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# Developing Computational Fluency Gr 3 - 7



**Presented by Jen Barker**

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REC 304 3:30 p.m. - 5:00 p.m.

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## What does it mean to have Computational Fluency?:

refers to having efficient and **accurate** methods for computing. Students exhibit computational fluency when they demonstrate **flexibility** in the computational methods they chose, **understand** and can explain these methods, and produce accurate answers **efficiently**. The computational methods that a student uses should be based on mathematical ideas that the student understands well, including the structure of the base-ten number system, properties of multiplication and division, and number relationships.

- NCTM (2000), p. 152

## Math Running Records:

Math running records are a three-part oral assessment. They provide evidence of a child's computational fluency. They help to make students' thinking visible.

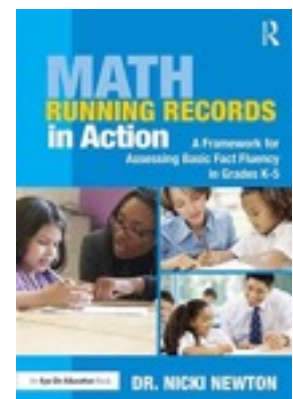
Websites to support:

<https://mathrunningrecords.wordpress.com/>

<https://guidedmath.wordpress.com/math-running-records-videos/>

**The three parts show:**

- speed and accuracy
- flexibility and efficiency (the child's thinking process)
- the child's disposition towards mathematics



LRS #178937

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**Rationale:**

*“We can be more productive, confident, and intentional in our teaching decisions when we have dependable, reliable, valid systems for collecting, organizing, analyzing, and interpreting students’ mathematical skills and behaviours.”*

- Dr. Nikki Newton, p.g. 4

## **RUNNING RECORDS: THREE PARTS:**

**Part One - Assessing for *Automaticity***

Students are given a set of benchmark problems to see and hear if students have automaticity with the basic facts. (see handout)

**Part Two - *Flexibility and Efficiency***

Students look at specific problems and share the strategies they used. Students’ thinking is made visible and teachers can see whether students are using lower level strategies such as counting or more advance strategies such as relating the facts they know to solve facts they don’t know (also referred to as derived facts). (see handout)

**Part Three - *Mathematical Disposition***

Students are asked how they think about themselves as mathematicians, what they do well and what they need to work on.

**Introduction to the assessment:**

**Teacher:** Hello \_\_\_\_\_. Today we are going to an addition/multiplication running record. First I am going to explain to you the different parts of this assessment. Then, I am going to give you a set of problems and I want you to say the answers. I am going to take some notes as you do the assessment. Next, I will ask you some questions about the problems you saw. Finally, I will ask you some questions about what you think about math. Do you understand what we are going to do? Do you have any questions. (Math Running Records, p.g. 40)

**Making Sense of the information:**

Marcos Martinez Multiplication Running Record 3rd Grade: 2014-2015										
	M0	M1	M10	M5	M2	M3	M4	M6	MD	MHF
RR 1 Sept. 15	✓	✓	✓	✗	✗	✗	✗	✗	✗	✗
RR 2 Oct. 22	✓	✓	✓	✓	✓	✗	✗	✗	✗	✗
RR 3 Nov. 30	✓	✓	✓	✓	✓	✓	✓	✗	✗	✗

From Math Running Records, p.g. 167

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## Whole class:

### Teach for Conceptual Understanding

Concretely - using manipulatives

Representational - pictorial

Abstract - using the numbers and symbols

For ideas, seek out *Teaching Student Centered Mathematics* by Van deWalle LRS #167789 Additionally, Carole Fullerton has some great resources, including *Sums and Differences* LRS# 169298, *Multiplicative Thinking* LRS #173444, and *Mastering the Facts Addition* LRS#164751 and *Mastering the Facts Multiplication* LRS #164750, Fair Shares LRS#168324

### Using Literature:

Mathematizing a read-aloud provides students with opportunities to learn mathematical concepts in meaningful contexts. Using literature to connect concepts with students' experiences helps foster understanding and motivates students to learn.

- Primary: <https://portal.sd71.bc.ca/group/l7lwzs1/primarymath/Documents/Math%20Bibliography%20Primary%202017.pdf>
- Intermediate: <https://portal.sd71.bc.ca/group/l7lwzs1/intermediatemath/Documents/Math%20Bibliography%20Intermediate%202017.pdf> from Campbell River/Comox
- <https://mathbookmagic.com/>

### Number Talks

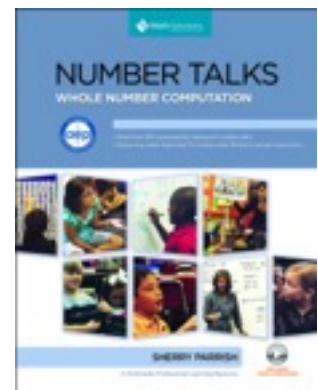
The potential learning intentions:

- Develop multiple strategies (Mental Math) for Decomposing
- Develop the ability to compute with flexibility, accuracy and efficiency

10 - 15 minutes of focussed discussion on either one question or a "string" of questions designed to elicit a particular strategy (e.g., doubles plus one)

Items you could use:

- Ten Frames or Base Ten Blocks
- Greg Tang books
- Online visual tools including the math rack and ten frames through <https://www.mathlearningcenter.org/resources/apps>
- Dot arrangements or Real life images of groups of items (arrays) <http://ntimages.weebly.com/photos.html>
- Graham Fletcher's Multiplication Subitizing Cards <https://gfletchy.files.wordpress.com/2014/03/multiplication-subitizing-cards.pdf> and here is a blogpost where he describes how he uses these. <https://gfletchy.com/2015/02/10/subitizing-to-foster-multiplicative-thinking/>



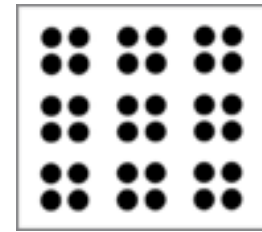
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### Guiding Questions:

- How many do you see?
- How do you see them?
- Does anyone see them differently?
- Can you draw them?

$$8 + 2 =$$
$$8 + 2 + 3 =$$
$$8 + 5 =$$



### Blogposts on Number Talks:

- On my site, I have discussed Number Talks <http://www.meaningfulmathmoments.com/number-talks.html>
- Sandra Ball has written about Number Talks: <https://startingwiththebeginning.wordpress.com/number-talks/>

### Video Examples:

Addition Number Talk  $16 + 15 =$  <https://www.youtube.com/watch?v=SPEfxPgZJy4>

Multiplication string  $7 \times 7$  by Math Solutions - <https://mathsolutions.wistia.com/medias/3flcbu6fnw>

Multiplication video in a combined Grades 4/5 class <https://www.teachingchannel.org/videos/4th-5th-grade-number-talks>

## Independent Practice:

### Games - Independent or Partner

- Guided Math has created and shares many games [http://www.guided-math-adventures.com/?page\\_id=125](http://www.guided-math-adventures.com/?page_id=125)
- Box Cars and One-Eyed Jacks <https://www.boxcarsandoneeyedjacks.com/product-category/math/>
- Multiplication Games [http://www.meaningfulmathmoments.com/uploads/1/1/1/9/11190716/multiplication - mastering the facts.pdf](http://www.meaningfulmathmoments.com/uploads/1/1/1/9/11190716/multiplication_-_mastering_the_facts.pdf)
- Addition and Subtraction games created by Sandra Ball <https://startingwiththebeginning.wordpress.com/building-a-foundation/>



### Daily Math Investigations/Numeracy Centres

- Sandra Ball's Numeracy Centres <https://startingwiththebeginning.wordpress.com/seasonal-centre-fun/> Primary Daily Math Investigations created by Sandra Ball <https://startingwiththebeginning.wordpress.com/daily-math-investigations/>
- Intermediate Daily Math Investigations created by Selina Millar <https://www.dropbox.com/sh/re2384i95esxuvg/AAClAng9H-C0EZUCJ2Op6Nkaa?dl=0>
- More Multiplication ideas can be found on my PDF of my PPT from the STA Focus day <http://www.meaningfulmathmoments.com/multiplication.html>

### Visual Scaffolding Fact Cards

- Guided Math Adventures has many different fact cards that provide visuals the support students learning of derived facts. [http://www.guided-math-adventures.com/?page\\_id=124](http://www.guided-math-adventures.com/?page_id=124)

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- Ten Frame Multiplication visual cards [https://drive.google.com/drive/folders/0Byth\\_H-Ygu2mSkFEcjdms19Sbzg](https://drive.google.com/drive/folders/0Byth_H-Ygu2mSkFEcjdms19Sbzg)

## Guided Small Group Instruction:

When your students are engaged in Daily Math Investigations/Games, you can make a huge difference for your students by working with them in small guided groups. Groups are **FLEXIBLE** and composition changes according to the needs of the students. During this time you could do a Number Talk, support students on practice questions, teach a new game, or review a concept taught to the class. You really don't want to miss these learning opportunities that support students' strengths and stretches and intentionally move them forward.

## NOTES: