

ACES MATH: Mental Mathematics (I)

Course Description

This is the first part of a two-semester course on mathematics before prealgebra. There are three main components in this course. The first component is to introduce fundamental laws of arithmetics of integers, including for instance rules for mixed operations. The second component is to introduce fundamental skills, based on the laws of algebra, in fast calculation. The third component is to introduce some fundamental concepts in number theory, such as quotient, remainder, least common multiple and greatest common factor etc, that will be useful in a pre-algebra class. The main objective for the students is to build a solid foundation on arithmetics of multi-digit integers.

Prerequisite. Students taking this course should be already familiar with arithmetics of two-digit positive integers. A placement test is required in general.

Textbooks. This course is mostly based on a set of lecture notes we developed in ACES. No textbook is required.

Main Topics. The main topics of this course include: review of arithmetic operations, rules of mixed operations, the use of various versions of distributive laws for fast calculation, fundamental concepts in number theory, and concepts on fractions and mixed numbers.

Philosophy. Learning mathematics is very similar to learning to play piano: you can not learn anything unless you practice a lot, and if you practice a lot you will be good at it. There is no other secret here. Therefore, we will have a large (but still reasonable) amount of homework for the students after each lecture.

Communications. Students and their parents are encouraged to communicate with the instructor on issues directly related to the course, through the email address aces.math.info@gmail.com; For other issues related to the ACES after school program, please email aces4kidsinfo@gmail.com .

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Lecture Plan

There are 24 lectures spread in 12 weeks. Here is a rough plan for the lectures. There might be minor changes on the plan based on students' feedback. Those changes will be announced in class.

- Lecture # 01: Review of addition and subtraction;
- Lecture # 02: Review of multiplication and division;
- Lecture # 03: Rules of mixed operations I;
- Lecture # 04: Rules of mixed operations II;
- Lecture # 05: Rules of mixed operations III;
- Lecture # 06: Distributive law and its applications I;
- Lecture # 07: Distributive law and its applications II;
- Lecture # 08: Distributive law and its applications III;
- Lecture # 09: Introduction to negative numbers;
- Lecture # 10: Addition and subtraction of negative numbers;
- Lecture # 11: Multiplication and division of negative numbers;
- Lecture # 12: Mixed operations with negative numbers;
- Lecture # 13: Arithmetics of multiple-digit integers I;
- Lecture # 14: Arithmetics of multiple-digit integers II;
- Lecture # 15: Arithmetics of multiple-digit integers III;
- Lecture # 16: Concepts in number theory I;
- Lecture # 17: Concepts in number theory II;
- Lecture # 18: Fractions and mixed numbers I;
- Lecture # 19: Fractions and mixed numbers II;
- Lecture # 20: Fractions and mixed numbers III;
- Lecture # 21: Fractions and mixed numbers IV;
- Lecture # 22: Mixed operations of integers and fractions I;
- Lecture # 23: Mixed operations of integers and fractions II;
- Lecture # 24: **Final Exam**;