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EDUCATION  
REPUBLIC OF SOUTH AFRICA

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English

# Grade R Mathematics Improvement Programme



## Workshop 5 Participant's Workbook

The Grade R Mathematics and Language Improvement Project is an initiative of the **Gauteng Department of Education** and its key partner, the **Gauteng Education Development Trust**.

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The **Schools Development Unit (SDU)** at the **University of Cape Town (UCT)** is the mathematics technical partner to the Grade R Mathematics and Language Improvement Project. The SDU is a unit within UCT's School of Education that focuses on teachers' professional development in Mathematics, Science, Literacy/Language and Life Skills from Grade R to Grade 12. The SDU offers teacher qualifications and approved UCT short courses, school-based work, materials development and research to support teaching and learning in all South African contexts.

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Programme conceptualisation and management: Cally Kuhne and Tholisa Matheza  
Translation and publishing project management: Arabella Koopman

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# Overview

## Purpose

This is the fifth of twelve Grade R Mathematics Improvement Programme workshops, which form part of the Gauteng Department of Education (GDE) Grade R Mathematics and Language Improvement Project.

The purpose of this workshop is to assist teachers to continue to implement the Maths Programme in their classrooms, to strengthen their understanding of teaching and learning in the Content Areas covered in Term 2 Weeks 4–7 and to reflect on how they are putting the guiding principles of teaching maths into practice in their classrooms.

References to the Grade R Mathematics Content Areas are taken from the *Curriculum and Assessment Policy Statement (CAPS): Grade R Mathematics (Final Draft)*, 2011, Department of Basic Education, South Africa.

## Learning outcomes

- ◆ To reflect on the implementation of Term 1 Week 10 and Term 2 Weeks 1–3
- ◆ To explore strategies to support teaching maths in Grade R
- ◆ To reflect on the Maths Programme’s guiding principles of teaching
- ◆ To engage with the Maths Programme content for Term 2 Weeks 4–7 (Space and Shape (Geometry); Numbers, Operations and Relationships; Patterns, Functions and Algebra; and Data Handling)
- ◆ To discuss appropriate observation and assessment in Grade R

## Workshop content

- ◆ Opening and reflection (1 hour)
  - ◆ Session 1: Space and Shape (Geometry) (1 hour)
- TEA
- ◆ Session 2: Numbers, Operations and Relationships (1 hour)
  - ◆ Session 3: Patterns, Functions and Algebra (1 hour)
- LUNCH
- ◆ Session 4: Data Handling (1 hour)
  - ◆ Closing activities (1 hour)

# Opening and reflection

1 hour

The **inclusivity principle**: All learners should feel welcome, included and happy to participate. Remember to treat all learners fairly and with respect.

Reflect on your implementation of the Maths Programme in your daily programme and complete the following activity.



## Activity 1

Discuss your progress in implementing the *Take back to school* task from Workshop 4.

1. What progress in maths did you observe in your learners after implementing Term 1?

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2. How did the information in the 'Check that learners are able to' in *Activity Guide: Term 1* assist you in assessing each learner's progress in Term 1?

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3. Did you successfully record each learner's progress using 'Term 1: Exemplar Record of Continuous Assessments' on pages 96–97 of *Activity Guide: Term 1*?

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## Video 1

Watch the video of the teacher discussing observation and assessment in her Grade R classroom.

What do you think the intention of the activity is? Pay special attention to how the teacher prompts the learners with questions and how she observes each learner.

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## Activity 2

In your small groups, discuss:

1. How you are managing assessment in your classroom.
2. How you use rubrics in your assessment process.
3. How you incorporate the School Based Assessments (SBA) and SA-SAMS online system as part of your assessment process.

Write down the main points of your discussion to share with the whole group. Consider what works well and where you have challenges with assessment.

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The **level principle**: Some learners may need more practice and support than other learners. Be sure to allow learners enough time and support to complete activities, to think and to answer questions.

# Session 1: Space and Shape (Geometry)

1 hour

## Term 2 Content overview: Space and Shape (Geometry)

This session focuses on teaching the content of Term 2 Week 4 – Space and Shape (Geometry). Remember that Space and Shape (Geometry) was also the focus of Week 3 which we covered in Workshop 4.

Read the content overview for Space and Shape (Geometry) on pages 63–65 of the *Concept Guide* and complete Activity 3.



### Activity 3

What Space and Shape concepts are presented in 3.1 and 3.2 of the content overview?

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In Grade R learners describe, sort and compare 3-D objects and focus on the similarities and differences between them. In Term 2 Week 4 learners sort, compare and describe 3-D objects according to size, colour and shape. They also look at and describe objects in relation to themselves and each other and from different positions (orientation and views). Another focus in Week 4 is on following directions and using vocabulary associated with position.



### Activity 4

1. Discuss how you could use objects in your classroom to encourage learners to talk about their position in relation to the objects they are looking at.

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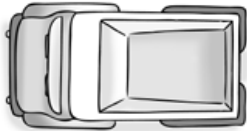
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2. Look at the pictures. Describe where you would stand in order to see each of the views of the truck.



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### Term 2 Week 4

Refer to the teacher-guided activity on pages 41–42 of *Activity Guide: Term 2*.



#### Activity 5

1. Which Space and Shape concepts are presented?

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2. Give examples of guiding questions that are asked in the teacher-guided activities. Will these questions encourage learners to talk about the concepts in question 1?

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Learners need many opportunities to play with and sort collections of 3-D objects. Teachers need to understand the underlying concepts in Space and Shape (Geometry) and communicate these using the correct maths language.



The following points should be remembered.

- ◆ An object is three-dimensional (3-D). You can look at it from the top, the bottom and the sides. 3-D objects have length, breadth (width) and height.
- ◆ A shape is two-dimensional (2-D). Shapes include circles, triangles, squares and rectangles. They have length and breadth (width).
- ◆ As learners explore the properties of 3-D objects they will identify objects that 'look like' 2-D shapes, e.g. the door looks like a rectangle, the road sign looks like a triangle, the plate looks like a circle. They will start to understand that the surfaces of 3-D objects look like 2-D shapes.

The **interaction principle**: Learning involves communication and the sharing of ideas. Responding in an appropriate way to something is a very important part of communication and of teaching and learning. Always listen to learners when they share their ideas or respond to your questions.

## Term 2 Content Summary (Week 4)



### Activity 6

Refer to Appendix A: Term 2 Weekly Content Summary (Weeks 4–7). Read the content overview for Week 4: Space and Shape (Geometry) on page 10 of *Activity Guide: Term 2*.

1. What are the topics for Week 4?

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2. What new knowledge is introduced in this week?

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3. What skills from previous weeks are practised?

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# Session 2: Numbers, Operations and Relationships

1 hour

The focus of Term 2 Week 5 is Numbers, Operations and Relationships.

## Term 2 Content overview: Numbers, Operations and Relationships

Previous workshops have presented the Content Area Focus: Numbers, Operations and Relationships. In this session we look at the Term 1–4 content overview (*Concept Guide*, pages 57–61) again.



### Activity 7

What new numbers are introduced in Term 2?

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## Term 2 Week 5: Teaching number

The number ‘five’ is introduced in Term 2 Week 5. The Maths Programme encourages the use of numbers in different situations and the use of multiple representations, e.g. a symbol, a word, a picture, dot cards, counters, claps. The routine used for introducing each number engages learners in a routine that is familiar, predictable, fun and presents the number in different ways.



### Activity 8

Refer to the Week 5 whole class activities in *Activity Guide: Term 2* (pages 46–50). Describe the routine that is used to teach the number ‘5’.

Day 1

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Day 2

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Day 3

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Day 4

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Day 5

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### **The number washing line**

The numbers 1 to 5 were pegged onto the number washing line in the maths area as they were introduced in Term 1. It is only in Week 5 that learners actively engage with the number washing line. Many teachers put up number lines from 0 to 10 or even to 20 in the classroom before learners are able to count or recognise these numbers.

Initially the Maths Programme's focus on the number washing line is incidental. From Week 5 it is used to focus on sequencing (ordering) numbers and talking about the relationship between numbers.

Use the number washing line to:

- ◆ order and compare numbers e.g.:
  - What number comes before 3?
  - What number is between 3 and 5?
  - What number comes after 4?
- ◆ explore how numbers increase from left to right, and decrease from right to left.
- ◆ use maths language such as *before*, *after*, *between*.

In the video the facilitator demonstrates a washing line activity that supports the teaching of number.

Read the activity that introduces the washing line to learners on page 48 of *Activity Guide: Term 2*.

 **Video 2**

Watch the video of the teacher using the number washing line to order the numbers 1 to 5. Notice how she scaffolds the activity and note the questions that she asks to prompt the learners.

Discuss the value of using a number washing line in Grade R.

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**Sequencing numbers:** Learners place the numbers in the correct counting order. Learners see the number line each day and during incidental discussions talk about each number.

**Order:** Learners discuss the numbers in relation to each other. The teachers asks which number comes before, after or between other numbers. Learners use correct maths language to describe the position of the numbers in relation to each other.

### Structure beads

The structure beads in your *Resource Kit* come in lengths of 10 beads grouped in fives, according to colour (five red beads and five yellow beads).

Structure beads help learners to:

- ◆ automatically recognise the number of beads in a group without counting, e.g. '4'.
- ◆ understand that one number may be a combination of two or more other numbers, e.g. '4' is made up of 2 and 2 or 1 and 3.
- ◆ develop skills in counting on from a given number, e.g. start at 3 and count on to 5.
- ◆ begin to work with addition and subtraction.
- ◆ begin to work with bonds of ten.

In this next activity, use your 10 structure beads to explore different number combinations. Follow your facilitator's lead and respond to the questions as set out in Activity 9.



### Activity 9

1. Show me two beads.
2. Show me one more bead.
3. Show me one fewer than four beads.
4. Show me four beads. Now show me one more than four. How many do you have?
5. What did you do to make it one more?
6. Show me one fewer than five. How many do you have?
7. What did you do to make it one less?
8. Now take one away. How many do you have?
9. Add one. How many do you have?

Read the activity that introduces the structure beads to learners on page 51 of *Activity Guide: Term 2*, step 3. In groups, discuss this activity.



### Activity 10

How does this structure bead activity help to develop the learners' number sense?

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The **practice principle**: Learners should have plenty of time to practise new skills and knowledge. When learners get regular practice in what they have already learnt, they get better at it and become more confident. They enjoy repetition and practice.

## Term 2 Content Summary (Week 5)



### Activity 11

Refer to Appendix A: Term 2 Weekly Content Summary (Weeks 4–7). Read the content overview for Week 5: Numbers, Operations and Relationships on page 10 of *Activity Guide: Term 2*.

1. What are the topics for Week 5?

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2. What new knowledge is introduced in this week?

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3. What skills from previous weeks are practised?

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4. Match the activities in Appendix A: Term 2 Weekly Content Summary (Weeks 4–7) with the lessons in each week.

# Session 3: Patterns, Functions and Algebra 1 hour

The focus of Term 2 Week 6 is Patterns, Functions and Algebra.

## Term 2 Content overview: Patterns, Functions and Algebra

Refer to Patterns, Functions and Algebra in the content overview (*Concept Guide*, page 62).



### Activity 12

1. What concepts are covered in Term 2?

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2. What are the differences between the Maths Programme content and the CAPS content?

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## Term 2 Week 6: Describe, copy and extend patterns

In Workshop 3, the focus of Patterns, Functions and Algebra was on recognising/identifying the repeat in a pattern. We also discussed the difference between a sequence and a pattern. Term 2 Week 6 builds on the content introduced in Term 1 Week 6.

In Term 2 Week 6 learners:

- ◆ describe the repeat in patterns using objects, pictures and sounds.
- ◆ copy patterns that others have made with objects, pictures and sounds.
- ◆ extend patterns that others have made.
- ◆ create their own patterns at various levels of difficulty such as:
  - circle, square; circle, square
  - circle, square, triangle; circle, square, triangle
  - circle, circle, square; circle, circle, square
  - red circle, blue circle, yellow square; red circle, blue circle, yellow square.
- ◆ tell what is missing when part of a pattern is hidden.



### Activity 13

Refer to Week 6 in *Activity Guide: Term 2* (pages 53–60).

1. Discuss how the whole class activities present lessons on pattern.

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2. Read steps 5 and 6 of the teacher-guided activity on page 59. How does the teacher scaffold the activities and guide the learners with questions?

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## Term 2 Content Summary (Week 6)



### Activity 14

Refer to Appendix A: Term 2 Weekly Content Summary (Weeks 4–7). Read the content overview for Week 6: Patterns, Functions and Algebra on page 11 of *Activity Guide: Term 2*.

1. What are the topics for Week 6?

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2. What new knowledge is introduced in this week?

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3. What skills from previous weeks are practised?

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4. Match the activities in Appendix A: Term 2 Weekly Content Summary (Weeks 4–7) with the lessons in each week.



# Session 4: Data Handling

1 hour

The focus of Term 2 Week 7 is Data Handling.

## Term 2 Content overview: Data Handling

Refer to Data Handling in the content overview (*Concept Guide*, page 68).



### Activity 15

1. What concepts are covered in Term 2?

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2. What are the differences between the Maths Programme content and the CAPS content?

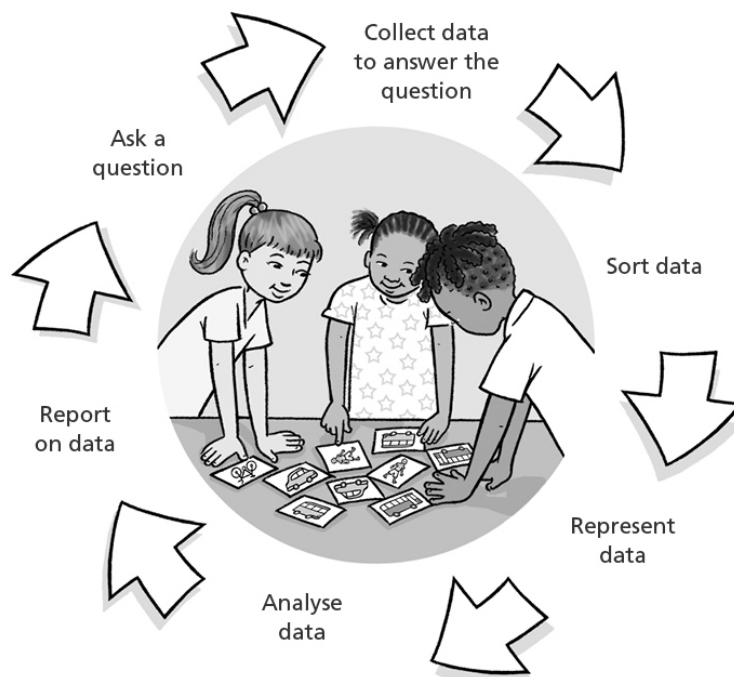
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## Data Handling

The Data Handling Content Area focuses on the purpose and process of handling data. It involves solving a problem or answering a question by collecting, sorting, representing and interpreting data.



In Grade R learners should have many opportunities to sort objects according to one or more attributes, such as colour, size or shape. Sorting is part of Data Handling, but it is not the only focus. It is important to always bring the learners back to the question that has been posed and the reason why they are collecting, sorting and thinking of ways to represent the data.

Questions are key to Data Handling, e.g.:

- ◆ I wonder which coldrink most learners like?
- ◆ How should we collect our data?
- ◆ How should we sort the data?
- ◆ How should we represent the data?



### Activity 16

Discuss how you could plan and implement a Data Handling activity based on the above questions. Record your ideas on flipchart paper.

### Representing data

Grade R learners explore different ways of showing or displaying the information they have collected. A **pictograph** is a way of representing data using pictures. In the whole class activity on Day 3 of Week 7, learners discuss how they come to school. Each learner is given a smiley face on **exactly the same size piece of paper**. They display the data by putting their picture in a column to represent four different means of transport. It is important to place the data in the columns, **without spaces** between the pieces of paper. The data is clearly represented and easy to interpret in order to answer the question: 'How do most learners come to school?'

### Term 2 Content Summary (Week 7)



### Activity 17

Refer to Appendix A: Term 2 Weekly Content Summary (Weeks 4–7). Read the content overview for Week 7: Data Handling on page 11 of *Activity Guide: Term 2*.

1. What are the topics for Week 7?

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2. What new knowledge is introduced in this week?

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3. What skills from previous weeks are practised?

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4. Match the activities in Appendix A: Term 2 Weekly Content Summary (Weeks 4–7) with the lessons in each week.

5. Refer to the teacher-guided activity in Week 7 (*Activity Guide: Term 2*, page 67). Discuss how the teacher guides the learners to sort the animals and then represent the data on a grid.

# Closing activities

1 hour



## Activity 18

**Lessons learnt:** Think about what you learnt during the workshop and complete the table.

Things I am already doing that work well	New ideas that I would like to try



### Take back to school task

1. Continue to use the Record of Continuous Assessments in *Activity Guide: Term 2* to assess your learners. Make use of your ongoing observation notes to build up evidence of what learners understand and can do.
2. Identify any concerns you have about individual learner's emerging grasp of maths concepts.
3. Bring copies of rubrics that you have used for maths assessment to the next workshop.
4. Bring a completed assessment record for one learner to the next workshop.
5. Use *Activity Guide: Term 2* to plan and implement Weeks 4–7 of the Maths Programme, including creating a maths area with a focus on the concept for each week.
6. Make notes on what worked well, what did not work so well and what you could do differently to improve teaching and learning.

### Evaluation

Complete the Evaluation Form.

## APPENDIX A: TERM 2 WEEKLY CONTENT SUMMARY (WEEKS 4-7)

### Term 2: Activity Plan

Week 4				
<b>CONTENT AREA: SPACE AND SHAPE (GEOMETRY)</b>				
<b>TOPIC: Position, orientation and views; describes, sorts and compares 3-D objects</b>				
<b>INTRODUCE NEW KNOWLEDGE:</b> Sort 3-D objects according to similarities and differences, one more, one less				
<b>PRACTISE:</b> Oral counting 1-15 and 5-1, counting objects 1-7, number concept 1-4, reinforce all shapes				
Whole class activities		Teacher-guided activity	Workstation activities	
<b>Day 1</b>	Reinforce all shapes/shape hunt.	Practise 1-4.	<b>Activity 1</b>	A circle/square/triangle can also be a ... (create a picture).
<b>Day 2</b>	Feely bag – feel different shapes and describe them.	Describing an object from different positions.	<b>Activity 2</b>	Make shapes using cookie cutters and playdough.
<b>Day 3</b>	Find shapes in class using position words.	Practising shapes and positions.	<b>Activity 3</b>	Block construction – use blocks/Unifix blocks.
<b>Day 4</b>	Shape detectives. One more, one less.		<b>Activity 4</b>	Puzzles (minimum of 12 pieces).
<b>Day 5</b>	Direction and position. Obstacle course.			
Week 5				
<b>CONTENT AREA: NUMBERS, OPERATIONS AND RELATIONSHIPS</b>				
<b>TOPIC: Recognise number symbols and number words; describes, orders and compares numbers</b>				
<b>INTRODUCE NEW KNOWLEDGE:</b> Introduce number 5				
<b>PRACTISE:</b> Oral counting 1-15, counting objects 1-7, count backwards from 5 (rhymes), reinforce number concept 1-4, sequencing numbers 1-4, more/fewer				
Whole class activities		Teacher-guided activity	Workstation activities	
<b>Day 1</b>	Introduce 5 (5 monkeys in the fifth house).	Match number symbols, number words and dot cards (4 and 5).	<b>Activity 1</b>	Playdough mat 5.
<b>Day 2</b>	Reinforce 4 and 5 (number symbols and number words).	Counting 1-7.	<b>Activity 2</b>	Ladybird numbers (roll correct number of paper balls).
<b>Day 3</b>	Counting forward and backwards. Number line.	Estimate and count. Structure beads.	<b>Activity 3</b>	Number matching – pegs.
<b>Day 4</b>	Reinforce 4 and 5.	Different configurations of the same number.	<b>Activity 4</b>	Number puzzles to 5 (using number words).
<b>Day 5</b>	Reinforce numbers 1-5 (dot cards, number symbols, number words to recognise).			

Week 6				
<b>CONTENT AREA: PATTERNS, FUNCTIONS AND ALGEBRA</b>				
<b>TOPIC: Copies and extends simple repeating patterns; creates own patterns; describes the repeat in patterns</b>				
<b>INTRODUCE NEW KNOWLEDGE:</b> Copy and extend simple patterns, create and explain own pattern, oral counting 1–20, count backwards from 7				
<b>PRACTISE:</b> Sequencing numbers 1–5, counting objects 1–7, making groups the same				
Whole class activities		Teacher-guided activity	Workstation activities	
Day 1	Physical patterns.	Focus on number concept 1–5. Shake and break. Make equal groups. Patterns with a partner. Unifix blocks.	<b>Activity 1</b> <b>Activity 2</b> <b>Activity 3</b> <b>Activity 4</b>	Extension of a pattern – drawing and colouring in. Snake patterns – using shapes. Pattern cards – using Unifix blocks. Threading patterns with beads.
Day 2	Identifying patterns in everyday objects.			
Day 3	Problem solving using patterns.			
Day 4	Making patterns using everyday objects.			
Day 5	Sound patterns.			
Week 7				
<b>CONTENT AREA: DATA HANDLING</b>				
<b>TOPIC: Collects and sort objects; represents sorted collections of objects; discusses and reports on sorted collections of objects</b>				
<b>INTRODUCE NEW KNOWLEDGE:</b> Draw a picture of collected objects, answer questions on own picture				
<b>PRACTISE:</b> Oral counting 1–20 and backwards from 7, counting objects 1–7, more than/less than/equal to, number concept 1–5, sorting and classifying				
Whole class activities		Teacher-guided activity	Workstation activities	
Day 1	Collects and sort objects (round or square).	Estimating. Counting. Sorting collections of animals. Pictograph: more/less. Questioning.	<b>Activity 1</b> <b>Activity 2</b> <b>Activity 3</b> <b>Activity 4</b>	Cutting and sorting transport pictures. Sorting waste objects. Shape graph (use cut out shapes). Sorting by colour.
Day 2	Sorting game. Poster 8.			
Day 3	Pictograph: How do you get to school?			
Day 4	Discuss Day 3 results (asking questions).			
Day 5	Collect and sort classroom objects.			

# Workshop 5 Evaluation Form

1. Did the workshop meet your expectations?

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2. What did you learn in this workshop that helped you the most?

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3. Was there anything that you did not like or had difficulty understanding?

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4. How will you apply what you have learnt in your Grade R classroom?

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5. Do you have any suggestions for improving further workshops?

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