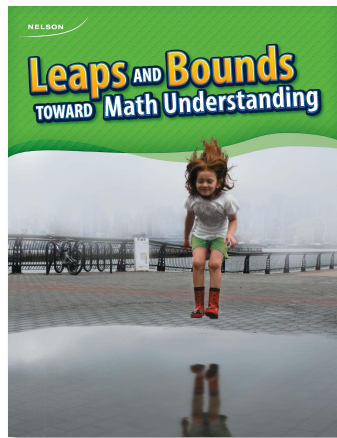
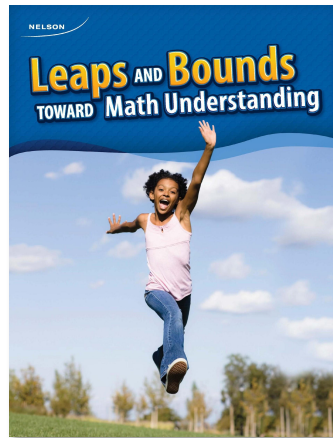


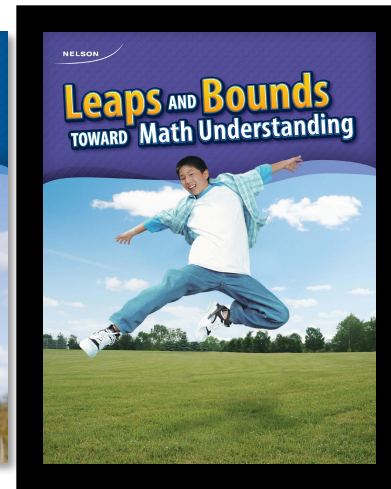
Leaps AND Bounds TOWARD Math Understanding



3/4



5/6



7/8

Cheryl Schaub – presenter

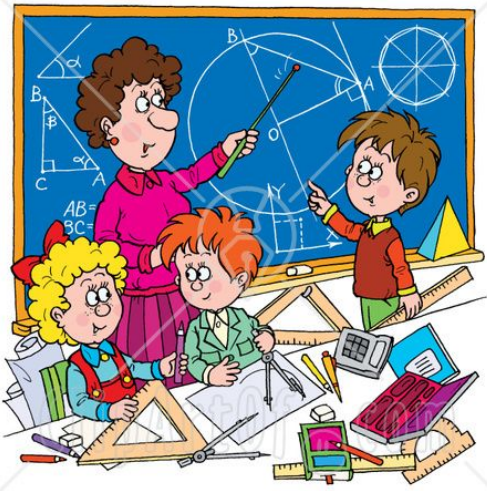
Struggling Students in Math



- What proportion of your students do you feel struggle?
- What do they struggle with?
- What gets in the way of you being able to give them the help they need?

Talk to your neighbours.

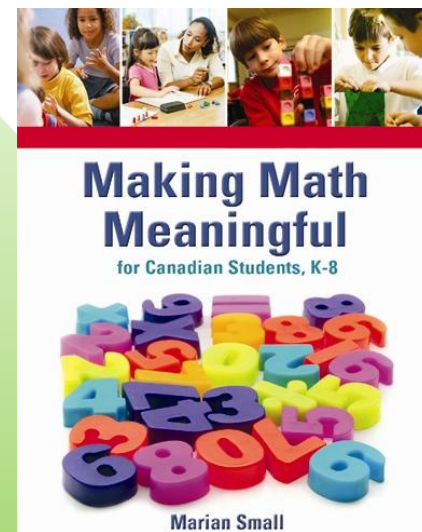
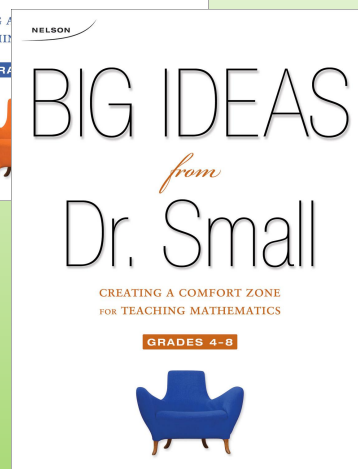
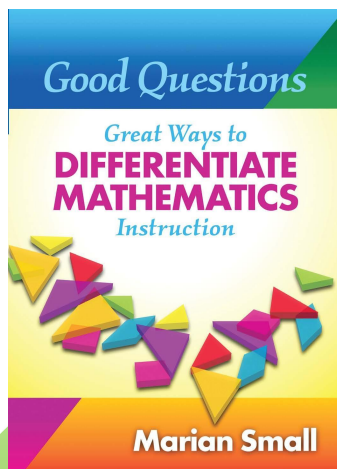
Numeracy vs Literacy Interventions



- more frequently provided by regular classroom teacher
- typically only minor tweaks on what everyone else is doing
- fewer resources to turn to

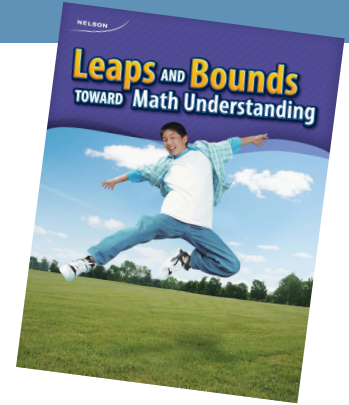


The Marian Small Family



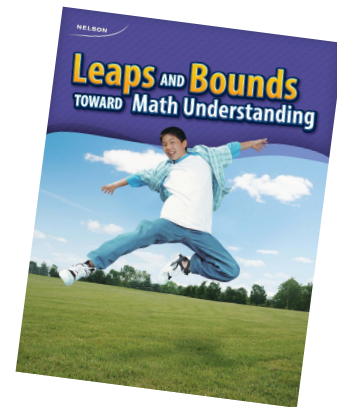
PROFESSIONAL RESOURCES AND INSTRUCTION FOR MATHEMATICS EDUCATORS

Leaps AND Bounds TOWARD Math Understanding

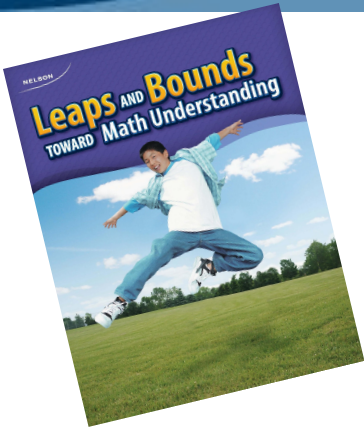


- Based on research -> developmental -> typical conceptual gaps
- Addresses curriculum in terms of content and pedagogy
- Focus: Grades 3–8 students – ‘Modulo’ will publish in French, 3-4 = April 2012, 5-6 = Fall 2012, 7-8 = TBA
- Goal: Long term success

Leaps AND Bounds TOWARD Math Understanding



- Designed for regular classroom teacher use
- Easily administered diagnostics identify specific gaps
- Multiple intervention pathways that go as far back as 3 grade levels
- Open-Ended or Guided lessons



Leaps AND Bounds TOWARD Math Understanding

- Careful analysis of possible gaps
- Differentiated instruction, i.e. not every student needs the same remediation at the same pace.
- Provides specific instruction / guiding questions / related student practice

Do you ever ask these types of questions?

What would be sufficient and revealing evidence of understanding?

What performance tasks must anchor the unit and focus the instructional work?

How will I be able to distinguish between those who really understand and those who don't (though they may seem to do so?)

What criteria will I use to evaluate student work?

What misunderstandings are likely?

How will I check for those misunderstandings?

What would be interesting and engaging activities on this topic?

What resources and materials are available on this topic?

What will students be doing in and out of class?

What assignments will be given?

How will I give students a mark (and justify it to parents)?

Did the activities work? Why, or why not?

Leaps AND Bounds

TOWARD Math Understanding

Strand: Number

Number Strand Overview

Topics

Pathways

Interventions

Representing and Comparing Decimals

Topic Overview

(page 32)

Diagnostic Tool

(page 34)

Pathway 1:

Decimals with Many Places

Open-ended

Guided

Pathway 2:

Comparing Decimals

Open-ended

Guided

Pathway 3:

Representing Decimal Thousandths

Open-ended

Guided

Pathway 4:

Multiplying and Dividing by 10s

Open-ended

Guided

What can *Leaps and Bounds* look like in a math classroom?

STEP
1

Diagnostic → **Administer** and assess the diagnostic

STEP
2

Pathway → Choose the **intervention pathway** based on diagnostic results

STEP
3

Intervention → Choose an **open-ended or guided lesson, connect** students' learnings, and **assign** student resource pages

Leaps AND Bounds TOWARD Math Understanding



Let's take a closer
look ...

The Teacher Resource

Teacher Resource – page 32

**Strand:
Number**

Representing and Comparing Decimals

Planning For This Topic

Materials for assisting students with representing decimals consist of a diagnostic tool and 4 intervention pathways. Pathway 1 focuses on working with decimals with more than 3 decimal places (with a particular emphasis on very small numbers less than 1). Pathway 2 concentrates on comparing decimals involving thousandths. Pathway 3 focuses on representing decimal thousandths. Pathway 4 involves multiplying decimals by powers of 10.

Each pathway has an open-ended intervention and a guided intervention. Choose the type of intervention more suitable for your students' needs and your particular circumstance.

The Teacher Resource

Curriculum Connections

Grades 5 to 8 curriculum connections for this topic are provided online. See www.nelson.com/leapsandbounds. Pathway 1 is appropriate for those following the WNCP curriculum. Pathway 4 is primarily for those following the Ontario curriculum. Pathways 2 and 3 are appropriate for both curriculums.



Correlations (online)



Correlation to WNCP Curriculum and Grade 8 Classroom Resources

Note: Leaps and Bounds 7/8 is a math intervention resource and therefore does not include new content and concepts being introduced to students for the first time in Grade 8. Leaps and Bounds 7/8 includes content from Grades 5 to 7 that will prepare students who are struggling for work at the Grade 7 or 8 level.

GRADE 8 Core Resources Correlation with Grade 8 WNCP core resources				INTERVENTION Resources and Outcomes Correlation between Leaps and Bounds 7/8 and prerequisite outcomes from WNCP Grades 5 to 7.			
Grade 8 WNCP outcomes	Nelson Math Focus 8	Math Makes Sense 8	MathLinks 8	Leaps and Bounds 7/8 Topics	Grade 7 WNCP outcomes	Grade 6 WNCP outcomes	Grade 5 WNCP outcomes
Number							
				Representing Large Whole Numbers <i>Pathway 1:</i> Using Decimals for Large Whole Numbers <i>Pathway 2:</i> Representing Millions and Billions <i>Pathway 3:</i> Representing Six-Digit Numbers	7. Compare and order positive fractions, positive decimals (to thousandths) and whole numbers by using: • benchmarks • place value • equivalent fractions and/or decimals. [CN, R, V]	1. Demonstrate an understanding of place value for numbers: • greater than one million • less than one thousandth. [C, CN, R, T] 2. Solve problems involving large numbers, using technology. [ME, PS, T]	1. Represent and describe whole numbers to 1 000 000. [C, CN, V, T]

The Teacher Resource

Professional Learning Connections

PRIME: Number and Operations, Background and Strategies (Nelson Education Ltd., 2005), pages 117–122, 127–130

Making Math Meaningful to Canadian Students K–8 (Nelson Education Ltd., 2008), pages 227–234, 241–244

Big Ideas from Dr. Small Grades 4–8 (Nelson Education Ltd., 2009), pages 61–67

Good Questions (dist. by Nelson Education Ltd., 2009), pages 35, 52

More Good Questions (dist. by Nelson Education Ltd., 2010), pages 66, 81

Why might students struggle with decimals?

Students might struggle with representing and comparing decimals for any of the following reasons:

- They might have difficulty switching from modelling whole numbers using base ten blocks to modelling decimals using base ten blocks (particularly when the large cube, instead of the flat, represents 1).
- They might not recognize that a decimal such as 0.060 can be read or renamed as thousandths; that is, 0.060 is 60 thousandths.
- They might think that a number with more digits is always greater than a number with fewer digits, as with whole numbers (e.g., they may think, mistakenly, that $0.8 < 0.423$).
- They neglect to consider the value of the zeros immediately to the right of the decimal point (e.g., they mistakenly think that $0.04 > 0.3$).
- They might not consider renaming decimals as a strategy for comparing them (e.g., to compare 4.1 with 4.123, rename 4.1 as 4.100).
- They might not understand how ten thousandths, hundred thousandths, and millionths relate to tenths, hundredths, and thousandths (e.g., 1000 millionths is the same as 1 thousandth).
- Their number sense, when it comes to very small numbers, may be weak, so they rely solely on rote procedures to compare and order these decimals.
- They might multiply a decimal by a power of 10 by appending 0s to the right of the decimal point instead of moving digits (e.g., writing 10×3.14 as 3.140).
- They might mix up the effects of multiplying and dividing by powers of 10 (e.g., they might multiply 0.234 by 100 to get 0.00234 instead of 23.4).

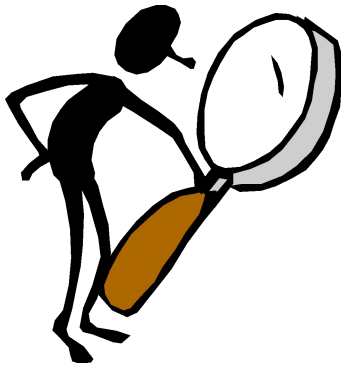
Leaps AND Bounds TOWARD Math Understanding

Diagnosis



The Diagnostic Tool

Teacher Resource – page 34



- Identifies conceptual gaps
- Describes and prescribes the different pathways (levels of understanding)
- Easy to administer / assess
- Small group or whole class
- Solutions provided

Pathways

- Provides differentiation with regards to conceptual levels
e.g. Comparing decimals, Representing decimals, Multiplying by 10's



Two Types of Intervention



OPEN-ENDED: Problem-solving based interventions that allow students flexibility in coming up with solutions.

GUIDED: Structured, step-by-step interventions that are more explicit and precise.



Lesson Model

Before - can be a variety of openers

- Prep students for assignment – posing thinking questions

During – open or guided styles

- Scaffolding students' thinking with questions
- Observing and listening to students'
 - Strategies used
 - Specific conceptual understandings identified in Teacher Resource

After – consolidating questions

- Connecting students' ideas
- Connecting important concepts



Before

Prep students for assignment – posing thinking questions

1. Open ended discussion questions

How are the numbers 6.001 and 1.006 alike? How are they different?

Create a question involving multiplication or division of decimals where the digits 4, 9, and 2 appear somewhere.

Before

Prep students for assignment – posing thinking questions

2. Anticipation/Reaction Guides

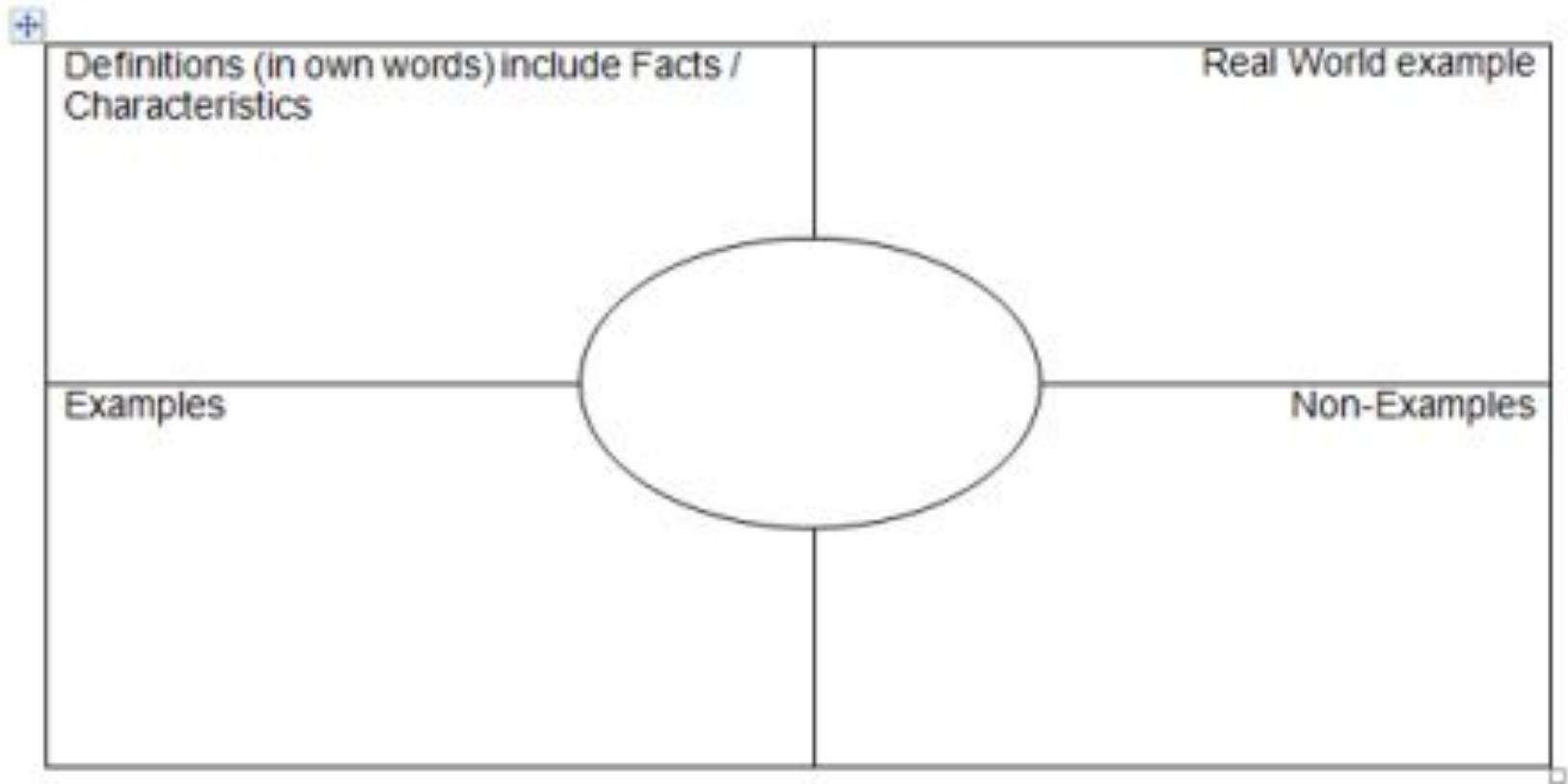
(What Do You Think? – In Nelson textbooks)

BEFORE (True or False)	STATEMENTS	AFTER	PROOF Use the back of this page to show your proof
	Every decimal multiplication is related to a whole number multiplication		
	Every decimal is equivalent to more than one fraction		
	Dividing will always result in a smaller answer		

Before

Prep students for assignment – posing thinking questions

3. Frayer Model



The diagram illustrates the Frayer Model, a concept learning tool. It consists of a large rectangle divided into four quadrants by a horizontal and a vertical line. In the center of the rectangle is a large empty oval. The quadrants are labeled as follows:

- Top-left quadrant: Definitions (in own words) include Facts / Characteristics
- Top-right quadrant: Real World example
- Bottom-left quadrant: Examples
- Bottom-right quadrant: Non-Examples

The central oval is intended for students to write a definition or key characteristics of the concept being studied.

Before

Prep students for assignment – posing thinking questions

4. “tell me everything you know about decimals”



decimals

During

Before using either the open or guided intervention use the following parallel types of questions...

During

**Use the Place value chart and base ten blocks.
Model the “Before” of Open-Ended Pathway 3
(page 18)**

**Notice the parallel types of questions for
Pathway 1 (page 14) and Pathway 2 (page 16)**

Scaffolding students' thinking with questions

Observing and listening to students'

- Strategies used
- Specific conceptual understandings identified in Teacher Resource

Comparing numbers

Teacher guide pages 28 - 33

Pathway 1

Represent **12 569** and **13 114** on place value charts by placing counters in the appropriate columns.

Ask: **How would you read these numbers?**

(twelve thousand five hundred sixty-nine; thirteen thousand one hundred fourteen)

Ask: **Which number has more ten thousands in it, 12 569 or 13 114?**
(They both have 1 ten thousand.)

Ask: **Which number has more ones in it?**
(12 569)

Ask: **Is 12 569 greater because it has more ones? Why or why not?**
(no, since it has fewer hundreds and fewer thousands)

Pathway 2

Represent **1259** and **1311** on a place value chart by placing counters in the appropriate columns.

Ask: **How would you read these numbers?**

(one thousand two hundred fifty-nine; one thousand three hundred eleven)

Ask: **Which number has more thousands in it?** *(They both have 1 thousand.)*

Ask: **Which number has more ones in it?** *(1259)*

Ask: **Is 1259 greater because it has more ones? Why or why not?**
(no, since it has fewer hundreds)

Open Style



From the student resource

Pathway 1 – page 32

Pathway 2 – page 37

Pathway 3 – page 43

Pathway 4 – page 49

Guided Intervention –

Pathway 1 example (student book)

Student resource – p 32

Decimals with Many Places

Pathway **1**
OPEN-ENDED

Sometimes you need numbers with a lot of decimal places to describe something that's very small.

You might also need a lot of decimal places to describe something precisely, whether it's big or small.

For example, a grain of pollen might be

$0.000\ 008\text{ m}$ ($\frac{8}{1\ 000\ 000}\text{ m}$) long.

You will need

- Place Value Charts (to Millionths) (BLM 4)

- Use the place value charts below to help you write 2 numbers for each description.

- a number that is less than 1 hundred thousandth but more than 5 millionths:



Ones	Tenths	Hundredths	Thousandths	Ten thousandths	Hundred thousandths	Millionths

Other Open Pathways for the Topic

Comparing Decimals

Pathway 2
OPEN-ENDED

Student resource – p 37

Representing Decimal Thousandths

Pathway 3
OPEN-ENDED

Student resource – p 43

Multiplying and Dividing by 10s

Pathway 4
OPEN-ENDED

Student resource – p 49

Guided Style



From the student resource

Pathway 1 – page 34

Pathway 2 – page 39

Pathway 3 – page 45

Pathway 4 – page 51

Guided Intervention – Pathway 1 example (student book)

Student resource – page 34

Decimals with Many Places

Pathway 1
GUIDED

- If you write a number like 0.003 200 in a place value chart, you can see why it can be read several ways.

Ones	Tenths	Hundredths	Thousandths	Ten thousandths	Hundred thousandths	Millionths
0	0	0	3	2	0	0

0.003 200 can be read in each of these ways:

3200 millionths

320 hundred thousandths

32 ten thousandths

Try These

- Write how you would read each decimal.

a) 0.000 004 _____

b) 0.000 04 _____

c) 0.000 4 _____

Guided Intervention –

Pathway 2 example (student book)

Comparing Decimals

Pathway 2
GUIDED

Student resource – page 39

The metric measurement system works just like our place value system. The place value of each digit of a measurement depends on which unit is considered the whole.

For example, a measurement of 0.236 m means

- 0 whole metres (0 m),
- 2 tenths of a metre (0.2 m),
- 3 hundredths of a metre (0.03 m), and
- 6 thousandths of a metre (0.006 m).

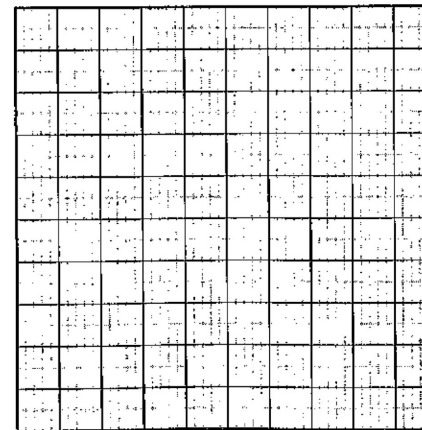
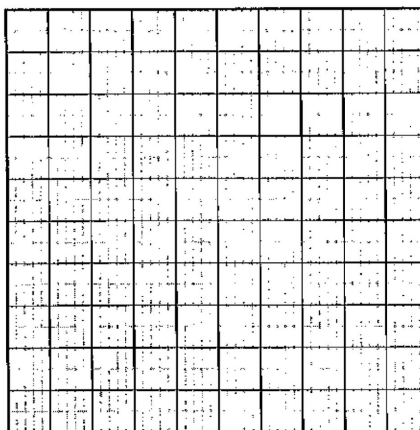
You will need

- Place Value Charts (to Thousandths) (BLM 6)
- Thousandths Grids

Try These

1. Shade the thousandths grids to model both decimals. Then write $<$ or $>$ to show the comparison.

0.152 0.132



Guided Intervention – Pathway 3 example (student book)

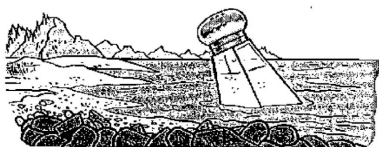
Representing Decimal Thousandths

Pathway 3
GUIDED

Student resource – page 45

To measure the saltiness (the salinity) of water, scientists use the term *parts per thousand*. Parts of the Pacific Ocean have a salinity of 37 parts per thousand, which is $\frac{37}{1000}$, or 0.037.

This means that 1 kg of ocean water could contain 0.037 kg of salt.



You will need

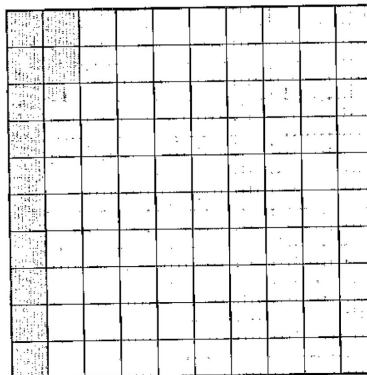
- Place Value Charts (to Thousandths) (BLM 6)
- Thousandths Grids (BLM 7)

Try These

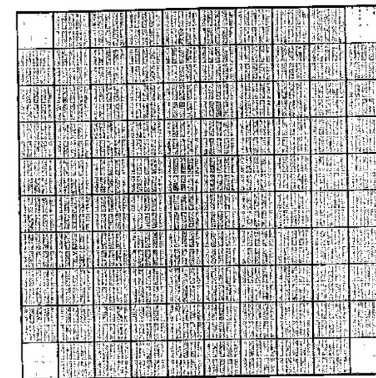
There are different ways you can represent or model 0.037.

1. Name the decimal modelled by the shaded part of each grid.

a) _____



c) _____



Guided Intervention –

Pathway 4 example (student book)

Multiplying and Dividing by 10s

Pathway 4 GUIDED

Student resource – page 51

Jana had to figure out the costs of snacks so that she could budget for school events.

Multiplying and Dividing by 10

To figure out the cost of 10 snacks, you can multiply \$1.23 by 10.

- You can estimate.

The cost of 10 snacks is a bit over \$10, since 1 snack is a bit over \$1.



You will need

- play coins
- Place Value Charts (to Ten Thousandths) (BLM 5)
- Hundredths Grids (BLM 8)

Try These

1. Explain or show how to use a place value chart for each calculation.

$$4.12 \times 10 = 41.2$$

$$230 \div 100 = 2.30$$

After

Consolidating both the Open and Guided Intervention

In the teachers guide there are consolidating questions which are used to ensure understanding.

Sample consolidating questions might be: (**Open ended** - depending on students work)

- How can you write 23 millionths as a decimal?
- Why does it make sense that the place to the right of the hundred thousandths is millionths?
- How many millionths make 1 ten thousandth? How do you know.

Sample consolidating questions might be: (**Guided**- depending on students work)

- Question 6 says that you need a lot of decimal places to write a very small numbers. Explain why the number 540.000 123 has many decimal places even though it's not a small number.
- Why does it make sense that the place to the right of the hundred thousandths is millionths?



Reviewing student work

A group of grade eight students were given the assessment found on **pages 34-36 in the teacher resource.**

Representing and Comparing Decimals

They were given 30-45 minutes to complete the assessment.
Students were encouraged to try every question.

Reviewing student work

With your table group assess the class results and decide on which pathway and interventions may be appropriate for each student or group of students.

Be prepared to share your findings and explain why.

Sharing and findings.....

What did you notice?

Pathway 1	Pathway 2	Pathway 3	Pathway 4	Other

NELSON

Leaps AND Bounds TOWARD Math Understanding

Digital Teacher's Resource

Interactive
Whiteboard
Resources

Teacher's Resource

Student Resource
Support

Title Page
Table of Contents
What is Leaps and Bounds
Diagnostic Tools
Teaching Notes
Blackline Masters
Power Point files of
SMART™ Notebook Files

Teaching Notes

Number

- Topic 1. Representing Large Whole Numbers
- Topic 2. Whole Numbers Operations
- Topic 3. Representing and Comparing Decimals
- Topic 4. Decimal Operations
- Topic 5. Relating Situations to Operations
- Topic 6. Comparing Fractions
- Topic 7. Fraction Operations
- Topic 8. Rates, Percents, and Ratios
- Topic 9. Multiplicative Relationships
- Topic 10. Integers

Patterns and Algebra

- Topic 11. Patterns
- Topic 12. Algebra

Geometry

- Topic 13. 3-D Shapes
- Topic 14. 2-D Shapes
- Topic 15. Geometric Drawings
- Topic 16. Location
- Topic 17. Transformations

Measurement

- Topic 18. Area and Perimeter
- Topic 19. Volume and Surface Area
- Topic 20. Angles
- Topic 21. Metric Units

Data and Probability

- Topic 22. Displaying Data
- Topic 23. Summarizing Data
- Topic 24. Probability

Notebook File Edit View Insert Format Draw Window Help

lb78iwb_t8_ratioerrate.notebook

Sample Answer

Group 1

1 start

2 p1-a1

3 p1-a2

4 p1-a3

5 p1-a4

6 p2-a1

7 p2-a2

8 p2-a3

9 p2-a4

Auto-hide

Toolbox

0 1

2 3

4 5

6 7

8 9

+ -

÷ ×

\$.

- Pull out a sports ball.
- Use the tiles to create an expression that shows how you would determine the unit price (or unit rate).
- You do NOT need to solve it.





Using Rates

Pathway 1

[Extend Page](#)

Does it work?

Gaps Closing Evidence gathered April-June 2010
from 470 students across ten boards in
Ontario

	Non-Gap Closing Students	Gap Closing Students	Gap Closing Males	Gap Closing Females
Pre %	57.2	37.2	40.0	34.8
Post %	58.6	56.4	57.0	56.2
% Growth	1.4	19.2	16.8	21.3

Gap of 20.0

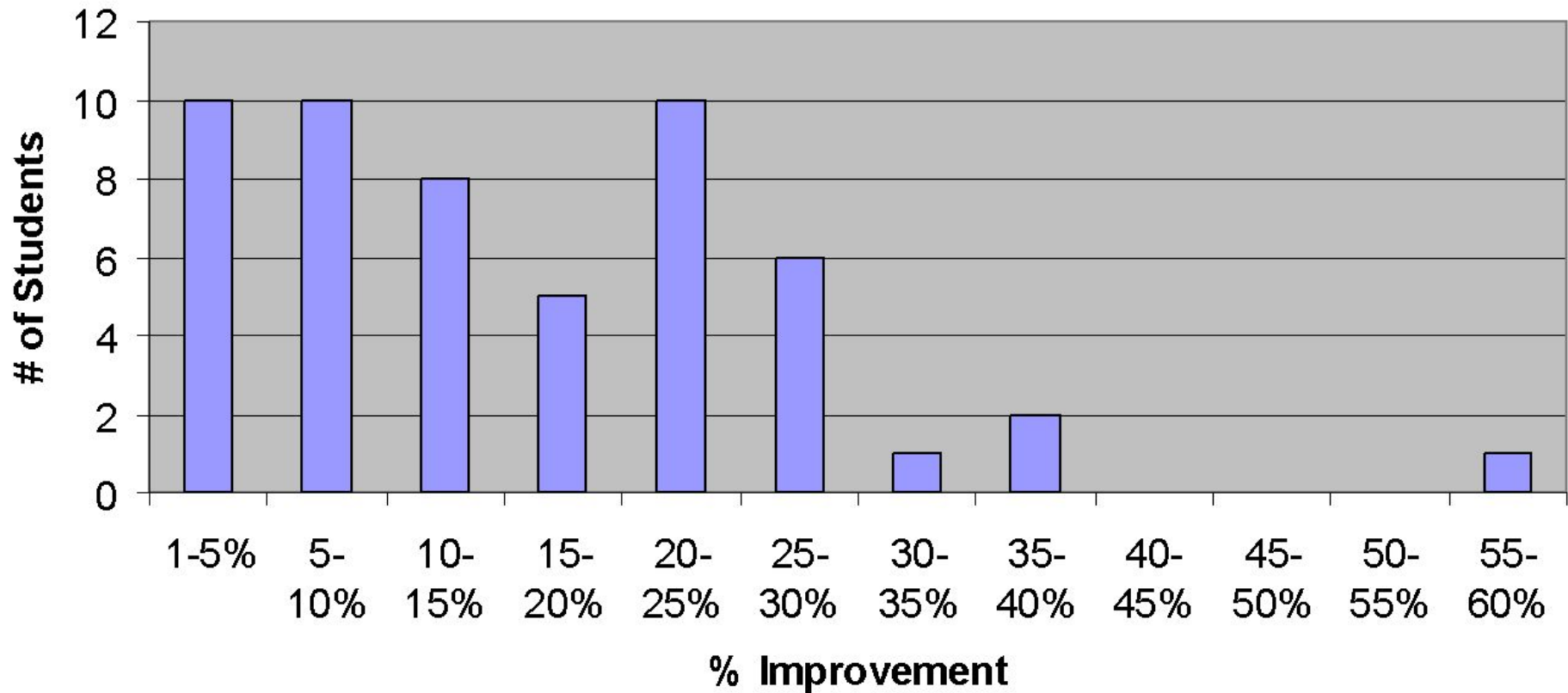
Gap of 5.2

Gap of 2.2

Gap of 0.8

And in New Brunswick...

% Improvement in Scores



How did students feel?

“Asum”

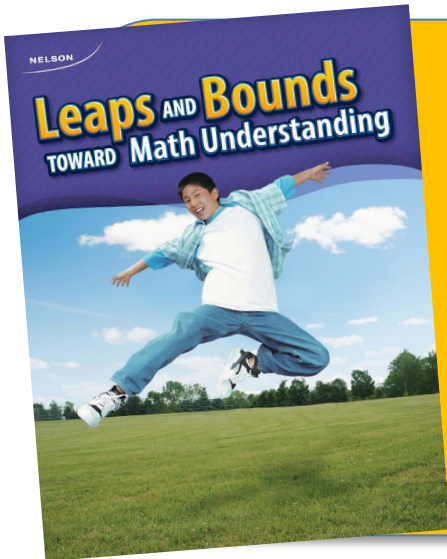
- Emilio

“Hape”

- Austin

“Prraod”

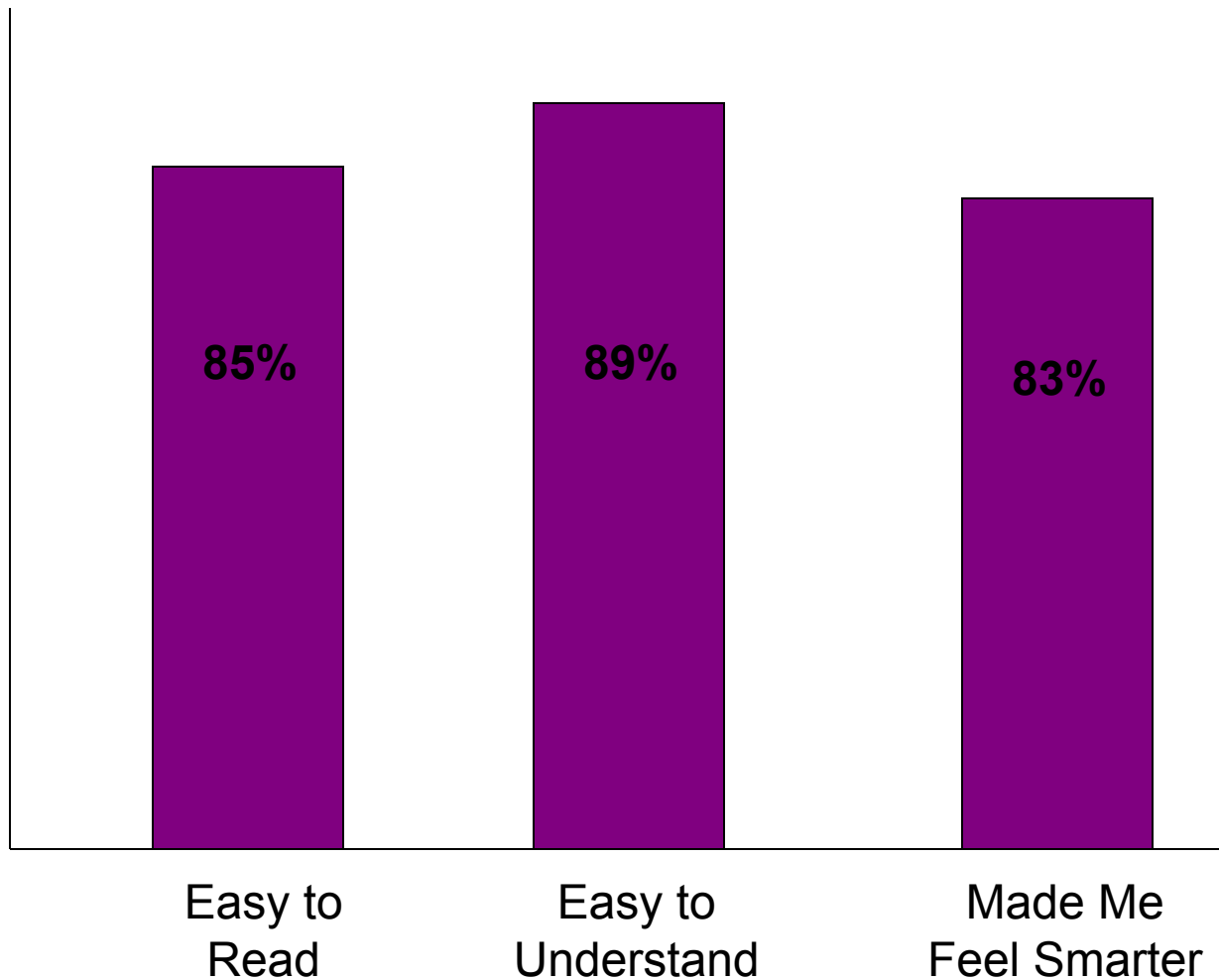
- Hannah



**“Smarter than
before”**

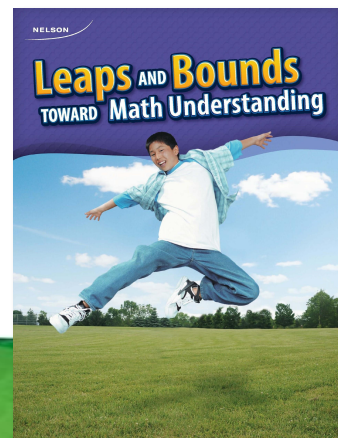
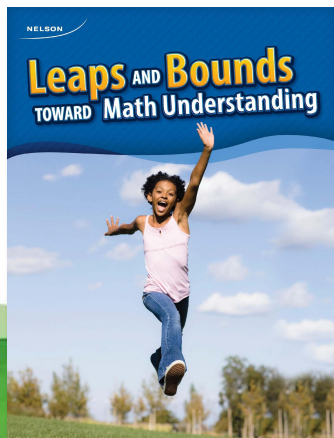
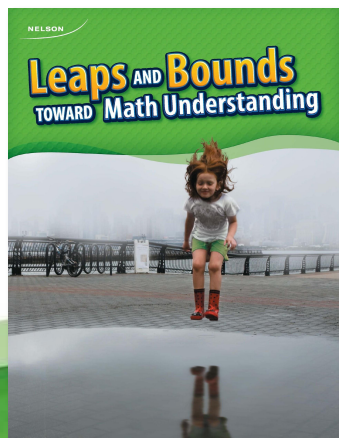
- Tasha, Damien, Dylan,
Taron, Evan...

How did students rate Leaps and Bounds?



Additional information at
www.nelson.com/leapsandbounds

- Correlations
- Digital Teacher's Resource samples
- Student Resource Solutions
- Marian's Math Club registration form



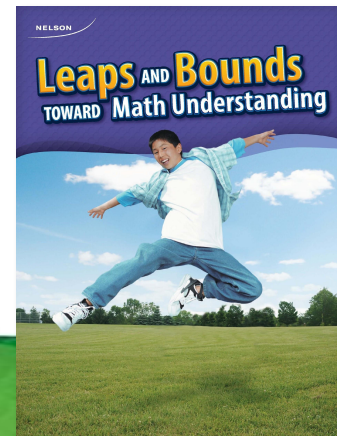
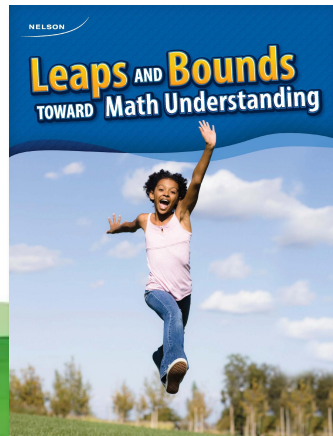
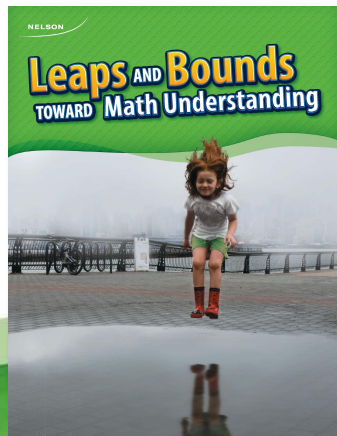
Ways to stay connected with this group:

www.crcpd.ab.ca

or

<http://learning.arpdc.ab.ca/course/view.php?id=125>

- Meet on-line with same grade teachers
- Post questions and queries
- Celebrate successes
- Discuss other interventions
- Share resources



**Leaps and Bounds is
available from the
Alberta LRC
(Learning
Resources
Centre)**

www.lrc.education.gov.ab.ca/

Grades 7/8 - EOD Pricing

**Teacher's Resource
(select one format)**

Print Teacher's Resource

\$84.01

Digital Teacher's Resource with Interactive Whiteboard activities (Online)

\$137.47

Digital Teacher's Resource with Interactive Whiteboard activities (DVD)

\$137.47

**Print + Digital Bundle Teacher's Resource with Interactive Whiteboard activities
(Online)**

\$198.63

Print + Digital Bundle Teacher's Resource with Interactive Whiteboard activities (DVD)

\$198.63

**Student Resource
(select one format)**

Student Resource 5-Pack (consumable)

\$76.36

Student Resource (Blackline Masters)

\$160.42

Student Resource (CD-ROM, modifiable)

\$160.42

Any questions



Next meeting will be a webinar on May 15 from 4:00 – 5:00 pm. An email with the link will be mailed to you. Please check your technology to ensure it is working properly (CBE teachers especially talk to your tech person in advance)

Use the moodle site to stay in touch: <http://learning.arpdc.ab.ca/course/view.php?id=125> or accessible directly through the CRC website www.crcpd.ab.ca

OR

Email Cheryl with any questions, student samples or topics to discuss.
cschaub@crcpd.ab.ca

Homework

- Pick one group of students to try a diagnostic with
- Be ready to discuss at our next meeting any insight that you may have discovered

AND/OR

- Post an activity, lesson, thought that you have to support student learning to the moodle

Thanks for *attending*

Please stay in touch!

Mathematics is ...

