

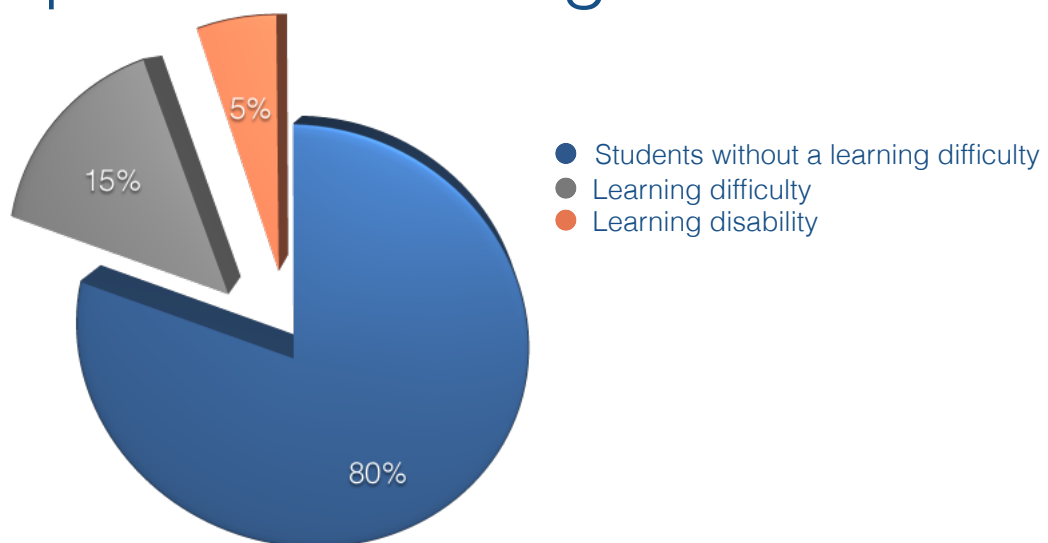
Dyscalculia: Identifying & supporting students

Nathalie Parry
M.Ed (Specific Learning Difficulties)
HDR Candidate

Speld Victoria



Specific Learning Difficulties



3-5% of students have a learning disability (AUSPELD guide 2016)

accessed for free here: <http://fuse.education.vic.gov.au/Resource/ByPin?Pin=Z94ZJY&SearchScope=All>

Dyscalculia

Dyscalculia is a condition that affects the ability to acquire arithmetical skills. Dyscalculic learners may have difficulty understanding simple number concepts, lack an intuitive grasp of numbers, and have problems learning number facts and procedures. Even if they produce a correct answer or use a correct method, they may do so mechanically and without confidence.

The National Numeracy Strategy (DfES, 2001)



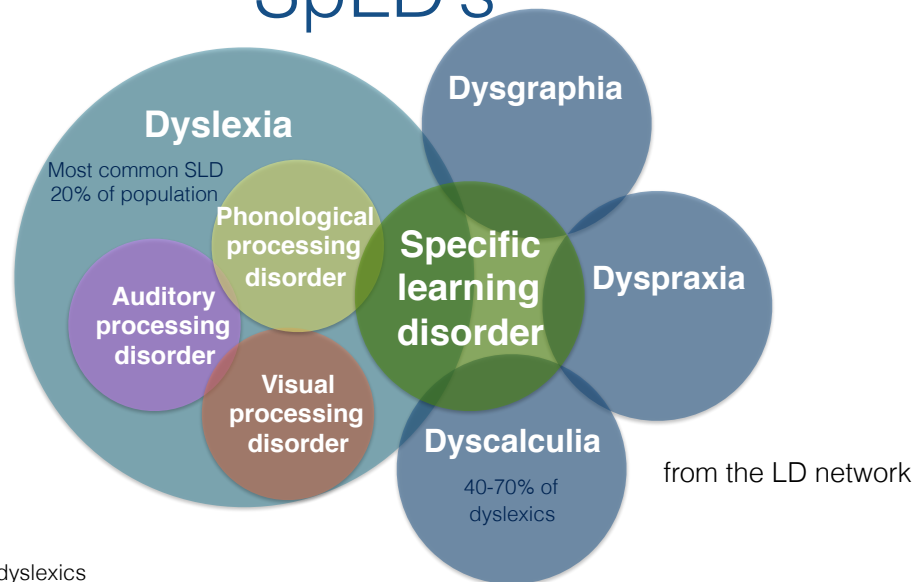
DSM-5 criteria

Difficulties learning & using academic skills, as indicated by the presence of:

- at least one of the following symptoms...
 - Difficulties mastering number sense, number facts or calculation
 - Difficulties with mathematical reasoning
- that have persisted for at least 6 months..
- despite the provision of intervention that targets those difficulties



Co-occurrence with other SpLD's



ADHD: 40-60% of dyslexics
ASD: high percentage have auditory processing, dyspraxia, dysgraphia

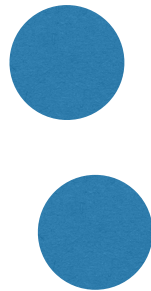


How many dots are there?

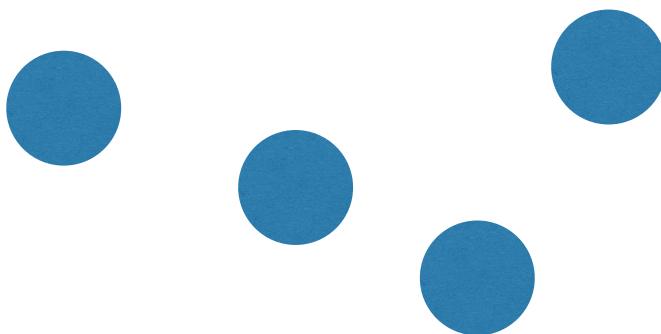
Shout out the answer as quickly as possible



Example

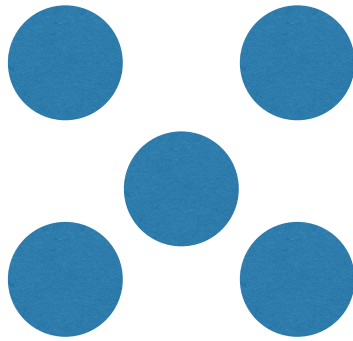


Example

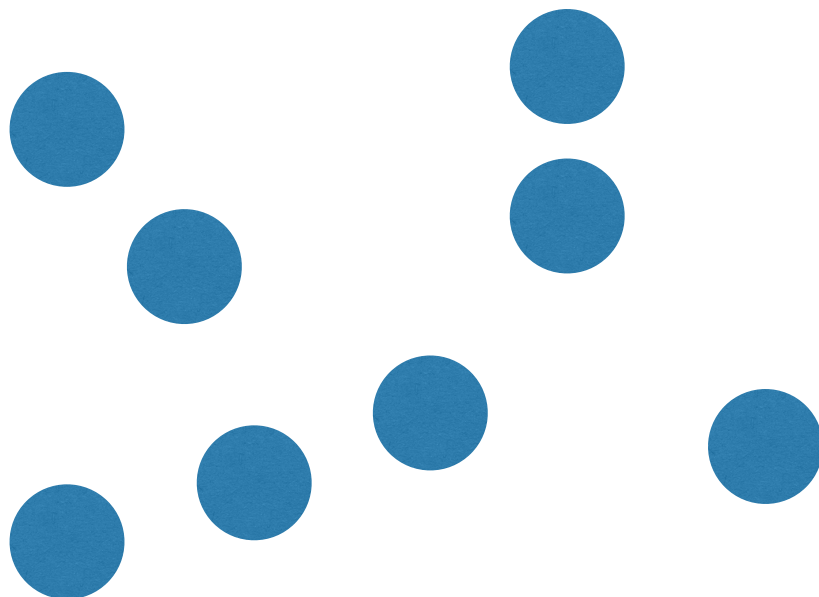




Example



Example





Shout out the larger
number as quickly as
possible



4 6



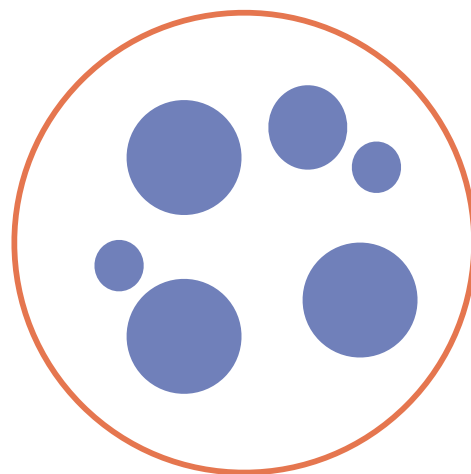
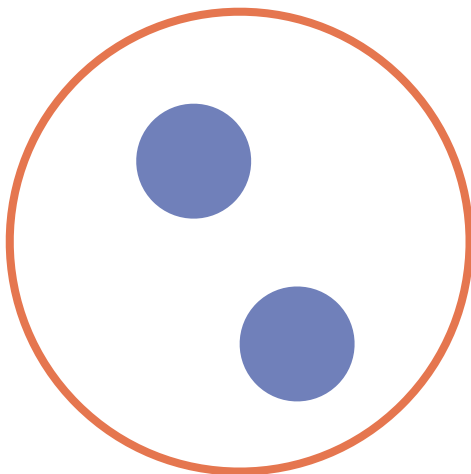
8 7

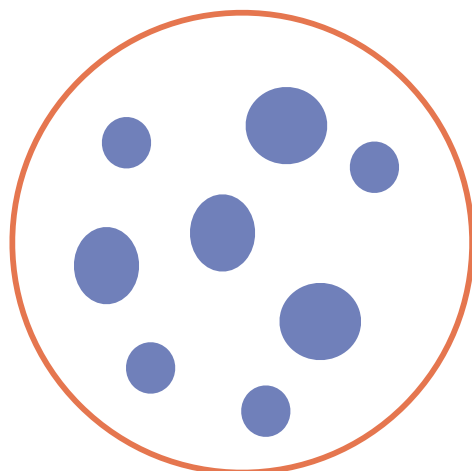
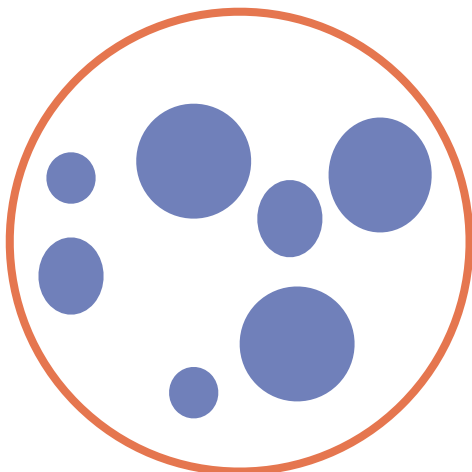
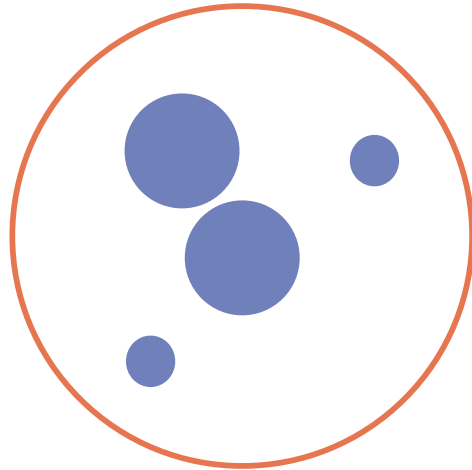
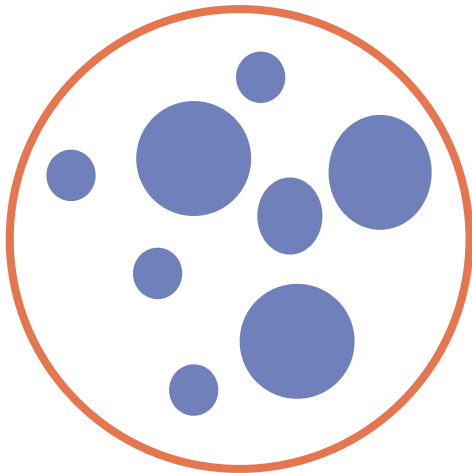


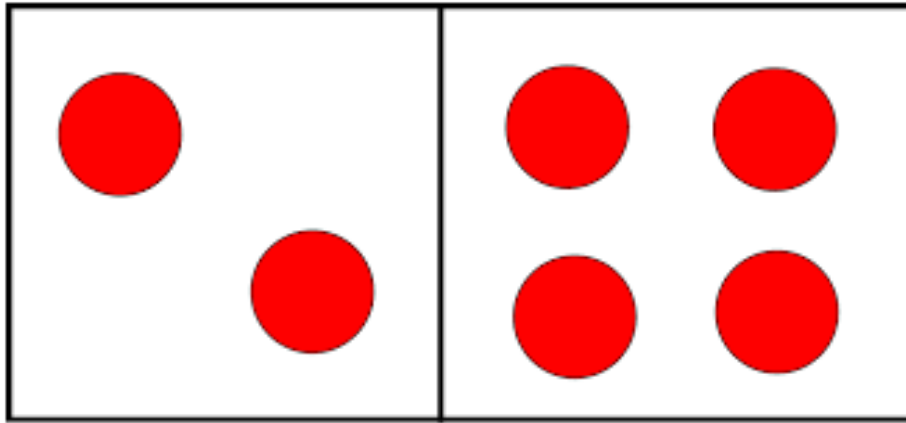
3 8



Shout out which side
has more dots. Left or
right?

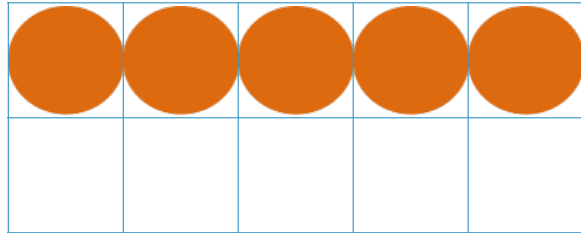






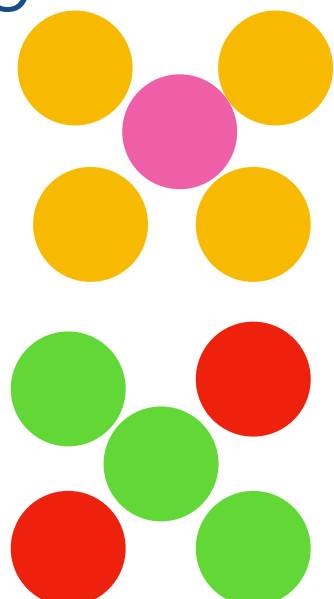
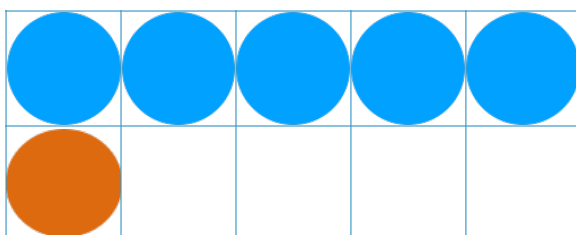
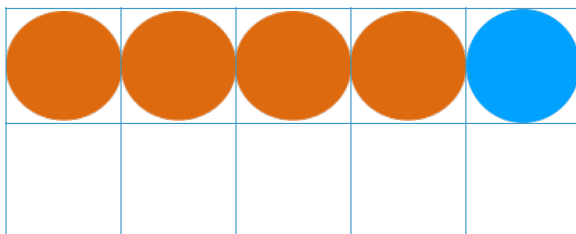


5



five

Numbersense



Interactive games

- <http://www.thenumberrace.com/nr/home.php>
- <http://www.thenumbercatcher.com/nc/home.php>
- <http://bit.ly/NUmberBeads>



Target: 





<http://teachwithlaughter.blogspot.com/2014/02/building-block-fun.html>



Resources

Ronit Bird: <http://www.ronitbird.com>

Dr Paul Swan: <https://drpaulswan.com.au>

Dr Dan Finkle: <https://mathforlove.com/dan-finkel/>





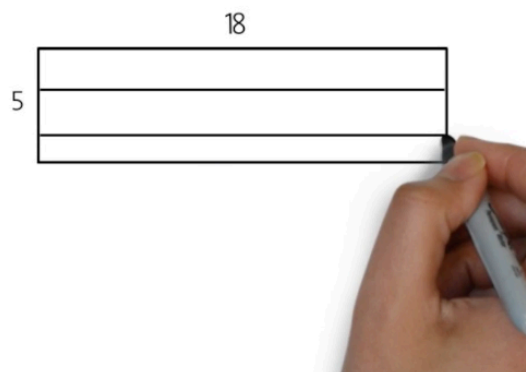
$$18 \times 5$$

$$18 \times 2 = 36$$

$$18 \times 2 = 36$$

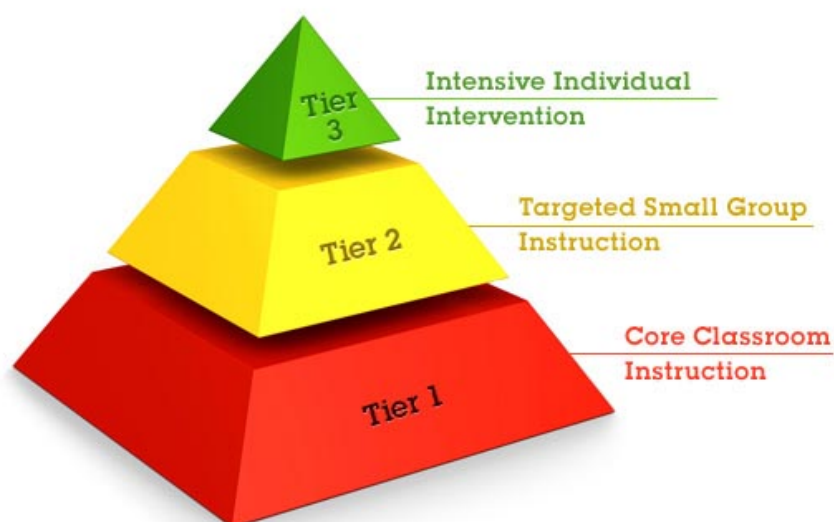
$$18 \times 1 = 18$$

$$36 + 36 + 18 = 90$$



<https://www.youcubed.org/resources/what-is-number-sense/>

Interventions



Dyscalculia screeners

- Numeracy Screener (free): <http://www.numeracyscreener.org/>
- IDL Dyscalculia Screener (free) <https://idlsgroup.com/dyscalculia-screener>
- Butterworths Dyscalculia Digital Screener: <https://shop.acer.edu.au/dyscalculia-screener-digital-10-administrations>
- Dynamo Profiler: <https://www.dynamoprofiler.co.uk/>



Dyscalculia screeners

- Emerson & Babbie's Dyscalculia Assessment <https://www.bloomsbury.com/uk/the-dyscalculia-assessment-9781408193716/>
- Chinn's More Trouble with Maths: <http://www.stevechinn.co.uk/books/more-book>



Maths Learning Difficulties and Dyscalculia Service

- [https://
psychologicalsciences.unimel
b.edu.au/psychology-clinic/
maths-and-dyscalculia](https://psychologicalsciences.unimelb.edu.au/psychology-clinic/maths-and-dyscalculia)



Speld Victoria

- [https://
www.speldvic.org.au/
assessments/](https://www.speldvic.org.au/assessments/)



Progressions & Trajectories

Counting items The student: <ul style="list-style-type: none"> responds to a request for a different amount by increasing or decreasing a quantity recognises the effects of adding to and taking away from a collection of objects. 	Counting items The student: <ul style="list-style-type: none"> counts a small number of items (typically less than 4). 	Counting items The student: <ul style="list-style-type: none"> recognises that the last number word said in a count answers 'How many?' matches the count (up to 10) to objects, using the one-to-one principle. 	Counting items The student: <ul style="list-style-type: none"> matches number words within the current known counting range to quantities of items correctly indicates the larger or smaller of two numerals in the range from 1 to 10.
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<https://www.vcaa.vic.edu.au/curriculum/foundation-10/crosscurriculumresources/Pages/Numeracy.aspx>



Progressions & Trajectories

Age Range	Level Name	Level	Description
5–6	Counter Backward from 10	10	Another milestone at about age 5 is being able to count backwards from 10.
6–7	Counter from N (N+1, N–1)	11	Around 6 years of age children begin to count on, counting verbally and with objects from numbers other than 1. Another noticeable accomplishment is that children can determine immediately the number just before or just after another number without having to start back at 1.
6–7	Skip-Counting by 10s to 100	12	A child at this level can count by tens to 100. They can count through decades knowing that 40 comes after 39, for example.

Building Blocks Trajectory: <http://marylandpublicschools.org/about/Documents/DCAA/Math/MGLCR/PreK-5/BuildingBlockLearningTrajectories.pdf>



How can we support students at risk of dyscalculia or mathematics learning difficulties?

Assisting Students Struggling with Mathematics: Response to Intervention (RtI) for Elementary and Middle Schools
<https://ies.ed.gov/ncee/wwc/PracticeGuide/2>

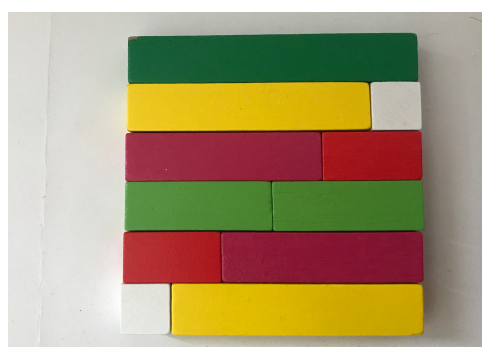
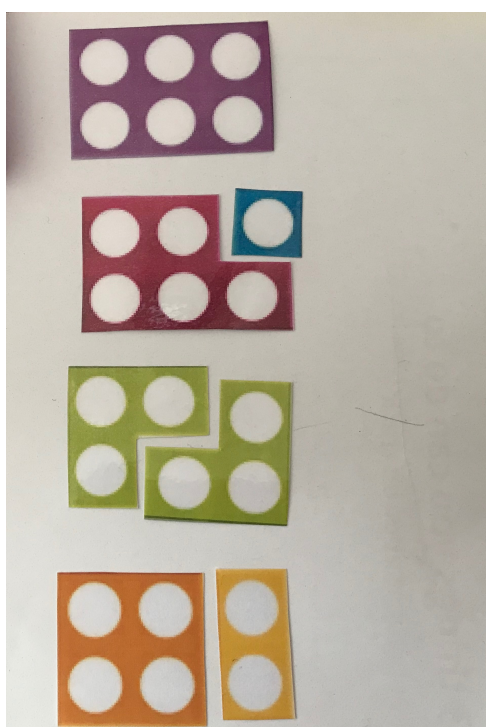
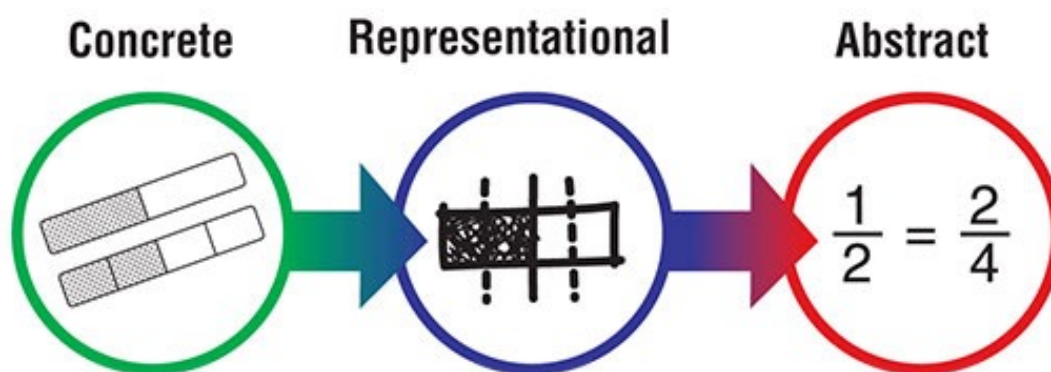


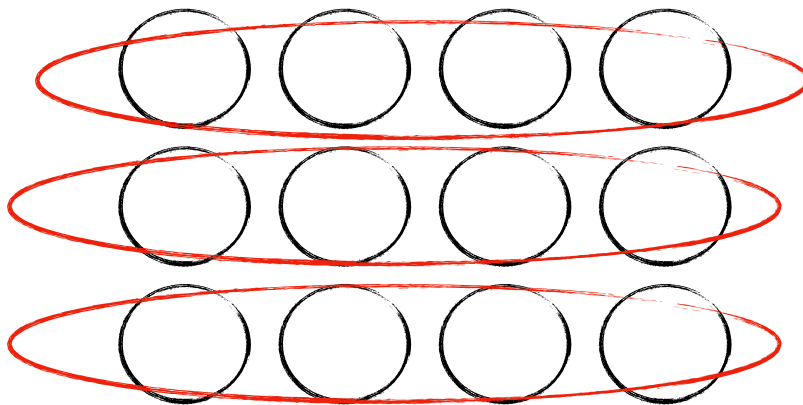
Explicit Instruction

- Research has also shown explicit instruction to be effective for improving outcomes in mathematics for students experiencing math difficulties and at risk for learning difficulties (Baker, Gersten & Lee 2002)



The CRA approach

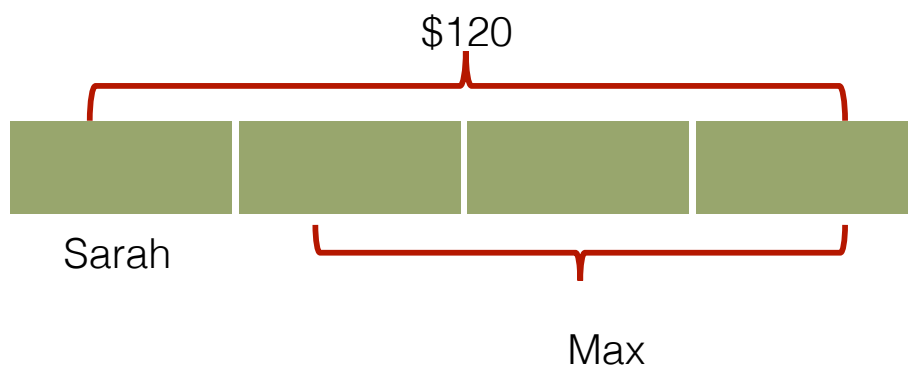




3 groups of 4



Max has 3 times as much money as Sarah.
Together they have \$120. How much money does
Max have?

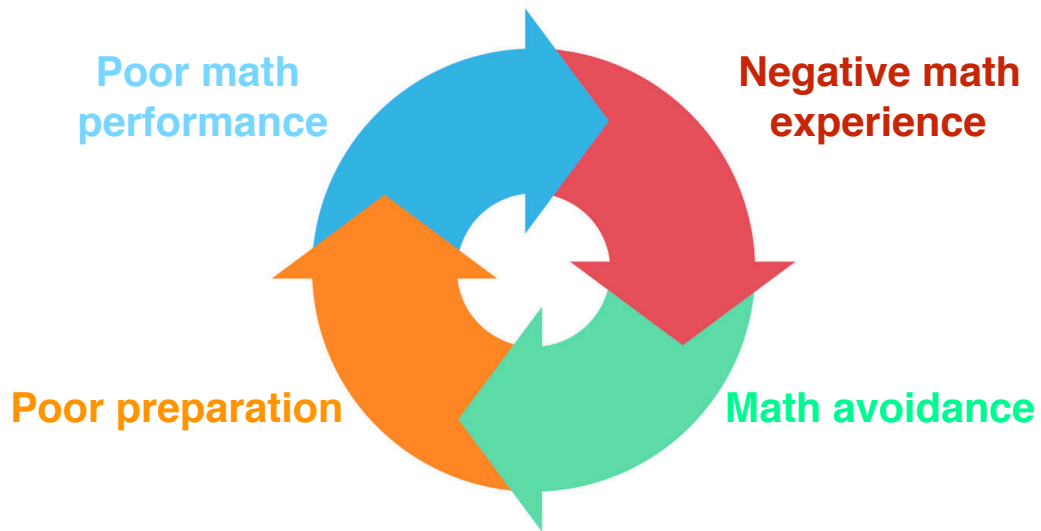


$$\begin{array}{r} 1 \\ 8 \quad 9 \\ 3 \quad 4 \\ \hline 1 \quad 2 \quad 3 \end{array}$$

Removing concrete materials exposes children to abstract concepts too early. As a result, they miss out on the opportunity to build a conceptual mathematical understanding.

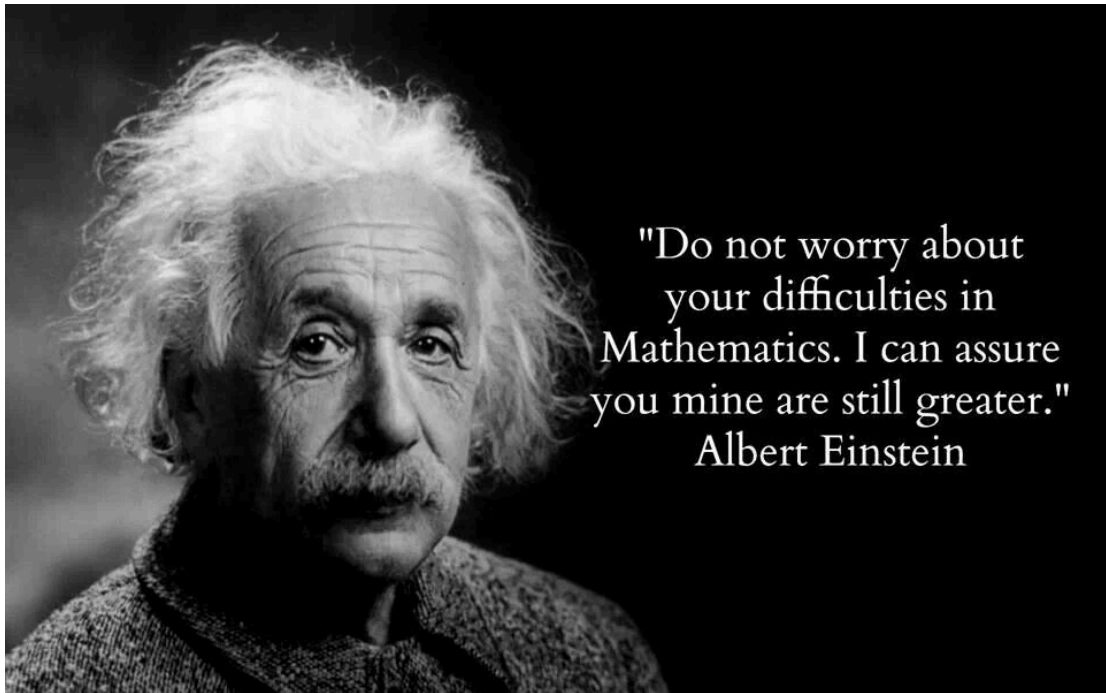
(Witzel, Riccomini & Schneider, 2008)

Math Anxiety & the Cycle of Failure



To summarise

- Dyscalculia is a specific learning disability with impairment in mathematics
- Affecting numerical and mathematical skills
- prevalence rate of about 5%
- high co-morbidity with other learning disabilities
- difficulties with basic number processing in both symbolic and non symbolic form
- Intervention strategies need to be developmentally appropriate and build on the foundational math skills or number sense
- Explicit instruction and the CRA approach is known to be more effective in supporting students at risk of learning difficulties



"Do not worry about
your difficulties in
Mathematics. I can assure
you mine are still greater."
Albert Einstein