

Algebra

The following is tuition requirement in junior secondary algebra.

1, Children should understand the meaning of rational numbers and real numbers, should understand how to calculate rational numbers, and could utilize calculations. Children should understand the meaning of tables such as square, cubic, square root, cubic root, should understand how to use calculator instead of these tables.

2, Children should understand the concepts of algebraic expressions, polynomial, fractional expression, and square root, should understand property of it, and could calculate and factorize it.

3, Children should know the concept of equation and simultaneous equations. Children should understand how to solve linear equation with one unknown, linear equation with two unknown, quadratic equation with one unknown and simultaneous equation, to learn how to solve fractional expression, quadratic equation with two unknown, to understand meaning of discriminant of quadratic equation with one unknown. Children should be able to solve applied problems making use of simultaneous equation according to relationship two equations.

Children should understand the concept of linear inequality with one unknown, simultaneous linear inequalities, be able to solve linear inequality with one unknown, simultaneous linear inequalities, be able to draw graph on the coordinate plane.

4, Children should understand the concept and property of plane coordinates, function, linear equation, fractional function, and quadratic equation, could draw the graph of linear equation, fractional function, quadratic equation.

5, Children should understand the meaning of statistics, understand common method of mathematics, could solve simple actual problems by using the knowledge of elementary statistics.

6, Children should learn mathematical way of thinking such as removing variable, reducing degree, perfect square, substitution method, should work out appropriate mathematical problems, should understand basic mathematical way of thinking such as transformation "Particular -> General -> Particular", "Unknown -> Known", expression by variable, combination of algebraic and geometrical way of thinking.

7, through the transformation of algebraic expressions, equations and inequalities, or significant formulas, Children should acquire logical reasoning by using concepts, rules, and properties of mathematics.

8, Children should understand the concept of dialectic and function such as known and unknown, particular and general, positive and negative, equality and inequality, constant and variable. Children should know the aspect of transformation appearing in the process of the solving problems equations. At the same instant, Children should get philosophies of socialism through the mathematics history and achievement of socialism.

The following is the contents and concrete tuition requirement

(A) Rational numbers

1, Concept of rational numbers

Rational numbers, number line, opposite numbers, absolute value, comparing the size of rational numbers.

Concrete requirement:

(1) To understand the meaning of rational numbers, to be able to express the opposite quantity by using positive and negative numbers, to be able to categorize rational numbers according to requirement

(2) To understand the meaning of number line, opposite numbers and absolute value, to understand how to draw number line, to be able to express positive numbers and negative numbers on the number line, to be able to find value of opposite number of rational numbers, and absolute value of rational numbers.

(3) To understand how to compare the size of rational numbers, to be able to express two or more rational numbers by using inequality sign.

2, Computation of rational numbers

Addition and subtraction of rational numbers, multiplication and division of rational numbers, reciprocal, power of rational numbers,

Four operations of rational numbers, scientific notation, approximate value and significant values, table of square and cube.

(1) To understand the significance of addition, subtraction, multiplication, division and power of rational numbers, to understand the meaning of calculation method of rational numbers and four operations, to be able to simplify calculation by making use of mathematics principle.

(2) To understand meaning of reciprocal, to be able to find reciprocal of rational numbers

(3) To understand the meaning of scientific notation of rational numbers which is more than ten.

(4) To understand concept of approximate value and significant digit, to be able to find approximate value by rounding off significant value. To know how to use the table of square and cube.

(5) To understand addition and subtraction of rational numbers, to understand cross relationship between multiplication and division.

(B) Addition and subtraction of polynomial

Algebraic equation, the value of algebraic equation, polynomial, monomial, collecting like terms. Expression with parenthesis and without parenthesis, multiplication of numbers and polynomials, addition and subtraction of polynomials.

Concrete requirement:

(1) To know how to express rational numbers by using letters, to know that expressing numbers with letters is a progress of mathematics.

(2) To know the concept of algebraic equation and the value of algebraic equation. To be able to express mathematics relationship by using algebraic equation, to find the value of algebraic

equation.

(3) To know polynomial, monomial, coefficient and degree of monomial, degree of polynomial, term and number of terms, to be able to arrange terms in descending order or ascending order according.

(4) To learn how to combine with the like terms, to learn how to use or remove parenthesis, to be able to do multiplication of numbers and polynomial, to do addition and subtraction of polynomial skillfully.

(5) Through the addition of the numbers and algebraic equations, value of algebraic equations, and polynomial, to know abstract thinking and dialectics of particular and general.

(C) Linear equation with one unknown

Equation, properties of equation, equation and solution of equation, how to solve equation

How to solve linear equation with one unknown

Application of linear equation with one unknown

Concrete requirement:

(1) To understand the concept and properties of equations, to be able to confirm the solution of equations.

(2) To understand the concept of linear equation with one unknown, to be able to solve linear equation with one unknown according to properties of equation and transposing terms. To know how to check solution of equation.

(3) To express mathematics relationship in the concrete problems, to be able to examine the solution whether it is relevant or not according to actual meaning.

(4) To understand mathematical way of thinking such as translation from unknown to known through the solving of equation.

(D) Simultaneous linear equations with two unknown

Linear equations with two unknown and the set of the solution of linear equations with two unknown, simultaneous equation and the solutions, solving method of simultaneous equation, solving simultaneous equation by using method of substitution and method of addition and subtraction, simultaneous linear equations with three unknown, application of linear equations with two unknown.

Concrete requirement:

(1) To understand concept of linear equation with two unknown, to be able to change linear equation with two unknown into the form of algebraic equations with one variable, to be able to check the solution of linear equation with two unknown.

(2) To understand concept of linear equation with two unknown and solutions, to be able to check the solutions of linear equation with two unknown.

(3) To be able to understand solving method of simultaneous linear equation with two unknown based on method of substitution and method of addition and subtraction, to be able to solve simple simultaneous linear equations with three unknown.

(4) To be able to make simultaneous linear equation with two or three unknown from simple applied problems.

(5) Through the solving simultaneous equation, to understand how to reduce the number of variable from three unknown to two unknown, one unknown, to understand the way of thinking such as transformation from unknown to known, complication to simplicity.

(E) Linear inequality with one unknown and simultaneous linear inequality with two unknown

1, Linear inequality with one unknown

Inequality, the property of inequality, solution set of inequality, linear inequality with one unknown and solving method

Concrete requirement:

(1) To understand concept and property of linear inequality with one unknown, to understand difference between property of equation and inequality.

(2) To understand concept of solution and set of solution, to distinguish between solution of equations and inequalities, to be able to express the set of solution on the number line.

(3) To be able to solve linear inequalities with one unknown based on the property of inequalities, and the rule of transference

2, Simultaneous linear inequality with one unknown

Simultaneous linear inequality with one unknown and solving method

Concrete requirement:

(1) To understand concept of simultaneous linear inequality with one unknown and the set of solution, to understand difference and relation between simultaneous linear inequality with one unknown and linear inequality with one unknown

(2) To understand solving method of simultaneous linear inequality with one unknown, to be able to find the solution on the number line.

(F) Multiplication and division of polynomials

1, Multiplication of polynomials

Power method, multiplication of polynomials, power of powers, power of product, and multiplication by monomial and polynomial, multiplication by polynomials, multiplication formulas.

Concrete requirement:

(1) To understand computational properties of power of positive integers such as power method, power of powers, power of product, to be able to calculate based on the properties skillfully.

(2) To be able to multiply monomial by monomial, monomial by polynomial, polynomial by

polynomial.

(3) To understand the meaning of five multiplication formulas, to be able to calculate it.

(4) Through the teaching of multiplication of polynomials and multiplication formulas by using power method, to understand recognition structure of "Particular -> General -> Particular".

2, Division of polynomials

Division of power, division by monomial and monomial, division by polynomial and monomial

Concrete requirement:

(1) To understand the properties of division of power, to be able to calculate based on the properties skillfully.

(2) To understand the rules of division by monomial and monomial, polynomial and monomial, to be able to calculate based on its properties.

(3) To be able to calculate mixed problems including addition, subtraction, multiplication, division, and power of polynomials, to be able to simplify calculations by using the rule of calculations and multiplication formulas.

(G) Factorization

Common factor, formulas, factor group, FOIL method

Concrete requirement:

(1) To understand the meaning of factorization, to understand difference and relation between factorization and multiplication of polynomial

(2) To be able to factorize based on common factor, formulas, factor group, and FOIL method

(H) Fractional expression

1, Concept and properties of fractional expressions, multiplication and division method, addition and subtraction method

Concrete requirement:

(1) To understand concept of fractional expression, rational expression, simple fractional expression, and common denominator, to understand properties of fractional expression, to be able to do reduction and reduction to common denominator.

(2) To understand the rule of addition, subtraction, multiplication, division, and power of fractional expression, to be able to calculate simple fractional expressions.

2, Power of zero and negative integers

Power of zero, power of negative integers, power of integers

Concrete requirement:

(1) To understand meaning of power of zero and negative integers, to understand power of integers based on properties of power of positive integers, to understand meaning of calculation of power of integers.

(2) To be able to express numbers making use of scientific notation.

(I) Fractional linear equation with one unknown

Linear equation, whose coefficient is letter, with one unknown, simple fractional equations and its applications?

Concrete requirement:

(1) To understand solving method of linear equation, whose coefficient is letter, with one unknown, to understand simple transformation of formula?

(2) To understand the concept of fractional equation, to know the simple fractional equations and its applications.

(J) Root of number

1, Square root and cubic root

Concrete requirement:

(1) To understand the concept of square root and cubic root, to be able to express square root, cubic root by using radical sign.

(2) To understand that root of number is inverse operation of power of a number, to be able to calculate square root and cubic root making use of square and cube.

(3) To know how to use the table of square root and cubic root. (If necessary, children can use calculator)

2, Real numbers

Rational numbers, real numbers

Concrete requirement:

(1) To understand concept of rational numbers and real numbers, to be able to make an induction real numbers, to understand the meaning of opposite number of real numbers and absolute value, to understand one to one correspondence of real numbers and number line.

(2) To understand calculation of rational numbers is applied to real numbers, to be able to four operations with irrational number.

(3) Through the research of circle ratio of ancient mathematician in our county, to foster scientific inquisitive thinking and patriotic spirit.

(K) Square root

Square root, concept of square root, simple square root, addition and subtraction of square root,

multiplication and division of square root, rationalization.

Concrete requirement:

(1) To know the concept of square root, simple square root, like terms of square root, to be able to distinguish simple distinguish and like terms of square root.

(2) To learn the property of square root, to be able to simplify square root making use of the property of square root.

(3) To learn four operations of square root, to be able to calculate it.

(4) To be able to rationalize square root in the denominator making use of one or two square root.

(L) Quadratic equation with one unknown

1, Quadratic equation with one unknown

Quadratic equation with one unknown, how to solve quadratic equation with one unknown, method of square, distribution, formula, factorization, discriminant of solution, relationship between solution and coefficient (*), factorization of quadratic equation with three terms (method of formula), application of quadratic equation with one unknown.

Concrete requirement:

(1) To understand concept of quadratic equation with one unknown, to be able to solve equation making use of square, to be able to solve quadratic equation, whose coefficient is a number, with one unknown making use of perfect square. To be able to solve quadratic equation with one unknown making use of four method.

(2) To understand discriminant of solution, to be able to determine quadratic equation, whose coefficient is a number, with one unknown making use of discriminant of solution.

(*)(3) To understand the meaning of relationship between solution and coefficient of quadratic

equation with one unknown, to be able to find one solution and coefficient making use of other solution already recognized, to be able to find sum of reciprocal and square of two solutions of quadratic equation with one unknown.

(4) Through the relationship between factorization of quadratic equation with three terms and solution of equation, to be able to factorize quadratic equation with three terms within the real numbers.

(5) To be able to solve applied problems by using quadratic equation with one unknown.

(6) To associate with the teaching contents, to foster ability of logical reasoning, to learn aspects of dialectic materialism.

2, Equation transformed into quadratic equation with one unknown,

Fractional equation transformed into quadratic equation with one unknown, irrational equation transformed into linear or quadratic equation with one unknown

Concrete requirement:

(1) To understand how to solve fractional equation transformed into quadratic equation with one unknown, to be able to solve fractional equation making use of removing denominator or substitution method, to be able to check solution.

(2) Making use of fractional equation transformed into quadratic equation with one unknown, to be able to solve applied problems.

(3) To understand concept of irrational equation, to understand how to solve irrational equation transformed into linear or quadratic equation with one unknown, to be able to solve irrational equation making use of squaring both sides, or both sides, to be able to check solution.

(4) Through the fractional and irrational equation transformed into quadratic equation with one unknown, to recognize interconvert of a thing

3, Simple simultaneous quadratic equation with two unknown

Quadratic equation with two unknown, simultaneous quadratic equation with two unknown. Solving

method of simultaneous equation consist of linear equation with two unknown and quadratic equation with two unknown. Solving method of simultaneous equation consist of quadratic equation with two unknown and quadratic equation, which is dividable into two equation, with two unknown.

Concrete requirement:

(1) To understand concept of quadratic equation with two unknown and simultaneous quadratic equation with two unknown, to understand how to solve simultaneous equation consist of linear equation with two unknown and quadratic equation with two unknown, to be able to solve simultaneous equation making use of method of substitution.

(*) (2) To understand how to solve simultaneous equation consist of quadratic equation with two unknown and linear equation, which is dividable into two equation, with two unknown.

(3) Through the solving simple simultaneous quadratic equation with two unknown, To know mathematical way of thinking such as removing variable and reducing degree, to understand deeply transformation of things

(M) Function and graph

1, Function

Coordinates axis, constants, variables, function and expressions

Concrete requirement:

(1) To understand concept of coordinates axis, to be able to draw coordinates axis accurately. To understand the meaning of coordinates plane, to be able to find the coordinates of the points. To know that the point on the coordinates plane is one to one correspondence to real numbers.

(2) To understand the meaning of constants, variable, and function, to be able to bring out the example of function, to be able to distinguish between constants and variables, domain and range.

(3) To understand the meaning of domain and range, to be able to identify area of domain and range of simple polynomials, fractional expressions and quadratic equations.

(4) To know the three expression of function, to be able to draw graph of function marking with a dot

(5) Through the lesson of function, to be experienced phenomenon with relationship, changing regularly, to learn way of thinking such as linear combination.

2, Direct proportional function and inverse proportional function

Direct proportional function and graph, inverse proportional function and graph.

Concrete requirement:

(1) To understand concept of direct proportional function and inverse proportional function, to be able to confirm expression of direct and inverse proportional function according to the conditions in the problem.

(2) To understand the property of direct and inverse proportional function, to be able to draw the graph. Depending on graph, to be able to find out the change of the value according to the increase, or decrease of domain.

(3) To understand how to find the coefficient, to be able to find expression of function.

3, The property and the graph of linear function

Linear function, the property and the graph of linear functions. Solution of simultaneous linear equation with two unknown by using graph

Concrete requirement:

(1) To understand concept of linear functions, according to situation in the actual problems, to be able to find out expression of linear function.

(2) To understand the property of linear function, to be able to draw the graph.

(3) To be able to find approximate solution of simultaneous linear equation with two unknown making use of graph.

(4) To be able to find the expression of function making use of coefficient.

4, Graph of quadratic function

Quadratic function, vertex of parabola, axis of symmetry, solution of quadratic equation with one unknown by using graph.

Concrete requirement:

(1) To understand the concept of quadratic function and parabola, to be able to draw graph by using dots, to be able to find vertex and axis of symmetry of a parabola making use of marking with a dot.

(2) To be able to find approximate solution of quadratic equation with one unknown making use of graph.

(3) To be able to find expression of quadratic function by using three points on the graph, which is already known, and coefficient of equations.

(N) Elementary statistics

Population and sample, mode, median, average, variance and standard variation, calculation of variance, relative frequency, practical work

Concrete requirement:

(1) To know the concept of wholeness, individual, population and sample, to be able to identify wholeness, individual, population and sample.

(2) To understand the meaning of mode and median, to be able to find the value of mode and median.

(3) To understand the meaning of average, average of population and sample, to learn the formulas to find average. To understand the meaning of weighted mean and formula, to be able to have a guess at average making use of average of sample.

(4) To understand the meaning of sample variance, variance and standard variation, to be able to calculate sample variance and standard variation, to be able to compare two data making use of variance and standard variation.