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Japanese Elementary School Students Math Performance:
A Case of Tottori Prefecture regional "Math Diagnostic Test"

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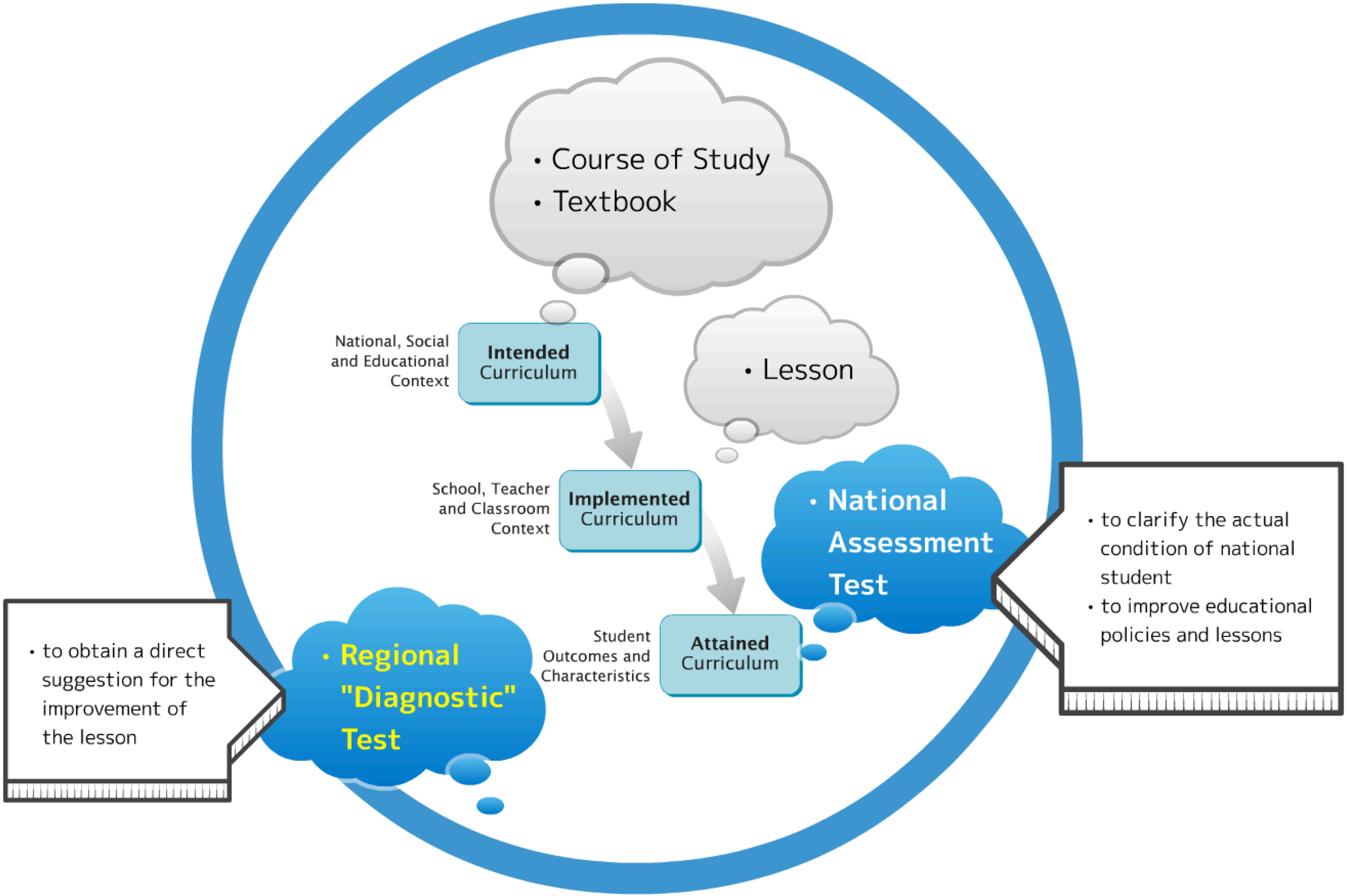

• Course of Study
• Textbook
National, Social and Educational Context
Intended Curriculum
• Lesson
School, Teacher and Classroom Context
Implemented Curriculum
• National Assessment Test
• to clarify the actual condition of national student
• to improve educational policies and lessons
Student Outcomes and Characteristics
Attained Curriculum
• Regional "Diagnostic" Test
• to obtain a direct suggestion for the improvement of the lesson


Tokyo
Osaka

Tottori Prefecture

米子空港
米子駅
島根県
倉吉
大山
蒜山
Central
Western
鳥取空港
鳥取砂丘
鳥取駅
Eastern
氷ノ山
岡山県
広島県
兵庫県

Tottori Elementary Math Diagnostic Test

a suitable opportunity for teachers to study mathematical and pedagogical content knowledge and recognize what are emphasis/important contents through the curriculum:

- What kinds of problems are essential/appropriate to verify students' math performance?
- What kind of performance do students show to such problems?

Procedure

1) determination of the Test members in math subcommittee of the district
2) determination of the grade staffs to analyze past results and discuss improvements of the year
3) improving such problems and develop new problems
4) planning the Test (as a whole)
5) workshop for the planning tests
6) ordering to print the Test booklets
7) implementation of the Test
8) scoring of the Test (by homeroom teachers of each school)
9) each school reports results (scores) of the Test
10) staffs aggregate and analyze the results, and make an annual report

Examinee students

Table 1. Number of students by each grade

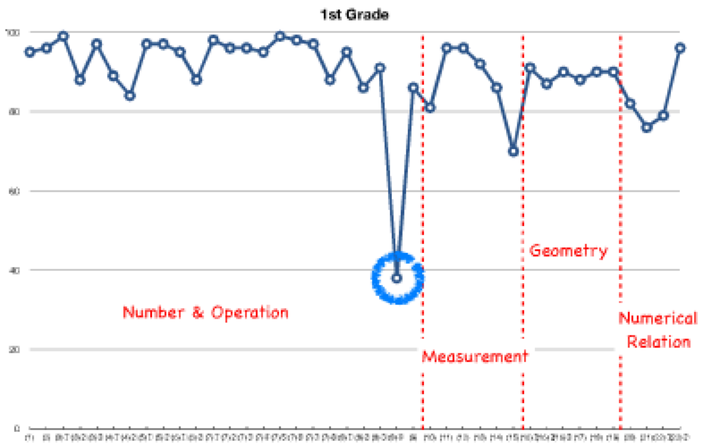
Grade	1st	2nd	3rd	4th	5th	6th
Number of students	4908	4867	4968	5138	5057	5241

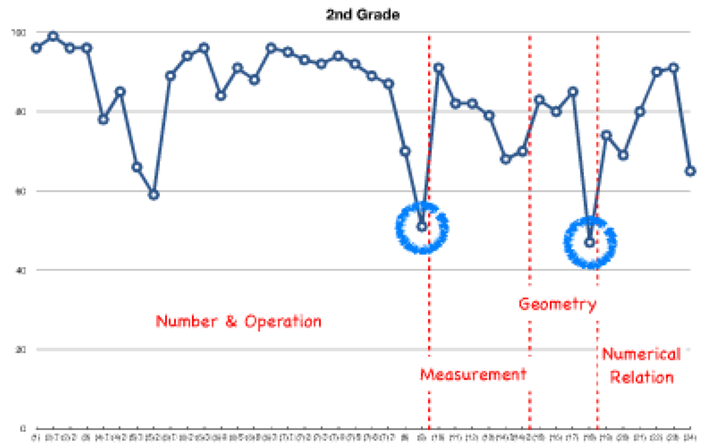
Table 2. National Assessment Test 2013

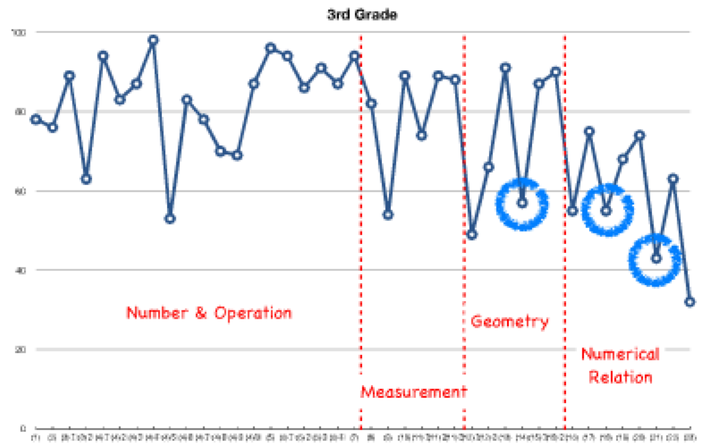
	Tottori Prefecture (%)	National Average(%)
Elementary Math A	78.1	77.3
Elementary Math B	60.2	58.6

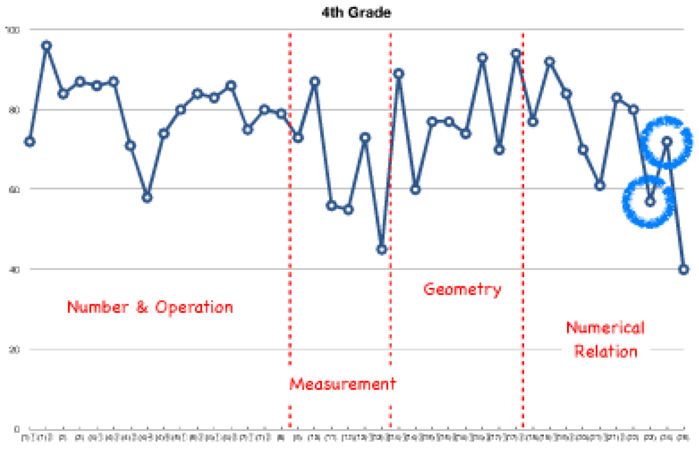
Problems for examining the thinking process

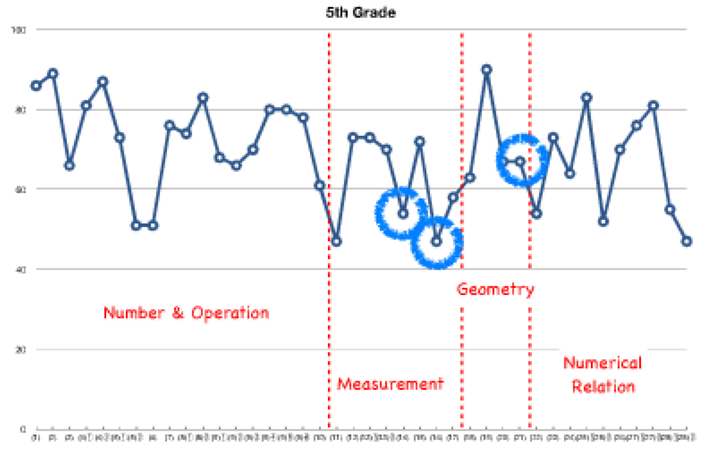
Although each Test problem requires only the answer basically, "problems for examining the thinking process" require describing the thinking process by an indication: "Let's leave your writing/trajectory of thought."

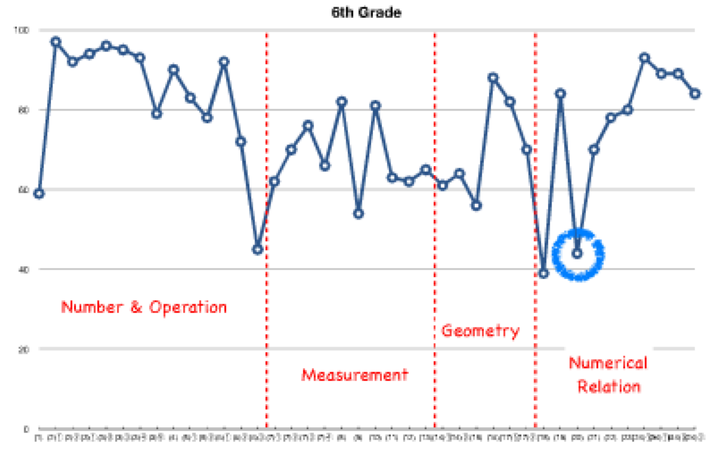

1st Grade
Number & Operation
Measurement
Geometry
Numerical Relation

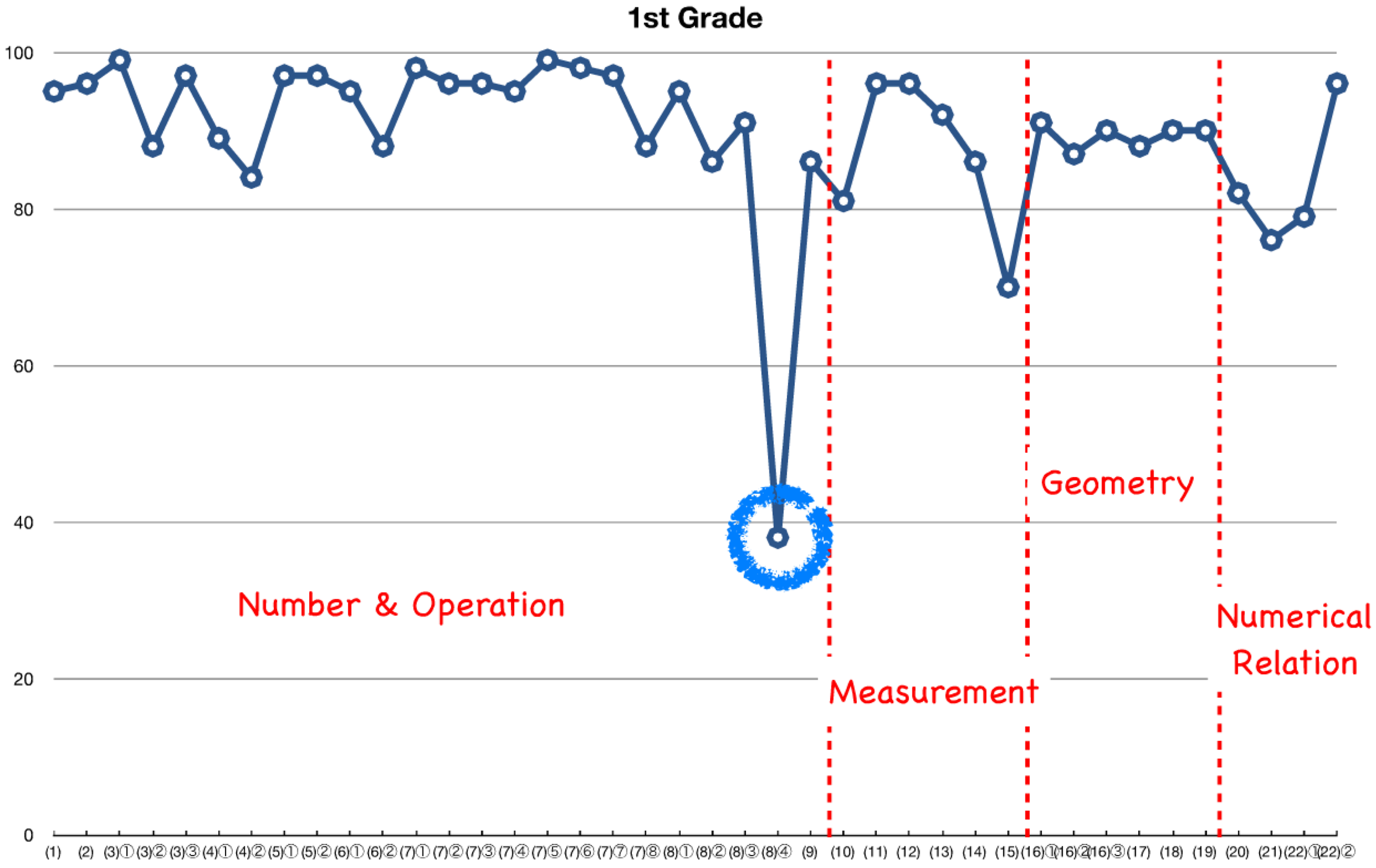

2nd Grade
Number & Operation
Measurement
Geometry
Numerical Relation


3rd Grade
Number & Operation
Measurement
Geometry
Numerical Relation


4th Grade
Number & Operation
Measurement
Geometry
Numerical Relation


5th Grade
Number & Operation
Measurement
Geometry
Numerical Relation


6th Grade
Number & Operation
Measurement
Geometry
Numerical Relation


1st Grade
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Number & Operation
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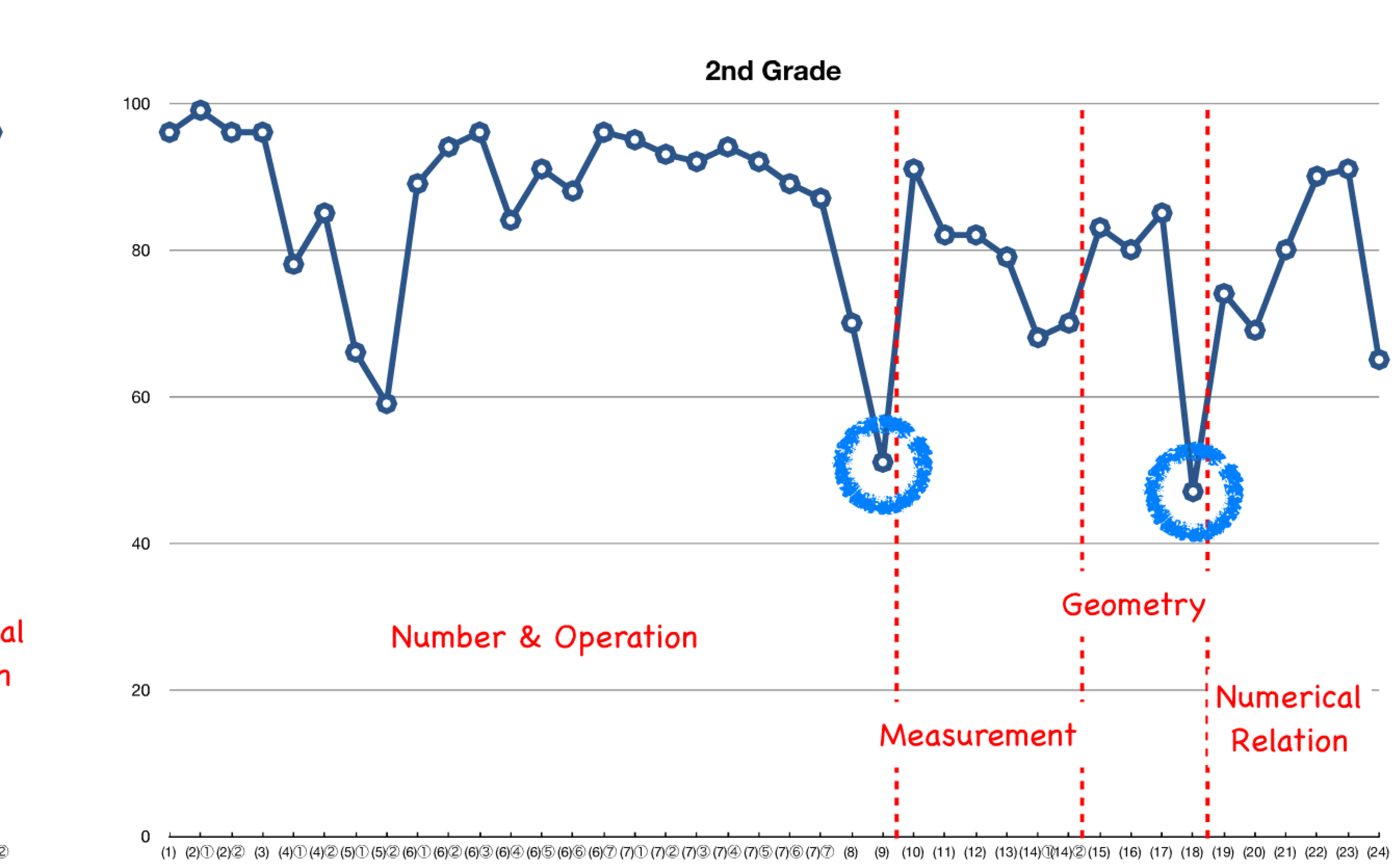
2nd Grade
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Number & Operation
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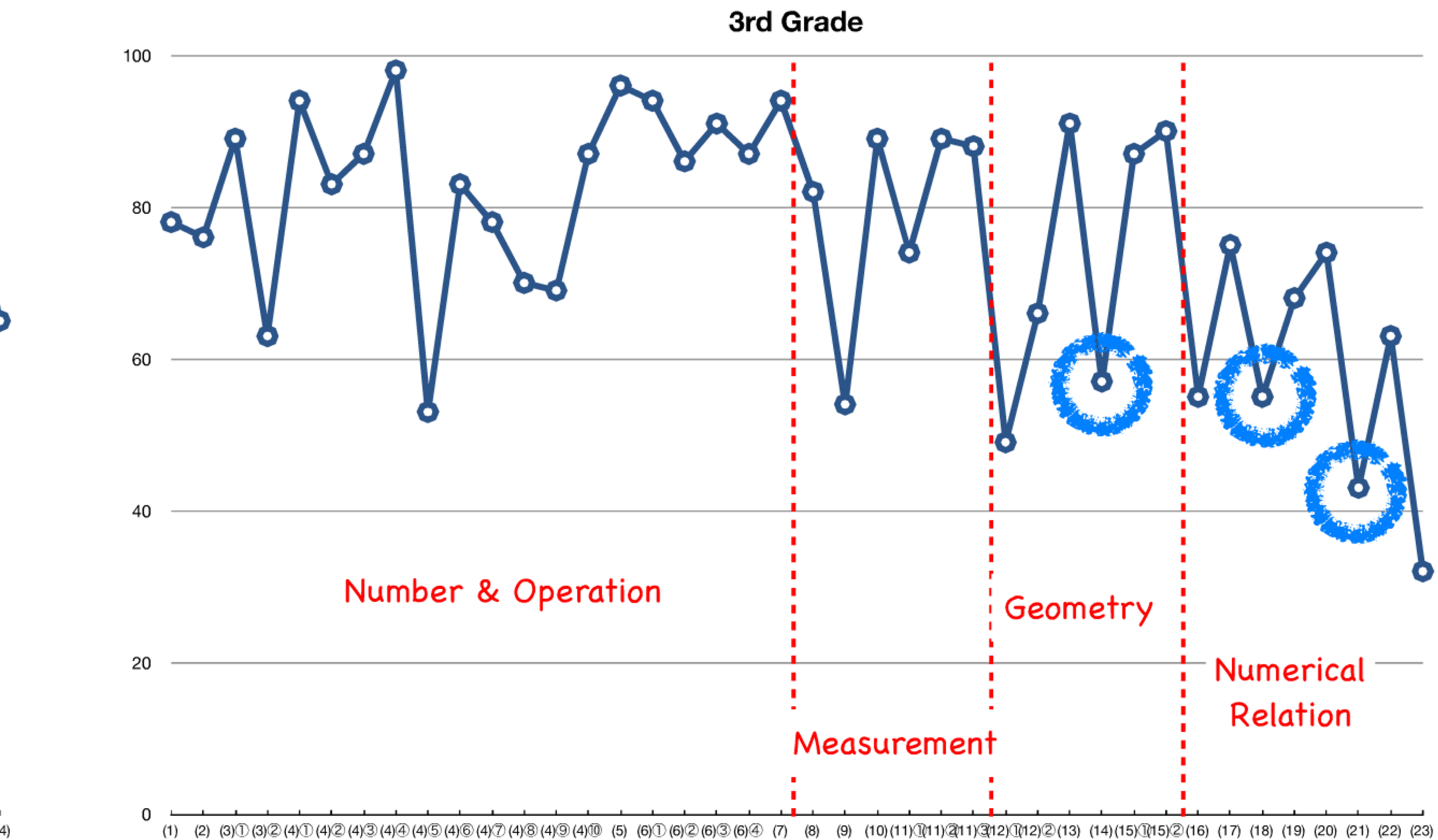
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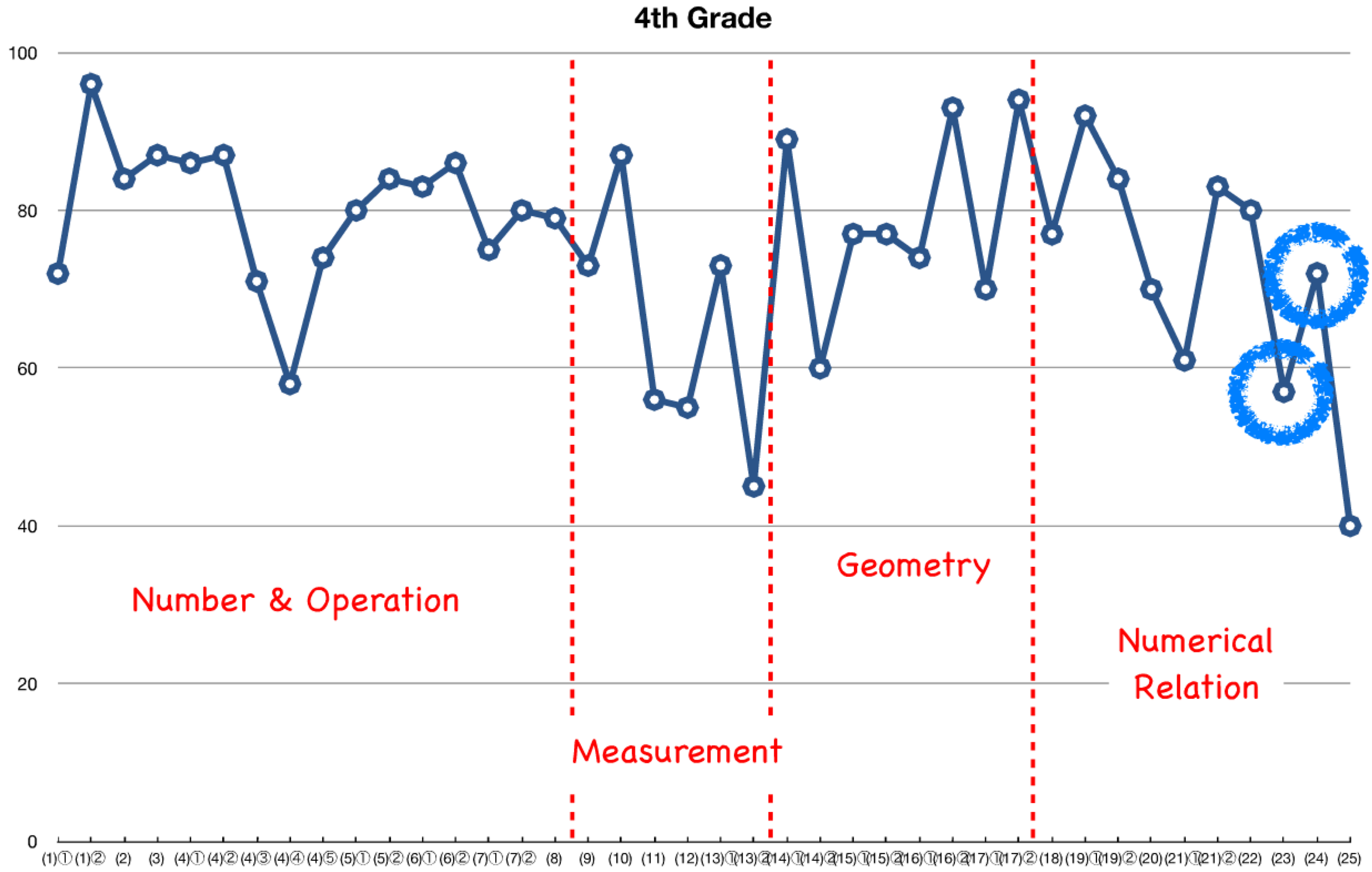
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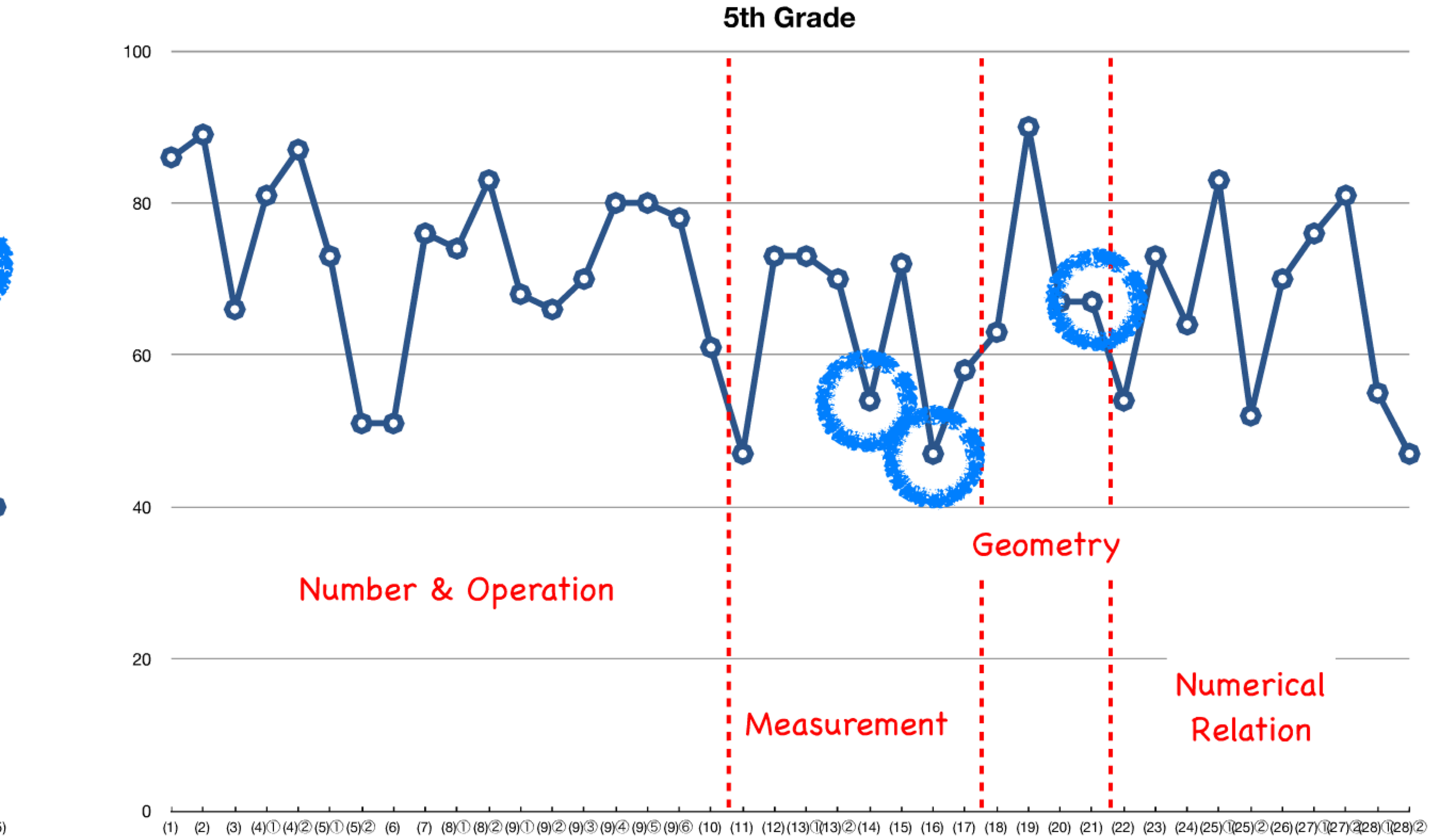
5th Grade
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Geometry
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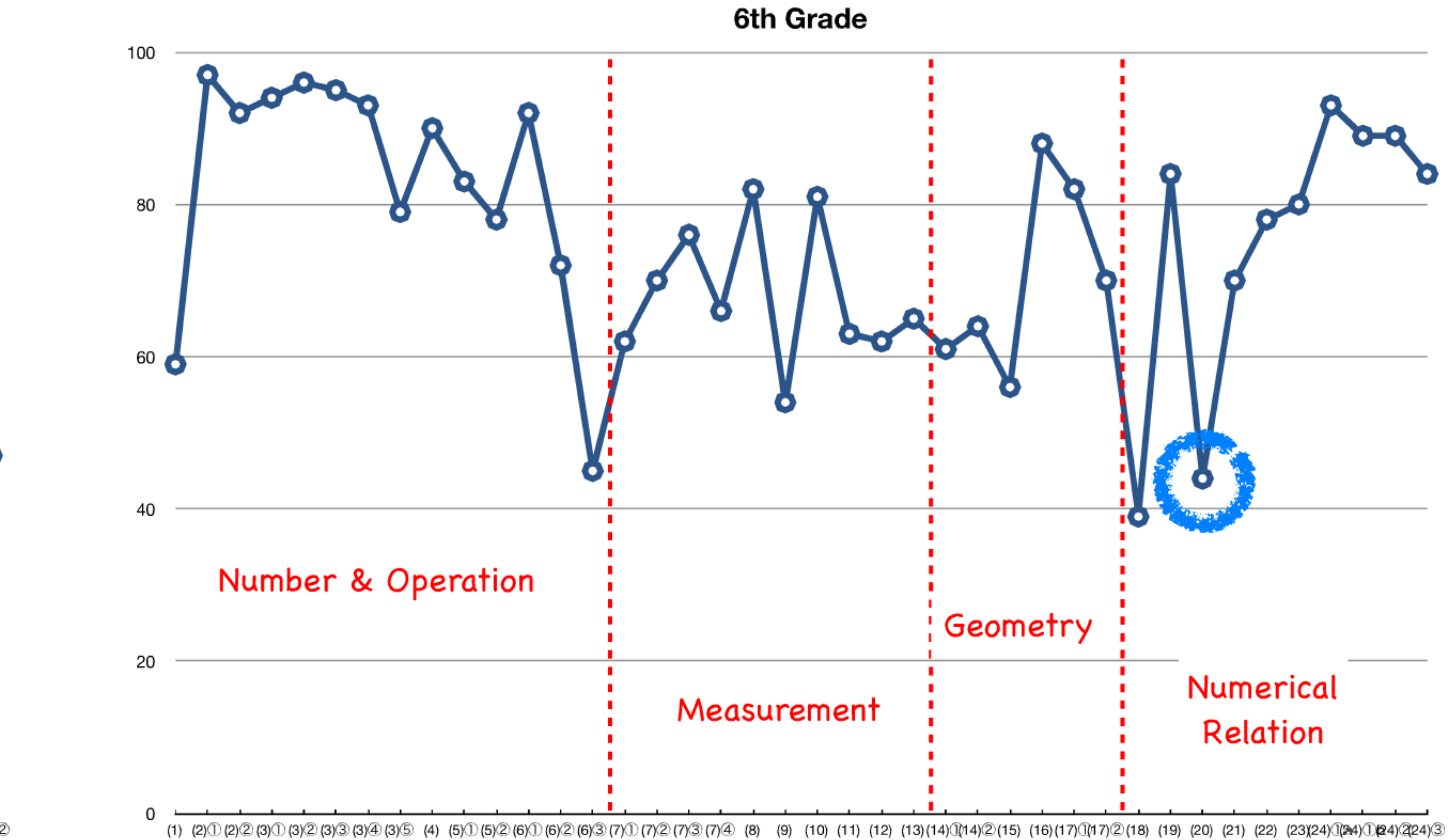
6th Grade
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Number & Operation
Measurement
Geometry
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Problem of 1st Grade

Prob. No.	Problem	Ave. of correct answer (%) 2012	2013	**2014**	Errors (Rate to the whole errors)
(8) ④	When distributing 12 pencils by one for one person, 5 pencils are left. When 10 pencils, how many pencils are left?	39	39	**38**	1. 7 (29%) 2. 5 (29%) 3. 2 (14%) 4. others (14%) 5. no answer (14%)

Intention of the Problem

- To find the unknown number from the given condition;
- To identify the number of pencils and persons;
- To represent a problem situation with a diagram or a picture.

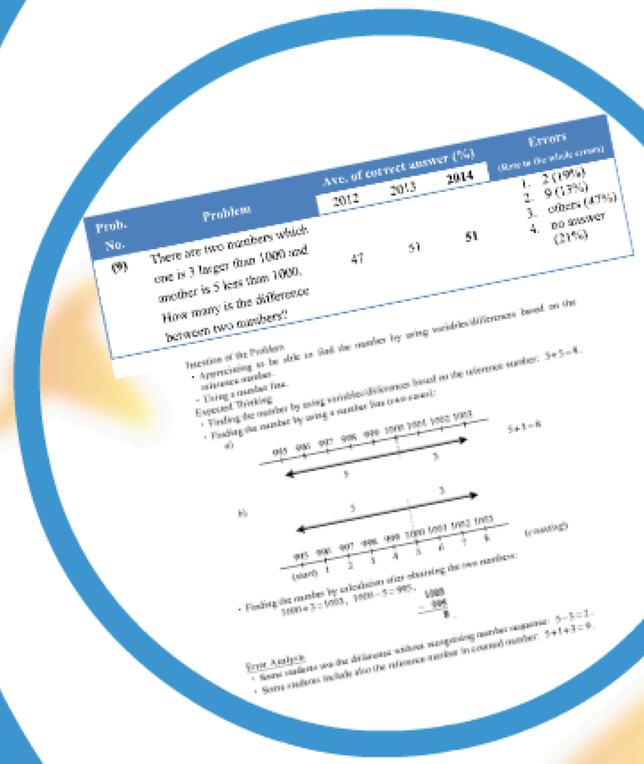
Expected Thinking

- Finding the distributed number of the pencils by subtracting the number of remainders from the number of the beginning. This number is the number of people. Then, subtracting the number of pencils to distribute to seven persons from ten: $12-5=7$, $10-7=3$.
- Finding the difference of the number of pencils between the first and the second situation. Since the two small pencil in the second situation, the number of remaining pencils also become two small: $12-10=2$, $5-2=3$

Error Analysis

- Some students can't do two-step thinking, they finish problem solving by finding the number of distributed pencils: $12-5=7$.
- Some students subtract five remainders from ten pencils: $10-5=5$.
- Some students misread the problem as "how many pencils remain when distributing 10 from 12?": $12-10=2$.

Problems of 2nd Grade



Prob. No.	Problem	Ave. of correct answer (%) 2012	2013	2014	Errors (Rate to the whole errors)
(9)	There are two numbers which one is 3 larger than 1000 and another is 5 less than 1000. How many is the difference between two numbers?	47	53	51	1. 2 (19%) 2. 9 (13%) 3. others (47%) 4. no answer (21%)

Intention of the Problem
- Appreciating to be able to find the number by using variables/differences based on the reference number.
- Using a number line.

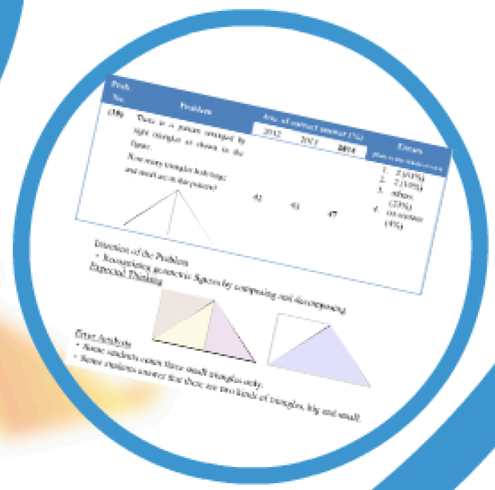
Expected Thinking
- Finding the number by using variables/differences based on the reference number: $5+3=8$.
- Finding the number by using a number line (two cases):

a)

b)

- Finding the number by calculation after obtaining the two numbers:
  $1000+3=1003$, $1000-5=995$; $1003-995=8$.

Error Analysis
- Some students use the difference without recognizing number sequence: $5-3=2$.
- Some students include also the reference number in counted number: $5+1+3=9$.



Prob. No.	Problem	Ave. of correct answer (%) 2012	2013	2014	Errors (Rate to the whole errors)
(10)	There is a picture arranged by right triangles as shown to the figure. How many triangles both big and small are in the picture?	42	43	47	1. 2 (10%) 2. 2 (10%) 3. others (23%) 4. no answer (45%)

Intention of the Problem
- Recognizing geometric figures by composing and decomposing.

Expected Thinking

Error Analysis
- Some students count three small triangles only.
- Some students answer that there are two kinds of triangles, big and small.

Prob. No.	Problem	Ave. of correct answer (%)			Errors (Rate to the whole errors)
		2012	2013	**2014**	
(9)	There are two numbers which one is 3 larger than 1000 and another is 5 less than 1000. How many is the difference between two numbers?	47	51	**51**	1. 2 (19%) 2. 9 (13%) 3. others (47%) 4. no answer (21%)

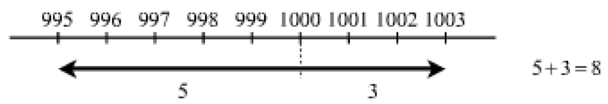
Intention of the Problem

- Appreciating to be able to find the number by using variables/differences based on the reference number.
- Using a number line.

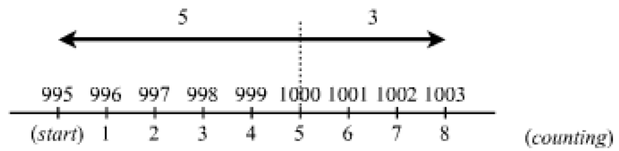
Expected Thinking

- Finding the number by using variables/differences based on the reference number: $3+5=8$.
- Finding the number by using a number line (two cases):

a)



b)

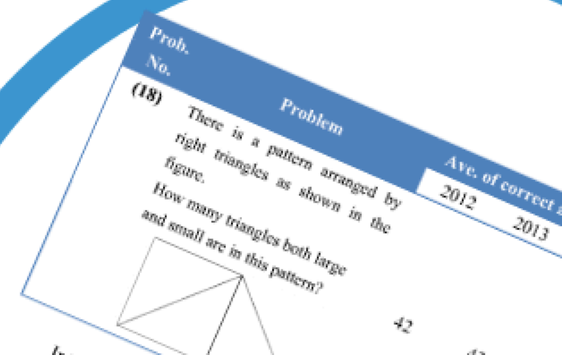


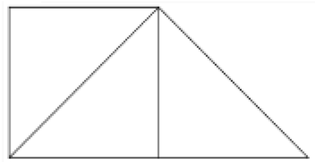
- Finding the number by calculation after obtaining the two numbers:
  $1000+3=1003$, $1000-5=995$,

$$\begin{array}{r} 1003 \\ -\ 995 \\ \hline 8 \end{array}.$$

Error Analysis

- Some students use the difference without recognizing number sequence: $5-3=2$.
- Some students include also the reference number in counted number: $5+1+3=9$.

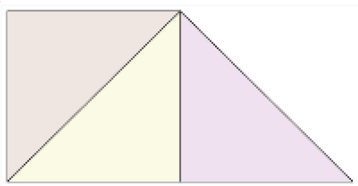
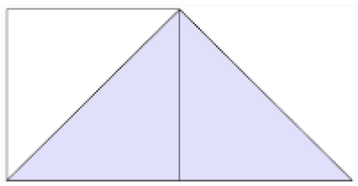


Prob. No.	Problem	Ave. of correct answer (%) 2012	2013	**2014**	Errors (Rate to the whole errors)
(18)	There is a pattern arranged by right triangles as shown in the figure. How many triangles both large and small are in this pattern? 	42	43	**47**	1. 3 (63%) 2. 2 (10%) 3. others (23%) 4. no answer (4%)

Intention of the Problem

- Recognizing geometric figures by composing and decomposing.

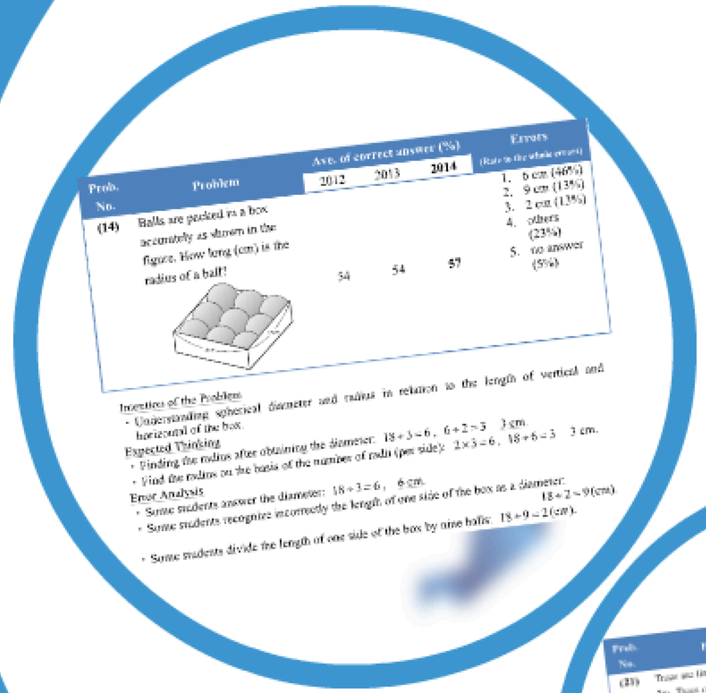
Expected Thinking

Error Analysis

- Some students count three small triangles only.
- Some students answer that there are two kinds of triangles, big and small.

Problems of 3rd Grade

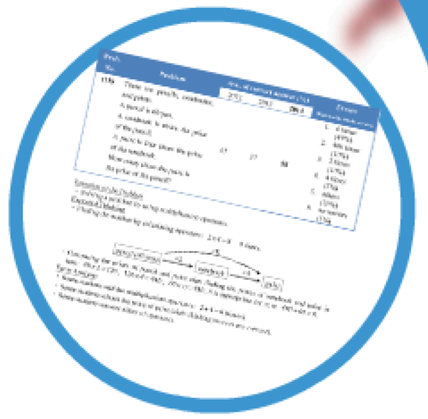


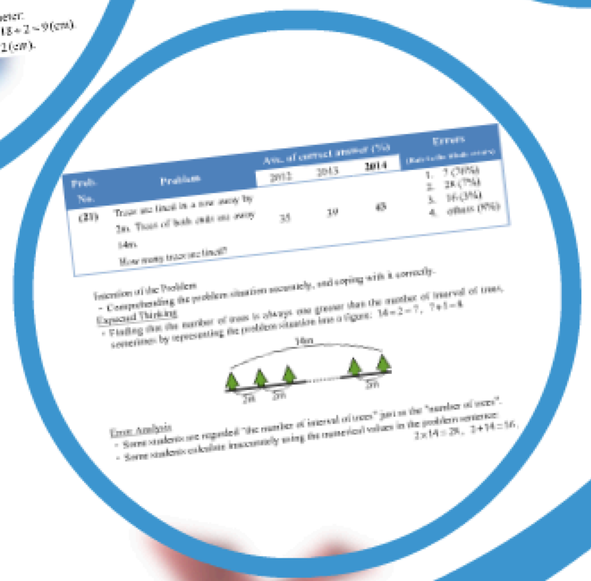
Prob. No.	Problem	Ave. of correct answers (%) 2012	2013	2014	Errors (Rate to the whole errors)
(14)	Balls are packed in a box accurately as shown in the figure. How long (cm) is the radius of a ball?	54	54	57	1. 6 cm (46%) 2. 9 cm (13%) 3. 2 cm (13%) 4. others (23%) 5. no answer (5%)

Intention of the Problem
- Understanding spherical diameter and radius in relation to the length of vertical and horizontal of the box.

Expected Thinking
- Finding the radius after obtaining the diameter: $18 \div 3 = 6$, $6 \div 2 = 3$ 3 cm.
- Find the radius on the basis of the number of radii (per side): $2 \times 3 = 6$, $18 \div 6 = 3$ 3 cm.

Error Analysis
- Some students answer the diameter: $18 \div 3 = 6$, 6 cm.
- Some students recognize incorrectly the length of one side of the box as a diameter: $18 \div 2 = 9$ (cm).
- Some students divide the length of one side of the box by nine balls: $18 \div 9 = 2$ (cm).



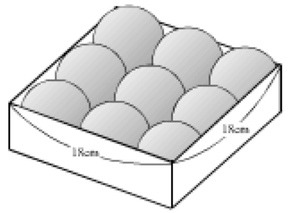


Prob. No.	Problem	Ave. of correct answer (%) 2012	2013	2014	Errors (Rate to the whole errors)
(21)	Trees are lined in a row away by 2m. Those of both ends are away 14m. How many trees are lined?	35	39	45	1. 7 (30%) 2. 28 (7%) 3. 16 (3%) 4. others (9%)

Intention of the Problem
- Comprehending the problem situation accurately, and coping with it correctly.

Expected Thinking
- Finding that the number of trees is always one greater than the number of interval of trees, sometimes by representing the problem situation into a figure: $14 \div 2 = 7$, $7+1=8$

Error Analysis
- Some students are regarded "the number of interval of trees" just as the "number of trees".
- Some students calculate inaccurately using the numerical values in the problem sentence: $2 \times 14 = 28$, $2+14=16$.

Prob. No.	Problem	Ave. of correct answer (%) 2012	2013	**2014**	Errors (Rate to the whole errors)
(14)	Balls are packed in a box accurately as shown in the figure. How long (cm) is the radius of a ball? 	54	54	**57**	1. 6 cm (46%) 2. 9 cm (13%) 3. 2 cm (13%) 4. others (23%) 5. no answer (5%)

Intention of the Problem

- Understanding spherical diameter and radius in relation to the length of vertical and horizontal of the box.

Expected Thinking

- Finding the radius after obtaining the diameter: $18 \div 3 = 6$, $6 \div 2 = 3$ 3 cm.
- Find the radius on the basis of the number of radii (per side): $2 \times 3 = 6$, $18 \div 6 = 3$ 3 cm.

Error Analysis

- Some students answer the diameter: $18 \div 3 = 6$, 6 cm.
- Some students recognize incorrectly the length of one side of the box as a diameter: $18 \div 2 = 9$ (cm).
- Some students divide the length of one side of the box by nine balls: $18 \div 9 = 2$ (cm).

Prob. No.	Problem	Ave. of correct answer (%) 2012	2013	**2014**

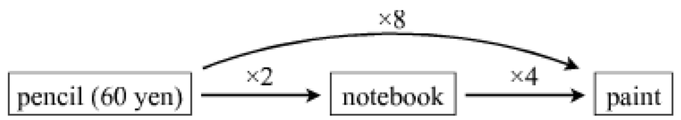
Prob. No.	Problem	Ave. of correct answer (%) 2012	2013	**2014**	Errors (Rate to the whole errors)
(18)	There are pencils, notebooks, and paints. A pencil is 60 yen. A notebook is twice the price of the pencil. A paint is four times the price of the notebook. How many times the paint is the price of the pencil?	57	57	**55**	1. 6 times (44%) 2. 480 times (10%) 3. 2 times (10%) 4. 4 times (5%) 5. others (26%) 6. no answer (5%)

Intention of the Problem

- Solving a problem by using multiplication operators.

Expected Thinking

- Finding the number by calculating operators: $2 \times 4 = 8$ 8 times.



- Comparing the prices of pencil and paint after finding the prices of notebook and paint in turn: $60 \times 2 = 120$, $120 \times 4 = 480$, $60 \times \square = 480$, 8 is appropriate for $\square$; or $480 \div 60 = 8$.

Error Analysis

- Some students add the multiplication operators: $2 + 4 = 6$ (times).
- Some students obtain the price of paint (*their thinking process are correct*).
- Some students answer either of operators.

18 ÷ 2 = 9 (cm).

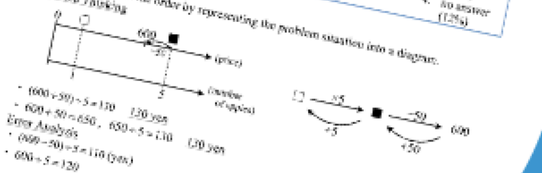
e side of the box by nine balls: 18 ÷ 9 = 2 (cm).

Problems of 4th Grade

Prob. No.	Problem	Ave. of correct answer (%) 2012	2013	2014	Errors (Rate to the whole errors)
(23)	I bought five apples. I paid 600 yen because the price was cut by 50 yen. How much was an apple?	58	59	57	1. 710 yen (24%) 2. 120 yen (15%) 3. others (40%) 4. no answer (12%)

Intention of the Problem
- Thinking back in the order by representing the problem situation into a diagram.

Expected Thinking



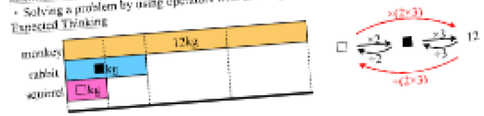
- $(600+50)\div5=130$ 130 yen
- $600+50=650$, $650\div5=130$ 130 yen

Error Analysis
- $(600-50)\div5=110$ (yen)
- $600\div5=120$

Prob. No.	Problem	Ave. of correct answer (%) 2012	2013	2014	Errors (Rate to the whole errors)
(24)	The monkey weighs 12 kg, and is three times the weight of the rabbit. The weigh of the rabbit is twice the weight of the squirrel. How many kg does the squirrel weigh?	72	74	72	1. 72 kg (25%) 2. 4 kg (12%) 3. others (38%) 4. no answer (25%)

Intention of the Problem
- Solving a problem by using operators with drawing diagrams.

Expected Thinking



- $12\div3=4$, $4\div2=2$ 2 kg
- $12\div(2\times3)=2$ 2 kg

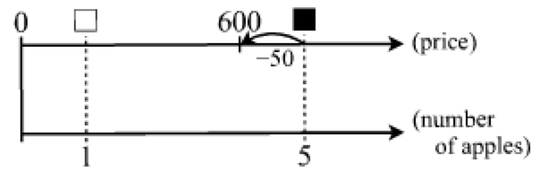
Error Analysis
- Some students can't represent the problem situation into a diagram or a figure, and consequently they do incorrect calculation variously with using the numerical values of the problem sentences: $12\times3\times2=72$, $12\div3=4$, $12-3-2=7$.

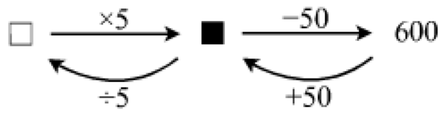
Prob. No.	Problem	Ave. of correct answer (%) 2012	2013	**2014**	Errors (Rate to the whole errors)
(23)	I bought five apples. I paid 600 yen because the price was cut by 50 yen. How much was an apple?	58	59	**57**	1. 110 yen (24%) 2. 120 yen (15%) 3. others (49%) 4. no answer (12%)

Intention of the Problem

・ Thinking back to the order by representing the problem situation into a diagram.

Expected Thinking





・ $(600+50)\div 5=130$ 130 yen

・ $600+50=650$, $650\div 5=130$ 130 yen

Error Analysis

・ $(600-50)\div 5=110$ (yen)

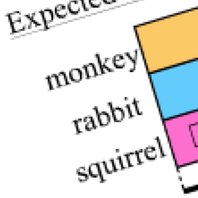
・ $600\div 5=120$

Prob. No.	Problem
(24)	The monkey weigh… is three times the… rabbit. The weig… is twice the … squirrel. How many k… weigh?

Intention of the Pr…

・ Solving a prob…

Expected Thinki…



・ $12\div 3$…

・ $12\div($…

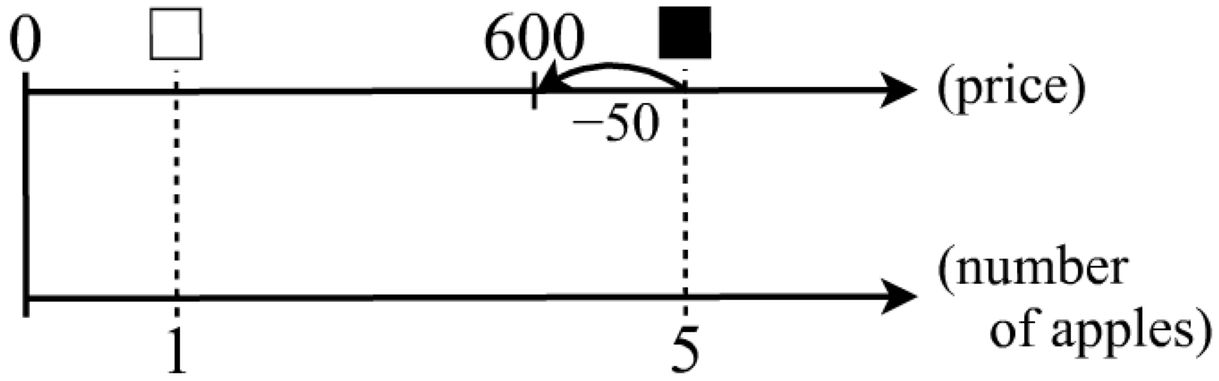
Error A…

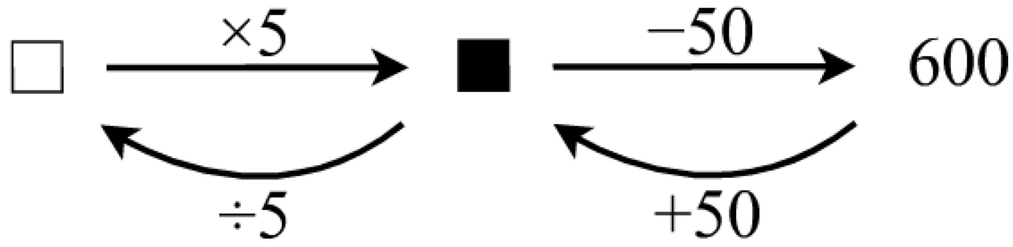
4. no answer (12%)

Intention of the Problem

- Thinking back to the order by representing the problem situation into a diagram.

Expected Thinking





- $(600+50)\div 5=130$ 130 yen
- $600+50=650$, $650\div 5=130$ 130 yen

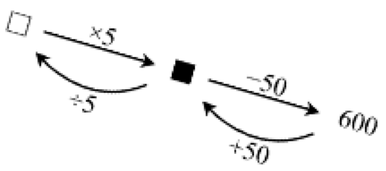
Error Analysis

- $(600-50)\div 5=110$ (yen)
- $600\div 5=120$

57

2. 120 yen (15%)
3. others (49%)
4. no answer (12%)

roblem situation into a diagram.

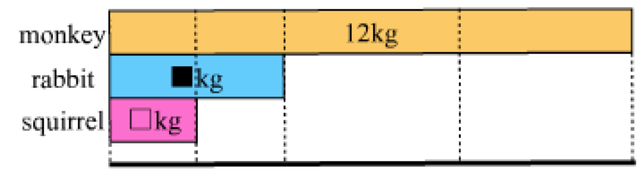


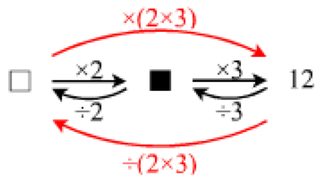
Prob. No.	Problem	Ave. of correct answer (%) 2012	2013	**2014**	Errors (Rate to the whole errors)
(24)	The monkey weighs 12 kg, and is three times the weight of the rabbit. The weight of the rabbit is twice the weight of the squirrel. How many kg does the squirrel weigh?	72	74	**72**	1. 72 kg (25%) 2. 4 kg (12%) 3. others (38%) 4. no answer (25%)

Intention of the Problem

・ Solving a problem by using operators with drawing diagrams.

Expected Thinking





・ $12 \div 3 = 4$, $4 \div 2 = 2$ 2 kg

・ $12 \div (2 \times 3) = 2$ 2 kg

Error Analysis

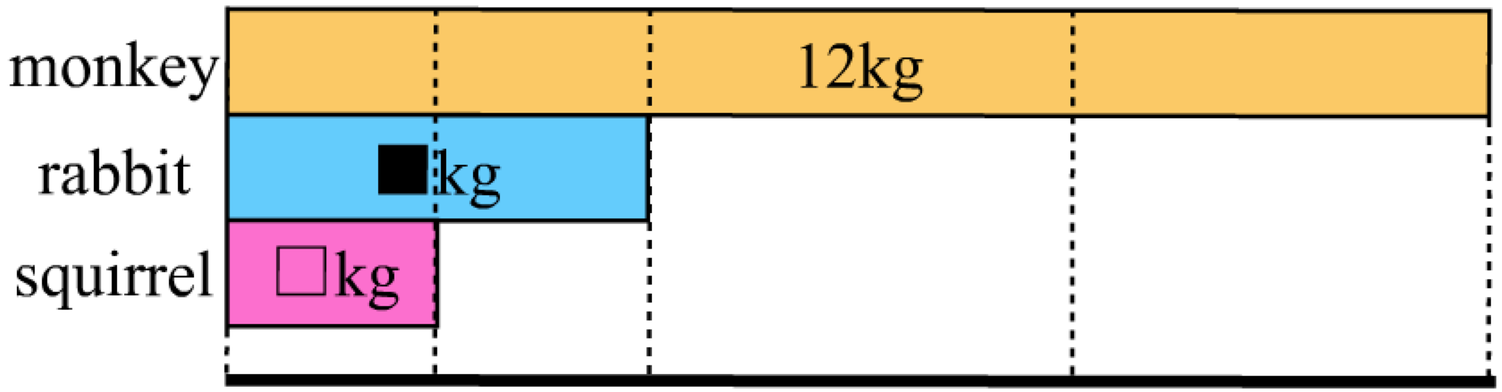
・ Some students can't represent the problem situation into a diagram or a figure, and consequently they do incorrect calculation variously with using the numerical values of the problem sentence: $12 \times 3 \times 2 = 72$, $12 \div 3 = 4$, $12 - 3 - 2 = 7$.

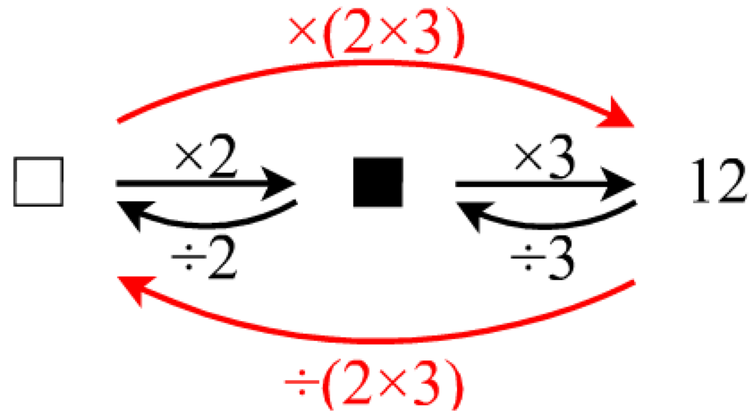
weigh?

Intention of the Problem

- Solving a problem by using operators with drawing diagrams.

Expected Thinking



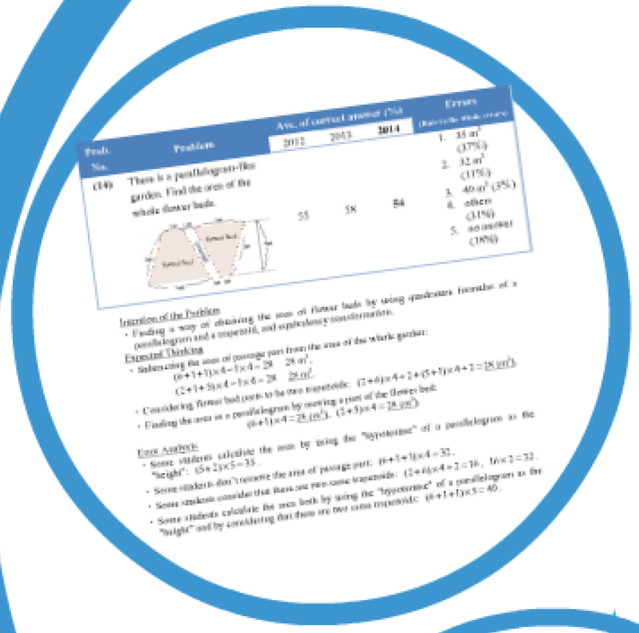


- $12 \div 3 = 4$, $4 \div 2 = 2$ 2 kg
- $12 \div (2 \times 3) = 2$ 2 kg

Error Analysis

- Some students can't represent the problem situation into a diagram or a figure, and consequently they do incorrect calculation variously with using the numerical values of the problem sentence: $12 \times 3 \times 2 = 72$, $12 \div 3 = 4$, $12 - 3 - 2 = 7$.

Problems of 5th Grade

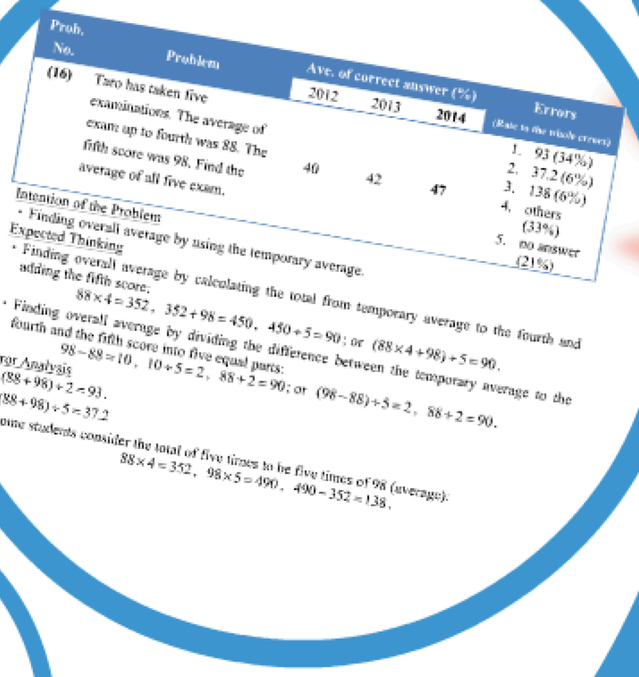


Prob. No.	Problem	Ave. of correct answer (%) 2012	2013	2014	Errors (Rate to the whole errors)
(14)	There is a parallelogram-like garden. Find the area of the whole flower beds.	55	58	84	1. 35 m² (37%) 2. 32 m² (11%) 3. 40 m² (3%) 4. others (31%) 5. no answer (18%)

Intention of the Problem
- Finding a way of obtaining the area of flower beds by using quadrature formulas of a parallelogram and a trapezoid, and equivalency transformation.

Expected Thinking
- Subtracting the areas of passage ways from the area of the whole garden:
  $(6+1+1)\times 4-1\times 4=28$ $28\ (m^2)$.
  $(2+1+3)\times 4-1\times 4=28$ $28\ (m^2)$.
- Considering flower bed parts to be two trapezoids: $(2+6)\times 4\div 2+(5+3)\times 4\div 2=\underline{\underline{18\ (m^2)}}$.
- Finding the area as a parallelogram by moving a part of the flower bed:
  $(6+1)\times 4=\underline{\underline{28\ (m^2)}}$, $(2+5)\times 4=\underline{\underline{28\ (m^2)}}$.

Error Analysis:
- Some students calculate the area by using the "upstairs" of a parallelogram as the "height": $(5+2)\times 5=35$.
- Some students don't remove the area of passage part: $(6+1+1)\times 4=32$, $16\times 2=32$.
- Some students consider that there are two same trapezoids: $(2+6)\times 4\div 2=16$, $16\times 2=32$.
- Some students calculate the area both by using the "hypotenuse" of a parallelogram as the "height" and by considering that there are two same trapezoids: $(6+1+1)\times 5=40$.

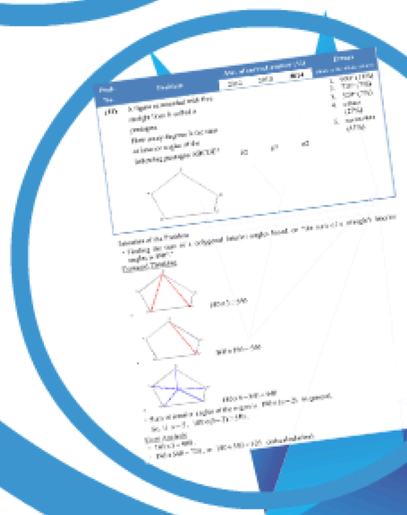


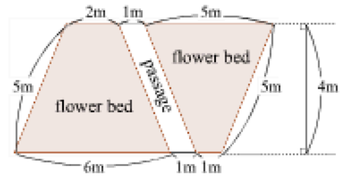
Prob. No.	Problem	Ave. of correct answer (%) 2012	2013	2014	Errors (Rate to the whole errors)
(16)	Taro has taken five examinations. The average of exam up to fourth was 88. The fifth score was 98. Find the average of all five exam.	40	42	47	1. 93 (34%) 2. 37.2 (6%) 3. 138 (6%) 4. others (33%) 5. no answer (21%)

Intention of the Problem
- Finding overall average by using the temporary average.

Expected Thinking
- Finding overall average by calculating the total from temporary average to the fourth and adding the fifth score:
  $88\times 4=352$, $352+98=450$, $450\div 5=90$; or $(88\times 4+98)\div 5=90$.
- Finding overall average by dividing the difference between the temporary average to the fourth and the fifth score into five equal parts:
  $98-88=10$, $10\div 5=2$, $88+2=90$; or $(98-88)\div 5=2$, $88+2=90$.

Error Analysis
- $(88+98)\div 2=93$.
- $(88+98)\div 5=37.2$
- Some students consider the total of five times to be five times of 98 (average):
  $88\times 4=352$, $98\times 5=490$, $490-352=138$.



Prob. No.	Problem	Ave. of correct answer (%)			Errors (Rate to the whole errors)
		2012	2013	**2014**	
(14)	There is a parallelogram-like garden. Find the area of the whole flower beds. 	55	58	**54**	1. 35 m^2 (37%) 2. 32 m^2 (11%) 3. 40 m^2 (3%) 4. others (31%) 5. no answer (18%)

Intention of the Problem

- Finding a way of obtaining the area of flower beds by using quadrature formulas of a parallelogram and a trapezoid, and equivalency transformation.

Expected Thinking

- Subtracting the area of passage part from the area of the whole garden:
  $(6+1+1)\times 4-1\times 4=28$ $\underline{28\ m^2}$,
  $(2+1+5)\times 4-1\times 4=28$ $\underline{28\ m^2}$.
- Considering flower bed parts to be two trapezoids: $(2+6)\times 4\div 2+(5+1)\times 4\div 2=\underline{28\ (m^2)}$.
- Finding the area as a parallelogram by moving a part of the flower bed:
  $(6+1)\times 4=\underline{28\ (m^2)}$, $(2+5)\times 4=\underline{28\ (m^2)}$.

Error Analysis

- Some students calculate the area by using the "hypotenuse" of a parallelogram as the "height": $(5+2)\times 5=35$.
- Some students don't remove the area of passage part: $(6+1+1)\times 4=32$.
- Some students consider that there are two same trapezoids: $(2+6)\times 4\div 2=16$, $16\times 2=32$.
- Some students calculate the area both by using the "hypotenuse" of a parallelogram as the "height" and by considering that there are two same trapezoids: $(6+1+1)\times 5=40$.

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Prob. No.	Problem	Ave. of correct answer (%) 2012	2013	**2014**	Errors (Rate to the whole errors)
(16)	Taro has taken five examinations. The average of exam up to fourth was 88. The fifth score was 98. Find the average of all five exam.	40	42	**47**	1. 93 (34%) 2. 37.2 (6%) 3. 138 (6%) 4. others (33%) 5. no answer (21%)

Intention of the Problem

・ Finding overall average by using the temporary average.

Expected Thinking

・ Finding overall average by calculating the total from temporary average to the fourth and

Errors
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1. 35 m² (37%)
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$98-88=10$, $10\div5=2$, $88+2=90$; or $(98-88)\div5=2$, $88+2=90$.

is

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garden:

$\times4\div2+(5+1)\times4\div2=28$ (m²).

e flower bed:

28 (m²).

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$(6+1+1)\times4=32$.

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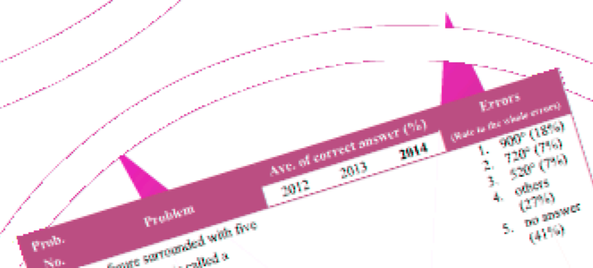
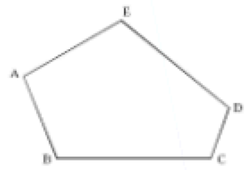
9

Error Analysi
・ $(88+98)\div$
・ $(88+98)\div$
・ Some stud

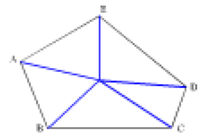


Prob. No.	Problem	Ave. of correct answer (%) 2012	2013	2014	Errors (Rate to the whole errors)
(21)	A figure surrounded with five straight lines is called a pentagon. How many degrees is the sum of interior angles of the following pentagon ABCDE? 	62	67	**67**	1. 900° (18%) 2. 720° (7%) 3. 520° (7%) 4. others (27%) 5. no answer (41%)

Intention of the Problem

- Finding the sum of a polygonal interior angles based on "the sum of a triangle's interior angles is 180°."

Expected Thinking

-  $180\times3=540$
-  $360+180=540$
-  $180\times5-360=540$
- Sum of interior angles of the n-gon is $180\times(n-2)$ in general. So, if $n=5$, $180\times(5-2)=540$.

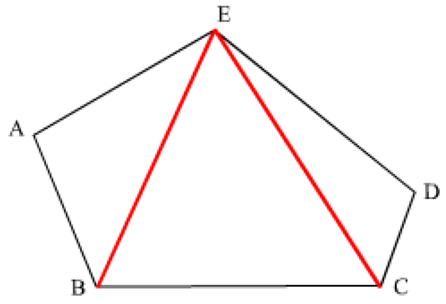
Error Analysis

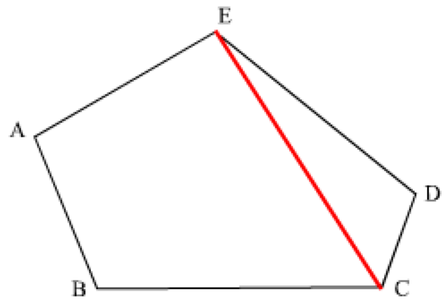
- $180\times5=900$.
- $180+540=720$, or $180+540=520$ (miscalculation).

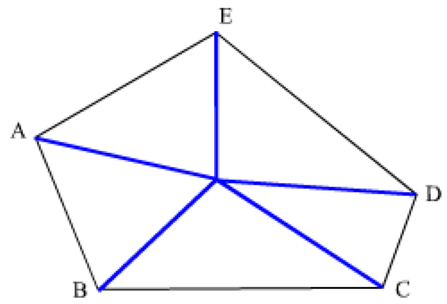
Intention of the Problem

- Finding the sum of a polygonal interior angles based on “the sum of a triangle's interior angles is 180°.”

Expected Thinking

- 

$180\times3=540$
- 

$360+180=540$
- 

$180\times5-360=540$
- Sum of interior angles of the n-gon is $180\times(n-2)$ in general.
  So, if $n=5$, $180\times(5-2)=540$.

Error Analysis

- $180\times5=900$.
- $180+540=720$, or $180+540=520$ (miscalculation).

Problem of 6th Grade

Prob. No.	Problem	Ave. of correct answer (%) 2012	2013	**2014**	Errors (Rate to the whole errors)
(20)	T-shirt of 1200 yen has become to 960 yen at the bargain sale. What percent discounts?	40	45	**44**	1. 80 % (50%) 2. 1.25% (9%) 3. 125% (7%) 4. 5% (5%) 5. others (28%) 6. no answer (18%)

Intention of the Problem

- Understanding the proportion.

Expected Thinking

- $1280-960=240$, $240\div1200=0.2$, $0.2\times100=20\ (\%)$.
- $960\div1200=0.8$, $1-0.8=0.2$, $0.2\times100=20\ (\%)$.

Error Analysis

- $960\div1200=0.8$, $0.8\times100=80$.
- $1200\div960=1.25$; $1.25\times100=125$.
- $1200-960=240$, $1200\div240=5$.

- The efforts of preparing, implementing, and analyzing the regional assessment test by teachers groups contribute to their professional development, especially in terms of mathematical content knowledge study “kyozai-kenkyu.”
- Furthermore, such a test is also effective for improvement of teaching in the classroom.

- The teachers groups have difficulty for "the development of new problems.”
- If an international database of math problems is developed, it is hoped that it helps the solution to such difficulties.

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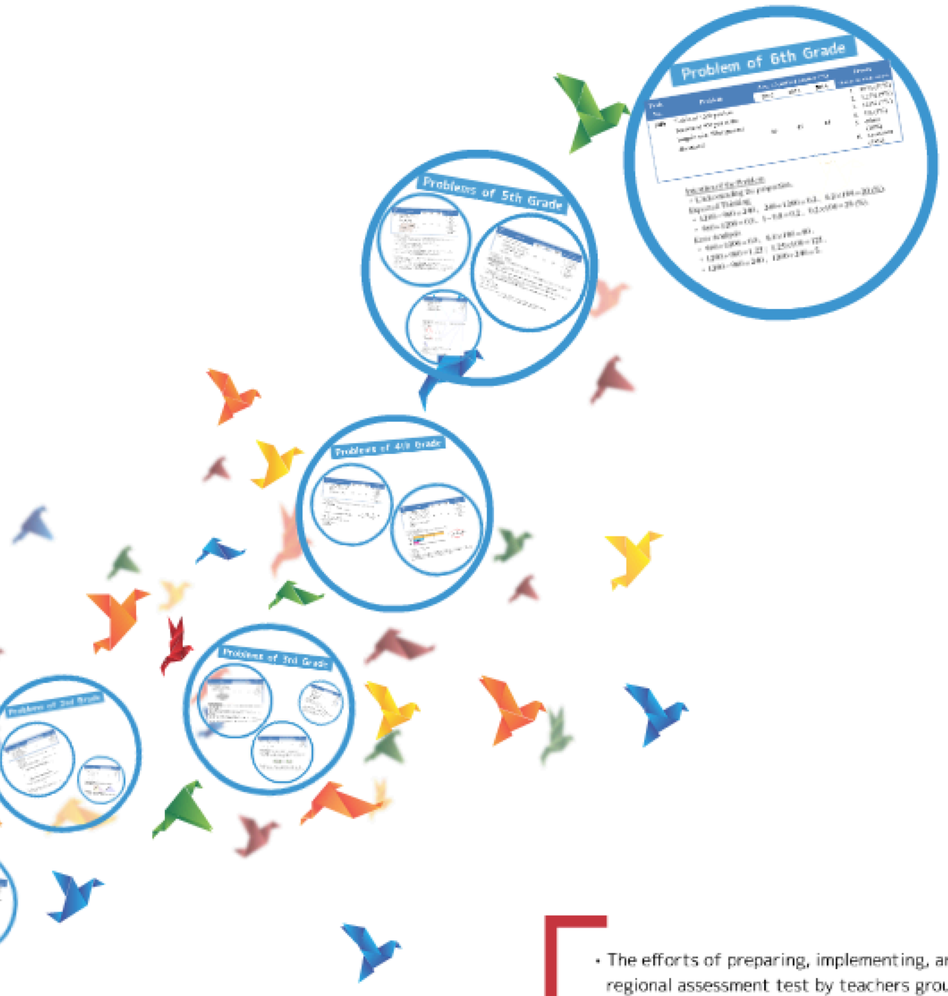
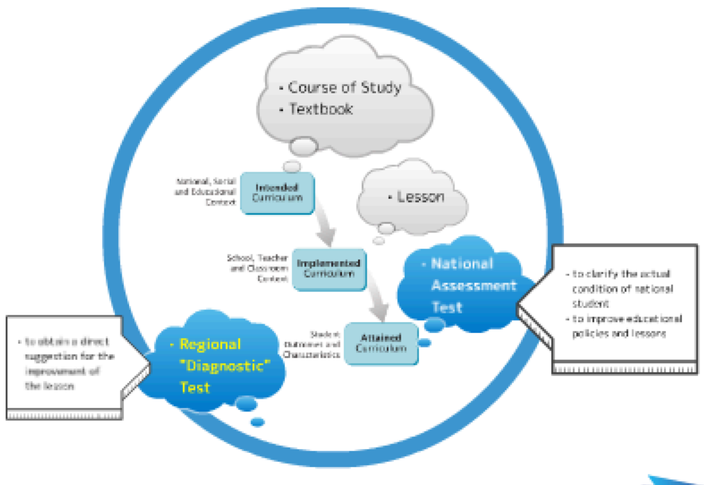
OPEN ENVIRONMENT
FOR WORLDWIDE MATHEMATICAL EDUCATION
Moscow, Russia • 8–11 April 2015

Japanese Elementary School Students Math Performance:
A Case of Tottori Prefecture regional "Math Diagnostic Test"

Tatsuya Mizoguchi Tottori University, Japan
Yusuke Shinno Osaka Kyoiku University, Japan





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