep a full playable copy of it.