



Individual Knowledge Assessment of Number (IKAN)

Administration and Scoring Manual

Foundations of Algebra



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"Educating Georgia's Future"

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Disclaimer: The *Individual Knowledge Assessment of Number (IKAN)* was created by the New Zealand’s Ministry of Education. The *Individual Knowledge Assessment of Number* is one part of New Zealand’s Numeracy Project. Documents included within this manual have been adapted from <http://nzmaths.co.nz/numeracy-projects> .

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Preface

As students enter high school, their mathematical reasoning should be grounded in a deep understanding of number that is composed of both strategy and knowledge. The application of number knowledge and mental strategies is often described as “number sense”. Strongly developed number sense facilitates student construction of algebraic reasoning. This manual explains the use of the Individual Knowledge Assessment of Number (IKAN), one of the Numeracy Project’s (see next paragraph) formative assessments, which helps determine number knowledge stage.

The Individual Knowledge Assessment of Number (IKAN) is one of *two* assessments that compose the diagnostic, formative, and summative portion of the New Zealand Numeracy Project. The other is the Global Strategy Stages (GLoSS) assessment (see pages 17 and 18 of this manual). To develop a more comprehensive picture of a student’s numeracy, please use both assessments. The complete Numeracy Project can be found at <http://www.nzmaths.co.nz/numeracy-projects> .

For further information and data on the importance of developing numeracy in Elementary, Middle, and High School Mathematics, please read Pamela Weber Harris’ text, *Building Powerful Numeracy for Middle and High School Students* and *Number Talks*, by Sherry Parrish.

Individual Knowledge Assessment of Number (IKAN)

The IKAN is a tool used to assess a student's number knowledge. An individual student's number knowledge directly corresponds to a stage in the Number Framework. The knowledge stages describe key items of knowledge that students need to know and be able to quickly recall without extended strategizing. The quick recall of number knowledge is developed over time and through the repeated use of mental strategies that are practiced through contextual problems.

Administering this portion of the IKAN will assist in identifying a student's Overall Number Knowledge Score.

This portion of the IKAN is suitable for students in grades 3 to 8 who are at the Advanced Counting stage or higher in the Number Framework. (See page 12- Number Framework) Students in kindergarten through 2nd grade (or those scoring at below stage 4) can be monitored using the Counting Interview (Individual Assessment of Number – Part 1) found here: <http://ccgpsmathematicsk5.wikispaces.com/IKAN+Webinar+and+Documents>

This portion of the IKAN is divided into five **parts**, with each part consisting of 8 questions:

- **Part One: Advanced Counting AC (Stage 4)**
- **Part Two: Early Additive EA (Stage 5)**
- **Part Three: Advanced Additive AA (Stage 6)**
- **Part Four: Advanced Multiplicative AM (Stage 7)**
- **Part Five: Advanced Proportional AP (Stage 8)**

Each **part** assesses the four knowledge domains that are foundational to students' application of algebraic thinking. There are two questions for each domain within each 8 item part. The four domains assessed within the Individual Knowledge Assessment of Number are *Number Sequence and Order, Fractions, Place Value, and Basic Facts*.

Materials:

- One copy (per student) of the student recording sheet attached to this document. The recording sheet is divided into the four knowledge domains assessed.
- Writing implements for student use (pencils)
- Equipment for projecting/showing the video assessment (Computer lab/Smartboard/projector connected to computer)

The on-line or downloaded IKAN automatically times the exposure students have to each item. The time allocated for each question differs depending upon the demands of each domain. The entire assessment takes less than 10 minutes.

It is recommended that different versions of IKAN (four different versions can be found here: <http://nzmaths.co.nz/ikan-forms>) be used within a school year to ensure that students not become familiar with the questions.

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An Individual Assessment of Number Knowledge Expectation continuum has been included on page 10. The Individual Assessment of Number Knowledge Expectation continuum is aligned to Georgia's State Standards and identifies the grade level expectations for students in grades Kindergarten through Eight. It can be used as a tool for progress monitoring and for screening individual students as they move through the elementary and middle school years.

How to Administer the IKAN

It is recommended that different versions of IKAN be used within a school year to ensure that students do not become familiar with the questions.

The four downloadable versions of the IKAN can be found here:

<http://nzmaths.co.nz/ikan-forms>

(It is recommended that you use/download the mp4 versions of the IKAN)

Directions:

1. Give each student a copy of the *IKAN Student Recording Sheet* (page 8, or here: <http://ccgpsmathematicsk-5.wikispaces.com/IKAN+Webinar+and+Documents>) and ensure that every student has a pencil.
2. Give the following directions to students:
 - “Please place your name, teacher’s name, grade level, and date at the top of the page.” *(Before moving on, ensure that all students have completed this part.)*
 - “I am going to play a video. You are going to *hear* some questions and the questions will be *shown* on the screen simultaneously. Please record your answers to the questions on the Student Answer Sheet.”
 - “8 questions will be asked in each of the five parts. Please write your answers starting next to the number one at the top of PART 1 and work your way down. After the 8 questions in “PART 1” have been answered, begin “PART 2” and continue recording your answers, moving down to the next question. *If further clarification is needed please provide as needed.*
 - “If you miss a question or if the questions become too hard, you can put a question mark on the sheet, and continue recording your answers moving down to the next question. If you choose to stop participating, please wait silently until the assessment video is complete.”
 - Start the video assessment. The sound will not begin until the first question appears on the screen. **Once the video is started it should not be stopped or restarted.**

The on-line IKAN automatically times the exposure students have to each item. The time allocated for each question differs depending upon the demands of each domain.

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It is beneficial that students continue through all five parts as they may have strength in a knowledge domain, which will be evident when marking the assessment horizontally (see Scoring the IKAN, pg. 9).

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Individual Knowledge Assessment for Numeracy (IKAN)
Written Assessment

**For students scoring within Strategy Stages 4-8 on the GloSS.*
IKAN 1 **IKAN 2** **IKAN 3** **IKAN 4** *(Circle the form used)*

Student Name: _____ Teacher Name: _____ Grade Level: _____ Date: _____

	Stage 4 Advanced Counting	Stage 5 Early Additive	Stage 6 Advanced Additive	Stage 7 Advanced Multiplicative	Stage 8 Advanced Proportional	Domain Stage Score <i>(for teacher use only)</i>
Domain	Part One	Part Two	Part Three	Part Four	Part Five	
Number Sequence and Order	1.	1.	1.	1.		
	2.	2.	2.	2.		
Fractions	3.	3.	3.	3.	1.	
	4.	4.	4.	4.	2.	
Place Value	5.	5.	5.	5.	3.	
	6.	6.	6.	6.	4.	
Basic Facts	7.	7.	7.	7.	5.	
	8.	8.	8.	8.	6.	
Total Correct					7.	
					8.	

Adapted from New Zealand Numeracy Project, New Zealand Ministry of Education

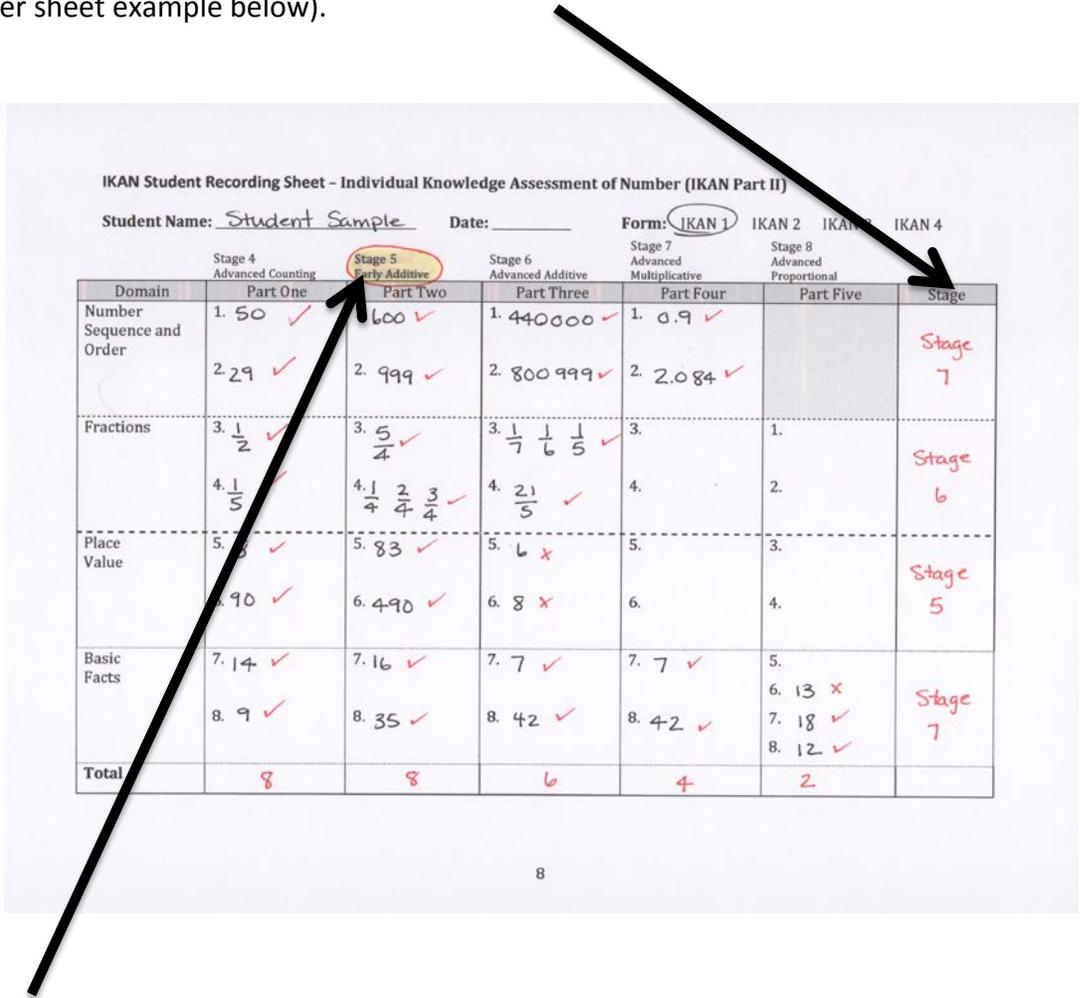
Overall Number Knowledge Stage Score _____
 (Last Stage of Consecutive Mastery: Last stage where all items are correct, before student begins missing items)

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Scoring the IKAN

The teacher scores all the questions once the session is over. The IKAN can be scored horizontally by individual domains and vertically for a knowledge stage. Scoring sample and explanation can be found on the next page.

Horizontally: Record the last stage in which the student got all the questions correct. Each of the knowledge domains requires an identified stage. Strengths and weaknesses within these domains can easily be identified for teaching and learning purposes (refer to the student answer sheet example below).



Vertically: Record the total number of questions that the student answered correctly at the bottom of the column. Highlight the *last stage of mastery*, the stage at which the student got all the questions correct *before* beginning to miss questions (refer to the student answer sheet example above- this student is an Overall Stage 5). This information may be used for collation of school wide knowledge data, or for placement of students in courses such as Foundations of Algebra. It is not recommended that vertical analysis be used for classroom practice.

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IKAN Expectation Continuum (Kindergarten through 8th Grade)

The development of number knowledge and strategy begins in kindergarten. The following table provides the grade level expectations for every student. By the end of 7th grade students should be able to correctly answer all of the questions on the Individual Knowledge Assessment for Number. The expectation of each grade level is appropriately aligned to the Common Core State Standards and will identify the performance of each student as:

- At Risk
- Cause For Concern
- Achieving At or Above Expectations
- High Achievers

End of Kindergarten Number Knowledge Expectations

Counting interview					Written Assessment				
NO PARTS MASTERED	FNWS/BNWS COUNTING MASTERED, BUT R&S NOT MASTERED	FNWS/BNWS R&S 20	FNWS/BNWS R&S 120	FNWS/BNWS R&S 1000	Stage 4 AC	Stage 5 EA	Stage 6 AA	Stage 7 AM	Stage 8 AP
At Risk		Cause for Concern	Achieving at or above expectations		High Achievers				

FNWS- Forward Number Word Sequence BNWS- Backwards Number Word Sequence
R- Recognition S- Sequence (number before and after)

End of 1st Grade Number Knowledge Expectations

Counting interview					Written Assessment				
NO PARTS MASTERED	FNWS/BNWS COUNTING MASTERED, BUT R&S NOT MASTERED	FNWS/BNWS R&S 20	FNWS/BNWS R&S 120	FNWS/BNWS R&S 1000	Stage 4 AC	Stage 5 EA	Stage 6 AA	Stage 7 AM	Stage 8 AP
At Risk		Cause for Concern	Achieving at or above expectations		High Achievers				

End of 2nd Grade Number Knowledge Expectations

Counting interview					Written Assessment				
NO PARTS MASTERED	FNWS/BNWS COUNTING MASTERED, BUT R&S NOT MASTERED	FNWS/BNWS R&S 20	FNWS/BNWS R&S 120	FNWS/BNWS R&S 1000	Stage 4 AC	Stage 5 EA	Stage 6 AA	Stage 7 AM	Stage 8 AP
At Risk			Cause for Concern	Achieving at or above expectations	High Achievers				

End of 3rd Grade Number Knowledge Expectations

Counting interview					Written Assessment				
NO PARTS MASTERED	FNWS/BNWS COUNTING MASTERED, BUT R&S NOT MASTERED	FNWS/BNWS R&S 20	FNWS/BNWS R&S 120	FNWS/BNWS R&S 1000	Stage 4 AC	Stage 5 EA	Stage 6 AA	Stage 7 AM	Stage 8 AP
At Risk				Cause for Concern	Achieving at or above expectations	High Achievers			

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End of 4th Grade Number Knowledge Expectations

Counting interview					Written Assessment				
NO PARTS MASTERED	FNWS/BNWS COUNTING MASTERED, BUT R&S NOT MASTERED	FNWS/BNWS R&S 20	FNWS/BNWS R&S 120	FNWS/BNWS R&S 1000	Stage 4 AC	Stage 5 EA	Stage 6 AA	Stage 7 AM	Stage 8 AP
At Risk					Cause for Concern	Achieving at or above expectations		High Achievers	

End of 5th Grade Number Knowledge Expectations

Counting interview					Written Assessment				
NO PARTS MASTERED	FNWS/BNWS COUNTING MASTERED, BUT R&S NOT MASTERED	FNWS/BNWS R&S 20	FNWS/BNWS R&S 120	FNWS/BNWS R&S 1000	Stage 4 AC	Stage 5 EA	Stage 6 AA	Stage 7 AM	Stage 8 AP
At Risk					Cause for Concern	Achieving at or above expectations		High Achievers	

End of 6th Grade Number Knowledge Expectations

Counting interview					Written Assessment				
NO PARTS MASTERED	FNWS/BNWS COUNTING MASTERED, BUT R&S NOT MASTERED	FNWS/BNWS R&S 20	FNWS/BNWS R&S 120	FNWS/BNWS R&S 1000	Stage 4 AC	Stage 5 EA	Stage 6 AA	Stage 7 AM	Stage 8 AP
At Risk					Cause for Concern		Achieving at or above expectations		

End of 7th Grade Number Knowledge Expectations

Counting interview					Written Assessment				
NO PARTS MASTERED	FNWS/BNWS COUNTING MASTERED, BUT R&S NOT MASTERED	FNWS/BNWS R&S 20	FNWS/BNWS R&S 120	FNWS/BNWS R&S 1000	Stage 4 AC	Stage 5 EA	Stage 6 AA	Stage 7 AM	Stage 8 AP
At Risk					Cause for Concern		Achieving at or above expectations		

******By the end of 7th grade students should have successfully completed through stage 8 of the IKAN******

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The Number Framework

Stage 0: Emergent	The student is unable to consistently count a given number of objects because they lack knowledge of counting sequences and/or one-to-one correspondence.
Stage 1: One-to-one counting	The student is able to count a set of objects or form sets of objects but cannot solve problems that involve joining and separating sets.
Stage 2: Counting from one on materials	The student is able to count a set of objects or form sets of objects to solve simple addition and subtraction problems. The student solves problems by counting all the objects.
Stage 3: Counting from one by imaging	The student is able to visualize sets of objects to solve simple addition and subtraction problems. The student solves problems by counting all the objects.
Stage 4: Advanced counting	The student uses counting on or counting back to solve simple addition or subtraction tasks.
Stage 5: Early additive part-whole	The student uses a limited range of mental strategies to estimate answers and solve addition or subtraction problems. These strategies involve deriving the answer from known basic facts (for example doubles, fives, making tens).
Stage 6: Advanced additive/early multiplicative part-whole	The student can estimate answers and solve addition and subtraction tasks involving whole numbers mentally by choosing appropriately from a broad range of advanced mental strategies (for example place value positioning, rounding and compensating or reversibility). The student uses a combination of known facts and a limited range of mental strategies to derive answers to multiplication and division problems (for example doubling, rounding or reversibility).
Stage 7: Advanced multiplicative part-whole	The student is able to choose appropriately from a broad range of mental strategies to estimate answers and solve multiplication and division problems. These strategies involve partitioning one or more of the factors (for example place value partitioning, rounding and compensating, reversibility).
Stage 8: Advanced proportional part-whole	The student can estimate answers and solve problems involving the multiplication and division of fractions and decimals using mental strategies. These strategies involve recognizing the effect of number size on the answer and converting decimals to fractions where appropriate. These students have strongly developed number sense and algebraic thinking.

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Questions and Answers for IKAN 1

	Part 1	Part 2	Part 3	Part 4	Part 5
1	What number is one more than 49? 50	What number is one more than 599? 600	What number is one more than 439 999? 440 000	Which decimal is the biggest 0.639, 0.9, or 0.84? 0.9	Which fraction is the biggest $\frac{3}{4}$, $\frac{73}{100}$, or $\frac{7}{10}$? $\frac{3}{4}$
2	What number is one less than 30? 29	What number is one less than 1000? 999	What number is one less than 801 000? 800 999	Which decimal is the smallest 2.4, 2.71, or 2.084? 2.084	Which is the smallest? $\frac{2}{3}$, 0.6, or 70 % 0.6
3	Write the fraction for one half. $\frac{1}{2}$	Write the fraction for five quarters. $\frac{5}{4}$	Write these fractions in order of size, smallest to biggest. $\frac{1}{5}$, $\frac{1}{7}$, $\frac{1}{6}$ $\frac{1}{7}$, $\frac{1}{6}$, $\frac{1}{5}$	Which number is the same as $\frac{3}{5}$? 5/3, $\frac{12}{20}$, 1 and $\frac{2}{3}$, $\frac{4}{6}$ $\frac{12}{20}$	How many hundredths are in all of 6.073? 607 or 607.3
4	Write the fraction for one fifth. $\frac{1}{5}$	Write these fractions in order of size, smallest to biggest. $\frac{3}{4}$, $\frac{1}{4}$, $\frac{2}{4}$ $\frac{1}{4}$, $\frac{2}{4}$, $\frac{3}{4}$	Write 4 and $\frac{1}{5}$ as a fraction. $\frac{21}{5}$	Which fraction is the smallest, $\frac{3}{8}$, $\frac{4}{10}$, or $\frac{1}{3}$? $\frac{1}{3}$	What number is half way between 4.8 and 4.7? 4.75
5	How many tens are in 80? 8	How many tens are in all of the number 832? 83 or 83.2	How many hundreds are in all of this number, 53 605? 536 or 536.05	Round the following decimal to the nearest tenth. 6.49 6.5	What is the simplest fraction for 80%? $\frac{4}{5}$
6	What is the number for nine groups of ten? 90	What is the number for 49 groups of ten? 490	How many tenths are in all of the number, 5.8? 58	How many thousands are in all of 6 457 894? 6457 or 6457.894	What is 1.3 written as a percentage? 130%
7	$7 + 7 = ?$ 14	$7 + 9 = ?$ 16	$15 - 8 = ?$ 7	$63 \div 9 = ?$ 7	What is the least common multiple of 6 and 9? 18
8	Half of 18 is ..? 9	$5 \times 7 = ?$ 35	$6 \times 7 = ?$ 42	What number divided by 7 gives 6? 42	What is the highest common factor of 36 and 48? 12

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Questions and Answers for IKAN 2

	Part 1	Part 2	Part 3	Part 4	Part 5
1	What number is one more than 89? 90	What number is one more than 899? 900	What number is one more than 649 999? 650 000	Which decimal is the biggest, 0.307, 0.48, or 0.2? 0.48	Which fraction is the biggest, $\frac{2}{3}$, $\frac{7}{10}$, or $\frac{3}{5}$? $\frac{7}{10}$
2	What number is one less than 60? 59	What number is one less than 700? 699	What number is one less than 303 000? 302 999	Which decimal is the smallest, 6.39, 6.2, or 6.175? 6.175	Which is the smallest, $\frac{3}{4}$, 0.76, or 80%? $\frac{3}{4}$
3	Write the fraction for one quarter. $\frac{1}{4}$	Write the fraction for six fifths. $\frac{6}{5}$	Write these fractions in order of size, smallest to biggest, $\frac{1}{2}$, $\frac{1}{9}$, $\frac{1}{8}$ $\frac{1}{9}$, $\frac{1}{8}$, $\frac{1}{2}$	Which number is the same as $\frac{2}{3}$? $\frac{3}{2}$, $\frac{6}{9}$, $1\frac{1}{2}$, or $\frac{66}{100}$ $\frac{6}{9}$	How many hundredths are in all of 2.081? 208 or 208.1
4	Write the fraction for one third. $\frac{1}{3}$	Write these fractions in order of size, smallest to biggest. $\frac{3}{5}$, $\frac{2}{5}$, $\frac{4}{5}$ $\frac{2}{5}$, $\frac{3}{5}$, $\frac{4}{5}$	Write 5 and $\frac{2}{3}$ as a fraction. $\frac{17}{3}$	Which fraction is the smallest, $\frac{2}{5}$, $\frac{1}{4}$, or $\frac{3}{8}$? $\frac{1}{4}$	What number is half way between 7.3 and 7.4? 7.35
5	How many tens are in 70? 7	How many tens are in all of the number 935? 93 or 93.5	How many hundreds are in all of this number, 14 870? 148 or 148.7	Round the following decimal to the nearest tenth. 3.37 3.4	What is the simplest fraction for 60%? $\frac{3}{5}$
6	What is the number for six groups of ten? 60	What is the number for 56 groups of ten? 560	How many tenths are in all of the number, 6.2? 62	How many thousands are in all of 725 106? 725 or 725.106	What is 0.085 written as a percentage? 8.5%
7	$8 + 8 = ?$ 16	$6 + 8 = ?$ 14	$16 - 9 = ?$ 7	$54 \div 6 = ?$ 9	What is the least common multiple of 4 and 6? 12
8	Half of 14 is ..? 7	$8 \times 5 = ?$ 40	$9 \times 8 = ?$ 72	What number divided by 8 gives 9? 72	What is the highest common factor of 24 and 32? 8

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Questions and Answers for IKAN 3

	Part 1	Part 2	Part 3	Part 4	Part 5
1	What number is one more than 79? 80	What number is one more than 499? 500	What number is one more than 109 999? 110 000	Which decimal is the biggest, 0.83, 0.6, or 0.754? 0.83	Which fraction is the biggest, $\frac{2}{5}$, $\frac{3}{8}$, or $\frac{1}{3}$? $\frac{2}{5}$
2	What number is one less than 40? 39	What number is one less than 900? 899	What number is one less than 702 000? 701 999	Which decimal is the smallest, 0.643, 0.52, or 0.9? 0.52	Which is the smallest? 59%, $\frac{5}{8}$, or 0.6? 59%
3	Write the fraction for one fifth. $\frac{1}{5}$	Write the fraction for four thirds. $\frac{4}{3}$	Write these fractions in order of size, smallest to biggest. $\frac{1}{4}$, $\frac{1}{5}$, $\frac{1}{11}$, $\frac{1}{11}$, $\frac{1}{5}$, $\frac{1}{4}$	Which number is the same as $\frac{4}{5}$? $\frac{5}{4}$, $\frac{2}{3}$, 1 and $\frac{1}{4}$, or $\frac{16}{20}$ $\frac{16}{20}$	How many hundredths are in all of 2.053? 205 or 205.3
4	Write the fraction for one quarter. $\frac{1}{4}$	Write these fractions in order of size, smallest to biggest. $\frac{2}{3}$, $\frac{3}{3}$, $\frac{1}{3}$. $\frac{1}{3}$, $\frac{2}{3}$, $\frac{3}{3}$	Write 6 and $\frac{7}{10}$ as a fraction. $\frac{67}{10}$	Which fraction is the smallest, $\frac{7}{8}$, $\frac{2}{3}$, or $\frac{5}{6}$? $\frac{2}{3}$	What number is half way between 2.3 and 2.8? 2.55
5	How many tens are in 100? 10	How many tens are in all of the number 481? 48 or 48.1	How many hundreds are in all of this number, 50 905 ? 509 or 509.05	Round the following decimal to the nearest tenth. 2.89 2.9	What is the simplest fraction for 70%? $\frac{7}{10}$
6	What is the number for eight groups of ten? 80	What is the number for 79 groups of ten? 790	How many tenths are in all of the number, 8.3? 83	How many thousands are in all of 9 050 391? 9050 or 9050.391	What is 0.034 written as a percentage? 3.4%
7	$9 + 9 = ?$ 18	$7 + 8 = ?$ 15	$14 - 8 = ?$ 6	$63 \div 9 = ?$ 7	What is the least common multiple of 3 and 7? 21
8	Half of 12 is ..? 6	$6 \times 5 = ?$ 30	$8 \times 7 = ?$ 56	What number divided by 4 gives 8? 32	What is the highest common factor of 12 and 21? 3

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Questions and Answers for IKAN 4

	Part 1	Part 2	Part 3	Part 4	Part 5
1	What number is one more than 69? 70	What number is one more than 799? 800	What number is one more than 729 999? 730 000	Which decimal is the biggest, 0.371, 0.4, or 0.55? 0.55	Which fraction is the biggest, $\frac{4}{5}$, $\frac{77}{100}$, or $\frac{3}{4}$? $\frac{4}{5}$
2	What number is one less than 90? 89	What number is one less than 600? 599	What number is one less than 604 000? 603 999	Which decimal is the smallest, 4.24, 4.389, or 4.4? 4.24	Which is the smallest, $\frac{3}{5}$, 65%, or 0.687? $\frac{3}{5}$
3	Write the fraction for one third. $\frac{1}{3}$	Write the fraction for three halves. $\frac{3}{2}$	Write these fractions in order of size, smallest to biggest. $\frac{1}{6}$, $\frac{1}{3}$, $\frac{1}{7}$ $\frac{1}{7}$, $\frac{1}{6}$, $\frac{1}{3}$	Which number is the same as $\frac{6}{10}$? $\frac{4}{8}$, $\frac{10}{6}$, 1 and $\frac{1}{6}$, $\frac{3}{5}$ $\frac{3}{5}$	How many hundredths are in all of 3.004? 300 or 300.4
4	Write the fraction for one half. $\frac{1}{2}$	Write these fractions in order of size, smallest to biggest. $\frac{3}{5}$, $\frac{1}{5}$, $\frac{4}{5}$ $\frac{1}{5}$, $\frac{3}{5}$, $\frac{4}{5}$	Write 3 and $\frac{2}{4}$ as a fraction. $\frac{14}{4}$	Which fraction is the smallest, $\frac{4}{6}$, $\frac{5}{8}$, or $\frac{3}{4}$? $\frac{5}{8}$	What number is half way between 3.4 and 3.9? 3.65
5	How many tens are in 90? 9	How many tens are in all of the number 654? 65.4 or 65	How many hundreds are in all of this number, 66 738 ? 667 or 667.38	Round the following decimal to the nearest tenth. 5.51 5.5	What is the simplest fraction for 40%? $\frac{2}{5}$
6	What is the number for five groups of ten? 50	What is the number for 62 groups of ten? 620	How many tenths are in all of the number, 7.4? 74	How many thousands are in all of 850 034? 850 or 850.034	What is 1.02 written as a percentage? 102%
7	$6 + 6 = ?$ 12	$9 + 6 = ?$ 15	$13 - 7 = ?$ 6	$56 \div 7 = ?$ 8	What is the least common multiple of 4 and 7? 28
8	Half of 18 is..? 9	$9 \times 5 = ?$ 45	$6 \times 8 = ?$ 48	What number divided by 6 gives 9? 54	What is the highest common factor of 12 and 28? 4

IKAN Accommodation Suggestions

Hearing impaired - The prompts are given using both video and audio and can be read by students.

Visually impaired - The prompts are given using both video and audio and can be listened to by students.

Extended time - GADOE SWD specialist: “The accommodations should not give an unfair advantage, but should be required to take away an unfair disadvantage. You need to determine what information you wish to gain from the assessment. For example, if you have an orthopedically impaired student who must use accommodations such as AAC or adapted response method to respond to the questions, extra time might be used to allow the student the time needed to communicate their response, but *not additional time to formulate or figure out the answer.*”

English Language Learners - One suggestion is that the prompts be translated ahead of time and then spoken aloud by the assessor as they appear on screen (while the audio is turned off).

Overview of Number Knowledge

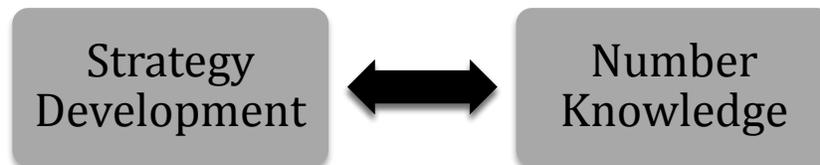
The Individual Assessment of Number (IKAN) outlines the important items of number knowledge that students should learn as they progress through the process of conceptually developing strategy. This knowledge plays a critical role in students applying their available strategies with proficiency and fluency across all the numbers and problem types that they may encounter.

Complete number knowledge is categorized under four content domains:

- Number Identification
- Number Sequence and Order
- Grouping/Place Value
- Basic Facts.

Basic fact knowledge is critical, however true number knowledge emphasizes that the process of deriving number facts using mental strategies is important in coming to know and apply these facts. It also demands that students come to know a broader range of facts than previously, including groupings of “benchmark” numbers, and that they have knowledge of factors of numbers and decimal and fraction conversions at the higher stages.

Number knowledge and strategy are dependent upon one another. It is imperative that students exhibit an equal balance of both knowledge and strategy as they prepare for the expectations of high school mathematics. A student’s lack of number knowledge is usually the result of an understanding of number that has been built through memorization and not through strategy development.



Strategy Development: Global Strategy Stage (GloSS) Assessment

The development of number knowledge and number strategy go hand-in-hand. The Individual Assessment of Number (IKAN) identifies key items of knowledge that students need to learn. The *Global Strategy Stage Assessment (GloSS)* assesses a student's ability to apply strategy to number and identifies the mental processes students use to estimate answers and solve operational problems with numbers.

The Global Strategy Stage (GloSS) assessments are a set of face-to-face interviews designed to assist classroom teachers in determining students' strategy stage for targeted intervention and acceleration. The GloSS is designed for students in kindergarten through 8th grade, but may also be used with secondary students, especially those in grades 9 and 10.

The GloSS identifies a student's number strategy in 3 domains:

- Addition and Subtraction
- Multiplication and Division
- Ratios and Proportions

It's important that students make progress in both areas of number. Strong knowledge is essential for students to broaden their strategies across a full range of numbers, and knowledge is often an essential prerequisite for the development of more advanced strategies. For example, a student is unlikely to solve $9 + 6$ as $10 + 5$ if he or she does not know the "ten and" structure of teen numbers. Similarly, using more advanced strategies helps students to develop number knowledge.

The stages that a student achieves within the IKAN (knowledge) assessment are often different from the stages that they achieve in the GloSS (strategy) assessment. Knowledge can be learned independently of any meaningful ability to apply it. Similarly, students can invent advanced strategies without sufficient knowledge to apply them to a broad range of problems and numbers.

For more information regarding the *Global Assessment of Strategy Stages (GloSS)* and information on how to identify a student's number strategy stage for the purpose of increasing number knowledge, go to <http://nzmaths.co.nz/gloss-forms>.