SA NUMERACY CHAIR PROJECT

Early Number Fun
Grade R Teacher Development Programme

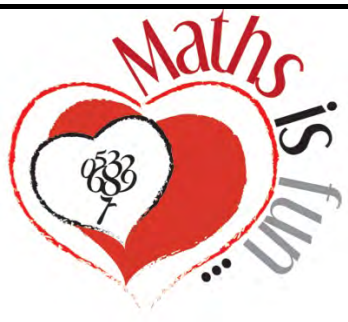
Session Seven Teacher Handbook

Name

_____

School

_____



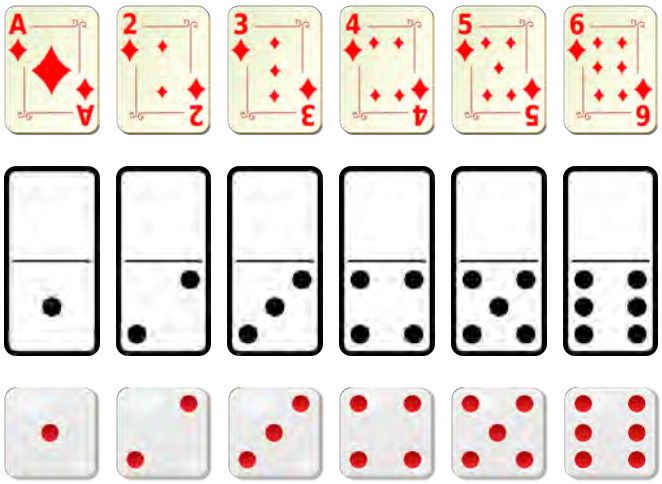
To access resources for this session, scan this QR code on your phone to go directly to the resources page:

To cite this document:
South African Numeracy Chair Project. (2017). Early Number Fun Grade R Teacher Development Programme: Session Seven Teacher Handbook. Grahamstown, South Africa: South African Numeracy Chair Project (Rhodes University).

Table of contents

Subitising

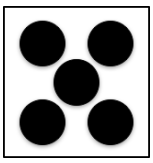
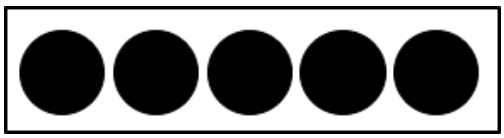
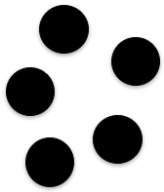
In this session, we focus on dot subitising with dominoes, dice and flash cards. Subitising is the ability to recognise dot arrangements in different patterns. The most common dot patterns can be seen on dice, dominoes and playing cards, as can be seen in the examples below.



There are two types of subitising: perceptual and conceptual.

- **Perceptual subitising** is the recognition of the number pattern
- **Conceptual subitising** is the recognition of number pattern as a combination of the *whole and its parts*. Conceptual examples are given below in the discussion about *alternate* dot patterns.

Spatial arrangements of dot sets can influence how difficult they are to subitise. For example:

Rectangular arrangement (commonly seen on cards, dominoes and dice) are easiest to subitise 	**Linear** arrangements are averagely difficulty to subitise 	**Scattered** (random) arrangements are the most difficult to subitise 

SUBITISING AND EARLY NUMBER STRATEGIES

Subitising is a fundamental skill in the development of number sense, supporting the development of conservation, compensation, unitizing, counting on, composing and decomposing of numbers.

Young children can begin by learning the patterns of dots up to 6. Learners can also connect the dot patterns to numbers, numerals, finger patterns, bead strings, etc. You can then extend this to patterns up to 10 when they are ready.

Children begin to learn these patterns by counting each dot one at a time. However, it is useful to work with learners to see the patterns without counting in ones. This can help children in counting on (from a known pattern set) or learning combinations of numbers (seeing a pattern of two known smaller patterns).

LANGUAGE DEVELOPMENT

Throughout all the activities suggested in this book, encourage learners to talk about the dot patterns they see and what they are doing during the activities. This will help them to develop their language as well as help them to be aware of their actions and thinking. This in turn helps to develop their confidence.

For example:

- When learners are working on recognising dot patterns:

  "I see 5 dots", "I see 2 dots, 2 more dots and 2 more dots, I see 6 dots altogether"

- When learners are playing games:

  "I see 5 dots at the end of the line. I will add a domino with 5 dots to that" etc.

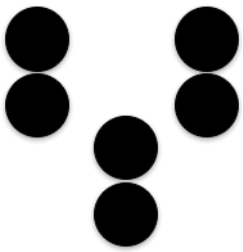
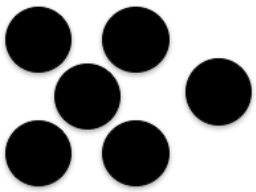
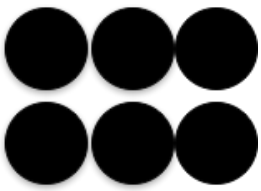
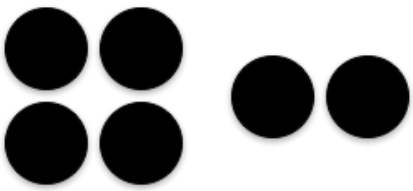
REGULAR AND ALTERNATE DOT PATTERNS

In this handbook, we refer to *regular* and *alternate* dot patterns.

Regular dot patterns, especially from 1 to 6, are the easiest to recognise. These are those most commonly seen on dice, dominoes and playing cards.

Alternate dot patterns work with other dot arrangements and are intended to help the learners to '*see*' patterns in different configurations. This is because different arrangements of dots lead to different decompositions of that number.

For example, here 6 dots can be seen in different ways:

Seen as 2, 2 and 2	Seen as 5 and 1	Seen as 3 and 3	Seen as 4 and 2
			

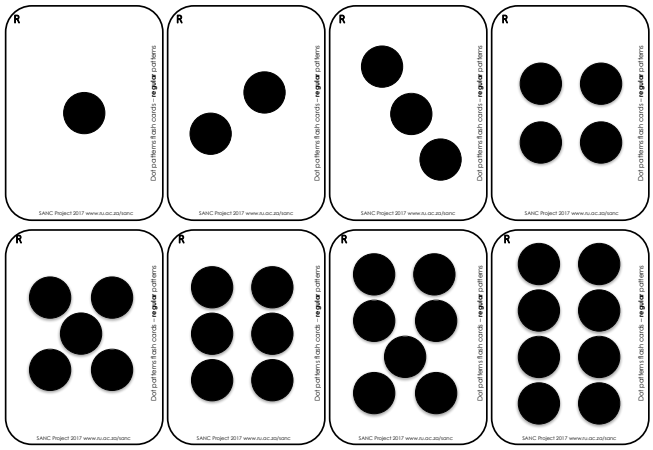
NOTES:

DOT PATTERN FLASH CARDS

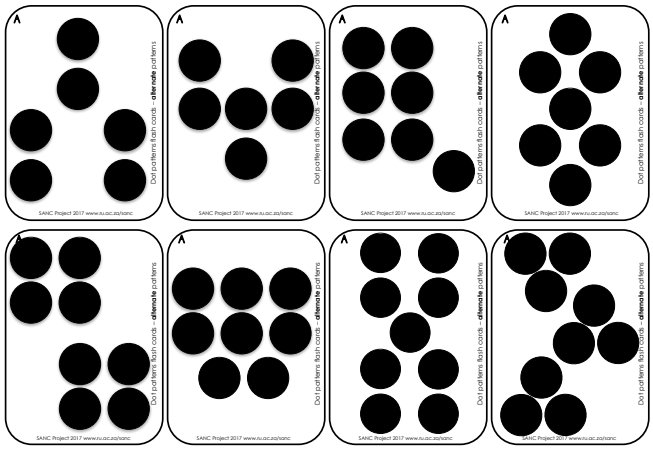
The dot pattern flash cards are provided with this in mind. The suggested activities in the following pages will use both types of pattern. This set contains:

- 10 **regular** dot pattern cards marked with an '**R**' in the top left corner
- 18 **alternate** dot pattern cards (2 of each number from 2 to 10), marked with an '**A**' in the top left corner
- 3 spare cards

Example **regular** pattern cards



Example **alternate** pattern cards



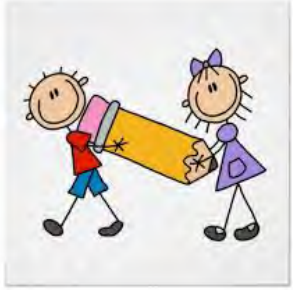
USING THE FLASH CARDS

In the suggested activities below:

- Begin with using the set of *regular* cards in the range 1 to 5 or 1 to 6 until children are familiar with the patterns.
- Once the children are familiar with the regular patterns, mix in some of the alternate pattern cards in the same number range.
- Move onto using cards in the range 1 to 10 when learners are ready.

NOTES:

Reflection Activity



Get into groups of 3-5 teachers who are from a different school to you.

1. Reflect on your **2016 learners progress** in relation to the pre and post assessment.
2. Do you notice any changes in the learners? Describe these changes to your group.
3. Is there anything you will do differently this year when you administer the assessment?

NOTES:

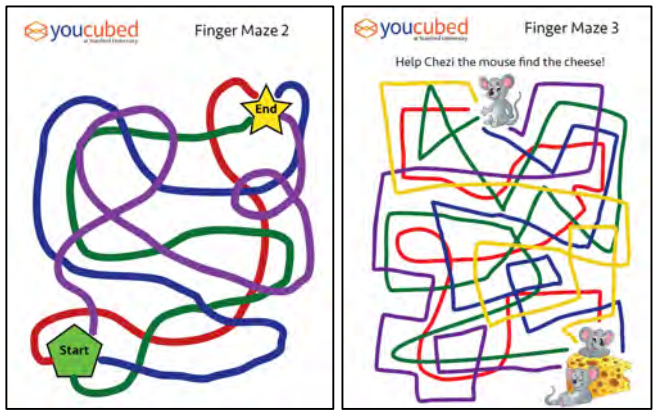
This section provides details of the activities that are be presented in this workshop.

Every workshop will have a similar section so you know where to look in the handbook.

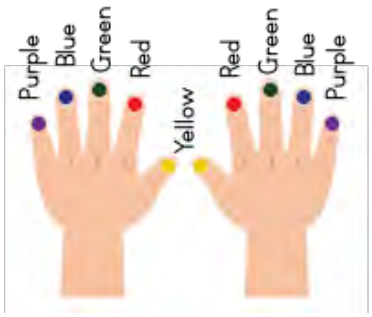
Resources

Finger Mazes 2 and 3

Below are two more finger mazes that focus on finger discrimination and encourage finger use.

Mathematical object of learning: Build finger differentiation, which is important for developing numerical and visual mathematical understanding ***Skills***: • Inhibition and shifting attention • Colour differentiation • Descriptive vocabulary such as *up, down, left, right, curved, straight, around*	***You need***: • Small coloured stickers for children's fingers in red, blue, green, purple, yellow • Finger Mazes 2 & 3 (laminated) ***For extension*** • Crayons (red, blue, green, purple, yellow) • Scrap paper	

Instructions:



1. Use the laminated mazes to work in small groups on the mat.
2. Put a coloured dot on each child's fingernail as shown in the diagram.
3. Have the child match their red index finger to the red path in the maze and **slowly** trace the path to the end. Help the child focus on the path and not speed along.
4. Each path should be traced slowly and take several seconds.
5. Next trace the green path with the matching finger.
6. After a child uses their dominant hand to trace all of the paths in the maze ask them to use their other hand.

Observe if learners struggle with any particular finger or hand. Let them practice more with the fingers and hands they struggle with.

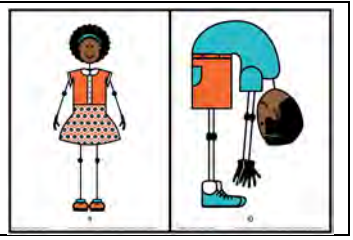
Extension ideas:

1. After children have used both hands and all fingers, get them to re-trace each coloured path. This time encourage them to try and describe <u>how</u> their finger moves along the path using words like *up, down, left, right, curved, straight, around* and so on.
2. Learners can also draw their own paths from a common start and end point in red, blue, green, purple, yellow.
   Mark the common start and end points for them on their pieces of scrap paper.
   They can then trace their own paths and swop their paths with other learners.

Freeze Frame Game

This game is similar to Musical Statues but learners pose and freeze in body positions shown on cards

Skills:	***You need***:
• Inhibition (supressing the urge to move) • Shifting attention to different parts of the body	• Set of 10 Freeze Frame cards • Music



Preparation:

- Before playing the game for the first time, show learners the cards one by one
- *Ask* learners to describe the position in words
- Then ask the learners to practice getting into the position and staying still

Instructions for the game:

1. As soon as the music starts playing, the learners move around the chosen outdoor space any way they want. But emphasise that they must listen for when the music stops.
2. After some time, stop the music.
3. When the music stops, show a card to the learners. Each learner copies the position and ***FREEZE*** in position.
4. Any learner who moves or has the wrong position is out.
5. Repeat steps 1 to 4, showing different cards each time.

FOR EXAMPLE

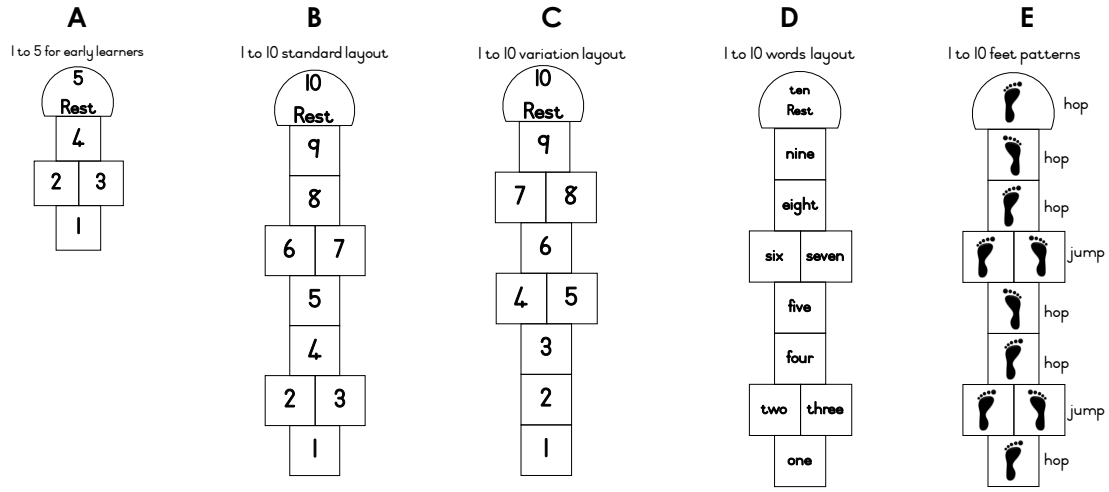
Show this card, and all learners must stand with their feet together and both hands on top of their heads.

Concentration and calming activities continued

Hopscotch Game

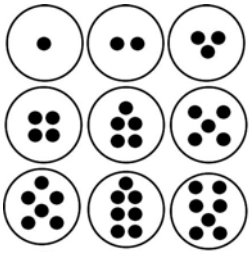
Mathematical object of learning:	***You need***:
Numeral (and number word) identification, counting forwards and backwards from 1-5 or 1-10 ***Skills***: • Inhibition and shifting attention • Differentiation between the two feet and balance development • Descriptive vocabulary	• Chalk • Stone or beanbag

- **Draw a hopscotch design on the ground using chalk.** A smaller layout (1 to 5) can be used for younger learners (A), the standard layout (B) is shown. An alternate layout is shown in C. You can also use words rather than numerals if you like as an extension (D).
- The "10" section at the top can be a rest and turn around area. You can give the space a more creative name, like "Heaven" if you wish.



- **Learners throw a flat stone to land on the first square.** The stone must land inside the square without touching the border or bouncing out. If the stone doesn't land within the lines, miss a turn and pass the stone to the next person.
- **Hop / jump through the squares. Miss the one where the marker is.** Each square gets one foot (a suggested hoping pattern is shown in diagram E above). Feet must stay inside the square(s); if a learner steps on a line, hops on the wrong square, or steps out of the square, they miss a turn.
- Encourage learners to **say what they are doing** at each step to develop language:
  i.e. *"I am hopping on one", "I am jumping on 2 and 3"*
- At the last number, turn around (remaining on one foot) and hop back in **reverse** order.
- Lean down and **pick up the stone**. Don't hop into that square. Get back to the first square.
- Pass the stone to the next learner.
- If the learner completes the course with a marker on square one (and without losing a turn), then the learner will throw the marker onto the 2nd square when they next have a turn. The goal is to complete the course with the marker on each square. **The first person to do this wins the game**!

Subitising activities with dot cards



Dot Card Trains

Mathematical object of learning:	***You need:***	***Work with:***
Sequencing dot patterns	1 set of DBE dot cards for each learner 	We suggest working with smaller groups on the mat

- Learners arrange a mixed up set of dot cards from *smallest to biggest*
- Then they arrange them from *biggest to smallest*

Extension ideas

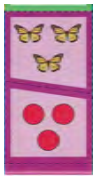
- Learners hold a set of 5 cards in their hands.
- Working as a pair, learner 1 chooses a card and lays it in front of both learners
- The 2nd learner must find the matching card and ***show and say*** why it matches.
- Learner two takes a turn to choose a card to lay out.

For example:

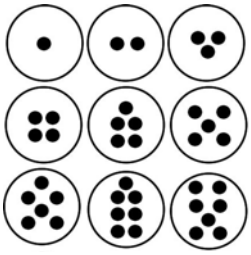
Learner One	**Learner Two**
Lays down 	Finds the matching card and could say: "There are 5 red dots on both cards" OR "I counted 5 birds on each card" etc.

- This activity could be extended to allow learners to lay cards that **add** to the card laid down. In this case, they must explain why the number of dots equals the first card.

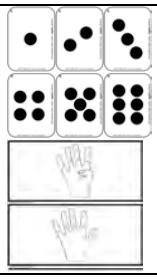
For example:

Learner One	**Learner Two**
Lays down 	Lays down  and  and could say: "2 dots and 3 dots make 5 dots" and so on

Subitising activities with dot cards continued



Finger Dot Match

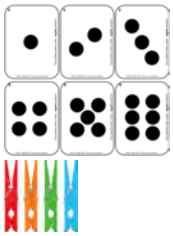
Mathematical object of learning:	***You need:***	***Work with:***
Connecting dot patterns to finger representations	• Dot pattern cards in range 1 to 5 to begin with • Finger flash cards from 1 to 5 to begin with 	We suggest working with smaller groups on the mat

- Hold up a finger flash card (i.e. 2) and ask how many fingers
- Learners show up the number of fingers and say the number
- Learners then find a dot card with that many dots

- Then hold up a card with 3 fingers i.e. 2 fingers and *one more*
- Learners show the number of fingers and say the number
- Learners find a dot card with 3 dots

- Continue with other finger patterns to 5
- Then extend the number range to 10

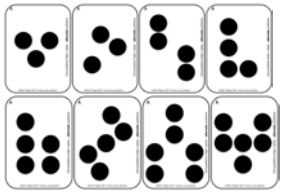
Clothespin Match

Mathematical object of learning:	***You need:***	***Work with:***
Relating dot patterns to a collection of physical objects and vice versa	• Dot pattern cards in range 1 to 6 to begin with • Pegs 	We suggest working with smaller groups on the mat

- Learners choose a dot card
- They attach the corresponding number of pegs on the edge of the card as shown →

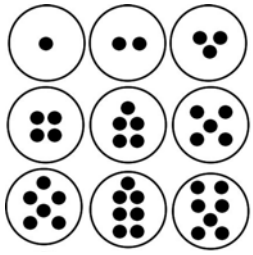
Extension ideas

- Use some of the alternate pattern dot cards (as shown to the right) in the range 1 to 6 to add a level of complexity.

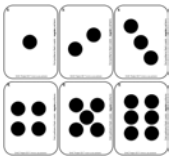


- As a separate activity, give a learner a number of pegs, for example five. Ask the learner to find the corresponding dot card.

Subitising activities with dot cards continued

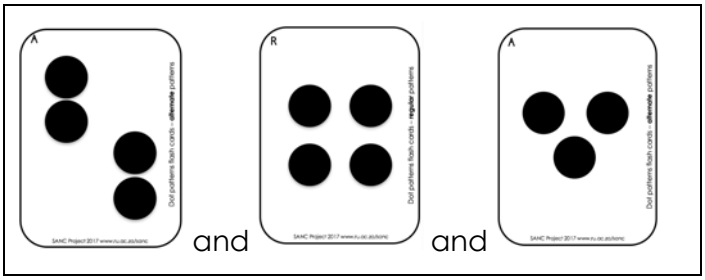


The same and different

Mathematical object of learning:	***You need:***	***Work with:***
• Recognising dot patterns • Differentiating between dot patterns by numerosity and pattern	Dot pattern cards from 1 to 6 prepared in sets of 3 (see below) 	We suggest working with smaller groups on the mat

- Prepare a number of three dot pattern cards to work with.
- Two cards must have the same number of dots and one must not.

  In this example, 2 cards show 4 dots and another shows 3.

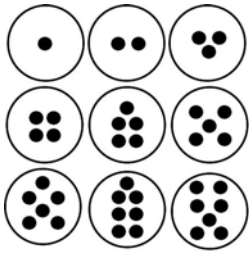


- Shuffle the set of 3 cards and lay them out
- Children find the one card that **does not belong** and **say** why it doesn't belong
- Encourage the use of language such as *more, less, groups of, left, right* and so on.

Extension

- When learners are comfortable with using 3 cards, work with a set of *4 cards* (3 with the same number of dots and one not)
- *Extend* the range of cards from 1 to 10, starting with 3 cards and then moving onto 4 cards.
  Note: the more cards you use and the bigger the number range, the harder the task is.

Subitising activities with dominoes

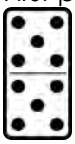
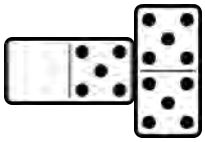
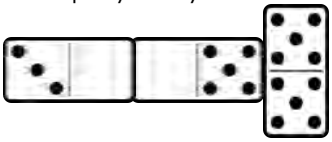
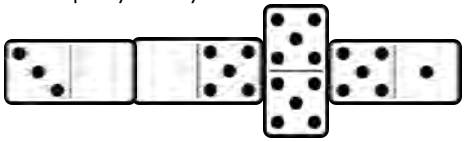
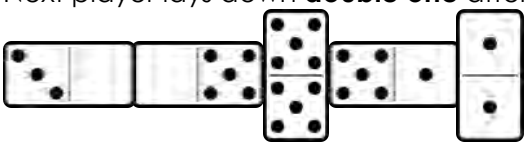


Playing the standard domino game

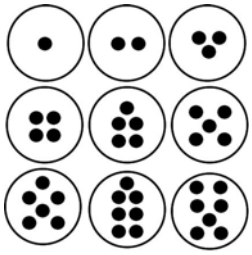
Mathematical object of learning:	***You need:***	***Work with:***
• Recognising dot patterns ***Skills*** • Turn taking • Language development	A set of dominoes	Children can play in pairs or groups of 3 or 4.

- **Shuffle the dominoes.** Turn them face down on the table, then move them around with your hands, being careful not to flip any over.
- Learners take **seven dominoes** from the pile and place them on the table so that others cannot see them
- Decide who will go first
- **Lay the first domino.** Normally the first domino should be a double tile (a tile with the same number on both ends). If non e are available, any tile may be used.
- **Take turns adding dominoes.** Learners select from their seven tiles, adding one domino to either end of the first domino.
- Dominos can only be added if the number of dots matches another set of dots already laid down.
- Encourage learners to **talk** about what they are doing at each stage:
  "I see 5 dots. I have 5 dots. It is the same. I can put my 5 dots down"
  OR
  "I see 5 dots. I do not have 5 dots. I cannot go"
- The game can finish in two ways:
  - When learners finish their 7 dominos
    OR
  - When learners lay down a domino, they pick up another. The game finishes when all dominos in the pile are finished. This is obviously a longer version of the game.

An example game is shown:

First player starts with **double 5**: 	Next player lays down **5 and blank** next to double 5 
Next player lays down **blank and 3** 	Next player lays down **5 and 1** next to double 5 
Next player lays down **double one** after the 1 	and so on..

Subitising activities with dominoes continued



Dice/Domino Match

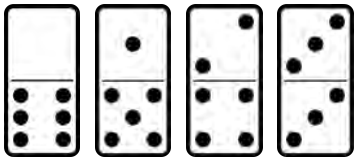
Mathematical object of learning:	***You need:***	***Work with:***
• Recognising dot patterns • Adding dots in range 1 to 6	• Dice (or dot pattern flash cards) • Domino sets	We suggest working with smaller groups on the mat

- Place all dominoes *face up* on the mat
- Roll the dice (You can do the same with a dot pattern flash cards rather than the dice)
- Learners find a domino with the same amount of dots in total as the dice / flash card
- If learners are counting all the dots, encourage them to ***count on*** from the biggest set of dots.

For example

Roll a six

Learners could choose any of these dominos to match the six rolled:



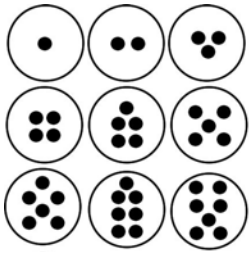
Domino Flash Game

Mathematical object of learning:	***You need:***	***Work with:***
Building dot patterns from memory ***Skills***: Developing working memory	• Wooden board, tray or similar • 12 counters / bottle tops etc. for each learner • 1 set of dominoes for yourself	We suggest working with smaller groups on the mat

- Show a domino for a count of 5-10 seconds, then hide it away
- Learners look at the domino while it is shown
- Learners try to build the domino from memory
- Ask:
- How many dots did you see?
- How did you see them?
- How did you remember what to build?

- Spend time discussing the **configuration of the pattern** and **how** children saw how many dots there were
- Finally, show the domino again so that learners are able to **self-correct**

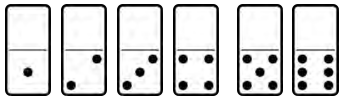
Sequencing activities with dominoes



For this series of activities:

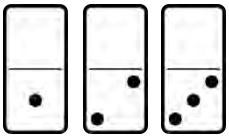
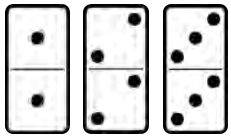
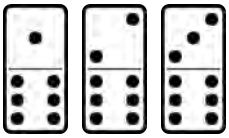
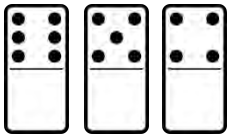
Mathematical object of learning:	***You need:***	***Work with:***
• Recognising dot patterns • Differentiating between dot patterns by numerosity and pattern • Sequencing	• Sets of dominoes for the learners	We suggest working with smaller groups on the mat

1. Simple sequences

- Use just a set of 6 dominoes with blanks and dots in a pile i.e. 
- Give the set to learners to **sequence** the dominoes first from *smallest to largest* and then *largest to smallest*

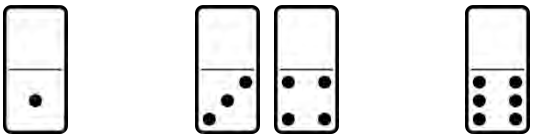
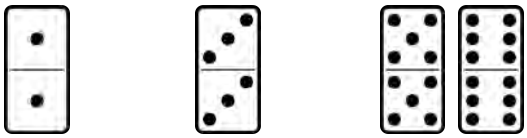
2. What comes next?

- Layout three dominoes on the mat, tray or board using one of the *example sequences* below.
- Leave the remaining dominoes face up in a pile on the mat.
- Ask learners to look at the dominoes and **work out what comes next**?
- Encourage the learners to **say** why they think this
- Learners then find the remaining dominoes from the pack to **build a sequence of 6 dominoes**.

Sequence One	Sequence Two	Sequence Three	Sequence Four
			

3. What is missing?

- Layout dominoes on the mat, tray or board using one of the *example sequences* below with enough space for a missing domino.
- Leave the remaining dominoes face up in a pile on the mat.
- Ask learners to look at the dominoes and **work out what is missing**?
- Encourage the learners to **say** why they think this
- Learners then find the missing dominoes from the pack to **complete the sequence**

Sequence One	Sequence Two
	
Sequence Three	**Sequence Four**