



2016 TRAINING WORKSHOP NO.7 MATHEMATICS



FOUNDATION PHASE



education

Department:

Education

PROVINCE OF KWAZULU-NATAL

Foundation phase
Just-in-Time Training Workshop 7
July/August 2016

Facilitator's Guide

Maths

Endorsed by:



Jika iMfundo
what I do matters



Jika iMfundo
Foundation Phase JIT
Workshop 7 Mathematics: July/August 2016
Workshop guide for facilitators

In this workshop participants will find out more about the teaching of number patterns, space and shape and assessment in the Jika iMfundo FP Maths materials.

Work in groups on all of the activity questions. Time guidelines are given and your facilitator will interact with you while you work. You will have many group discussions in which you can share what you have found.

Participants need the Dictionary, Tracker and Lesson Plans for Term 3 in this session.

Workshop plan

8.00 – 8.30 – Arrival and distribution of materials for the workshop

8.30 – 10.30 – Session 1: Language across the curriculum – maths vocabulary in the topic of Number Patterns (2 hours = 120 min)

10.30-11.00 – Break

11.00-12.30 – Session 2: Assessment in the toolkit – Content context: Number Patterns and number lines (1 hour = 60 min)

12.30 – 13.30 – Session 3: Space and shape (1 ½ hours = 90 min)

Session 1: Language across the curriculum – maths vocabulary in *Number Patterns*

In this session the following lesson plans from the Term 3 Jika iMfundo FP Maths materials are relevant:

- *Grade 1 Term 3 lessons 27, 28, 30 and 31.*
- *Grade 2 Term 3 lessons 22 and 23.*
- *Grade 3 Term 3 lessons 20 and 21.*

This activity involves sets of questions to guide the discussion for about 120 minutes. Your facilitator will guide you as you break into groups and have large group discussions throughout this time.

Refer to the extract from the dictionary at the end of this guide for the following activities.

The activities in this session refer to the Dictionary, Lesson plans and CAPS. The focus varies in the different activities, so that by the end of the session participants will have broadened their understanding of the terminology of number patterns and how it is presented and used in these documents.

Activity 1

Discuss the following questions in your group. Use the dictionary extract to help you.

1. Think about the words “between” and “extend”. How would you use the following methods to explain the meanings of these words to your learners?

Ideas suggested by groups will vary. They need to be relevant to the mode of each representation.

- a. A gesture.

“between” – You could hold out your hands and put one on either side of a desk.

“extend” – You could put one hand down in a certain place and gesture using the other hand to show steps moving away from the stationary hand and then sweep it up to show the steps being “extended” further along.

- b. Real object(s).

“between” – you could lay down three objects and talk about which one is between the other two.

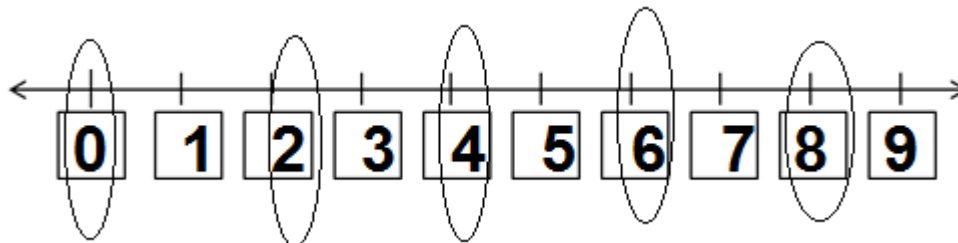
“extend” – you could lay out objects to make a pattern – book, pen, book, pen, book, pen, ... and ask what shapes you need to add to extend the pattern.

- c. A drawing.
“between” – make a drawing of one thing between two others.
“extend” – draw a length of string and then draw to show adding more to the length – making it longer, extending the length.
 - d. A verbal explanation.
“between” – explain that between means when something is in the middle, for example 4 is between 3 and 5 in the sequence 3, 4, 5.
“extend” – o add to or to make longer, for example the sequence 3, 4, 5, ... can be extended by adding the numbers 6, 7, 8.
 - e. A written explanation. Write up the verbal explanation. Diagrams could be added.
2. Compare your ideas, thinking about the following:
 - a. Did you find it easier to explain the word “between” or “extend”? If so, why?
It may have been easier to explain the word “between” since between is something that can be shown concretely very clearly. Opinions will vary. The discussion of difficulty is productive – it does not matter if opinions vary.
 - b. In what way do gestures/objects/drawings/verbal/written explanations differ? How do the different methods complement each other?
Gestures can be used to “show” things physically while words are spoken. Words draw on language whereas gestures are unspoken means of communication. Gestures can be used together with spoken words to assist in giving an explanation. Objects can also be used together with spoken and written explanations to make the explanations more tangible. Drawings are more abstract but they can also be used to complement verbal and written explanations. The different kinds of explanations are good since they reach learners with different styles of learning. Questions can also be used while explanations are given in order to check that learners are following the given explanations.
 3. Are the words ‘between’ and ‘extend’ used only in mathematics or are they also used more generally? Where and how?
Both of these words are used generally as well as in mathematics. The general meaning of the words does link to the mathematical meaning. Even in mathematics, the words have different meanings – in number patterns, time, space and shape (position) and so on. But in all contexts, the meanings are similar, not contradictory.

The next activity gives participants some time to do hands-on maths – using ideas from the lesson plans. This is to show how the activities progress. It is also to show that they are linked to the CAPS.

Activity 2

1. Use the number line below to mark up the 2s number pattern, starting at zero. Explain to your group how to count along the number line.
They will complete the number line, starting at zero as instructed. The twos should be circled, or marked in some other way.



2. Use a 200 number board to circle all of the multiples of 2. (See page at the end of this guide for a copy of a 200 number board.) Discuss the pattern(s) that you notice in the numbers you have circled. *All of the multiples of 2 must have been marked.*

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100
101	102	103	104	105	106	107	108	109	110
111	112	113	114	115	116	117	118	119	120
121	122	123	124	125	126	127	128	129	130
131	132	133	134	135	136	137	138	139	140
141	142	143	144	145	146	147	148	149	150
151	152	153	154	155	156	157	158	159	160
161	162	163	164	165	166	167	168	169	170
171	172	173	174	175	176	177	178	179	180
181	182	183	184	185	186	187	188	189	190
191	192	193	194	195	196	197	198	199	200

Some patterns that you notice are:

- All of the numbers in the second, fourth, sixth, eighth and tenth columns have been circled.
 - The second column has all of the multiples of 2 that end in a 2.
 - The fourth column has all of the multiples of 2 that end in a 4.
 - The sixth column has all of the multiples of 2 that end in a 6.
 - All multiples of 2 end in a 2, 4, 6, 8 or 0.
 - Etc.
3. Look at these numbers. They may not be in order and all the numbers in the sequence might not be there. Which one does not belong to the pattern? Why do you say that?
- 210, 220, 203, 240, 250, 260 (203 does not belong to the 10s pattern)
 - 365, 375, 385, 397, 405 (397 does not belong to the 5s pattern)

This is an activity with higher order questions. The learners have to work out which numbers shown can be fitted into a pattern (by identifying a rule) and therefore work out which number does NOT fit in with the rule they have identified.

The next activity moves on to reflection on the lesson plan activities (extracts selected on number patterns topics) in the mathematics being covered in the activities.

Activity 3

1. Go through the following activities from the Grade 1, 2 and 3 lesson plans and circle all of the vocabulary which has a particular meaning as a mathematical term in the context of the planned topic, *Number Patterns*. The Lesson Vocabulary list has also been given. **Circle the number patterns terms.**

All vocabulary related to number patterns should be circulated. The following terms should have been circled:

Grade 1 Term 3 Lesson 30

Number-line, multiple of 2, 2s.

Note that the arrows on either end of the number line given for this activity show that the number line can be extended – it is just a section of a longer (infinite) line.

Grade 2 Term 3 Lesson 23

0–200 number board, 2s, multiple, backwards, multiples, number line, even numbers, odd

numbers, twos

Grade 3 Term 3 Lesson 20

Pattern, 10s pattern, 5s pattern, 2s pattern, order, sequence.

2. Look over the terms you have circled. These are words that may have a special meaning in the context of maths.
 - a. Are the same words used in all three grades? What is the same/what is different?
All of them use the notation 2s, 5s, 10s, grade 1 and 2 use the word multiple and number-line. Other words are not used across all these grades in these particular activities (but they might be used in other LP activities – these are very brief extracts).
 - b. Compare the activities across the three grades. How do they show progression?
The number ranges increase. The grade 3 questions where learners have to identify a number that “does not fit” are more difficult than the grade 1 and 2 questions in which learners simply have to continue an identified pattern.

The next activity calls on participants to look carefully at the dictionary in order to see which of the terms they have found in the lesson plans are defined in the dictionary list. (NOTE that not all words are present. There could be a need to include more terms in the dictionary list.)

Activity 4

1. How many of the terms that you identified are included in the dictionary list?
 - a. Which words are not there and would you like to see them there?
Order, ...
 - b. Read the given explanations (with diagrams/etc.). Are they helpful/not? Discuss.
Opinions will differ.
2. If you did bring your dictionary with you, look through it and see if other words you identified are given and check the explanations.
Participants discuss.
3. The dictionary provides bilingual terminology explanations.
 - a. Are both languages useful and if so how?
Opinions will differ.
 - b. How could a teacher use the dictionary in lesson planning and preparation?
Various suggestions possible. Look up meanings of words. Look up the examples and use them in lessons or to use them to make up own examples.
 - c. Is there a use for the dictionary in a classroom and if so in what way?
Various suggestions possible. Teachers and learners could refer to it to look for meanings of words and examples. They can also use it to look for translations in English and isiZulu.

The final activity in this session turns the focus onto the CAPS directly – this should be reviewed in the light of the Lesson Plan content.

Activity 5

1. Go through the extracts on page 5 which are from the CAPS:
 - a. **Circle** all of the vocabulary relating to the topic, *Number Patterns*.
CAPS Grade 2 Term 3 Copy, extend, describe, number sequences, forwards, backwards, multiple, 1s, 10s, 5s, 2s, (up to 80), number patterns.
CAPS Grade 2 Term 3 Copy, extend, describe, number sequences, forwards, backwards, multiple, 1s, 10s, 5s, 2s, 3s, 4s, (up to 180), number patterns.
CAPS Grade 3 Term 3 Copy, extend, describe, number sequences, forwards, backwards, multiple, 20s, 25s, 50s, 100s, (up to 1 000), number patterns.
 - b. How does the curriculum show progression in for content area?
The number of different patterns in which to count changes and the number range increases.
2. Compare the use of the terms across the three grades in the CAPS, Lesson Plans and Dictionaries.
 - a. How are they the same? *Discuss. Some are the same, others not. They all call for counting in multiples.*
 - b. How are they different? *The multiples change. Levels of difficulty change.*

It is useful to look at vocabulary and content used across grades in order to see progression but also to enable standardisation of terms and explanations used. The dictionary can help to bring standardised examples and explanations.

Session 2: Assessment in the toolkit – Content context: Number patterns and number lines.

The toolkit lesson plans and assessments are CAPS aligned. This session looks at a content topic across the lesson plans for Term 3 to show how the toolkit presents a useful combination of linked activities and assessment tasks to enable teachers to cover the curriculum and assess learners' progress on that content.

In this session the following lesson plans from the Term 3 Jika iMfundo FP Maths materials are relevant:

- *Grade 1 Term 3 lessons 1-5, 11-13, (27, 28, 30 and 31).*
- *Grade 2 Term 3 lessons 1, 3, 9-12, (22 and 23).*
- *Grade 3 Term 3 lessons 1-6, 16-18 (20 and 21).*

This activity involves sets of questions to guide the discussion for about 60 minutes. Your facilitator will guide you as you break into groups and have large group discussions throughout this time.

Toolkit over view – task types and support

There is also assessment support given in the CAPS document. Refer to suggestions starting on page 491.

Activity 1

1. How does the tracker assist with continuous assessment planning and implementation?
 - a. Weekly?
The tracker provides an assessment activity and a rubric to assist teachers to allocate a level to the learners every week. The task is brief and usually relates to the work done during class in the week. Teachers need to develop a routine of their own that will enable them to carry out this continuous assessment efficiently and meaningfully. It is helpful since it helps teachers to track their learners progress and diagnose issues as they crop up rather than after too much time has passed.
 - b. Over the term?
There are two written tests provided in addition to the weekly continuous assessment tasks. There is a mark sheet that teachers can use to record the marks of the learners for all of the tasks each term.
2. How does each lesson plan cater for continuous assessment?
The lesson plans include a reminder each day that continuous assessment should be carried out. Time for continuous assessment needs to be allocated by the teacher but it is advised that teachers do this as part of their interaction with learners during the individual classwork activity slot in the lesson plans.
3. Where are the printable resources that are provided as part of the toolkit?
At the back of the Lesson Plans document.
4. List the printable resources that are useful for assessment.
The written tests and memoranda are provided as printable resources. These are provided on the LOLT together with English translations in order to assist teachers to clarify meanings when needed.

Teaching and assessing the topic of Number Patterns using the toolkit

Activity 2 Continuous assessment

1. What is the activity for which this rubric is provided?
It is a counting activity, counting in 2s in a given number range (0 to 80). Note that the range is 0-80 but individual learners/groups should not count all the way from 0 to 80. Teachers should ask learners to count in a variety of intervals, in the range 0-80. For example, "Count forward from 24 to 34" or "Count forwards from 68 to 78", "Count backwards from 60 to 48" and so on.
2. How does the activity relate to the topic of Number Patterns?
Counting in 2s is a pattern – so this counting helps establish the 2s pattern.

3. How would you use it to assess all of the learners in the class?

SPECIAL ACTIVITY HERE: MODEL THE USE OF THE RUBRIC, using the following prompt cards. Ask 7 participants from the group to act out different counts – you will set this up before the session starts in the morning or at tea time.

<i>The following 7 cards should be given to 7 different members of your group for the day. Each of them must know how to apply the instruction on the card. Explain to them that they MUST do exactly what is on their cards – so that the full range of levels is demonstrated when you do the role play.</i>	Card 1 Try to count in 2s from 40 to 50 backwards but cannot do it AT ALL.
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Work through the role play in order to demonstrate the use of the rubric. Then discuss how to cope with assessing a whole class using the rubric.

Different options of grouping learners in order to assess all of the learners in the class are possible. Teachers must make their choices based on the number of learners in the class and the time it takes to assess individual learners on the task.

4. How would you record your observation results?

Teachers can use the mark sheet provided in the tracker.

Activity 3 Written assessment

1. Discuss the written assessments, guided by the following questions:

a. Do the assessment questions relate to the content taught in the lesson plans?
Yes. Discuss.

b. Does the memo assist you in the marking of the assessment? How?
Yes. Discuss.

c. How are the written assessment task questions different from the continuous assessment

activity tasks?

Continuous assessment tasks are more focused and also shorter. Written tests cover most of the work done in a term and even some “revision” work to help learners to keep up to date with the full curriculum content being covered each term.

- d. How do the questions relate to the CAPS curriculum requirements for number patterns? (Refer to Session 1 for the CAPS extract on *Number Patterns*.)
CAPS content covered. Discuss.

2. Design three different questions for Term 3 *Number Patterns* (including number lines) for each grade that you teach. Each question should be at a different level – from Level 1 to 3.
Individual activities drawn up by teachers.

Session 3: Space and shape

In this session the following lesson plans from the Term 3 Jika iMfundo FP Maths materials are relevant:

- *Grade 1 Term 3 lessons 35-38 and 40.*
- *Grade 2 Term 3 lessons 13-18 and 36.*
- *Grade 3 Term 3 lessons 9-11 and 25-29.*

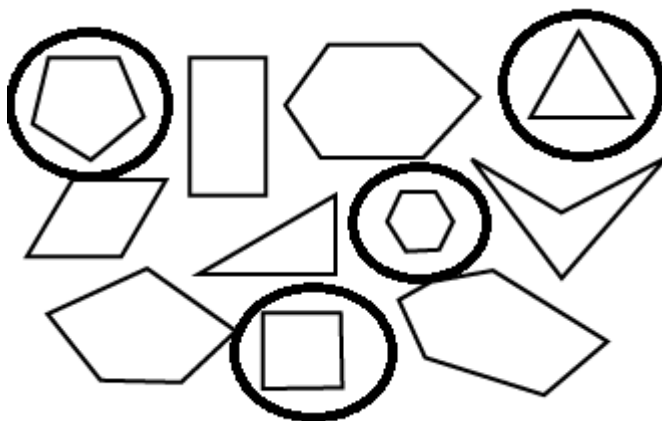
This activity involves sets of questions to guide the discussion for about 90 minutes. Your facilitator will guide you as you break into groups and have large group discussions throughout this time.

Warm up starter activity! Make shapes using your hands/arms/objects that you have with you. Here are some pictures of people doing this activity. Discuss the different shape that people make.



Activity 1

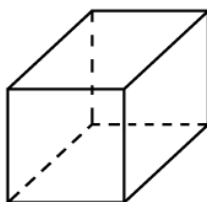
1. Draw three different types of each of the following shapes. Try to vary their sizes and orientations. *Drawings will differ. There should be some of different size (different lengths of sides) and different orientations (in different positions, not just in the familiar orientation.)*
 - a. Quadrilaterals
Must have 4 sides.
 - b. Hexagons
Must have 6 sides.
 - c. Triangles
Must have 3 sides.
 - d. Octagons
Must have 8 sides.
2. Look at the drawings of shapes below and circle all of the regular polygons. (*The drawings might change when printed, but those which are circled are regular in the original. The word “regular” is often used carelessly – for mathematical shapes it has this particular meaning, it does not mean “common” or “often seen”.*)



Activity 2

1. Draw a house/person/animal using only geometric shapes. You should use at least 3 different kinds of shapes in your drawing.
Drawings will differ. Allow sharing of creativity and encourage participants to name the shapes that they have used to draw their figures.
2. ENRICHMENT: *Refer to the information given above to answer these questions.* Most people know and agree that a rectangle can also be a parallelogram, but what about other relationships between shapes? Answer **SOMETIMES** or **ALWAYS** or **NEVER** to the following questions.
 - a. When is a parallelogram a kite?
Sometimes
 - b. When is a square a trapezium?
It may have been easier
 - c. When is a kite a square?
Sometimes
 - d. When is a rectangle a parallelogram?
Always
 - e. When is a parallelogram a rhombus?
Sometimes
 - f. When is a rectangle a trapezium?
Always
 - g. When is a rhombus a square?
Sometimes
3. Why is it a useful activity for learners to think about the relationships between shapes?
It helps them to become very familiar with the shapes and their characteristics.

Activity 3







1. How many faces, edges and vertices does the shape have?
6 faces, 12 edges and 8 vertices (corners)
2. How would you name the shape? Give two possible names.
A cube or a hexahedron or a square prism.
3. What dimension is the shape?
3-dimensional


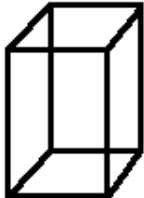

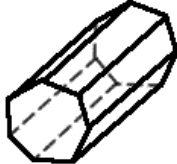
Activity 4

1. Naming is given in the tables below:

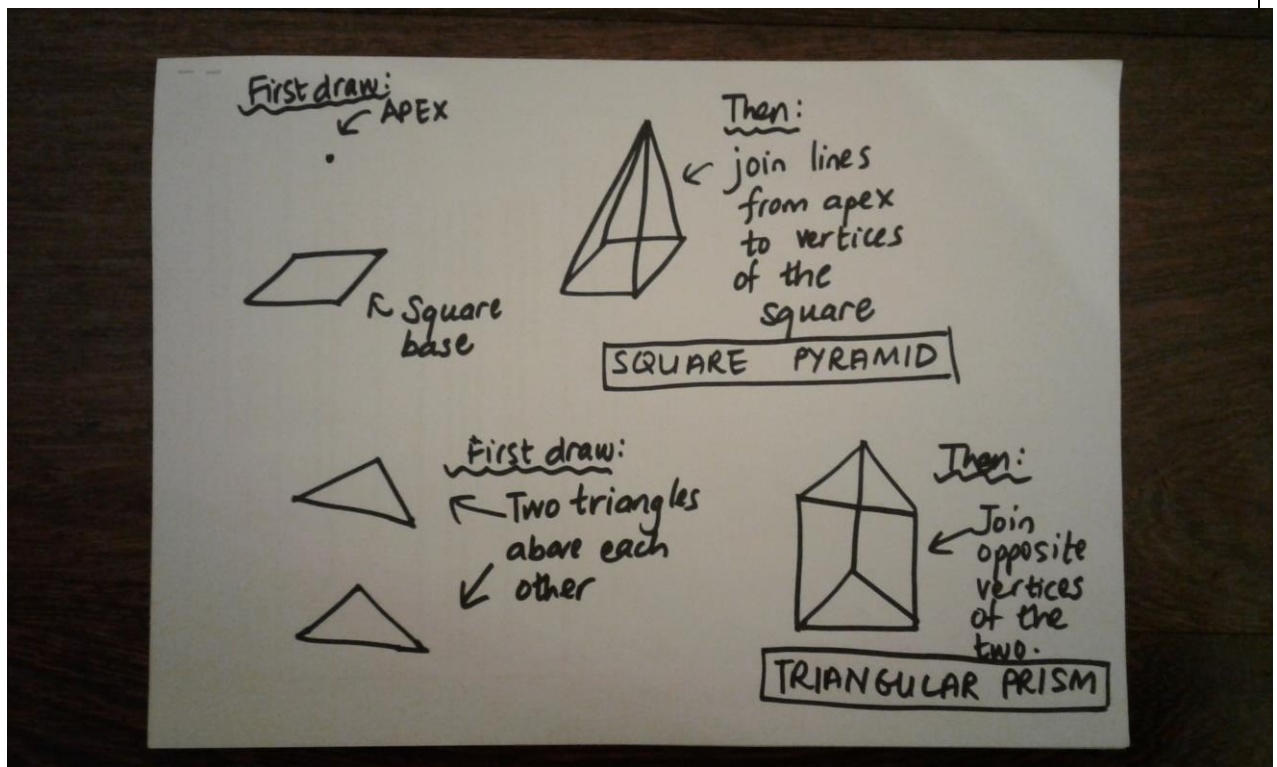
Pyramids:

			
Triangular pyramid Tetrahedron	Square pyramid Pentahedron	Pentagonal pyramid Hexahedron	Octagonal pyramid Nonahedron

Prisms

			
Triangular prism Pentahedron	Square prism Hexahedron	Pentagonal prism Heptahedron	Heptagonal prism Nonahedron

1. To sketch a pyramid, it is usually the easiest to draw the base, set the position of the apex, and drop down the edges where necessary. Draw each of the pyramids shown above yourself.
Participants practise drawing the shapes themselves.
2. To sketch a prism, it is usually the easiest to draw the congruent bases, and then draw in the edges where necessary. Draw each of the pyramids shown above yourself.
Participants practise drawing the shapes themselves.



Acknowledgement: The following resource was used in the preparation of this workshop. Sapire, I. (2010). *Mathematics for Primary School Teachers*. Saide and the Wits School of Education, University of the Witwatersrand, Johannesburg.