

Glossary of terms and subject areas for study.

Mathematical subjects for future competitions

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Geometry:

1. Definitions of points, lines, area, volume, 2-D objects, 3-D objects.
2. Definitions of simple 2-D objects: Various triangles.
3. Definitions of simple 2-D objects: Various quadrilateral.
4. Definitions of other 2-D objects: Regular polygons, convex polygons, other.
5. Definitions of relationships between lines and 2-D objects: Diagonals, angles (acute, obtuse, right), parallel, perpendicular, tangent, etc...
6. Definitions related to circles: centre, radius, diameter, circumference, chord, arc, angles, segment, sector, other sub regions, etc...
7. Definitions related to polygons: angles, perimeter, area, sub regions, etc...
8. Relationships between polygons and circles: cyclic, circumscribed, tangential, etc...
9. Similar and congruent objects.
10. Pythagorean triangles.
11. More about triangles: bisectors, heights, specific shapes, etc...
12. More about quadrilaterals: square, rectangle, rhombus, trapezoid, parallelogram, other special shapes.
13. Division of certain shapes into a collection of other shapes, either similar or with certain trait.
14. Sequence of shapes inscribed in other shapes.
15. Lines and points in X-Y coordinate systems.
16. Manipulation of points on a grid: distances, number, intersections, etc...
17. Basic 3-D figures: prism, pyramid, cone, parts of boxes, spheres, etc...
18. Relationship in various bodies between volume surface area, sides, etc...
19. Effects on the traits of shapes and bodies by increasing and/or decreasing of sides, area, shape, or volume.

Basic manipulations of numbers:

20. Definitions of integers, fractions, decimal, rational and non rational numbers.
21. Definitions of primes, odd, even, divisors, multiple.
22. Definitions of factors. Sum, difference, quotient, absolute, and remainder.
23. Estimation and rounding.
24. Arithmetic, geometric and other sequences and series.
25. Common multiples and divisors.
26. Manipulation of decimal numbers and decimal representation of fractions and other numbers.
27. Percentage.
28. Factoring, number of factors, relation of factors, smallest and largest factors sum of factors, etc...
29. Manipulations of collection of numbers: primes, max, min, median, average, etc...
30. Digit sum, digit multiply, etc...
31. Manipulation and collection of certain numbers.
32. Powers and their decimal expansion.

33. Binary and other representations of numbers.

Functions and equations:

34. Value of polynomials.

35. Simplification of polynomials.

36. Factorization of polynomials.

37. Linear equations with 2-3 unknowns.

38. Simple quadratic equation with one unknown.

39. Simple exponents.

40. Simplification.

41. Definition and manipulation of functions $f(N)$ or $f(x)$.

42. Definition of generalized operations between numbers or elements.

Probability and combinations

43. Dice: sums, probability, conditional issues.

44. Probability of drawing items from a collection.

45. Unions and intersections of groups and conditional probabilities.

46. Probability of winning certain games, and expected payout.

47. Permutations along lines and circles.

Arithmetic operations:

48. Conversions between decimal, percent, and ratio.

49. Squares, square roots, powers, conversion, etc...

50. Conversions between infinite decimals expansions and fractions.

Sets and subsets:

51. Sets and subsets and ordering certain objects (letters for example).

52. Division of various items to a group.

53. Selection of subgroups from a larger group using certain criteria.

Problems involving time:

54. Portions of whole, rates, and times.

55. Speed distance, time, accelerate – one or more variables.

56. Clock, days, hours, minutes, and seconds.

57. Manipulation of ages.

Problems involving units:

58. Dimension, size of objects, scaling and conversion of units.

59. Distance achieved through constant speed and acceleration rates.

60. Rate of flow through pipes, and cross sections.

Problems involving money:

61. Money: sums, unit prices, change, denominations, misc...

62. Number of coins of various denominations.

63. Advanced monetary issues: interest, variable prices, profit, exchange rates, etc...

Other types of word problems:

64. Weighted averages.

65. Integer solutions of certain problems (students, etc...) based on given some auxiliary information.

66. Word problems with 2-4 unknowns, with linear or integer solutions.

67. Counting of digits, paths, shapes, certain numbers, etc...

68. City with certain street structure: distances, number of ways to get between locations, etc...

Flow charts:

69. Flow charts based on arithmetic definitions of terms in sequences.

70. Flow charts based on probability.

71. Flow charts based on logic.