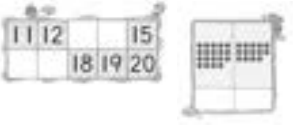
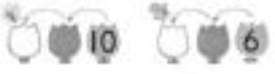
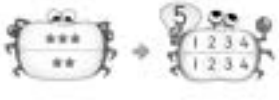
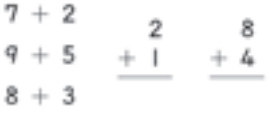
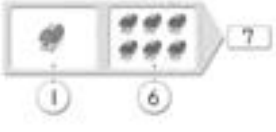
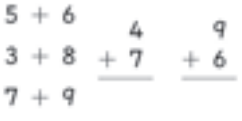
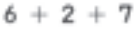
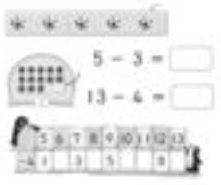
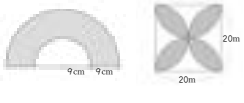
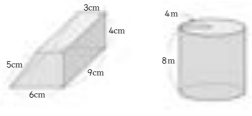
Eye Level
Math

Description of Eye Level Basic Thinking Math Curriculum

Level	Samples			Summary
1	 Writing Numbers	Practicing Numbers up to 5	 Practicing Numbers up to 10	Students learn to write numbers correctly and learn numbers from 1 to 10. Since these are the basics of learning numbers, students should be allowed to continue their study until students can count numbers intuitively.
2	 Making 10	 Learning Numbers up to 15	 Practicing Numbers up to 20	Students can read and write numbers correctly and learn numbers from 11 to 30. Using semi solid objects to make 10, students are taught to understand complements. Numbers above 10 will be expanded through grouping until numeric progression is completely established through 30.
3	 Adding 1	 Adding 3	 Practicing Adding 1, 2, and 3 ①	Students learn the numerical order by expansion of numbers up to 120 and the addition of 1, 2, and 3.
4	 Practicing Adding 1, 2, and 3 ②	 Subtracting 2	 Practicing Subtracting 1, 2, and 3	By studying adding 1, 2, and 3, the numerical order up to 120 is covered. Learning in this section is checked through verbal testing. Also, students study subtracting 1, 2, and 3.
5	 Making Numbers	 Addition with Sums up to 10	 Addition Facts ①	Students learn how to make numbers, and they develop skills in mental arithmetic by constructing and reviewing the addition table.
6	 Addition Facts ②	 Addition Facts ②	 Addition of Three 1-Digit Numbers Ⅰ	Students develop mental addition skills at this level. Arithmetic skills are practiced to enable students to mentally calculate solutions to addition problems with renaming.

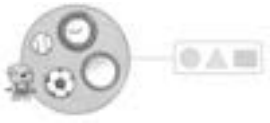
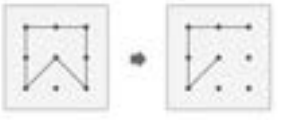
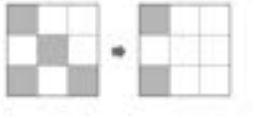
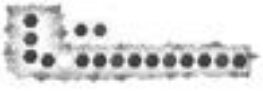
Level	Samples			Summary
7	There are 19 loaves of bread and 5 cakes. How many loaves of bread and cakes are there? Addition of 1-Digit Numbers to 10-19	9 + 2 + 9 ; 9 + 5 + 8 ; 7 + 4 + 9 ; 12 + 3 + 5 Addition of Three 1-Digit Numbers Ⅱ	18 + 9 ; 12 + 12 ; 15 + 9 ; 18 + 8 Reviewing Addition	Students review the addition table for complete understanding of (2 digits up to 19) + (1 digit), and they practice mental arithmetic to increase their skills of answering intuitively.
8	 9 − 6 = ☐ ; 8 − 6 ; 9 − 7 Subtraction with Minuends from 2 to 10	 5 − 3 = ☐ ; 13 − 4 = ☐ Subtraction Facts	7 − 6 ; 10 − 6 ; 11 − 6 ; 8 − 6 ; 9 − 6 ; 12 − 8 ; 10 − 8 ; 13 − 8 ; 9 − 8 Subtraction Facts	Students study the subtraction table until intuitive answers can be given. Students should be able to understand that subtraction and addition are inverse arithmetic functions. This level develops mental arithmetic skill of subtraction.
9	20 − 6 ; 21 − 6 ; 22 − 7 ; 23 − 9 There were 21 apples in the basket. If Thomas ate 3 apples, how many apples are left in the basket? Subtraction of 1-Digit Numbers from 2-Digit Minuends from 10 to 23	19 − 13 ; 23 − 12 ; 22 − 20 Subtraction of 2-Digit Numbers (without regrouping)	13 − 8 − 2 ; 21 − 10 − 5 Subtraction of Three Numbers	Students are enabled to give intuitive answers by understanding the concept, theory and method of (2-digit)-(1-digit) subtraction. This level completes the mental arithmetic of subtraction.
10	There are 58 children's books and 25 history books in Vicky's room. How many books are there in Vicky's room altogether? Addition with Sums up to 99	42 + 74 ; 74 + 75 ; 59 + 78 ; 64 + 46 ; 87 + 95 Addition of 2-Digit Numbers	362 + 4 ; 413 + 274 ; 655 + 192 ; 483 + 465 Addition of 3-Digit Numbers ①	Students develop mental addition skills by practicing 2-digit addition, without written regrouping.
11	36 − 3 ; 75 − 34 ; 63 − 17 ; 28 − 9 ; 93 − 57 Subtraction of 2-Digit Numbers	33 + 46 + 7 ; 43 − 9 − 7 Addition and Subtraction with Three Numbers	Janice has 124 beads. She used 85 of them to make a necklace. How many beads does she have left? Subtraction of 3-Digit Numbers	Students develop mental subtraction skills by practicing 2-digit subtraction, without written regrouping.
12	2 × 1 ; 2 × 2 ; 2 × 3 ; 5 × 9 ; 5 × 8 ; 5 × 7 ; 8 × 1 ; 8 × 4 ; 8 × 8 ; 6 × 4 ; 7 × 0 ; 9 × 5 Multiplication Facts	In the Group Running event, there are 4 people on each team. If 8 teams competed in this event, how many people participated? Multiplication of 1-Digit Numbers by Other 1-Digit Numbers	17 × 5 ; 18 × 5 ; 19 × 5 ; 31 × 3 ; 42 × 6 ; 73 × 9 Multiplication of 2-Digit Numbers by 1-Digit Numbers ①	Students learn the relationship between the accumulation of the same number and multiplication. Students become more familiar with the multiplication table and master the fundamental process of multiplication.
13	All the third grade students in Jimmy's school are going on a field trip. If 28 students can ride in one bus, how many students can ride in 5 buses? Multiplication of 2-Digit Numbers by 1-Digit Numbers ②	100 × 9 ; 323 × 3 ; 583 × 6 Multiplication of 3-Digit Numbers by 1-Digit Numbers	20 × 90 ; 30 × 70 ; 67 × 54 ; 85 × 28 ; 99 × 44 Multiplication of 2-Digit Numbers by Other 2-Digit Numbers	Students learn the method of multiplying (2-digit) x (1-digit) numbers, and the skill of regrouping through mental calculations.
14	18 ÷ 2 ; 5)5 ; 6)54 Dave has 24 cucumbers. If he wants to put 6 cucumbers in each container, how many containers does he need? Understanding Division	The tricycle shop has 19 wheels. Since each tricycle needs 3 wheels, how many tricycles can be assembled and how many wheels will be left? Division with Remainders	8)96 ; 8)95 ; 7)39 ; 49 ÷ 6 = ☐ × ☐ + ☐ ; 76 ÷ 7 = ☐ Division of 2-Digit Numbers by 1-Digit Numbers	Students become familiar with the division table and master the fundamental process of division.

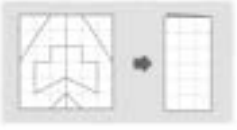
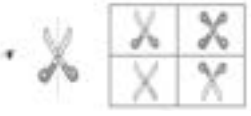
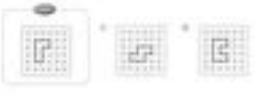
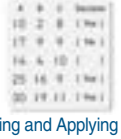
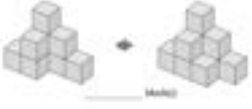
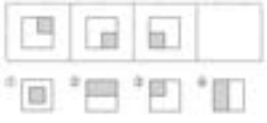
Level	Samples			Summary
15	9)439 4)720 574 ÷ 7 959 ÷ 4 Division of 3-Digit Numbers by 1-Digit Numbers	58)238 79)417 Division by 2-Digit Numbers	❼ 4,800 people want to visit Mars. If the spaceship can carry 40 people on each trip, how many trips will it take to let everyone visit? ❼ All 5,428 students in Margaret's school are going on a trip. If 40 students can ride on each bus, how many buses are needed for the trip? Division by 2-Digit Numbers	Students continue their study of division by practicing with 2-digit divisors. Attention is given to both the speed and accuracy of calculations.
16	45cm 4mm − 29cm 7mm 5,500mL = ☐ L 500mL 49kg 90g = ☐ g Application of Arithmetic Ⅰ	25−(14+7) 6×5÷3 (15÷6)÷3 6×9−72÷8 6×6÷45÷3−20 (80−(5+4)×41)÷4 Learning Order of Operations	10,000 seconds = ☐ minutes ☐ seconds = ☐ hours ☐ minutes ☐ seconds 3hr 52min 42sec + 7hr 33min 29sec 10hr 25min 12sec − 4hr 54min 50sec Application of Arithmetic Ⅱ	Students practice performing the correct order of the four arithmetic operations in compound problems. Units of measurement will also be studied.
17	❹ Write each improper fraction as a mixed number or a whole number, and write each mixed number as an improper fraction. $\frac{43}{4}$ $5\frac{4}{11}$ $\frac{64}{8}$ $9\frac{5}{7}$ Understanding Fractions	$\frac{6}{7}+\frac{4}{7}$ $1-\frac{1}{9}$ $1\frac{6}{7}+1\frac{1}{7}-\frac{5}{7}$ $4\frac{5}{13}+2\frac{5}{13}$ $4\frac{5}{7}-3\frac{4}{7}$ $1\frac{2}{7}-\frac{5}{7}-\frac{4}{7}$ Addition and Subtraction of Fractions with the Same Denominators	❺ Find the area of each shaded section.  Application of Arithmetic Ⅲ	Students will learn the meaning of 'fraction' and complete the addition and subtraction of fractions having the same denominator.
18	1.92 + 2.32 3.81 − 2.62 3.942 + 5.7 4.9 − 3.85 19.8+5.1 3.625+0.7 9.53−6.92 8.6−2.44 Addition and Subtraction of Decimals	❻ Circle each set of numbers where the first number is a multiple of the second number. (9, 12) (16, 4) (48, 12) Multiples and Factors	❹ Simplify each fraction with the common factors 2, 3, or 5. $\frac{8}{16}$ $\frac{15}{25}$ $\frac{14}{21}$ $\frac{9}{24}$ ❹ Simplify each fraction to its lowest terms. $\frac{7}{14}$ $\frac{6}{18}$ $\frac{21}{35}$ $\frac{8}{12}$ Simplifying Fractions ①	Students will learn the meaning of 'decimal' and become familiar with reducing fractions based on multiplication and factoring.
19	❹ Simplify each fraction to its lowest terms. $\frac{16}{20}$ $\frac{32}{48}$ $\frac{28}{84}$ $\frac{23}{92}$ Simplifying Fractions ②	$\frac{5}{8}+\frac{2}{3}$ $\frac{5}{12}+\frac{7}{10}$ $\frac{7}{12}-\frac{3}{16}$ $2\frac{7}{12}+7\frac{8}{15}$ $4\frac{5}{14}-2\frac{5}{21}$ Addition and Subtraction of Fractions with Different Denominators ①	❼ Jason, Judy, and Matt collected recyclable materials as shown in the table below.  Addition and Subtraction of Fractions with Different Denominators ①	After learning how to reduce fractions, students will learn addition and subtraction of fractions having different denominators.
20	$\frac{1}{2}-(\frac{1}{4}-\frac{1}{5})$ $3\frac{1}{2}+\frac{3}{4}-\frac{3}{5}$ $\frac{2}{3}+(\frac{3}{4}-\frac{2}{5})$ $5\frac{2}{3}-2\frac{5}{8}-2\frac{2}{9}$ Addition and Subtraction of Three Fractions	$\frac{5}{12}\times16$ $4\frac{3}{5}\times1\frac{1}{5}$ $14\times3\frac{3}{4}$ $3\frac{2}{3}\times0.15$ $\frac{11}{12}\times3\times7$ $2\frac{5}{8}\times12\times\frac{1}{4}$ Multiplication of Fractions	$\frac{3}{8}\div5$ $9\div3\frac{2}{5}$ $3\frac{4}{15}\div2\frac{6}{25}$ $2.4\div\frac{1}{8}$ $4\frac{1}{5}\div0.7$ $2\frac{1}{2}\div\frac{5}{8}\div1\frac{5}{9}$ Division of Fractions	Students will learn about addition and subtraction of three fractions having different denominators. Students will also learn how to multiply and divide fractions.
21	0.2 × 5.4 3.124 × 23 0.52 × 0.21 138×0.004 400×0.0036 Multiplication of Decimals	23.5÷1000 0.042÷6 37)699.3 56)21 1.23)5.289 Division of Decimals	❻ Find the comparing amounts. $\frac{1}{4}$ of 24 75% of 400 1.05 of 500 Ratios	Students will learn to that multiplication and division of decimals are the same as for natural numbers, and they will practice placing decimal points in solutions. Ratios will also be studied.
22	$x-13=25$ $75\div x=15$ $(x\div4)+8=15$ $(x-9)\div4=7$ $(x+2\frac{4}{7})=3\frac{1}{3}$ $(x\times3.5)=175$ $x+2\frac{5}{7}\times2.3=9\frac{1}{5}$ $x\div1\frac{3}{7}+1.7=5\frac{1}{2}$ Equations	❽ Solve for x. $4:7=2:x$ $\frac{2}{3}:\frac{5}{7}=3\frac{1}{2}:x$ $\frac{11}{5}:0.63=8:x$ Equivalent Ratios	❺ Find the perimeter and area of the shaded section.  Application of Arithmetic Ⅳ	Students will solve equations and practice solving equivalent ratios. Circular geometry will also be covered.
23	$3+\frac{1}{2}\div\frac{5}{6}$ $(\frac{9}{10}-\frac{3}{4})\times\frac{5}{4}$ $\frac{1}{3}\div\frac{8}{9}+\frac{5}{6}\div\frac{8}{9}$ $0.5\times\frac{7}{10}\div1.4\div2.4$ $6-(5-(\frac{3}{4}+\frac{1}{6})\div11)$ Basic Operations with Whole Numbers, Fractions, and Decimals	10km² = ☐ ha = ☐ dam² = ☐ m² 15,000,000m² = ☐ dam² = ☐ ha = ☐ km² Application of Arithmetic Ⅴ	❺ Find the surface area and volume.  Application of Arithmetic Ⅵ	Students will develop their skills with fractions and practice compound calculations involving the four arithmetic operations. Students will also learn how to convert units of measurement and determine the surface area and volume of three dimensional objects.

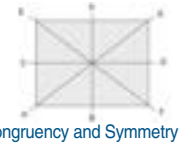
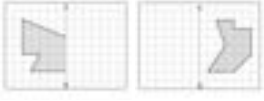
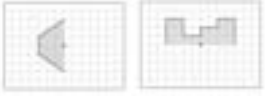
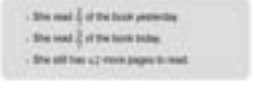
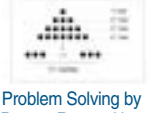
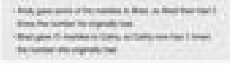
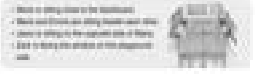
Level	Samples	Summary
24	Find the prime factorizations of the following numbers. ❶ 42 ❷ 108 Find the number of factors for the following numbers. ❶ $2^2\times5^2$ ❷ $2^2\times3^2$ Prime Factorization	In the Venn diagrams below, shade the areas of the complementary sets. ❶ A^C ❷ $(A\cap B)^C$ Sets	Fill in the boxes and circle the correct property used. $\left(-\frac{3}{5}\right)\times4+6\times\left(-\frac{3}{5}\right)$ $=\left(-\frac{3}{5}\right)\times4+\left(-\frac{3}{5}\right)\times\square$ (Commutative, Associative, Distributive) Property of Multiplication $=\left(-\frac{3}{5}\right)\times(4+\square)$ (Commutative, Associative, Distributive) Property of Multiplication $=\left(-\frac{3}{5}\right)\times\square$ $=\square$ Multiplication and Division of Rational Numbers ①	Students learn about prime factors by understanding divisors, multiples, decimals, fractions, and composite numbers. Students learn about set theory and computations related to sets. Students also gain greater understanding of the properties of rational numbers and operations with rational numbers.
25	This figure has an area of $A\text{cm}^2$. ❶ Express the area A in terms of a, b, and h. ❷ If $a=5\text{cm}$, $b=7\text{cm}$, and $h=3\text{cm}$, what is the area of the figure? Evaluating Expressions	The following is solved by using the Properties of Equality. Write the number of the Properties of Equality above, (1)~(3), that was used. ❶ $2x-3=5$ $2x=5+3$ (1) $2x=8$ (2) $x=4$ (3) ❷ $\frac{1}{4}x+3=1$ $\frac{1}{4}x=1-3$ (1) $\frac{1}{4}x=-2$ (2) $x=-8$ (3) Equations	Plot the following points on the coordinate plane. A(−1, 1) B(0, 3) C(−5, 4) D(2, −2) Functions and Their Graphs ①	Students learn to solve the four arithmetic operations of rational numbers and linear equations based on understanding the property of equality. Students learn the definition of domain and range using the concepts of equal or above, equal or below, above and below to mark coordinates on a perpendicular line.
26	Look at the graph on the right and find the equation for the function. ❶ ❷ Functions and Their Graphs ②	Find $\mathbf{m}\angle x$ in the following figures. ❶ 75° 85° 110° ❷ 120° 80° 60° Polygons	Find the surface area and volume of each of the following solid figures. ❶ 3cm 4cm 5cm 10cm ❷ 10cm Surface Area and Volume of Solid Figures	Students learn to find the relationships of directly proportional and inversely proportional functions and to draw graphs by understanding the concepts of function. Students learn about relative frequencies, cumulative frequencies, and positional relationships between lines and planes on flat planes or in space. Students will also learn about congruence of triangles; the properties of triangles, circles, and sections; and how to find surface areas and volumes of solid figures.
27	Simplify the following expressions. ❹ $16x^3y^4\div(-2xy)^2$ ❺ $\frac{5}{6}x^3y\div\frac{10}{21}x^2y^2$ Multiplication and Division of Monomials	If $x=4$ in $4x-2y=12$, what is the value of y? The graph of $-4x+3y-5=0$ passes through two points, $\mathrm{A}(2a,-1)$ and $\mathrm{B}(4,b)$. What is the value of $a-b$? Linear Equations with Two Variables	Solve the following systems of equations. ❶ $\begin{cases}x+y=3\\x+3y=7\end{cases}$ ❷ $\begin{cases}3x+2y=8\\3x-y=2\end{cases}$ Solve the following systems of equations. ❶ $\begin{cases}y=4x-3\\-5x+2y=6\end{cases}$ ❷ $\begin{cases}x=2.5y+\frac{1}{4}\\-4x+7y=2\end{cases}$ Systems of Equations ①	Students learn about approximate values and how to solve addition, subtraction, multiplication and division of monomials and polynomials by understanding the law of exponents. Students also learn to solve linear equations and systems of equations containing two variables.
28	If the number of solutions to the system of equations $\begin{cases}ax+7y=-3\\-9x-14y=-b\end{cases}$ is infinite, find the value of $a+b$. Systems of Equations ②	Parallelogram ABCD on the right has a base of 8cm ($\mathrm{AD}=8\text{cm}$). Supposing its area is no more than 48cm^2, what is its maximum height? Linear Inequalities	A graph of $y=ax+b$ is shown on the right. Suppose this graph is parallel to the straight line given by $kx-4y+2=0$. Find the value of k. Linear Functions and Their Graphs	Students learn about systems of equations in which the coefficients are decimal or fractional. Students learn about inequalities and the concepts of linear functions, graphs, slopes, and intercepts. Students also learn to solve various forms of linear inequalities and systems of inequalities. Students learn about probability by understanding the meaning of possible values.
29	In the figure shown on the right, it can be proven that $\triangle\mathrm{ABD}\cong\triangle\mathrm{ACD}$. Fill in the boxes. Proof In △ABD and △ACD, □ (Hypothesis) …… ① □ (Hypothesis) …… ② □ is common to both triangles. …… ③ From ①, ②, and ③, △ABD ≡ △ACD (SAS Congruence) Properties of Isosceles Triangles	In the figures below, O is the circumcenter of $\triangle\mathrm{ABC}$, and point I is the incenter of $\triangle\mathrm{ABC}$. Find $\mathbf{m}\angle x$. ❶ 40° O ❷ 20° I Circumcenter and Incenter of a Triangle	Point G is the centroid of $\triangle\mathrm{ABC}$. Find the value of x. ❶ G ❷ F E G x 10 Applications of Similarity	Students learn about probabilities and statements. Students learn to solve a variety of geometric problems by learning the properties of various triangles and squares. Students learn to draw similar figures and understand conditions of similarity of triangles. Students learn to solve problems by applying the properties of similarity in triangles.
30	Given square OABC with an area of 5, if point D is on the number line such that $\mathrm{OC}=\mathrm{OD}$, then find the coordinates of point D. Irrational Numbers	Rationalize the denominator of each of the following expressions. ❶ $\frac{8}{\sqrt{5}-\sqrt{3}}$ ❷ $\frac{\sqrt{3}-\sqrt{2}}{2\sqrt{2}-\sqrt{3}}$ Multiplying Polynomials	Factor each of the following. ❶ $2ax-4ay$ ❸ [illegible] ❷ $4x^2-12x+9$ ❹ $2x^2-18xy+36y^2$ Factor each of the following. ❶ $2(x+y)^2+7(x+y)-4$ ❸ $(2x+1)^2-(x-3)^2$ ❷ $(x-2y)(x-2y-4)-12$ ❹ $2xy-2x+y-1$ Factorization	Students learn the concepts of irrational and real numbers based on square roots, and they learn to expand polynomials using the distributive law and the product rule. Students will also learn to factor various equations by understanding factoring and perfect-square expressions. Students will become familiar with new forms of quadratic equations and learn how to solve them.
31	Suppose $y=a(x-p)^2-q$ is as shown on the right. Find the signs of a, p, and q. Quadratic Functions and Their Graphs	Find the maximum or minimum value for the following functions. ❶ $y=5x^2-10x+6$ ❷ $y=-\frac{1}{4}x^2+8x-4$ The quadratic function $y=x^2+5ax-6b$ has the minimum value of 7 when $x=3$. Find the value of $\frac{b}{a}$. Maximum and Minimum Values of Quadratic Functions	Find the length of diagonal l in the following. ❶ 6cm 10cm ❷ 12cm 5cm rectangle square Applications of the Pythagorean Theorem ①	Students learn to solve quadratic equations using the quadratic formula, and they learn to solve various quadratic equations in which the coefficients are fractional or decimal. Students also learn how to solve various problems by applying the properties of quadratic functions. Students learn how to find the lengths of segments and the areas and volumes of plane figures using the Pythagorean Theorem.
32	In the rectangular prism shown on the right, find the shortest route that starts at point A, passes through the edge BC, and reaches point G. Applying the Pythagorean Theorem	In the figure shown on the right, circle O is an inscribed circle of $\triangle\mathrm{ABC}$. What is the length of $\overline{\mathrm{BQ}}$? ① 4cm ② 5cm ③ 6cm ④ 7cm ⑤ 8cm Examining Circles	The elevation angle looking up from point A to point C, which is at the top of an apartment building, is 40°. If the distance from point A to point B is 100m, find the height of the apartment building. ($\tan40^\circ\simeq0.84$) Applying Trigonometric Ratios	Students learn how to solve various problems involving two dimensional and three dimensional figures using the Pythagorean Theorem. Students learn about arcs, chords and positional relationships of two circles. Students also learn about inscribed angles, central angles, tangent lines, and chords, and a circle and a proportion. The meaning of trigonometric ratios, trigonometric ratios of a complementary angle and the relationship between three trigonometric ratios will also be examined.

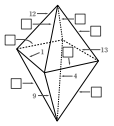
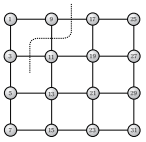
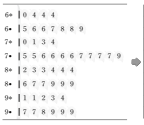
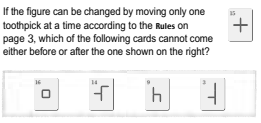
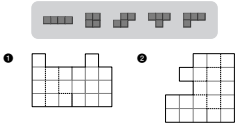
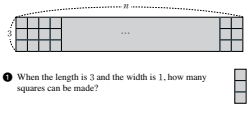
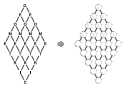
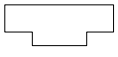
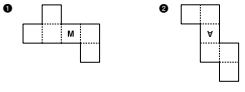
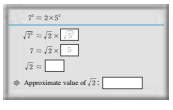
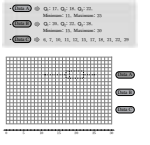
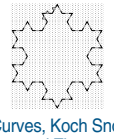
Eye Level
Math

Description of Eye Level Critical Thinking Math Curriculum

Level	Samples			Summary
1	Draw a line to the bird that completes the pattern.  Repeating Patterns (AB)	The objects below have the same shape. Name the shape and circle it in the box on the right.  Recognizing Shapes	Circle the bigger one.  Comparisons (size)	Students study the repeating pattern of 'AB' and the fundamental properties of circles, triangles, and quadrangles. By practicing drawing the same shape on dot paper, students learn perception of space. Students also learn to compare sizes through coupling and the basics of grouping.
2	Circle the building that completes the pattern.  Repeating Patterns (ABA)	How many triangles are there in the figure below.  Recognizing Shapes	Complete the figure on the right to make it match the one on the left. (Use Clear Paper to check your answer.)  Drawing Figures on Dot Paper (3×3)	Through recognizing the repeating patterns of 'ABC', 'AAB', 'ABB', and 'ABA', and by drawing missing shapes, combining shapes, and dividing shapes, students develop a perception of space and location. Students also compare objects in terms of thickness and height.
3	Find the pattern and circle the animals.  Repeating Patterns (ABBA)	Complete the figure on the right to make it match the one on the left. (Use Clear Paper to check your answer.)  Drawing Figures on Grids	Circle the heavier one.  Comparisons (weight)	Students learn to recognize the repeating patterns of 'AABB', 'AAAB', 'ABBB', and 'ABBA'. Exercises using dot paper and grid improves students' perceptions of depth and location. Students also compare the thicknesses and weights of objects.
4	Circle the shape that completes the pattern.  Repeating Patterns (ABB)	Combine the top two figures to make a new figure below. (Use Clear Paper to check your answer.)  Combining Shapes	Draw lines to match the related pictures.  Matching	Students study patterns that repeat in 'AB', 'AABB', 'ABC', 'AAB', 'ABB', 'AAAB', 'ABBB', 'ABA', and 'ABBA' sequences. Students also learn to distinguish between shapes by having to identify the shapes of quadrangles and triangles.
5	Write the number that completes the pattern.  Increasing Patterns (ABAABAAAB)	Look at the overlapped figures and circle the one that is at the bottom.  Understanding Combined Shapes	Look at the picture and circle the correct word.  The orange is (bigger, smaller) than the strawberry. Comparisons	Students identify and complete complex patterns with the following sequences: 'ABBCCCDDDD', 'ABABBABBBABBBB', and 'ABAABAAAB'. By discovering numbers that skip by two, students develop a sense of mathematical progression. Students also practice sorting by finding objects that fit given conditions.
6	Look at the numbers in the shaded column. Find the pattern and write the correct numbers in the blank spaces.  Number Patterns (by 10)	Complete the figure on the right to make it match the one on the left.  Drawing Missing Shapes	Line up 3 Colored Blocks, and then shade the circle beside the correct block length below.  Comparing Lengths	Students identify and complete complex patterns with the following sequences: 'ABCABCCABCCC', 'ABCAABCAAABC', and 'ABAABBAAABBB'. Students continue the study of mathematical progression by identifying numbers that skip by 10. By using Colored Blocks, students learn the concept of length.

Level	Samples			Summary
7	Write the number that completes the pattern.  Increasing Patterns (number)	Draw a figure on the right that is the same as the one on the left. (Use Clear Paper to check your answer.)  Drawing Figures on Dot Paper (6×6)	Look at the relationship between the pair and circle the one that belongs in the blank space.  Relationships	This level focuses on the study of increasing patterns involving size, type, color, direction, and number. Students learn to find numbers that skip by 5, and they learn these three-dimensional shapes: cubes, columns, and ball-shaped objects. Also, students learn about conservation of width.
8	Look at the numbers in the shaded boxes. Find the pattern and write the correct numbers in the blank spaces.  Number Patterns (by 3)	Circle all the figures that will produce 2 parts that are the same size and shape when cut along the dotted line.  Dividing Shapes (2 parts)	Order the containers from the one with the most liquid to the one with the least.  Comparing Volumes	Students learn to find number patterns by viewing diagrams, and they learn to find numbers that skip by 3. Students learn the basic symmetry of shapes by identifying shapes and dividing them into parts. By dividing shapes into parts, students develop their spatial skills and a greater understanding of fractions.
9	Draw lines to complete the pattern.  Line Patterns	Draw the figure on the right that is made when the paper on the left is folded in half.  Recognizing Shapes	Look at the related figures and write the number of the figure that belongs in the blank space.  Recognizing Changes	Students learn to recognize patterns with lines, shapes, and dominos while numbering and dividing shapes. Students learn to divide objects into four parts. Students also develop their skills of observation and reasoning by analogy by manipulating shapes given in diagrams.
10	Write the number of the figure that completes the pattern.  Shape Patterns	Circle the image you would see if a mirror were placed on the dotted line. (Use Mirror to check your answer.)  Mirror Images	Circle the figure below that has the same area as the ▭.  Comparing Areas	Students use mirrors to learn about symmetry. They learn basic concepts related to parallel movement, symmetrical shapes, and lines of symmetry in line-symmetrical shapes. Also, students learn about conservation of area.
11	Draw the correct number of dots on the domino to complete the pattern.  Domino Patterns	Find the number pattern, and then write "Yes" or "No" to show if the set of numbers fits the pattern. Then use A, B, C, and number operations to show the number relationship.  Recognizing and Applying Patterns	How many more blocks are needed to make the set of blocks on the left the same as the one on the right?  Counting Blocks	At this level, 'counting blocks' are used to develop spatial skills. Rotary movement is also examined through changing the orientation of shapes. Conservation of volume is studied by transferring liquid among various containers.
12	Draw the figure that would be the result of rotating the given figure in the direction of the arrow.  Transforming Figures	The → and ↓ arrows form a pattern in the ▭. Answer the questions.  Problem Solving by Pattern Recognition	Look at the related figures and write the number of the figure that belongs in the blank space.  Recognizing Changes	Students learn to count the number of quadrangles of different sizes and various shapes within diagrams. Students learn to solve problems by particular methods that fit given situations, choosing from finding patterns, using data tables, drawing diagrams, and deductive reasoning. Recognizing changes of pattern within diagrams reinforces the skill of learning by analogy.
13	In how many ways can each rectangular block illustrated in the table fit into the rectangular figure above the table? Assume that the individual segments of the blocks in the table and the figures above the table are actually the same size.  Calculating the Number of Rectangles	Find the total number of triangles in the figure below. Answer the questions.  Problem Solving by Data Analysis	The number in each □ is the sum of the two numbers on either end of the line. Answer the questions.  Problem Solving by Alternative Methods	Through the movement of shapes, activities at this level reinforce basic concepts related to parallel movement and symmetrical movement. By finding the original shape which has been rotated in the direction of an arrow, students learn the basics of rotary movement.
14	The picture below follows an increasing pattern and the figure numbers indicate the order. When the figure number increases by 1, by how many does the number of squares(■) increase?  Recognizing Various Patterns	Follow the given instructions for each figure. Shade the new figure.  Transforming Figures on Grids	Trees are to be planted around a yard with the dimensions shown below. The trees are to be planted 3m apart. How many trees will be needed?  Problem Solving by Drawing Diagrams	Students learn to recognize and use patterns of shapes and numbers to solve problems. Students also learn to transform figures and solve problems using diagrams.

Level	Samples	Summary
15	Every exposed face of the blocks below was painted. How many faces were painted.  Counting Blocks Balance 1 and Balance 2 are level. How many kittens have to be put on 'A' to make Balance 3 level?  Problem Solving by Deduction Four animals were weighed and the following result was obtained. Read the following statements and write the names of the animals in the boxes in order from the heaviest to the lightest.  Understanding Word Problems	By finding the number of counting blocks, students determine the volume of three-dimensional figures. Also, by finding the number of painted counting blocks, students determine the surface area of three-dimensional figures.
16	The front, side, and top views of a block are given. Circle the correct block.  Recognizing Different Views of Blocks There are 3 ways to go from the house to the store and 2 ways to go from the store to the school. How many different ways can you go from the house to the school via the store?  Problem Solving by Tree Diagrams Look at the following conditions and set of numbers. Answer the questions.  Recognizing Appropriate Numbers	By examining the pattern of how the number of objects increases by 2 or 3, students learn to calculate the number of objects. Students also learn to find the shape of a single, three-dimensional block by viewing it from the front, side, and top.
17	Find all the lines that will form matching halves when the figure is folded along the lines.  Congruency and Symmetry Find the pattern in the following set of problems. Write the correct number in each □.  Problem Solving by Pattern Recognition Write all the numbers belonging to C.  Solving Problems Using Venn Diagrams	Students learn to recognize number patterns by counting objects and filling in missing values. Students determine the three-dimensional shape of a figure constructed from two blocks by viewing it from the front, side, and top, and they study the line symmetry of shapes.Through the use of Venn Diagrams, students learn the basic concepts of intersection and union.
18	Using line AB as the line of symmetry, complete each line-symmetrical figure.  Line Symmetry Jessica shot 5 arrows and the arrows hit the 10, 9, 8, and 7 point rings. Write all the possible scores she can get.  Problem Solving by Data Analysis A teacher asked students to bring a comic book or a history book to class. Write "True" or "False" in each □.  Evaluating Statements	Students learn to find and draw symmetrical figures using lines of symmetry. Students also learn to evaluate statements by analyzing sentences or phrases connected with "and" and "or".
19	Using the given point as the point of symmetry, complete each point-symmetrical figure.  Point Symmetry Mindy has been reading a book. How many pages are there in the book?  Problem Solving by Reverse Calculation Draw a triangle that is congruent to the one shown below.  Problem Solving by Trial and Error	Students determine the three-dimensional shape of a figure constructed from three blocks by viewing it from the front, side, and top. Students learn to find and draw a symmetrical figure using a point of symmetry. Students also learn strategies of problems solving, such as drawing diagrams, using reverse calculations, trial and error, and deductive reasoning.
20	Find the number pattern and complete the table. Then use ■, ●, and number operations to show the number relationship.  Number Relationships How many marbles will be needed to create the pattern shown below if the bottom row has 29 marbles?  Problem Solving by Pattern Recognition Andy, Brad, and Cathy each had some marbles that they redistributed among themselves. Each person now has 30 marbles. How many marbles did Andy have in the beginning?  ➡ Above conclusion is (reasonable, not reasonable). Logic	Students learn to determine the three-dimensional shape of a figure constructed from four blocks by viewing it from the front, side, and top. Students also learn to verify a result obtained by applying two premises by drawing a Venn Diagram or analyzing a sentence.
21	Complete the function table and write the equation.  Functions Circle the solid figure that is drawn correctly.  Understanding Solid Figures Magnify the figure by drawing a similar figure with sides that are twice as long. Then draw another similar figure with sides that are $\frac{1}{2}$ as long as the original figure.  Similar Figures	Students learn to complete correspondence tables by comparing the related expressions of X and Y, and they then learn the relational expression of X and Y. Students learn to magnify and reduce figures by drawing similar figures. Students also learn to analyze and evaluate two or three given statements by using various methods.
22	Read the graph and complete the coordinates in the table. Then write the equation relating y to x.  Functions Draw the figure that would produce the given rotational solid figure.  Rotation of Figures In the following table, each type of ball represents a different unknown number. Each row and column will add up to the number at the right or bottom. Fill in each □.  Problem Solving by Deduction	Students learn to determine the coordinates of a point and write expressions relating X and Y. Students also learn to use the basic dimensions of three-dimensional objects to calculate surface areas and volumes.
23	Write the numbers from 2 to 7 once so that each side of the triangle has a sum of 14. Fill in each ○. Problem Solving by Alternative Methods Josh has a magic box. He used this box twice after she put in an initial amount of money and got $85 in return. Fill in each □.  Reviewing Methods of Problem Solving For the class meeting, Maria, Jason, Emma, and Zack are sitting as the statements describe. Read the following statements and answer the questions.  Analyzing Word Problems	Students learn about direct and inverse proportions and how to determine a proportionality factor using the relationship between X and Y. Students study the construction and rotation of solid figures. Students also learn problem solving strategies and how to analyze a problem and its solution.

Level	Samples			Summary
24	For the octahedron below, find the value for each box using each of the following numbers only once so that the sum of the values for the 3 edges of each surface equals 20. 2, 3, 5, 6, 7, 8, 10  The Magic of Numbers	Divide the given figure with a line so that the sum of the numbers on each side of the line is equal. (Answers may vary.)  Square Games	The time shown is between 9:00 and 10:00. Find the time when the angle between the hour hand and the minute hand is 180°.  Clock Angles	Students learn basic equations through Magic Squares, Square Games, and The Magic of Numbers. Understanding the angles between the hour hand and the minute hand, students learn how to solve difficult problems related to the angles of a clock.
25	The following is a table of gas prices with full-service and self-service options at the South End Station and West End Station. Gas Station / South End / West End Price per Liter($) / Full-service / 1.20 / 1.15 Self-service / 1.14 / 1.13 ❶ Write an expression that shows the relationship between the amount of gas x(L) and the price P($) for each gas station. Fuel Consumption	Sam, Kelly, Helen, James, and Julie each like either tulips, roses, lilies, carnations, or chrysanthemums. Everyone likes a different kind of flower. Read the following descriptions to determine who likes chrysanthemums. • Sam does not like tulips. • Kelly dislikes tulips and roses. • Helen likes lilies. • James is allergic to carnations. • Julie likes the flower that James is allergic to. • Someone likes chrysanthemums. ⇒ ☐ likes chrysanthemums. Various Problems Ⅰ	Refer to the following stem and leaf plot to complete the frequency table and answer the questions below.  Point Range / Frequency 60 — less than 65 / 4 65 — 70 70 — 75 75 — 80 80 — 85 85 — 90 90 — 95 / 5 95 — 100 / 6 Total / 49 Stem and Leaf Plots	Students study linear equations through various applications closely related to daily life, such as speed, time, fitness center, and fuel consumption. Students learn how to arrange and analyze data using stem and leaf plots.
26	If the figure can be changed by moving only one toothpick at a time according to the **Rules** on page 3, which of the following cards cannot come either before or after the one shown on the right?  The Geometry of Toothpicks	According to the given **Conditions**, draw a quadrilateral and a hexagon using the indicated pegs as vertices. **Conditions** Total number of pegs forming the sides of the two figures: 18 Number of pegs shared by the two figures: 2  Geoboards Ⅰ	Use all 5 tetrominoes shown in the box, once each, to make the following figures.  Polyominoes	Students gain interest in geometry through using common materials such as toothpicks and matches. Students' curiosity and motivation for learning increase as well as understanding of spatial relations through using various teaching tools, such as Geoboards and Polyominoes.
27	Use the numbers 1 through 49 once each, and complete the following 7 × 7 magic square using the pyramid method.  Magic Squares Ⅱ	Find the perimeter of the figures made by lining up the sides of squares with sides measuring 1 adjacent to one another. ❶ Find the perimeter when there is one square. ❷ Find the perimeter of the figure made by lining up the sides of two squares adjacent to each other.  Various Problems Ⅱ	The rectangular piece of paper shown below has a length of n and a width of 3. If the paper is cut into 1 × 1 squares, 128 squares can be made. Find the value of n.  ❶ When the length is 3 and the width is 1, how many squares can be made? Various Problems Ⅱ	Students learn the properties of numbers through number puzzles and calculators. Students learn how to solve problems using given conditions and applying systems of equations to calculate calories from food consumed.
28	Group letters connected by lines to form **GEOMETRIC** on the diagram below. Find the number of times each letter is used and write the number in the corresponding circle. Using the results, find the sum of the numbers that follow.  ⇒ 1+4+10+20+35 Pascal's Triangle	If the numbers from 1 to 9 are placed, once each, into the figure shown on the right, find the sum of the numbers in ⬢ to be 4 times the sum of the numbers in □. Find the probability that the numbers in □ are consecutive numbers. (The order of the numbers does not matter.)  Problems Involving Probability and Statistics	In the picture below, connect the midpoints of each side of the non-shaded equilateral triangles and shade in the central equilateral triangles formed by these segments.  The Sierpinski Triangle	Students learn how to solve various systems of equations related to daily life, such as determining the possibilities of various events occurring in students' lives and probabilities using Pascal's Triangle. Students also examine fractals through Sierpinski Triangles and try to find rules for them.
29	Divide the figure below into four P-shaped ( ) Thinking Pentos.  Dissection of Polygons	Write the missing letter in the correct square of the following nets so that the letters **M** and **A** are oriented in the same direction as on the cube shown on the right when the net is folded.   Nets of Cubes Ⅰ	Let's make the 5 × 2 × 2 rectangular prism shown on the right. Answer each of the following.  ❶ How many Thinking Cubes are needed to make the solid figure above? Soma Cube	Students develop spatial skills and their ability to solve problems by dividing figures or constructing figures. Students practice visualizing in three dimensions and two dimensions by constructing regular hexahedrons. Students also improve their sense of space by playing games with seven-piece Thinking Cubes.
30	Find the approximate value of $\sqrt{2}$ using the numbers on Number Board **R**. ❶ Use $49 = 7^2$ and $25 = 5^2$ to find the approximate value of $\sqrt{2}$.  The Rules in Numbers	Use the method on pages 5 and 6 to find 7 consecutive composite numbers of natural numbers. ❶ If the smallest number in the set of 7 consecutive composite numbers is $n+2$, write expressions for the 6 remaining numbers in order. Number Stories	Bonnie's uncle is trying to find the length of wire he needs to build a circular fence. Find each of the following.  ❶ If the radius of the circular fence is xm, write an expression for the area of the circle. Math on a Green Field	Students learn to concepts of irrational numbers, composite numbers, prime numbers, and perfect numbers. Students also learn the relationships among the number of sides, perimeters, and areas of regular polygons and equations.
31	What is the value of the n^{th} term in the following sequences? ❶ −1, 2, 9, 20, 35, 54, … ❷ 1, 3, 6, 10, 15, 21, … Rules and Sequences	Draw a box and whisker plot for each of the following data sets.  Box and Whisker Plots	As before, draw equilateral triangles from the trisection points of each side and erase the bases as you did in ***Step 1***.  Koch Curves, Koch Snowflakes, and Zigzags	Students learn the concept of sequence to the n-th term. Students also learn how to interpret and analyze data using box and whisker plots, as well as learning about logical sums and logical products. Students review the concept of similarity using Koch Curves and Koch Snowflakes.
32	Add 3 adjacent squares to the figure shown on the right to make its perimeter first as long as possible and then as short as possible. Show each case on the figures below. The length of the sides of the square is 1.   Transformation of Figures	Find the shortest distance of a solid figure made by placing 1cm cubes side by side. ❶ Find the shortest distance for connecting A to B, B to C, and C to D along the surface of the solid figure shown on the right.  Exploring Solid Figures	Make the area of the (2, 5, 2) tile board shown on the right equal 15cm².  ❶ If $x = 2$, find the value of y. ❷ If $y = 1$, find the value of x. Figures and Factoring	Students learn about congruous transformations, similarity transformations, and symmetric transformations by examining transformations based on the perimeters and areas of figures. Students learn how to find perimeters, areas, and the shortest distances of solid figures using factoring.