The Wilkie Way

NZ Curriculum Screening Assessment

Teacher Guide & Answers

Mathematical Number Knowledge & Skills

Level 4

(shows where student is operating between Mid Level 4 & Early Level 5)

2nd Year

- Whole Number
- Addition & Subtraction
- Multiplication & Division
- Fractions
- Decimals & Percentages

This screening assessment is designed by Charlotte Wilkinson. A private education consultant specialising in the teaching and learning of primary mathematics. (MOE Accredited ID 654)
The purpose behind the mathematical screening assessment is to find out what your students know to ensure a firm foundation for the building of further mathematical concepts.
The screening will also show up specific weak areas within a level band that will require further teaching and learning experiences.

The areas of mathematics screened in this level 4 knowledge and skills assessment are:

Numbers	Reading & writing large numbers, the multiplicative structure of whole numbers (nesting of groups of ten), rounding, multiplying and dividing by tens (including decimals), standard form.
Addition & Subtraction	Mental addition & subtraction, rounding and compensating, standard algorithm for whole numbers and decimals, inverse operation, estimation.
Multiplication & Division	Factors, lowest common multiples, prime numbers, mental strategies doubling & halving, rounding and compensating, standard algorithms for single digit by double digit. Double digit by double digit multiplication (grid, array or algorithm), estimation, exponents.
Fractions	Fractions of a set by multiplication & division, equivalent fractions, rational numbers, addition & subtraction of fractions.
Decimals & Percentages	Comparison (up to three decimal places), multiplicative structure, nesting of groups of ten (tenths and hundredths). Mental strategies, rounding & compensating for addition & subtraction, fraction to decimal conversion, fraction to percentage conversion, percentage of a number.

This screening assessment can be used to identify groups of students with common weaknesses to create targeted intervention booster groups. Students scoring in the mid level 3 band should be re-screened using the level 3 assessment screen.

	Mid Level 3	Upper Level 3	Early Level 4	Mid Level 4	Upper level 4	Early Level 5
Overall Score	0 - 15	16 - 37	38 - 60	61 - 79	80 - 94	95 - 100
Whole Number	0 - 5	6 - 10	11 - 15	16 - 19	20- 22	23
Add/Sub	0 - 2	3 - 6	7 - 9	10 - 12	13 -15	
Mult/Div	0 - 2	3 - 6	7 - 12	13 - 16	17 - 19	20
Fractions	0 - 3	4 - 8	9 - 12	13 - 16	17 - 20	21 - 22
Decimals	0 - 3	4 - 7	8 - 12	13 - 16	17 - 18	19 - 20

Administering the screening assessment.

This assessment is not timed. Expect students to take around 30 - 60 minutes to complete. Sections can be completed at different times rather than taking the whole assessment screen in one go.

Students with a specific reading difficulty may have a reader. The reader may not explain, only read the words.
Students with a specific writing difficulty may have a writer. A writer records exactly what a student says.

Each page of the assessment screens for a particular area of mathematical knowledge.

Each page has a specific marks (one mark per correct answer). The lowest weighting on the addition & subtraction section reflects the need to be working multiplicatively most of the time in level 4 topics.

If a student scores low on any particular page then this indicates an area of general weakness for this student requiring further teaching and learning experiences.

Within each page, the questions target smaller items of knowledge or skills within the particular area of mathematical knowledge. Information on each set of questions is given at the end of each page in the teacher guide. If students make consistent errors then this particular area of knowledge is weak and requires specific targeted teaching and learning practice. For each targeted area of learning, Pearson Mathematics and Wilkie Way Resources have been identified for further teaching and learning experiences. (Pearson Mathematics is also linked to Figure it Out activities chapter by chapter in the book of the teacher guide).

On the addition and subtraction and the multiplication and division pages, where a student is asked to work the question mentally no mark will be given if an algorithm is used. All other questions an efficient strategy must be used which may well be a written algorithm. An estimation may show a recording of rounding but no exact calculating must be evident.

To find out more information on the application of additive and multiplicative thinking to solve problems use the Primary Maths Assessment Tool (PMAT) published by Edify. (ISBN 9780947496562) - www.edify.co.nz. It would be expected students with knowledge at level 4 would be assessed using Section 6 of the assessment tool.

This Wilkie Way Assessment Screen and PMAT are both included in the Beagle suite of assessment tools - a cloud based solution supporting NZ schools to raise student achievement and close the gap, using assessment data to drive instruction and save time in analysing and interpreting results.
www.beagleinnovations.com

Pearson Mathematics is available from www.edify.co.nz or download an order form from www.thewilkieway.co.nz.

Further copies of this teacher guide can be accessed from the subscription area of www.thewilkieway.co.nz.

What do you know about the number system?

1. Write the following numbers.

a. forty thousand six hundred and three **40 603**

b. thirty four million nine hundred and seven thousand two hundred and sixty one **34 907 261**

2. How many whole groups of 10 in each of these numbers?

a. 739 **73** **b.** 4857 **485** **c.** 42 583 **4258**

3. How many whole groups of 100 in each of these numbers?

a. 4276 **42** **b.** 53 723 **537** **c.** 264 396 **2643**

4. **Complete the table by rounding the numbers in the fir lun**

3687	**3690**	**3700**	**4000**
54 931	**54 930**	**54 900**	**55 000**

5. Complete the following:

a. 24.84 x 10 **248.4** **b.** 576 x 10 **57 0** **c.** 6.39 x 1000 **6390**

d. 3000 ÷ 10 **300** **e.** 96 ÷ 0 **43.96** **f.** 324 ÷ 1000 **0.324**

6. These numbers are it n ndard form. Re write the numbers in full.

a. 3 x 10^4 **30 0** 8 x 10^5 **800 000** **c.** 2 x 10^3 **2000**

Maximum e		
Q1	2	t is able to write large numbers and use zero as a place holder.
Q2		udent understands the multiplicative structure (repeated grouping)of the number system.
Q4	6	Student is able to round numbers to a given place value using the convention of rounding 5 up.
Q5	6	Student is able to use the multiplicative structure of the number system.
Q6	3	Student understands multiplicative notation (standard form).

Understanding the multiplicative structure of the number system and the x10 factor between columns allows students to multiply and divide numbers of any size using place value and the basic multiplication facts. It allows students to work flexibly with numbers in their canonical and non canonical forms (renamed). Understanding the x10 factor between columns allows for the rewriting of larger numbers in standard form which makes working with larger numbers feasible.

The understanding is extended to decimal numbers, the number of tenths and hundredths in numbers. While an understanding of fractions assists students with making sense of decimal numbers, the rules of the whole number system apply to decimal numbers.

Writing decimal numbers in standard form continue the pattern of 10 = 10^1 and 1 = 10^0 0.1 = 10^{-1} (not assessed).

Students must also see numbers in their sequential position. Rounding numbers is required for estimation and the degree of rounding depends on the approximation required.

Understanding all aspects of place value are required for the development of number sense and the ability to work flexibly with numbers.

Resources for Teaching and Learning			
		Pearson Mathematics	**Wilkie Way**
Q1	To be able to write large numbers and use zero as a place holder.	**Book 3b** Chapter 1	**Teacher Handbook Series: No. & The Number System** Chapters 3 - 5
Q2 Q3	To develop an understanding of the multiplicative structure of the number system.	**Book 3b** Chapter 1	**Teacher Handbook Series: No. & The Number System** Chapter 9
Q4	To be able to round numbers to a given place value using the convention of rounding 5 up.	**Book 3b** Chapter 1	**Teacher Handb ries: No. & The N tem** Chapter 11
Q5	To be able to use the multiplicative structure of the number system.	**Book 4a** Chapter 7	**Te her ndbook Series: No. Number System** Ch ter 13
Q6	To develop an understanding of multiplicative notation (standard form).	**Book 4a** Cha 7	**Teacher Handbook Series: No. & The Number System** Chapter 10

Pearson Ma mat s referenced to Figure it Out Resources in Pearson Mathematics Teacher Gu

Av fr m www.thewilkieway.co.nz members content area (subscription):

Prob s: To develop conceptual understanding.
Knowledge Activities: Place value worksheets & games.
Planning & Assessment: Place value progressions.
Practice Workbooks: Aligned to Pearson book chapters.

Teacher Handbook Series: No & The Number System is available from the online store **www.thewilkieway.co.nz**

Pearson Mathematics Maintenance Workbooks:

Each book provides maintenance work for knowledge and skills (across all strands)as well as problem solving.

Level 3b.
Level 4a.
Level 4b.

What do you know about addition and subtraction?
Solve these equations mentally.

1a. 345 + 198 = **543** **b.** 673 - 199 = **474** **c.** 358 + 357 **= 715**

Use a written method to solve these equations.

2a. 528 + 264 = **792** **b.** 824 - 576 = **248**

3a. 387 + **245** = 632 **b.** 742 - **456** = 286

4a. 634.8 + 87.66 = **722.46** **b.** 832.4 - 56.82 = **7[illegible]8**

Estimate the answer to the following equations to the cl[illegible] thousand.

5a. 6734 + 2377 = **9000** **b.** [illegible] = **9000**

Estimate the answer to the following equations to the closest hundred.

6a. 5364 + 883 = **6300** **b.** 8732 - 378 = **8300**
c. 5768 + 2094 = **7900** **d.** 9787 - 3472 = **6300**

Ma[illegible]		**Score 15**
Q1	3	[illegible]udent uses an efficient mental strategy for addition and subtraction. (No score if any evidence of recording anything other than the answer).
Q2	2	Student is able to use a standard algorithm for addition & subtraction.
Q3	2	Student uses the inverse relationship between addition and subtraction to solve a change unknown equation.
Q4	2	Student is able to use a standard algorithm for decimal numbers showing correct alignment of columns.
Q5 **Q6**	6	Student is able to use estimation for addition and subtraction. (No score if students solve first then make an estimate).

Students should be flexible in their use of the number system to add and subtract using place value and the recall of basic facts. They should be confident in their use of a standard written algorithm for addition and subtraction but equally confident in their use of estimation. In today's world of technology, the need to estimate is of high importance as most calculating is carried out by technology (a calculator or spreadsheet). The user must be able to estimate inorder to be able to notice errors in the results.
Addition and subtraction is used as a tool across all strands. It should not take up 'thinking space' when used to solve problems.

Resources for Teaching and Learning			
		Pearson Mathematics	**Wilkie Way**
Q1	To be able to use an efficient mental strategy when adding or subtracting a number close to 100 or a double.	**Book 4a** Chapter 1	**Teacher Handbook Series: No. & The Number System** Chapter 12
Q2	To be able to use a standard algorithm for addition & subtraction.	**Book 4a** Chapter 1 **Book 4a** Chapter 17 - *in the context of Mass* **Book 4a** Chapter 18 - *in the context of Length*	
Q3	To understand and use the inverse relationship between addition and subtraction to solve a change unknown equation.	**Book 4a** Chapter 1	**Teacher Handbook Series: Arithmetic Operations** Chapter 6
Q4	To be able to use a standard algorithm for decimal numbers showing correct alignment of columns.	**Book 4a** Chapter 7 **Book 4b** Chapter 15 - *in the context of Perimeter*	**Teacher Handbook Series: No. & The Number System** Chapter 15 **Fractions Decimals & Percentages** Chapter 8
Q5 **Q6**	To be able to use estimation for addition and subtraction.	**Book 4a** Chapter 1	**Teacher Handbook Series: No. & The Number System** Chapter 11
		Addition and Subtraction is used as a tool in many chapters through out the books.	

Pearson Mathematics chapters referenced to Figure it Out Resources in Pearson Mathematics Teacher Guides.

Available from www.thewilkieway.co.nz members content area (subscription):

Problems: To develop conceptual understanding
Knowledge Activities: Addition & subtraction games
Planning & Assessment: Addition & subtraction progressions
Professional Learning: PowerPoint - Teaching & Learning Basic Facts

Teacher Handbook Series: All are available from the online store **www.thewilkieway.co.nz**

Pearson Mathematics Maintenance Workbooks:
Each book provides maintenance work for knowledge and skills (across all strands) as well as problem solving.

Level 3b.
Level 4a.
Level 4b.

What do you know about multiplication and division?

1a. Write all the factors of 32 **1,2,4,8,16,32**

b. What is the lowest common multiple of 2, 4 and 7 **28**

2. Circle the prime number 8 18 27 **(37)** 46 63

Solve these equations mentally.

3a. 63 x 5 = **315** **b.** 99 x 6 = **594**

Solve the following equations and show how you arrived at your answer.

4a. 58 x 7 = **406** **b.** 372 x 8 = **2976**

5a. 81 ÷ 3 = **27** **b.** 348 ÷ 4 = **87**

6a. 38 x 24 = **912** **b.** 57 x 46 = **2**

7a. 6 x 0.45 = **2.7** **b.** 1 ÷ 25 = **48**

Estimate the answer to the following equa ns t the closest hundred.

8a. 473 x 6 = **3000** **b.** x 9 = **7200**

9a. 576 ÷ 3 = **200** **b.** 2417 ÷ 6 = **400**

Write the answers

10a. 7^2 **49** 2 c. 3^4 **81**

Maximum re		
Q1	2	S nderstands the vocabulary factors and multiples.
Q2		S dent understands the vocabulary prime numbers.
Q3	2	Student is able to use efficient mental multiplicative strategies.
Q4 Q5	4	Student uses an efficient strategy, which may include a standard algorithm for multiplication and division.
Q6	2	Student is able to use cross product thinking for double digit multiplication. Using a drawn array or a standard algorithm.
Q7	2	Student is able to multiply and divide by a decimal number.
Q8 Q9	4	Student is able to use the number system and basic facts to make estimates of multiplication and division.
Q10	3	Student understands exponent notation.

Multiplicative strategies require students to understand and use the distributive and associative properties of multiplication including doubling and halving. Irrespective of the size of the number the same strategies are applied and rely on place value knowledge and recall of facts. In today's world of technology, the need to estimate is of high importance as most calculating is carried out by technology (a calculator or spreadsheet). The user must be able to estimate in order to be able to notice errors in the results.

Resources for Teaching and Learning			
		Pearson Mathematics	**Wilkie Way**
Q1	To consolidate an understanding of the vocabulary factors and multiples.	**Book 3b** Chapter 8 **Book 4b** Chapter 1	
Q2	To consoldate an understanding of the vocabulary prime numbers.	**Book 4b** Chapter 1	
Q3	To develop and use efficient mental multiplicative strategies.	**Book 4a** Chapter 2	**Teacher Handbook Series: Arithmetic Operations** Chapter 9
Q4 Q5	To develop and use efficient strategies, including a standard algorithm for multiplication and division.	**Book 3b** Chapter 6 **Book 3b** Chapter 7 **Book 4a** Chapter 2 **Book 4a** Chapters 17,18 & 19 - *the context of measure* **Book 4b** Chapters 15,16 &18 - *in the context of mea*	**Teacher Handb k Series: No. & The r System** Chapte
Q6	To be able to use cross product thinking (array) for double digit multiplication.	**Book 4a** Chap r 2	**Teacher Handbook Series: Arithmetic Operations** Chapter 9
Q7	To be able to multiply and divide by a dec ma number.	**B k** Ch ter 8 **B k 4** apter 4	**Teacher Handbook Series: No. & The Number System** Chapter 15
Q8 Q9	To be able to estima wit multipl a ivision	**B ok 4a** Chapter 2	**Teacher Handbook Series: No. & The Number System** Chapter 13
Q 10	e an unde tanding of e ponent notation.	**Book 4a** Chapter 4	**Teacher Handbook Series: No. & The Number System** Chapter 10

Pearson Mathematics chapters referenced to Figure it Out Resources in Pearson Mathematics Teacher Guides.

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Professional Learning: PowerPoint - Teaching & Learning Basic Facts.

Teacher Handbook Series: all are available from the online store **www.thewilkieway.co.nz**

Pearson Mathematics Maintenance Workbooks
Each book provides maintenance work for knowledge and skills (across all strands) as well as problem solving.
Level 3b. Level 4a. Level 4b.

What do you know about fractions?

1a. What is $^1/_4$ of 36 **9**

b. What is ¾ of 32 **24**

c. What is ⅝ of 64 **40**

d. What is $^7/_5$ of 40 **56**

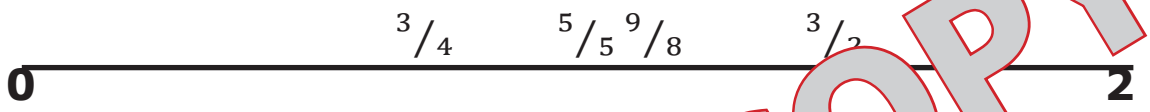
2. Choose the correct fraction from the table equivalent to the fraction given.

a. ⅓ $^5/_{15}$ **b.** ⅘ $^{12}/_{15}$ **c.** ⅝ $^{15}/_{24}$ **d.** $^7/_4$ $^{21}/_{12}$

Write these fractions where they belong on the number line.

3a.

4a.



5. Add these fractions and write answer in simplest form.

a. $^1/_6 + {}^8/_6 = 1\frac{1}{2}$ **b.** $^3/_4 + {}^3/_8 = 1\frac{1}{8}$ **c.** $^1/_5 + {}^2/_3 = {}^{13}/_{15}$

6. Subtract these fractions.

a $^6/_7 - {}^2/_7 = {}^4/_7$ **b.** $^4/_5 - {}^3/_{10} = \frac{1}{2}$ **c.** $^7/_9 - {}^1/_6 = {}^{11}/_{18}$

Ma[illegible] Sa[illegible] .12		
Q1	[illegible]	Student is able to use multiplication and division to find a fraction of a number.
Q2	4	Student is able to use proportional adjustments to recognise an equivalent fraction.
Q3	4	Student is able to order and place same denominator fractions on a number line.
Q4	4	Student is able to use benchmarking to order and place different denominator fractions on a number line.
Q5 Q6	6	Student is able to add and subtraction fractions with same denominator and use proportional adjustments when denominators are different.

Students understanding of fractions should have encompassed both continuous and discrete models. They should recognise that fractions are numbers that can be compared and ordered. They should understand that fractions are numbers that can be compared and ordered and have multiple names. (Understanding of rational numbers).
Working with fractions at this level is reliant on recall of multiplication and division facts and an understanding of multiplicative comparisons for making proportional adjustments.
Special equivalent fractions with a denominator based on groups of ten can be re written as a decimal number obeying the same rules of the number system as whole numbers.
Decimal numbers were invented 1500 years after the whole number system, (as a business tool) because fractions were hard to work with.

Resources for Teaching and Learning			
		Pearson Mathematics	**Wilkie Way**
Q1	To practice using multiplication and division to find a fraction of a number.	**Book 4a** Chapter 5	**Teacher Handbook Series: Fractions Decimals & Percentages** Chapter 9, 11 **Dice & Counter Games:** Sets 12 & 15
Q2	To practice using proportional adjustments to recognise an equivalent fraction.	**Book 4b** Chapter 3 **Book 4b** Chapter 22 (Probability ideas)	**Teacher Handbook Series: Fractions Decimals & Percentages** Chapter 9
Q3	To compare and order same denominaor fraction.	**Book 4a** Chapter 5	**Teacher Handbook Series: Fractions Decim s & Percentage** Chapter 7 **Dice & ou er G es:** S 2
Q4	To be able to benchmark fractions to order and place different denominator fractions.	**Book 4a** Chapter 5	**eac r ndbook Series: ract s Decimals & tages** Chapter 9 **Dice & Counter Games:** Set 12
Q5 Q6	To be able to add and subtraction fractions with same denomina and use proport l adjustmen he denominato s diffe	**Bo 4b C t 3**	**Teacher Handbook Series: Fractions Decimals & Percentages** Chapter 7, 9

P rse Ma ematics chapters referenced to Figure it Out Resources in Pearson Mathematics Te er u es.

Available from www.thewilkieway.co.nz members content area (subscription):

Problems: To develop conceptual understanding.
Classroom Posters: Understanding Fractions.
Planning & Assessment: Fractions progressions.

Teacher Handbook Series: Fractions Decimals & Percentages.
Dice & Counter Games are all available from the online store **www.thewilkieway.co.nz**

Pearson Mathematics Maintenance Workbooks:

Each book provides maintenance work for knowledge and skills (across all strands) as well as problem solving.

Level 3a.
Level 3b.
Level 4a.
Level 4b.

What do you know about decimals and percentages?

1. Write these numbers in order from smallest to largest.

a. 0.35 0.276 0.5 0.068 0.91 **0.068 0.276 0.35 0.5 0.91**
b. 4.5 4.54 4.054 4.504 4.45 **4.054 4.45 4.5 4.504 4.54**

2. How many tenths in each of these numbers?
a. 0.67 **6** **b.** 3.8 **38**

How many hundredths in each of these numbers?
c. 0.75 **75** **d.** 1.43 **143**

3. Solve the following additions and subtractions mentally.
a. 34.6+ 24.7 = **59.3** **b.** 42.56 + 34.99 = **77.55**

c. 79.2 - 34.9 = **44.3** **d.** 68.56 - 21.99 = **46.57**

4. Write these fractions as decimal numbers
a. $^{5}/_{2}$ **2.5** **b.** $^{3}/_{5}$ **0.6** **c.** $^{5}/_{4}$ **1.25**

5. Write these fractions as a percentage.
a. ¼ **25%** **b.** ⅘ **80%** **c.** $^{13}/_{25}$ **52%** **d.** $^{9}/_{20}$ **45%**

6. Find a. 20% of 142 **28.4** **b.** 60% of 242 **145.2** **c.** 25% of 96 **= 24**

Maximum Score 20		
Q1	3	Student is able to compare decimal numbers up to three decimal places.
Q2	4	Student understands the multiplicative structure of decimal numbers.
Q3	4	Student is able to use efficient mental additive strategies with decimal numbers.
Q4	4	Student is able to convert fractions to decimals.
Q5	4	Student is able to convert fractions to percentages.
Q6	2	Student is able to find a percentage of a quantity using fractions and place value knowledge.

Decimals were invented as special fractions that can be written following the same rules as the whole number system. They involve the repeated nesting of groups of ten as parts of one.
To make sense of decimal numbers students need to have extended their knowledge of whole number place value into a situation that requires an understanding of fractions as numbers that can be compared and ordered.
Using fractions and decimals in the context of measurement provides a meaningful context for students to see fractions in a continuous model.
Percentages use fractions as a representation of a proportion. Percent means out of one hundred. The equivalent fraction must have a denominator of one hundred. Students need to become flexible in their use of fractions, decimals and percentages choosing whichever version is the most efficient for the problem solution.

Resources for Teaching and Learning			
		Pearson Mathematics	**Wilkie Way**
Q1	To be able to compare decimals up to three decimal places.	**Book 3b** Chapter11 **Book 3b** Chapter13 **Book 4a** Chapter 17 - *in the context of mass*	**Teacher Handbook Series: No. & The Number System** Chapter 15
Q2	To develop an understanding of the multiplicative structure of decimal numbers.	**Book 3b** Chapter 23 & 24 in the context of measure **Book 4a** Chapter 17, 18 & 19 - *in the context of measure*	**Teacher Handbook Series: Fractions Decimals & Percentages** Chapter 8
Q3	To be able to use efficient mental additive strategies with decimal numbers.	**Book 3b** Chapter14 **Book 4a** Chapter 6 **Book 4a** Chapter 17 - *in the context of mass*	**Teacher Handbook Series: No. & The Numb r System** Chapter 15
Q4	To be able to convert fractions to decimals.	**Book 4a** Chapter 5 **Book 4b** Chapter 4	**Teac dbo Series:** **ecimals &** **es** Chap 11 **Counter Games:** Set 15
Q5	To be able to convert fractions to percentages.	**Book 4a** apter 5 **Book 4b** er 5	**Teacher Handbook Series: Fractions Decimals & Percentages** Chapter 10 **Dice & Counter Games:** Set 15
Q6	To be able t ind percentage ar using tion nd place ue o dg	**Book 4a** Chapter 5 **Book 4b** Chapter 3	**Teacher Handbook Series: Fractions Decimals & Percentages** Chapter 10 **Dice & Counter Games:** Set 15

Pear n Mathematics chapters referenced to Figure it Out Resources in Pearson Mathematics Teacher Guides.

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Problems: to develop conceptual understanding
Classroom Posters: Understanding Fractions
Planning & Assessment: Fractions progressions & place value progressions

Teacher Handbook Series: Fractions Decimals & Percentages
Dice & Counter Games are all available from the online store **www.thewilkieway.co.nz**

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Level 3a
Level 3b
Level 4a
Level 4b