

I-EMC Syllabus JUNIOR

Subject	Topic	Subtopic	Explanation
Algebra	Set	Set builder notation	Reading and writing set builder notation
		Set operation	Forming the intersection, union, difference, and complement of sets
		Venn diagram	Making inference from Venn diagram
	Function and its graph	Mapping / arrow diagram	Reading and writing an arrow diagram for a function between finite sets
		Linear and quadratic function	Evaluating $f(x)$ when f is linear/quadratic, its graphs (intercept, intersection)
	Equation	System of linear equations	Setting up and/or solving a system by elimination and substitution
		Quadratic equation	Solution by factoring, completing the square, or abc-formula
	Inequality	Solution set of inequalities	Finding the solution set to an inequality or a system of inequalities
		Extreme values	Finding maximum and/or minimum under certain condition
		Sign	Positive times positive is positive, etc. Square is never negative
Sequence and series	Arithmetic and geometric sequence	Finding a particular term or the general term	
	Arithmetic and geometric series	Summing up a finite sequence	
Number Theory	Divisibility of integers	Special divisibility condition	Divisibility by 2, 3, 4, 5, 8, 9, 10, 11
		Parity	Odd or even
		Divisor	Finding the divisors, their number, and their sum
		Prime number	Using the properties of prime numbers
		Prime factorization	Using the existence and uniqueness property of prime factorization
	Division with remainders	GCD and LCM	Finding the gcd and lcm by factorization or other methods
		Quotient and remainder	Finding the quotient and remainder
	Digits	Digit expansion	Expressing $ab=10a+b$, $abc=100a+10b+c$, and so on
Digit sum		Finding the sum of digits	
Combinatorics	Permutation	Permutation of different objects	Identifying which objects are permuted, and using the $n!$ formula
		Permutation with repetition	Permuting identical objects
		Permutation with grouping	Permuting groups and the objects within groups
		Circular permutation	Round table (rotational symmetry), necklace (rotation + reflection)
	Combination	Subset	Choosing members of a set to form one or several subsets
	Pigeonhole	Set pigeonhole	Choosing enough members of several sets
	Probability	Coins	Repeated coin tossing. Unfair coin
		Dice	Repeated die tossing. Unfair die
		Cards	Standard deck of 52 cards
	Statistics	Centrality measure	Mean / average, median, and mode
Chart		Making inference from pie chart, bar diagram, etc	
Geometry	Triangle	Sum of angles in a triangle	Using the fact that the sum of angles in a triangle is 180 degrees
		Right triangle	Pythagorean theorem
		Similarity and congruency	AA, SAS, and SSS condition. Ratio of corresponding sides
	Quadrilateral	Area	Base times height over two. Heron formula
		Square and rectangle	Basic properties of square and rectangle. The use of Pythagorean theorem
		Parallelogram	Opposite angles equal. Opposite sides equal
		Trapezoid	Superimposing a parallelogram or square on a trapezoid
		Area	Base times height
	Circle	Angles on a circle	Central angle and arc measure
		Area and circumference	Formulas for a circle
Chord and cut of a circle		Finding the length of chord, the area of sector, etc	