



# The Wilkie Way

## NZ Curriculum Screening Assessment

### Teacher Guide & Answers

## Mathematical Number Knowledge & Strategies

### Level 2

(Shows where student is operating between level 1 and 3)

## School Year 2017

- Whole numbers
- Addition & Subtraction
- Multiplication & Division
- Fractions

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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 the level band that will require further teaching and learning experiences.

The areas of mathematics screened in this level 2 knowledge and strategy assessment are:

Whole Numbers	Place value, naming columns, expanding numbers, 10 more/10 less, grouping & sequencing (rounding) numbers.
Addition & Subtraction	Basic addition & subtraction facts to 10, teens & doubles Recall or derive facts to 20 Uses facts to 10 in other columns. At level 2 students should be able to use a simple additive strategy to add/subtract a single digit to a double digit number.
Multiplication & Division	Can make equal groups. Understands multiplication as repeated addition. Recognises an array to represent multiplication. Understands a division statement as equal grouping or equal sharing. Recalls or derives multiplication & division facts.
Fractions	Recognising half as two equal parts, identifying a unit fraction of a shape or quantity. Writing non unit fractions. Understanding half as a counting unit, the denominator representing the size of the unit, the numerator as how many units. Fractions as a result of a division (sharing). relationship between fractions, multiplication & division.

This screening assessment can be used to identify groups of students with common weaknesses to create targeted intervention booster groups.

Students scoring in the level 1 band should be re-screened using the Pearson Assessment Interview Part 1. Students scoring in the level 3 band should be re-screened using the Level 3 assessment screen.

	Level 1	Level 1-2	Level 2	Level 2-3	Level 3
<b>Overall Score</b>	0 - 12	13 - 30	31 - 70	71 - 90	91 - 100
<b>Whole Number PV</b>	0 - 3	4 - 7	8 - 21	22 - 28	29 - 30
<b>Add/Sub</b>	0 - 3	4 - 8	9 - 20	21 - 24	25 - 26
<b>Mult/Div</b>	0 - 2	3 - 6	7 - 15	16 - 22	23 - 24
<b>Fractions</b>	0 - 4	4 - 8	9 - 14	15 - 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.

**The whole number** , place value screen contributes 30 marks to the overall score. This section has the highest weighting as without an understanding of the number system students cannot make sense of working with numbers.

**Addition/Subtraction** and **Multiplication/Division** have a similar equal weighting of 26 for addition and subtraction and 24 for multiplication and division. This reflects the likelihood of more additive experiences.

The **fractions** section contributes 20 marks to the overall score. Looking at both partitioning regions and partitioning sets of objects. Also covers understanding fraction symbols.

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 within the particular area of mathematical knowledge. Information on each set of questions is given at the end of each page in this teacher guide. If students make consistent errors then this particular area of knowledge is weak and requires specific targeted teaching and learning practice.

A level two students should be displaying some early additive thinking. (not counting) when calculating in addition and subtraction. If they are unable to record their thinking in any way you will need to make use of an assessment interview.

The Pearson Assessment Interview is suggested as it has questions designed to provide the opportunity to show a variety of early additive strategies based on doubles, teens or facts to ten and interviewer support to help identify what might be missing for these students.

[www.edify.co.nz](http://www.edify.co.nz)

Students successfully completing this screening assessment with only the occasional non specific mistake has the mathematical knowledge to confidently be able to deepen and build further mathematical concepts.

This assessment tool is included in the Beagle suite of assessment tools - a cloud based solution supporting NZ schools to raise student achievement and close the gap, use assessment data to drive instruction and save time in analysing and interpreting results.

[www.beagleinnovations.com](http://www.beagleinnovations.com)

**What do you know about numbers?**

**1. Write the value of the underlined digit in each of these numbers in words?**

For example: 36 six ones

- a. 48 **four tens**    b. 357 **three hundred**    c. 2438 **two thousand**  
 d. 63 582 **sixty thousand**    e. 507 **zero tens**

**2. Expand the following numbers. For example: 36 = 30 + 6**

- a. 54 **50 + 4**                      b. 374 **300 + 70 + 4**  
 c. 247 **200 + 40 + 7**            d. 3567 **3000 + 500 + 7**

**3. Write the number 10 more than each number given.**

- a. 35 **45**    b. 46 **56**    c. 124 **134**    d. 397 **407**

**4. Write the number 10 less than each number given.**

- a. 74 **64**    b. 52 **42**    c. 327 **317**    d. 604 **594**

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

- a. 46 **4**            b. 73 **7**            c. 137 **13**            d. 437 **43**

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

- a. 538 **5**            b. 268 **2**            c. 1348 **13**

**7. Round each number to the closest 10 (decade).**

- a. 37 **40**            b. 82 **80**            c. 65 **70**            d. 143 **140**

**8. Round each number to the closest 100**

- a. 378 **400**            b. 742 **700**

**Maximum Score 30**

<b>Q1</b>	5	Students knows column values of whole numbers (to 5 digits)
<b>Q2</b>	4	Students understand additive structure of number in their standard partitions.
<b>Q3&amp;4</b>	8	Students understand the importance of 10 in the number system when adding and subtracting.
<b>Q5&amp;6</b>	7	Students show an understanding of the multiplicative structure of the number system, groups of ten repeatedly nesting inside groups of ten.
<b>Q7</b>	4	Students are able to round numbers to the closest ten (decade) with two digit numbers and understand the convention of round up when the digit 5 is involved. Can round to closest decade with a 3 digit number.
<b>Q8</b>	2	Students are able to round to the closest hundred.

Understanding the number system is essential in "cracking the code". Initially students require a linguistic understanding, names of numbers, names of columns. Their understanding must develop further to understand the additive partitioning and how basic addition and subtraction facts are repeated in each of the columns. A conceptual understanding requires students to understand the multiplicative nature of the number system based around repeated groups of ten. Students must also be able to see numbers in their sequential position. All aspects of place value must be developed for students to be successful in estimating and operating with numbers.

**What do you know about addition and subtraction?**

Complete the following equations.

- 1a.  $3 + 5 = 8$       b.  $7 + 7 = 14$       c.  $10 + 8 = 18$   
 d.  $10 - 3 = 7$       e.  $15 - 5 = 10$       f.  $16 - 8 = 8$
- 2a.  $7 + 6 = 13$       b.  $12 + 7 = 19$       c.  $9 + 6 = 15$   
 d.  $15 - 8 = 7$       b.  $17 - 4 = 13$       c.  $14 - 6 = 8$
- 3a.  $40 + 20 = 60$       b.  $80 + 40 = 120$       c.  $32 + 6 = 38$   
 d.  $90 - 30 = 60$       e.  $120 - 50 = 70$       f.  $89 - 4 = 85$

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

Students may use number lines or equations to show their thinking.

- 4a.  $36 + 8 = 44$   
 $36 + 4 + 4$   
 $30 + 14$   
 $34 + 10$
- 5a.  $72 - 7 = 65$   
 $72 - 2 - 5$   
 $2 - 7 = -5 \quad 70 - 5$
- 6a.  $38 + 19 = 57$   
 $38 + 20 - 1$   
 $30 + 10 + 17$
- 7a.  $68 - 29 = 39$   
 $68 - 30 + 1$   
 $68 - 20 - 8 - 1$
- b.  $58 + 9 = 67$   
 $58 + 2 + 7$   
 $58 + 10 - 1$   
 $50 + 17$
- b.  $63 - 9 = 54$   
 $63 - 3 - 6$   
 $63 - 10 + 1$
- b.  $25 + 27 = 52$   
 $25 + 25 - 2$   
 $26 + 26$   
 $20 + 20 + 12$
- b.  $72 - 35 = 37$   
 $72 - 30 - 2 - 3$  (use  $35 + 35 = 70$ )  
 $70 - 30 = 40 \quad 40 - 5 = 35 \quad 35 + 2$   
 $70 - 30 = 40 \quad 2 - 5 = -3 \quad 40 - 3$

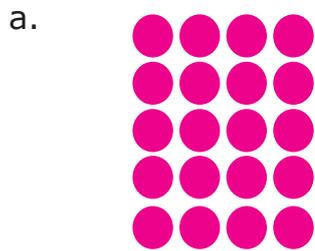
Maximum Score 26		
<b>Q1</b>	6	Students recall basic addition & subtraction facts within 10, doubles and teens.
<b>Q2</b>	6	Students recall basic addition and subtraction facts with 20, near doubles, near teens, facts using facts to 10.
<b>Q3</b>	6	Students use knowledge of facts to 10 and understand they are repeated in other columns in the number system.
<b>Q4</b>	2	Students use an additive strategy to add a single digit to a double digit.
<b>Q5</b>	2	Students use an additive strategy to subtract a single digit from a double digit.
<b>Q6</b>	2	Students use an efficient additive strategy to add double digit numbers.
<b>Q7</b>	2	Students use an efficient additive strategy to subtract double digit numbers.
<p>Students should be developing recall of basic addition and subtractions facts. Knowledge of facts to 10, teens and doubles are used to build knowledge of facts to 20. Students who stumble at questions 4 or use counting on to solve the question could be asked to explain their thinking for answers to question 2 to see if they know how to use doubles and teens to solve near doubles and teens. If you are unsure whether students are using any additive strategy or if they are reliant on counting on or back then evidence from an assessment interview will be required to confirm strategy thinking.</p>		

## What do you know about multiplication and division?

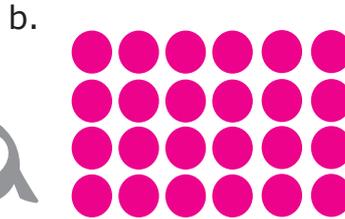
1. Picture shows 3 groups of 5 or 5 groups of 3

2a. Picture shows 4 groups of 2      b.  $4 \times 2$  or  $2 \times 4$

3. Write both multiplications shown by each array.

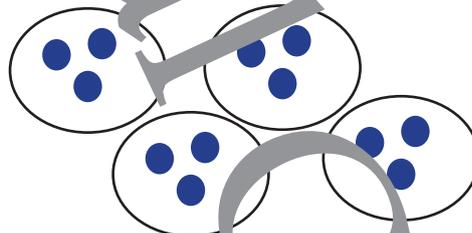
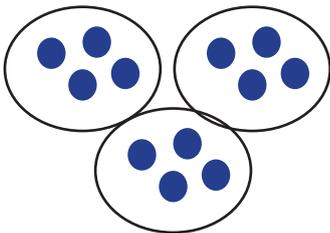


$4 \times 5$   
 $5 \times 4$



$6 \times 4$   
 $4 \times 6$

4a. Draw a picture to show  $12 \div 3 = 4$       b.  $12 \div 3 = 4$



*12 shared between 3 or 12 divided into groups of 3*

Complete these equations:

5a.  $6 \times 2 = 12$       b.  $7 \times 5 = 35$       c.  $10 \times 3 = 30$

6a.  $14 \div 2 = 7$       b.  $45 \div 5 = 9$       c.  $80 \div 10 = 8$

7a.  $4 \times 4 = 16$       b.  $7 \times 6 = 42$       c.  $4 \times 8 = 32$

8a.  $14 \times 6 = 84$       b.  $18 \times 3 = 54$       c.  $13 \times 4 = 52$

9a.  $28 \div 4 = 7$       b.  $35 \div 7 = 5$       c.  $18 \div 3 = 6$

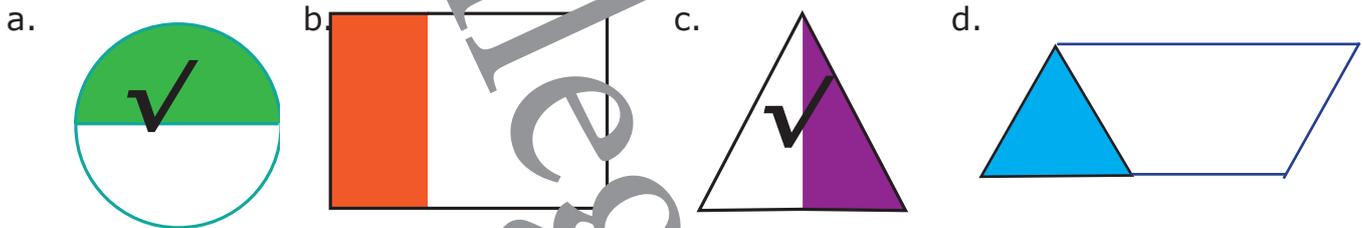
### Maximum Score 24

Q1	1	Can represent an equal sharing
Q2	2	Can represent a repeated addition and can represent a repeated addition statement as a multiplication statement.
Q3	4	Understands the array model representing the commutative property of multiplication.
Q4	2	Understands a division statement as either an equal share or an equal group. Can complete a division equation.
Q5	3	Recalls multiplications by 2, 5 and 10
Q6	3	Understands division as inverse of $\times 2$ $\times 5$ or $\times 10$
Q7	3	Knows or derives multiplication facts
Q8	3	Applies distributive property or double and halving to derive facts.
Q9	3	Uses recall of multiplication facts and inverse relationships to solve division.

Students should be demonstrating an understanding of how multiplication works rather than **just** recall of facts. Good recall of facts is essential for future mathematical learning. Question 8 will show those students who have a good understanding of the properties of multiplication.

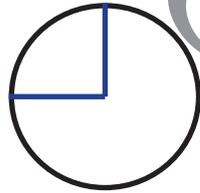
## What do you know about fractions?

1. Put a ✓ on the shapes that have one half coloured.

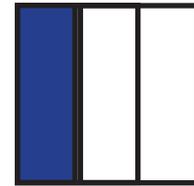


2. Colour or shade

a.  $\frac{1}{4}$  of the circle



b.  $\frac{1}{3}$  of the square



c. Write the fraction of the circle NOT coloured  $\frac{3}{4}$

d. Write the fraction of the square NOT coloured  $\frac{2}{3}$

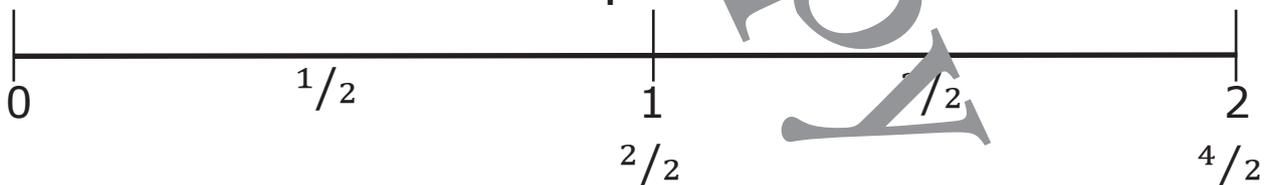
3a. Colour  $\frac{1}{4}$  of the set of counters



b. Colour  $\frac{1}{8}$  of the set of counters



4. Write these fractions in their correct position on the number line.



5a. 3 shared between 2 is  $1\frac{1}{2}$  b. 3 shared between 4 is  $\frac{3}{4}$

6a.  $\frac{1}{3}$  of 12 is **4** b.  $\frac{1}{5}$  of 20 is **4** c.  $\frac{2}{7}$  of 21 is **6** d.  $\frac{3}{5}$  of 30 is **18**

### Maximum Score 20

Q1	4	Students understand half as two equal parts. Mark scored for halves and not halves identified.
Q2	4	Students understand the denominator gives the number of equal parts to make the whole and the numerator defines how many equal parts.
Q3	2	Students can find the unit fraction of a set of objects.
Q4	4	Students understand half as a counting unit and that fractions are numbers.
Q5	2	Students recognise a fraction as a result of a division (equal sharing)
Q6	4	Students understand the relationship between multiplication, division & fractions

Students need to develop an understanding of the different concepts represented by a fraction. Part whole relationships, understanding of fractions as an extension of numbers - from whole numbers to rational numbers and as quotients, the result of a division.  
 Note: Q2c & d Are students able to write fraction symbolically or correctly in words? It is common for student at this level to write fractions in words as they are still learning the symbols for fractions.