Identifying Dyscalculia

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Overview

- What is dyscalculia?
- What are the different forms of dyscalculia?
- What are the indicators of dyscalculia?
- Dyscalculia checklists
- What do we need to be good at maths?
- What can go wrong?
- How can we help?
- Concrete materials

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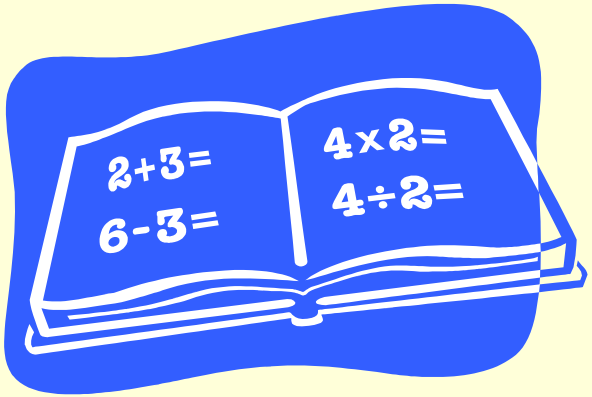
What is dyscalculia?

- How is it different from being bad at maths?

- What factors can affect our maths ability?



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Definitions of Dyscalculia

- Dyscalculia is a condition that affects the ability to acquire arithmetical skills. (DfES 2001)

- A congenital condition: its effects on the learning of numerical skills can be very profound. (Butterworth)

- Dysfunction in the reception, comprehension or production of quantitative and spatial information (Sharma).

DSM-IV (2000)

Mathematics Disorder:

"as measured by a standardised test that is given individually, the person's **mathematical ability** is **substantially less than would be expected** from the person's age, intelligence and education. This deficiency materially **impedes academic achievement or daily living**"

The National Numeracy Strategy DfES (2001)

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**

What are the different forms of dyscalculia?

- Acalculia
- General difficulties with maths
- Dyscalculia
- Pseudo-dyscalculia

Adler, B. “What is Dyscalculia”

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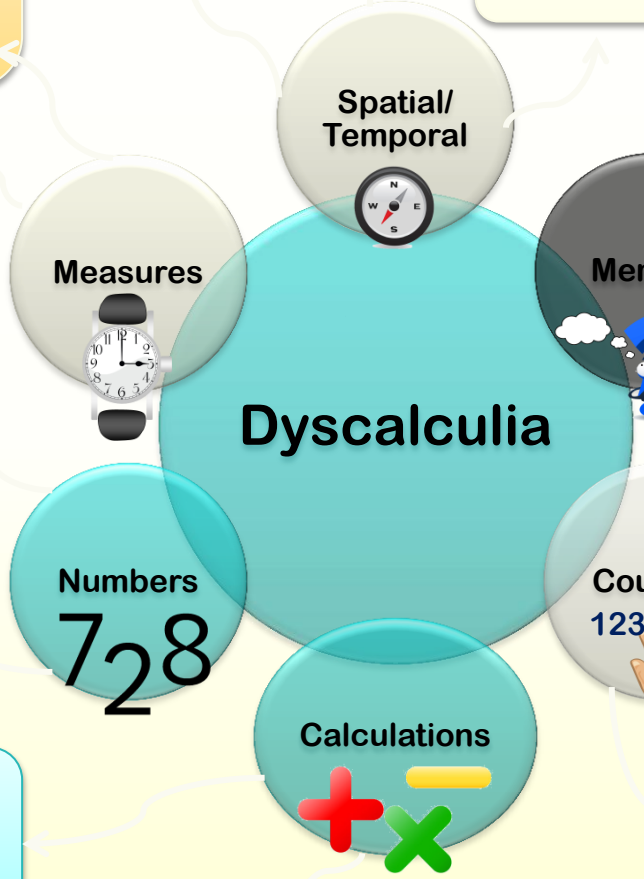
Dyscalculia



- struggles to understand mathematical concepts – speed, time etc.
- difficulties with telling the time
- left/right confusion
- map reading difficulties
- cannot accurately recall number facts
- problems handling money – working out change etc.
- constantly re-learning and recapping skills
- organisational issues
- issues with place value
- struggles to understand chronology
- difficulty navigating back and forth along a number line or sequence
- problems transferring information: e.g. 5+4=9 therefore 4+5=9
- can lose place easily
- lack confidence in their answers
- finds counting in twos, threes etc. problematic

Indicators of Dyscalculia

- An inability to subitise even very small quantities
- Poor number sense
- An inability to estimate whether a numerical answer is reasonable
- Immature strategies- for example counting all instead of counting on
- Inability to notice patterns
- Weaknesses in both short term and long term memory
- An inability to count backwards reliably
- Weakness in visual and spatial orientation

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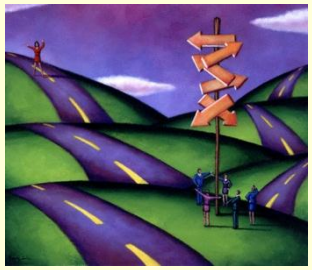
Indicators of Dyscalculia (cont'd)



- Directional confusion
- Slow processing speed
- Difficulty sequencing
- Difficulty with language
- Poor memory for facts and procedures
- Inability to generalise

- Difficulties in word problems and multi step calculations
- Problems with all aspects of money
- Marked delay in learning to tell the time

Subitising Activity

- Place counters on a table and cover with your hand
- Start with small numbers and see how many you can subitise without counting.
- What strategies could you use to increase the number that you can subitise?

Babies can count

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How do you identify and assess for dyscalculia?

- Dyscalculia Screener- Butterworth
- Dyscalculium- FE/HE screener
- Questionnaire/Checklist
- Observation

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DYSCALCULIA SCREENER(Nfer/Nelson 2003)

- Developed by Brian Butterworth
- Based on research that showed dyscalculic pupils performed worse on certain numerical processing skills

Tests include:

- Dot counting
- Number comparison
- Timed arithmetic

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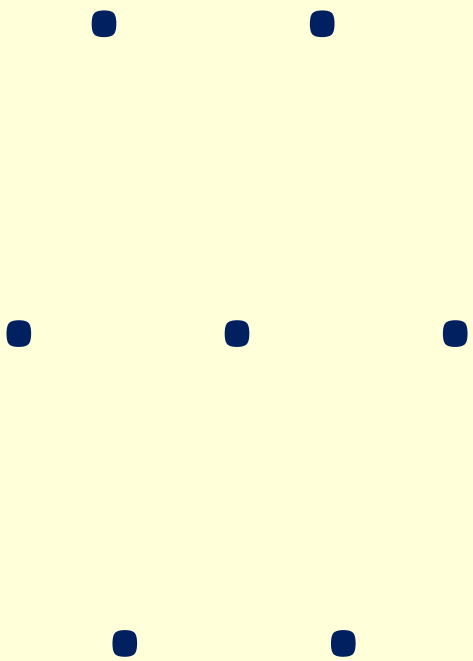
Dot counting (Enumeration)

Students decide whether the quantity of dots in one circle matches the digit in the other.



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Number comparison

Students are presented with two digits, often of different physical sizes, and they determine which is greater

6

8

Item timed arithmetic

3 + 4 = 8

Left or right key: √ or X

Multiplication tests for older students

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GL assessment
the measure of potential

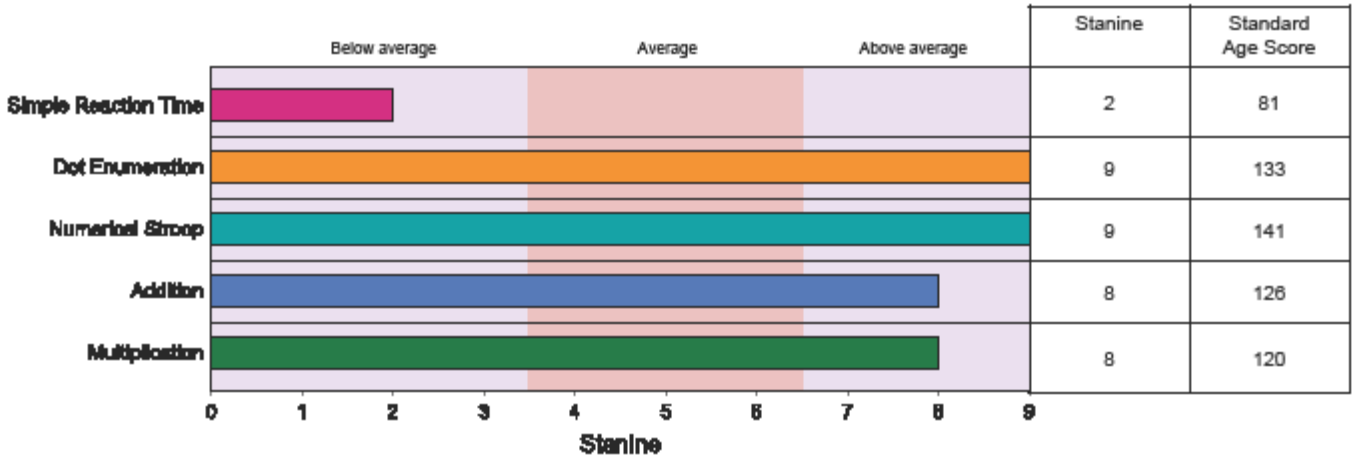
Dyscalculia Screener Teacher/Practitioner Report

Organisation/School: City Road Middle School **Group:**

Name: Michael Watts

Date of birth: 01/01/1999

Date of test: 19/10/2009



	Stanine	Standard Age Score
Simple Reaction Time	2	81
Dot Enumeration	9	133
Numerical Stroop	9	141
Addition	8	126
Multiplication	8	120

An asterisk (*) next to a sub-test indicates that the learner answered a number of questions incorrectly. The recommendations on the next page will provide further information.
Fields that display (-) indicate that the learner is under 10 years old and therefore not required to take the sub-test.

GL assessment
the measure of potential

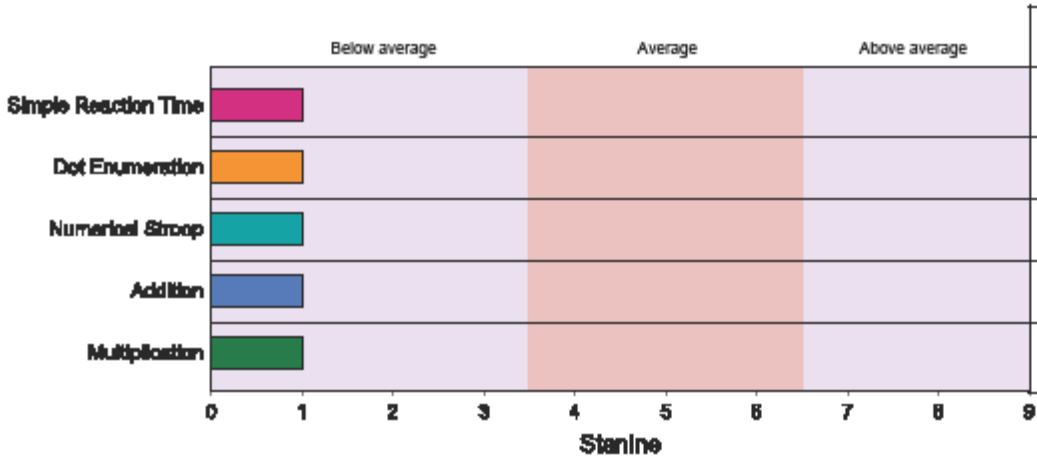
Dyscalculia Screener Teacher/Practitioner Report

Organisation/School: City Road Middle School **Group:**

Name: Andy Constantine

Date of birth: 01/01/1999

Date of test: 30/09/2009



	Stanine	Standard Age Score
Simple Reaction Time	1	69
Dot Enumeration	1*	59*
Numerical Stroop	1*	59*
Addition	1*	72*
Multiplication	1*	63*

An asterisk (*) next to a sub-test indicates that the learner answered a number of questions incorrectly. The recommendations on the next page will provide further information.
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19-Oct-2009

GL assessment
the measure of potential

Dyscalculia Screener Teacher/Practitioner Report

Organisation/School: City Road Middle School **Group:**

Name: Andy Constantine **Date of birth:** 01/01/1999

Date of test: 30/09/2009

The pupil appears not to have understood how to do the Numerical Stroop test.
The results for Dot Enumeration, Numerical Stroop, Addition and Multiplication should be treated with caution as the pupil appears to be guessing on these tests.

Recommendations:
Andy appears to have been guessing the answers on some or all of the sub-tests. It is not possible to give a diagnosis since there may be various reasons for this behaviour, including not trying. However, it is possible Andy is dyscalculic and cannot answer any of the questions satisfactorily or with confidence.

The test should be repeated on another occasion. If Andy still guesses rather than tries to answer the questions, then he should be provisionally classified as dyscalculic until further investigation can be carried out.

Recommendations are based on the author's wide experience of working with dyscalculia. However, local procedures and resources may need to be taken into account in determining an implementation plan.

The effectiveness of specialist help depends upon the programme of study fitting the individual circumstances. General prescriptions are likely to be of little use.

There are many products, books and services that may be effective in providing support to individuals. Intervention may be planned using GL Assessment's Dyscalculia Guidance handbook. Visit our website http://www.gl-assessment.co.uk for further details.

It is important to note that *Dyscalculia Screener* is not a full diagnostic assessment; it is a screener. This means its purpose is to identify children who are experiencing difficulties known to be associated with dyscalculia that may require further investigation. The results from the screener are not intended to give firm evidence that dyscalculia is present at this stage.

Dyscalculium

- A screener designed at Loughborough University for post 16 students

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Checklists

BDA Dyscalculia Checklist

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Observation

- In class
- Observe how they attempt a question
- Look for signs of stress
- Encourage the learner to verbalise how they are attempting the maths

How many children have dyscalculia?

- Between 5 and 8%

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How many children have maths learning difficulties?

Chinn suggests that 25% of children have maths difficulties

What do you think the average age is at which children give up on maths?

Why?

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Activity

- List all the reasons you can think of why children give up on maths at such an early stage?

Why is teaching/learning maths so important?

Dinner party activity

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How to be good at Maths

- What skills do you need to be good at maths?

Taken from Steve Chinn's book The trouble with Maths

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What can go wrong?

- Short term memory
- Working memory
- Long term memory
- Direction
- Visual
- Speed of working
- No attempts
- Recording

(Taken from Steve Chinn's book The trouble with Maths)

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What can go wrong?

- Poor recall of basic facts
- Poor reading skills
- Sequencing
- Transfer of skills
- Order
- Not checking an answer
- Organisation
- Transposals
- Generalisations and recognising patterns

(Taken from Steve Chinn's book The trouble with Maths)

Short term memory

Problem

- Only being able to store 3 items in STM
- Being unable to recall the question

Suggestions

- Avoid lengthy instructions and chunk information into smaller parts
- Repeat questions

Working Memory

Problem	Suggestions
Difficulties with mental arithmetic	Have multiplication squares available
	Provide prompt cards with basic number facts

Long term memory

Problem	Suggestions
Unable to remember procedures	Use prompt cards with procedures modelled
Unable to recall tables or basic number facts	Provide tables squares and lists of basic facts Teach key facts and demonstrate how to derive new facts from these.

Direction

Problem	Suggestions
Difficulty counting backwards	Practice, with smaller sequences and from different starting points
Confusion over whether to work from left to right or from right to left	Use highlighters and arrows- teach alternative methods

Visual

Problem	Suggestions
Anxiety when faced with a page of numbers	Use aperture cards so that only one question is visible at a time
Losing place on the page	Use reading rulers to highlight sections of the page

Speed of working

Problem	Suggestions
Inability to give answers quickly	Give more time and provide basic facts, tables etc
Being impulsive- jumping straight in to a question	Encourage re- reading of questions, reading them out loud and drawing the problem if possible

No attempts

Problem	Suggestions
Inability to know where to begin	Model an answer Give hints
Gives up after two or three questions	Modify worksheets so that they are at the correct level and are not overfacing

Sequencing

Problem	Suggestions
Difficulty recalling number sequences	Point out patterns and highlight
Difficulty recalling the sequence of procedure	Make sure procedures are supported with understanding

Transfer of skills

Problem

Being unable to transfer knowledge- eg to know that 2+3=5 is the same as

2

3 +

5

Suggestions

Present problems in different forms, use language to support and explicitly point out how the information can be transferred

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Transposals

Problem

Transposing numbers eg writing 17 for 71

Suggestions

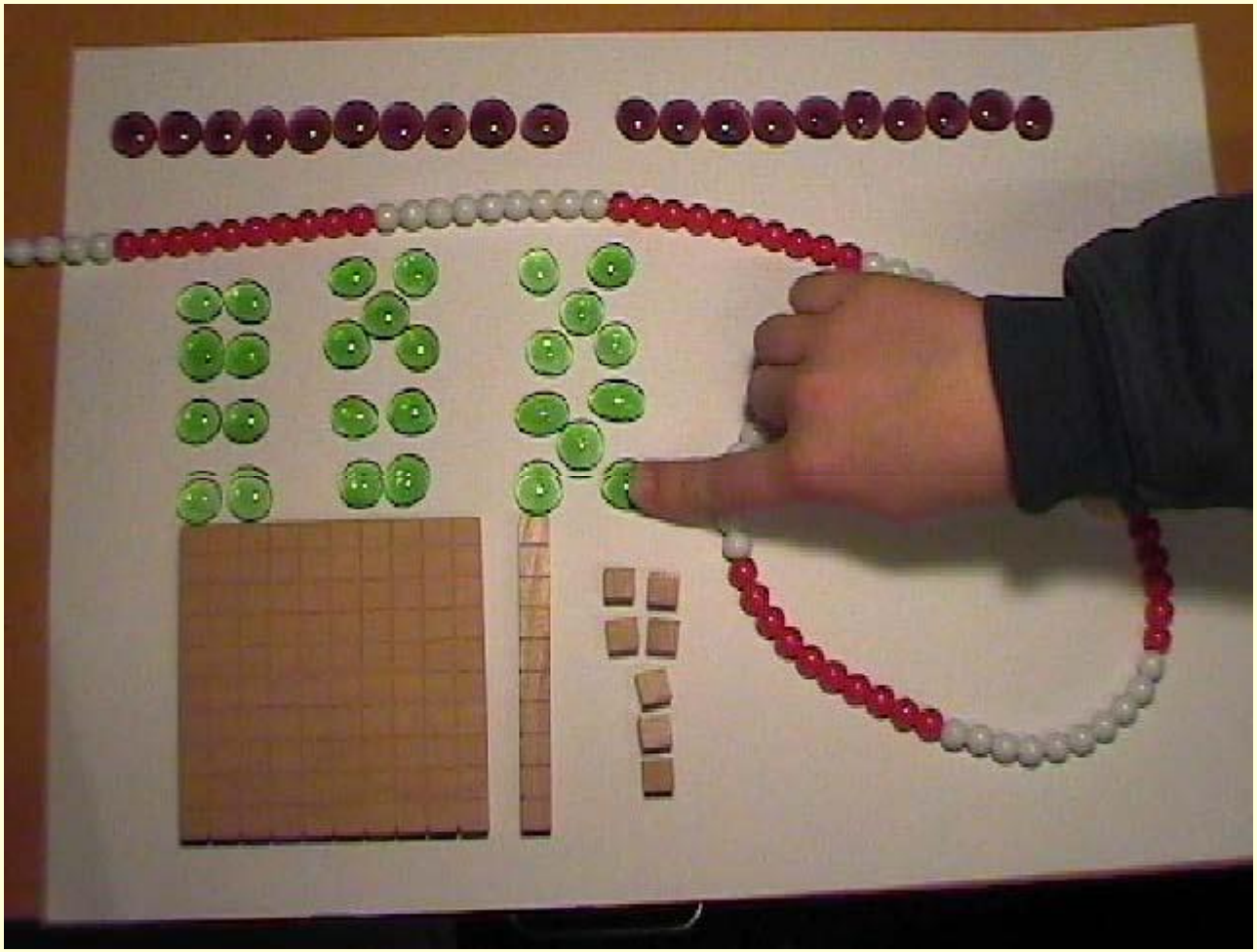
Use place value cards

Explain teen numbers- in terms of their language structure and digit structure

Recognising patterns

Problem	Suggestions
Inability to spot patterns	Use colours to highlight patterns Start with more obvious patterns and then build on this- explicitly point them out if needs be

Concrete Materials



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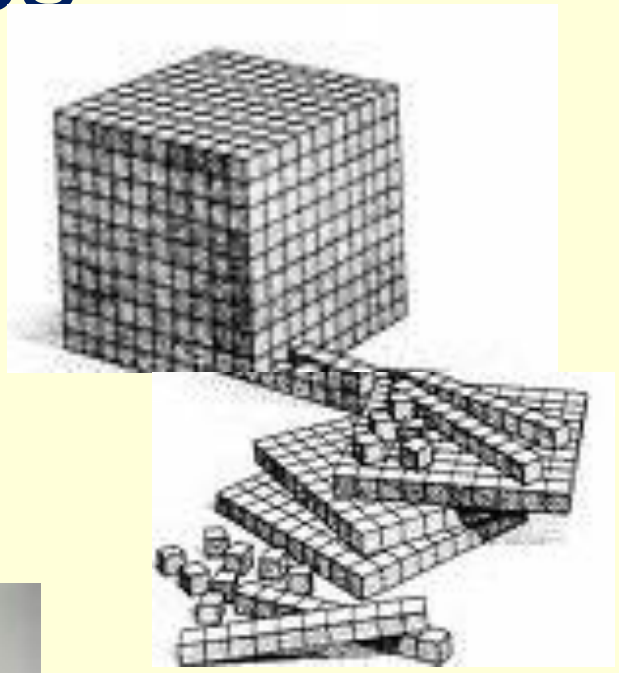
Examples



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What are concrete manipulatives?

Real materials that can be moved touched and felt

Discrete Materials- objects such as counters, coins, plastic animals, glass nuggets, cubes

Continuous materials-Cuisenaire rods, Stern blocks, Base Ten equipment

Semi-Abstract Visuo-Spatial models: Dice,100 squares,number lines, Slavonic Abacus

Abstract Models: Empty or partially empty number lines

Activity

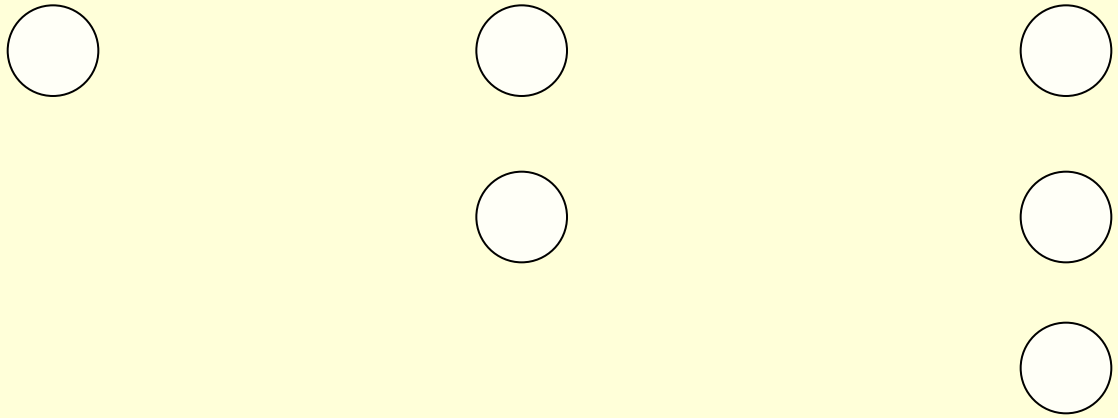
- Cuisenaire rods
- Free play
- Pattern copying
- Structured exploration

Using Dot Patterns

- Dot patterns
- Bridge the gap between concrete and abstract work
- Will help develop a sense of number
- Will help develop the concept of conservation of number
- Can be linked to familiar patterns eg dice or dominoes

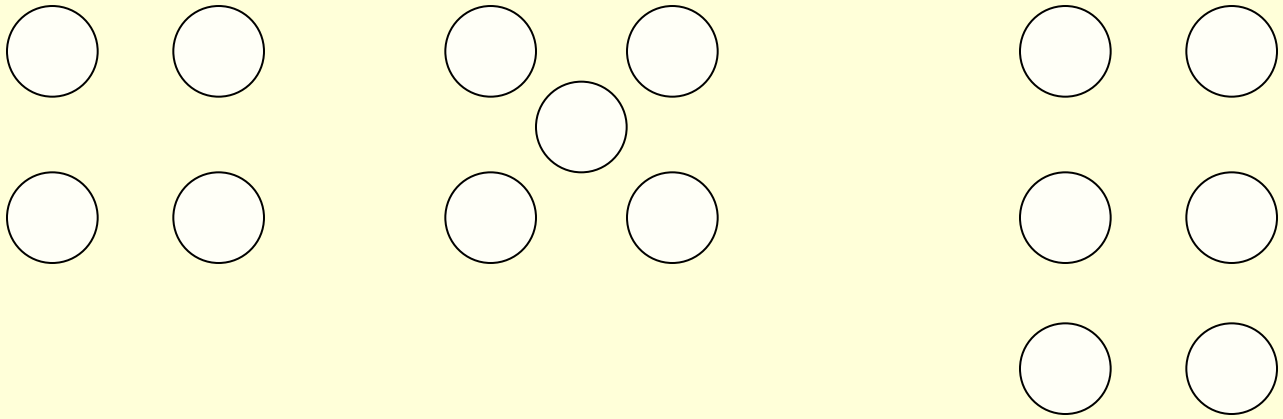
Number Patterns Dorean Yeo

- 1 2 3



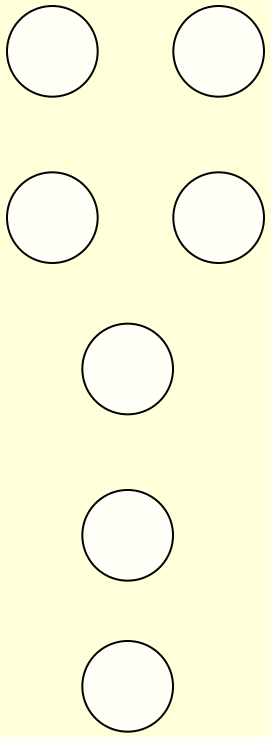
Number patterns

- 4 5 6



Number Patterns

- 7



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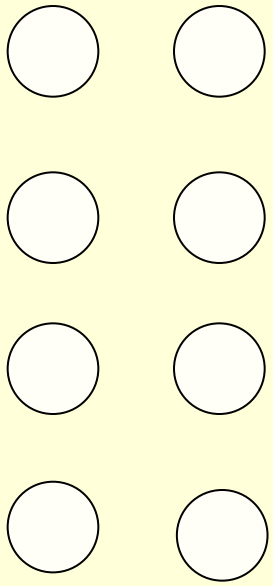

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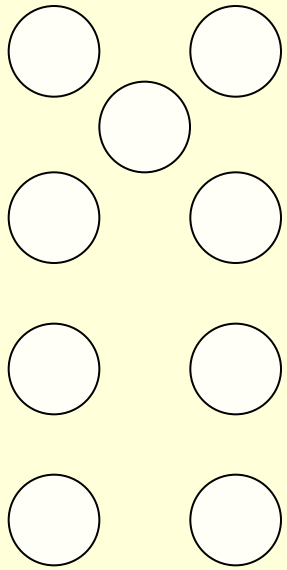
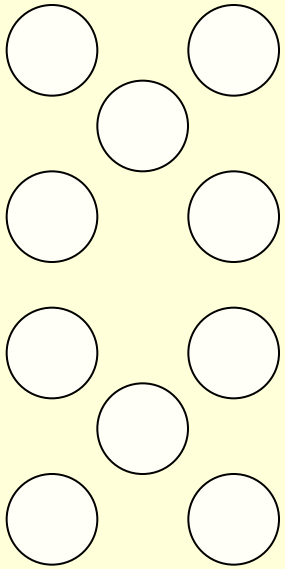
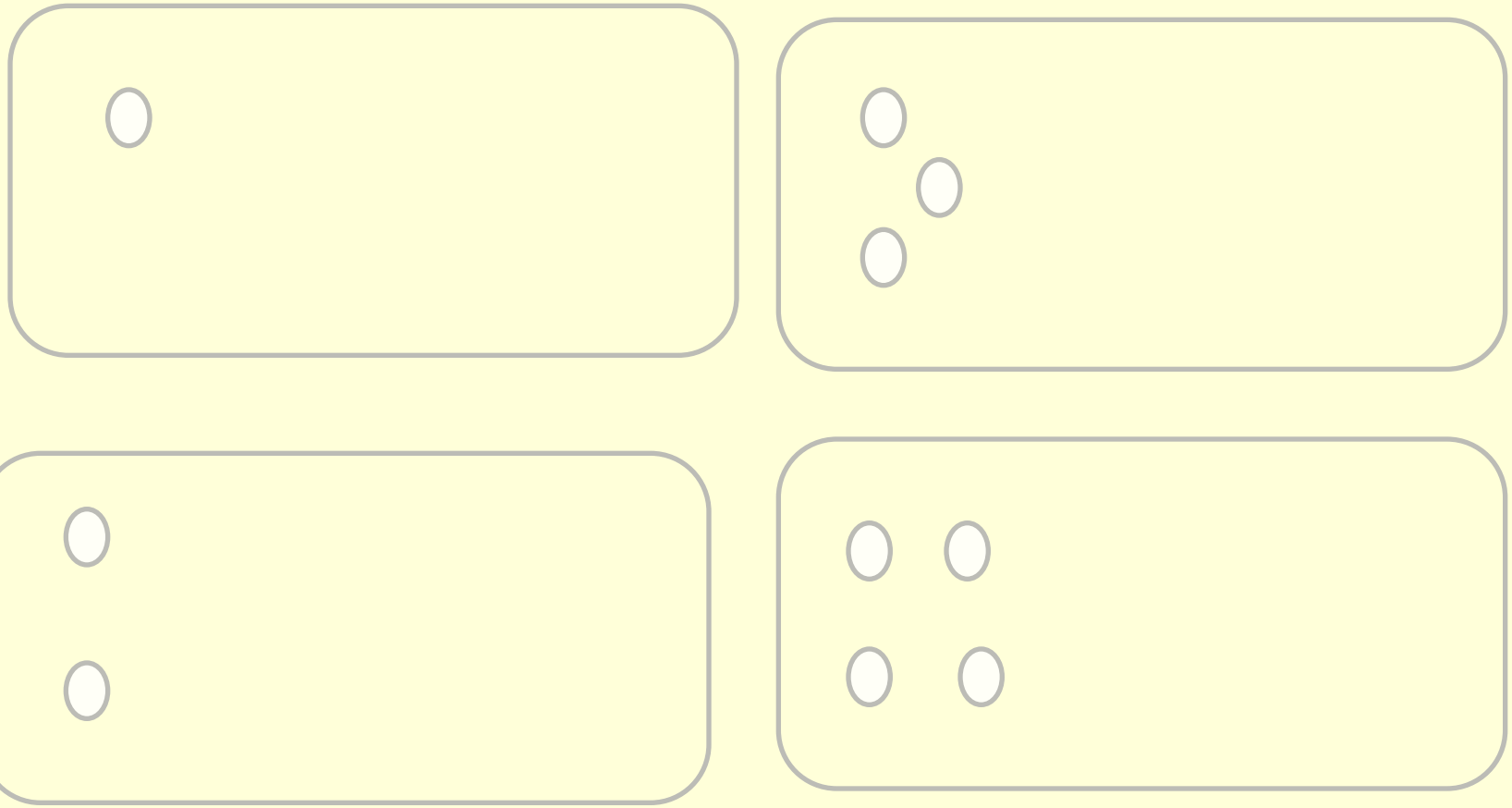


Number Patterns

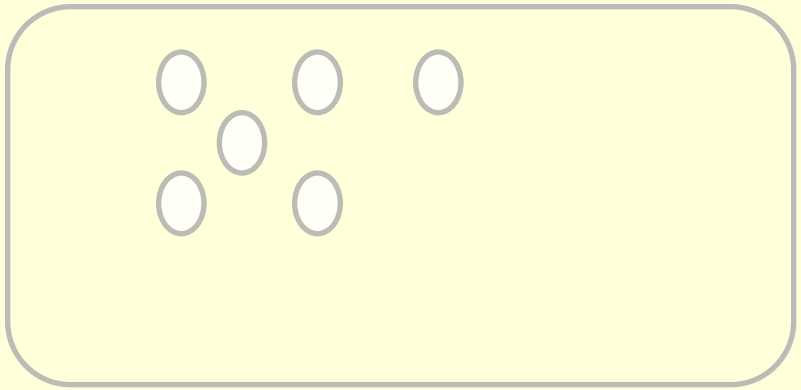
- 10

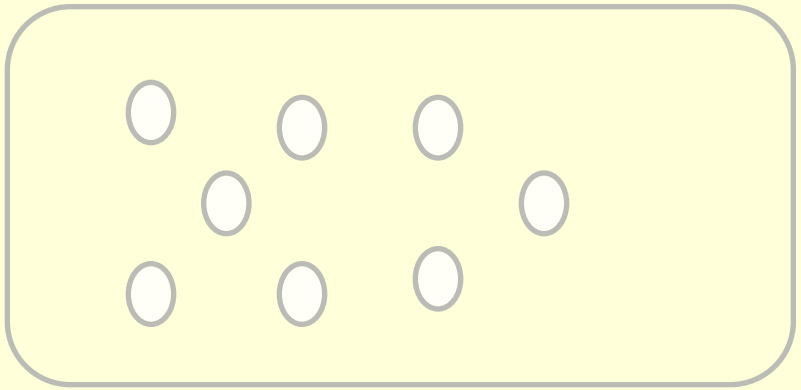


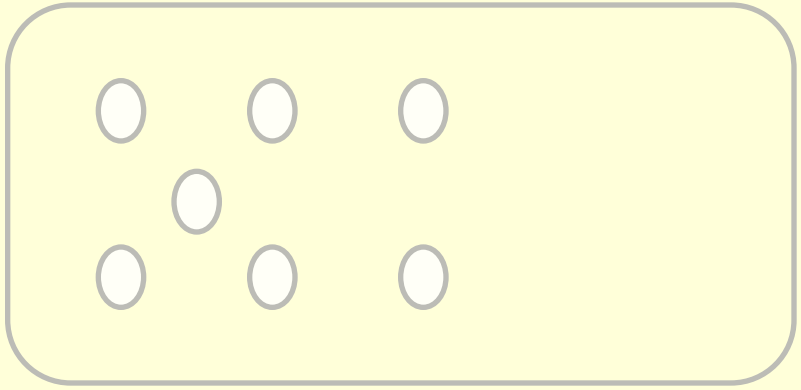
Chinn Patterns

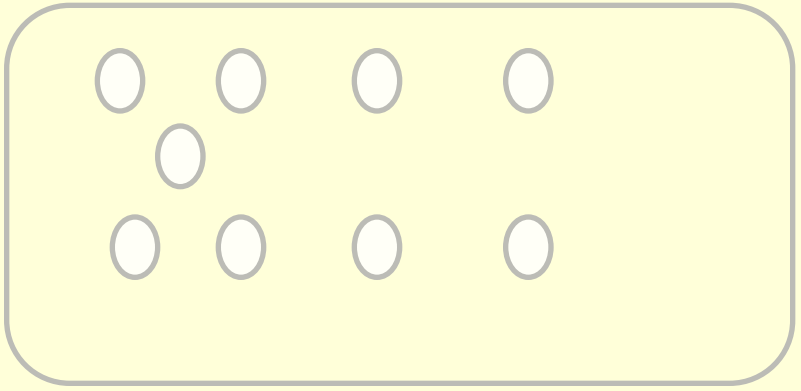


Chinn Patterns (5 and a bit)

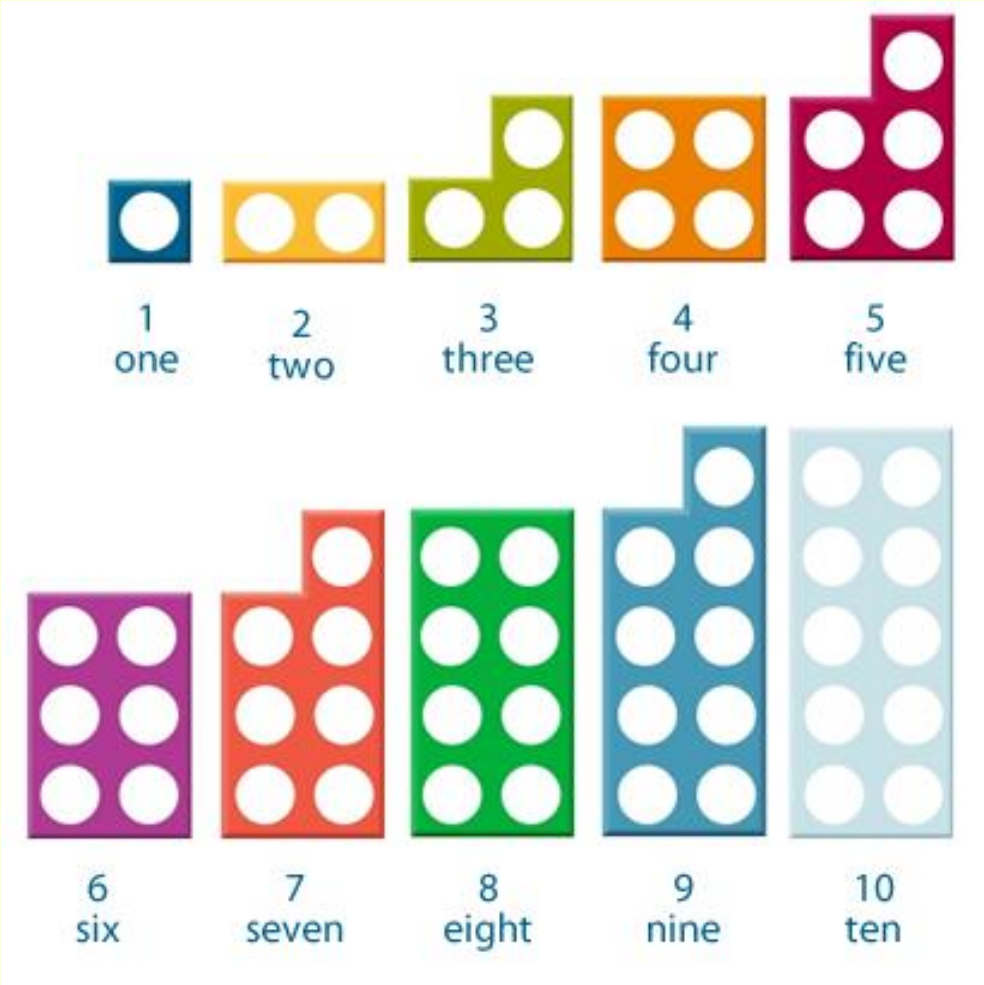








Numicon



Reflections

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For further information

- **BDA website: www.bdadyslexia.org.uk**

- **Helpline tel. no: 0333 405 4567**
- **Helpline email: helpline@bdadyslexia.org.uk**

- **Training tel. no: 0333 405 4565**
- **Training email: training@bdadyslexia.org.uk**

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