PARTICIPANT'S HANDOUT

2017 TRAINING WORKSHOP NO.8

MATHEMATICS

FOUNDATION PHASE

PILO
IMPROVING LEARNER PERFORMANCE

education

Department:
Education
PROVINCE OF KWAZULU-NATAL

Foundation phase
Just-in-Time Training Workshop 8
February 2017

Participants' Handout

Maths

Jika iMfundo
what I do matters

Endorsed by:

Jika iMfundo
Foundation Phase JIT
Workshop 8 Mathematics: January/February 2017
Workshop guide for participants

In this workshop participants will find out more about the teaching of sharing leading to fractions, and adding and subtracting on a number line in the Jika Imfunda materials, and how the Jika Imfundo mark record sheets align to SA SAMS.

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.

Workshop plan
8.00 – 8.30 – Arrival and distribution of materials for the workshop
8.30 – 10.30 – Session 1: Sharing leading to fractions (2 hours = 120 min)
10.30-11.00 – Break
11.00-12.30 – Session 2: Adding and subtracting on number line (1 ½ hours = 90 min)
12.30 – 13.30 – Session 3: SA SAMS (60 min)

Session 1: Sharing leading to fractions (2 hours = 120 min)

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.*

Materials: When you work through this activity you will need some blank sheets of paper and a set of about 20 counters per group.

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.

In the Foundation Phase, learners are introduced to all four of the operations after they have come to grips with basic number concept. Number concept of whole numbers must be learned before the concepts of the four operations can begin because the operations are performed on numbers – and you can't work with something that you have not yet mastered.

The order in which the operations are introduced also links to the development of concepts in a logical order – with addition coming first and finally division. As a teacher of mathematics you will appreciate the progression and enable your learners to develop their base of mathematical knowledge through these four operations.

The CAPS content is carefully planned to enable learners to progress along the natural lines of mathematical conceptual development. Here is an extract from CAPS which gives an overview of this content progression.

Number, operations and relationships (CAPS, page 9)

The number range developed by the end of Grade 3 includes whole numbers to at least 1 000 and common fractions. In this phase, the learners' number concept is developed through working with physical objects to count collections of objects, partition and combine quantities, skip count in various ways, solve contextual (word) problems, and build up and break down numbers.

- Counting enables learners to develop number concept, mental mathematics, estimation, calculation skills and recognition of patterns.
- Number concept development helps learners to learn about properties of numbers and to develop strategies that can make calculations easier.
- Solving problems in context enables learners to communicate their own thinking orally and in

writing through drawings and symbols.
- Learners build an understanding of basic operations of addition, subtraction, multiplication and division.
- *Learners develop fraction concept through solving problems involving the sharing of physical quantities and by using drawings. Problems should include solutions that result in whole number remainders or fractions. Sharing should involve not only finding parts of wholes, but also finding parts of collections of objects. In this phase, learners are not expected to read or write fraction symbols.*

Here is an extract from the English/IsiZulu dictionary giving definitions and examples of some of the terms used in the CAPS extract above:

Maths word	**Diagram/explanation**	**Isihumusho**	**Umdwebo/incazelo**
whole number	Whole numbers are counting numbers starting from 0. E.g. 0, 1, 2, 3, 4, 5, 6, …	inombolo ephelele	Izinombolo eziphelele yilezi esibala ngazo sisukela e-0. Isb. 0, 1, 2, 3, 4, 5, 6, …
remainder	Something that is left over. E.g. If I share 7 sweets between 2 children, each child gets 3 sweets and there is one sweet left over.	insalela	Yinto esalile. Isb. Uma ngihlukanisa amaswidi ayi-7 ngihlukanisela abantwana aba-2 umntwana ngamunye uthola amaswidi ama-3 bese kusala iswidi elilodwa.
fractions	Parts of a whole. E.g. Half, third, quarter.	amaqhezu	Izingxenye zento ephelele. Isb. Uhhafu, okukodwa kokuthathu, ikota.

Activity 1
Discuss the following questions in your group. Refer to the CAPS extract above in your discussion.

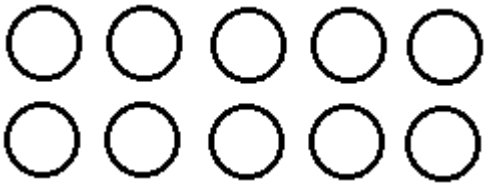
1. Why does whole number concept development need to be established before operational concept?
2. In what way is fraction concept both a number concept and an operation concept?
3. How does the way we write a fraction symbol link to division?
4. CAPS recommends that learners are not expected to write fraction symbols in the FP.
    a. Discuss this idea.
    b. When do you think learners should begin to write fraction symbols why?

Continuous and discontinuous wholes
When learners are introduced to fractions they are always called on to "find a fraction of a whole". This is when learners are still experiencing concrete representations of fractions. These concrete representations are necessary to allow learners to develop an abstract concept of a fraction as a number.

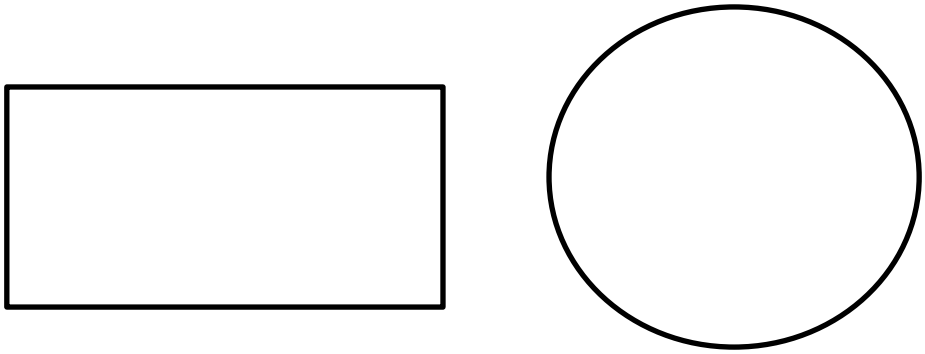
When teaching fractions in schools, the emphasis is often on situations where the object can easily be cut, folded, split or coloured in equal parts. Although there is some need for this sort of activity, children should be exposed to a wide variety of situations, including some where such folding or splitting strategies will not be successful. In experiencing a variety of situations where fractions can be found, learners will have the opportunity to reflect on and develop their own conceptual understanding about fractions. In other words, children must see a whole in all its representational (concrete) forms. This will aid them in developing a more solid grasp of the concept of a fraction.

In an earlier JIT on fractions you were introduced to the idea of two different kinds of "wholes". The two different kinds of wholes that were spoken about previously are continuous and discontinuous wholes:

- **Discontinuous wholes** – Groups of items that need to be divided into smaller groups in order to be shared e.g. sweets, marbles, beads etc.



- **Continuous wholes** – Single items that need to be broken up in order to be shared e.g. slices of bread, cakes, chocolate bars, etc.



There is lots of terminology given above – your teaching of fractions will be informed by all of this theory and so it's important for you to be able to understand and apply the theory.

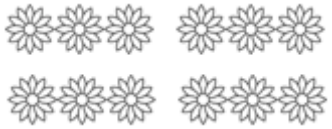
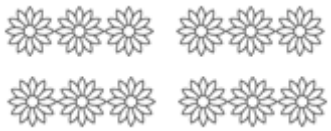
Activity 2
Use your blank sheets of paper and counters to demonstrate how you find fractions in this activity.

1. What does it mean to "find a fraction of a whole"?
2. Why does division lead to finding fractions?
3. Give some examples of continuous wholes and show how you would find halves, thirds and quarters of the whole.
4. Give some examples of discontinuous wholes and show how you would find fifths, sixths and eighths of the whole.
5. Discuss the difference between continuous and discontinuous wholes.
6. Why do you think it is important for learners to be exposed to both continuous and discontinuous wholes?

Sharing leading to fractions is introduced in Grade 2 in the FP. Here is the CAPS overview extract (CAPS page 21) which summarises the first level of content for these grades – **1.10 Sharing leading to fractions.**

CAPS topic	**Grade 2**	**Grade 3**
1.10 Sharing leading to fractions	Solve and explain solutions to practical *problems that involve equal sharing* leading to solutions that include *unitary* fractions.	Solve and explain solutions to practical *problems that involve equal sharing* leading to solutions that include *unitary* and *non-unitary* fractions.

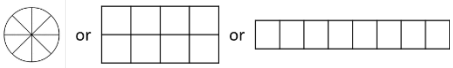
Here is an extract from the English/IsiZulu dictionary giving definitions and examples of some of the terms used in the CAPS extract above:

Maths word	**Diagram/explanation**	**Isihumusho**	**Umdwebo/incazelo**
sharing/share (divide)	When you share objects among a certain number of people you are "sharing" the objects. You can divide numbers by finding out how you share them. E.g. If you have 12 flowers, and you share them equally among 4 children, how many flowers will each child get? (12 ÷ 4 =)  12 ÷ 4 = 3 Each child will get 3 flowers.	hlukanisela (hlukanisa)	Uma wabela abantu abayinani elithile izinto ezithile, "uyahlukanisa". Ungahlukanisa izinombolo ngokuthola ukuthi umelwe ukuzaba kanjani. Isb. Uma unezimbali ezi-12 bese uzahlukanisela abantwana aba-4, umntwana emunye uzothola izimbali ezingaki? (12 ÷ 4 =)  12 ÷ 4 = 3 Umntwana ngamunye uthola izimbali ezi-3.
unitary fraction	A fraction which has a numerator value of 1. E.g. $\frac{1}{5}, \frac{1}{7}, etc$	iqhezu lokukodwa kokuphelele	Iqhezu lapho inombolo engaphezulu iyinombolo 1. Isb. $\frac{1}{5}, \frac{1}{7}, njl$
non-unitary fractions	Fractions that are not unitary fractions. They have a numerator which is bigger than 1. E.g. $\frac{4}{5}, \frac{2}{7}, etc$	iqhezu lokungaphezu kokukodwa kokuphelele	Amaqhezu angajwayelekile. Anenombolo engaphezulu enkulu kunoku-1. Isb. $\frac{4}{5}, \frac{2}{7}, njl$

Fractions are formally introduced in Grade 2 in the FP. Here is the CAPS overview extract (CAPS page 23) which summarises the first level of content for these grades – **1.17 Fractions.**

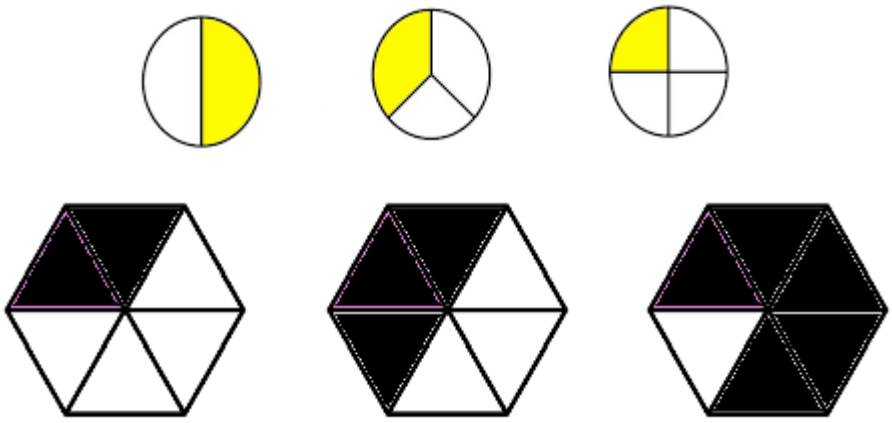
CAPS topic	**Grade 2**	**Grade 3**
1.17 Fractions	Use and name *unitary* fractions in familiar contexts including halves, quarters, thirds and fifths. Recognise fractions in diagrammatic form. Write fractions as 1 half.	Use and name *unitary* and *non-unitary* fractions in familiar contexts including halves, quarters, eighths, thirds, sixths, fifths. Recognise fractions in diagrammatic form. Begin to recognise that two halves or three thirds make one whole and that one half and two quarters are *equivalent*. Write fractions as 1 half, 2 thirds.

Here is an extract from the English/IsiZulu dictionary giving definitions and examples of some of the terms used in the CAPS extract above:

Maths word	**Diagram/explanation**	**Isihumusho**	**Umdwebo/incazelo**
diagrammatic form	Something which is given in a drawing form. E.g. You can give fractions in diagrammatic form in circles or many other shapes. These are some different diagrammatic forms:  	umdwebo	Yinto ewumdwebo. Isb. Ungadweba amaqhezu abe wumdwebo oyisiyingi noma ongesinye isimo. Lokhu okungezansi kuyimidwebo eyizimo ezihlukahlukene.
equivalent	Equivalent fractions are fractions which have the same value. E.g. One half is equivalent to two quarters.	kulingana	Iqhezu elilingana namaqhezu alinganayo. Isb. Uhhafu ulingana namakota amabili.
non-unitary fractions	Fractions that are not unitary fractions. They have a numerator which is bigger than 1. E.g. $\frac{4}{5}, \frac{2}{7}, etc.$	iqhezu elingajwayelekile	Amaqhezu angajwayelekile. Anenombolo engaphezulu enkuluk kunoku-1. Isb. $\frac{4}{5}, \frac{2}{7}, njl.$

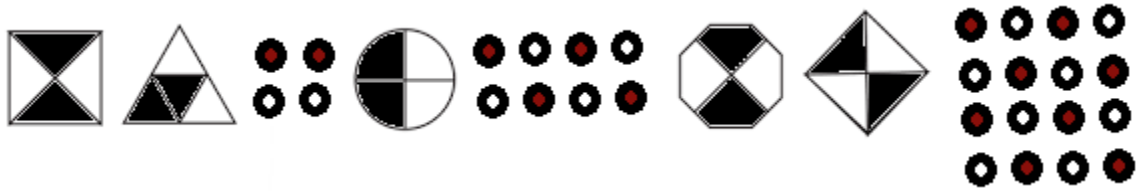
Activity 3

1. What is meant by the phrase "*problems that involve equal sharing*"?
2. Why is equal sharing essential in the context of fraction concept development?
3. The curriculum uses the terminology "unitary" and "non-unitary". Give some numeric examples of "unitary" and "non-unitary" fractions.
4. Which of the following are examples of "unitary" fractions and which are examples of "non-unitary" fractions? What makes them different?



5. Draw some other diagrammatic form of unitary and non-unitary fractions using a discontinuous whole.
6. Why are diagrammatic forms useful in the teaching of fractions?
7. The curriculum talks about learners beginning to recognise the equivalence of certain fractions.
    a. What could you do to promote this recognition?
    b. How will you know that they are starting to recognise equivalent fractions.

8. Are each of the following diagrammatic forms of 2 quarters? Why/why not?



9. Draw diagrammatic forms of 2 thirds using as many different kinds of wholes as you can think of.

The PILO lesson plans include lessons that take the learner through the progression of content recommended by CAPS. They provide several worked examples and many activities in the classwork and homework activities – but you might even wish to add to these examples once you have worked through them yourself and identify areas where even more practice might be beneficial to learners.

At all times you need to remember to allow learners to work with concrete materials such as paper and counters to help them move from concrete representations of the concept to the abstract concept itself. In Grade 2 (term 1) there are two lessons that address the introduction of sharing and grouping division. This leads to fractions in the following terms:

- Lesson 24: Fives sharing and grouping
- Lesson 31: Twos sharing and grouping

Activity 4

Refer to the lesson plan extract below when you discuss the questions that follow.

Grade 2 Lesson 24: Fives sharing and grouping

Activity 1:

- Put learners into groups of **5**. Give each group **20** counters.
- Use 15 counters. Ask the groups to share **15** counters equally amongst **five** group members. Ask: **How many counters does each member get?** (3) **How many counters are left?** (0)
- Use 11 counters. Share **11** counters equally amongst group members. Ask: **How many counters does each get?** (2) **How many counters are left?** (1)
- Use 14 counters. Share **14** counters equally amongst the **5** group members. Ask: **How many counters does each member get?** (2) **How many counters are left?** (4)
- Use 16 counters. Share **16** counters equally amongst the **five** group members. Ask: **How many counters does each member get?** (3) **How many counters are left?** (1)

1. Why does the lesson plan recommend putting the learners into groups of 5?
2. How is the first activity suggested (share 15 counters) different from all of the other activities suggested?
3. How would you add to this lesson to enable further consolidation of sharing division? Discuss other activities to include and explain why you would include them.

In the lesson plans the classwork and homework are designed to consolidate concepts and skills learned in the lesson of the day.

Activity 5
Refer to this lesson plan extract when you discuss the questions that follow.

Grade 2 Lesson 24: Fives sharing and grouping
Classwork

1. Draw 15 triangles. Share them equally amongst five groups.
    a. Are any triangles left or not?
    b. Write: __ shared amongst __ is __. __ triangles are left.
2. Draw 11 suckers. Share the suckers equally amongst five children.
    a. Are there any suckers left?
    b. Write: __ shared amongst __ is __. __ sucker is left.
3. Draw 20 circles. Share them equally amongst five groups.
    a. Are there any circles left or not?
    b. Write: __ shared amongst __ is __. __ circles are left.
4. Draw 17 squares. Share them equally amongst five groups.
    a. Are there any squares left or not?
    b. Write: __ shared amongst __ is __. __ squares are left.

Homework

1. Draw 10 circles. Share them between five children.
    a. Are any cars left or not?
    b. Write: __ shared amongst __ is __. __ cars are left.
2. Draw 13 suckers. Share the suckers equally amongst five children.
    a. Are there any suckers left?
    b. Write: __ shared amongst __ is __. __ suckers are left.

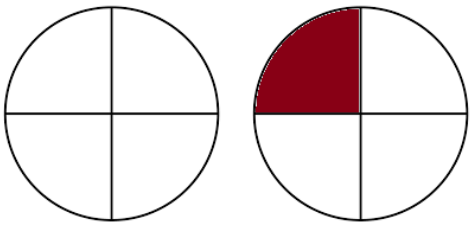
1. Work through the activities.
2. In what way do the classwork and homework activities for Lesson 24 consolidate concepts and skills learned in the lesson of the day?
3. How would you add to or change these classwork and homework activities to enable further consolidation of sharing division? Discuss why you would make these changes.

Learning about fractions in the FP should enable learners to realise that fraction parts of a whole should all be equal in size. You need to give learners ample opportunities to practice the language of fractions as this will help them to develop a solid basis for later fraction work.

Remember that for continuous and discontinuous wholes there is a slight difference in what you say when you find fraction parts. Here is an example of the correct language to use:

Continuous wholes – Single items that need to be broken up in order to be shared e.g. slices of bread, cakes, chocolate bars, etc.

EXAMPLE
To find $\frac{1}{4}$ of a circular disc, I first divide the whole circular disc into 4 parts of equal size. Each part is $\frac{1}{4}$ of the whole, and if I shade one of these parts, I have shaded $\frac{1}{4}$ of the whole.

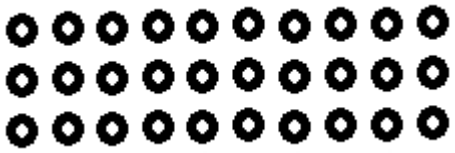


Discontinuous wholes – Groups of items that need to be divided into smaller groups in order to be shared e.g. sweets, marbles, beads etc.

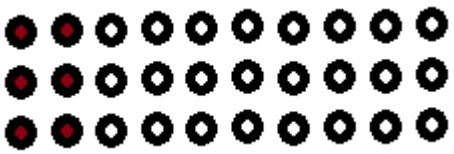
EXAMPLE

To find $\frac{1}{5}$ of 30 counters, I first divide the counters into 5 groups of equal size. I find five groups with six counters in each group. Each group is $\frac{1}{5}$ of the whole, and so 6 counters is $\frac{1}{5}$ of 30 counters.

30 counters



6 counters is $\frac{1}{5}$ of 30 counters.



In Grade 3 (term 1) there are four lessons that address the introduction of sharing and grouping division. This is built on in the fractions lesson later in the term:

- Lesson 14: Fives sharing and grouping
- Lesson 17: Twos sharing and grouping
- Lesson 20: Threes sharing and grouping
- Lesson 23: Fours sharing and grouping
- Lesson 27: Sharing leading to fractions
- Lesson 28: Fractions as parts of a group

Lesson 27 (*Sharing leading to fractions)* has two core activities – the first is more practical and the second is worksheet based – to consolidate learning from the practical activity.

Activity 6

Refer to the lesson extract below in this activity:

Grade 3 Lesson 27: Sharing leading to fractions

Activity 1: Whole class activity

Take your learners outside and do the following activities.

- Divide the class into groups of even numbers. Give each group two hula-hoops. Ask the groups to divide themselves into two equal smaller groups by stepping inside the hoops one at a time. When they are finished, ask them to describe what they had just done. (Our group has **6** learners. If we divided ourselves equally between the **2** hoops, there are **3** learners in each hoop. We can also say that one half of our group is **3**.)

Activity 2: Learners work in pairs.

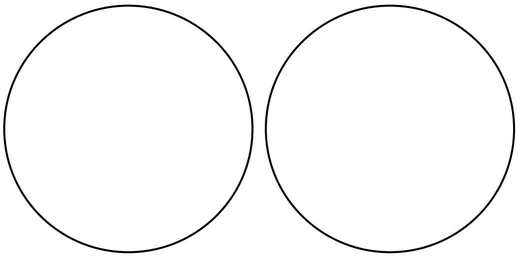
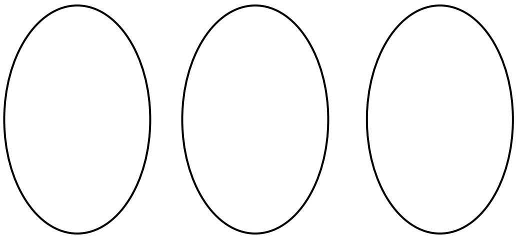
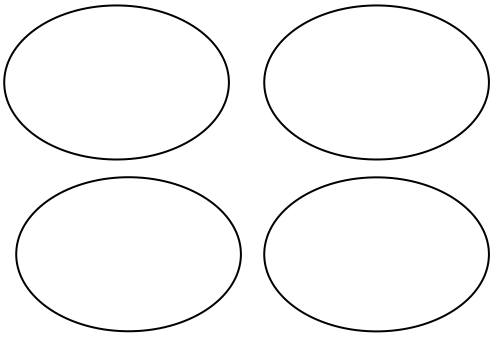
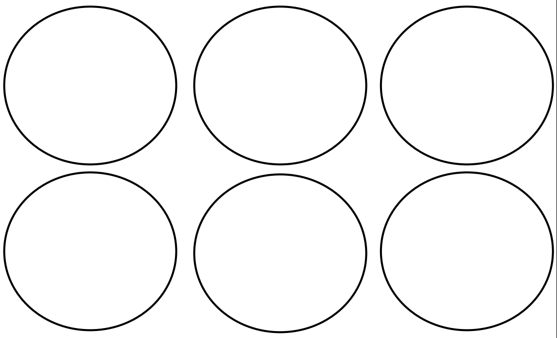
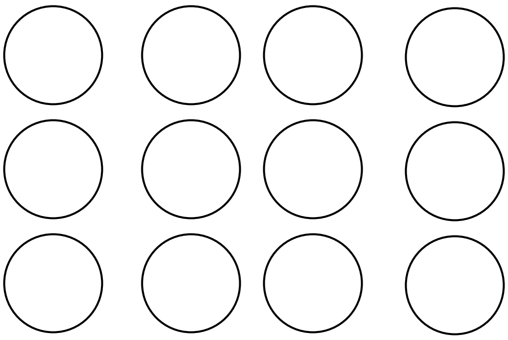
Take the learners back to the class. Give each pair a worksheet with sharing circles and **12** counters as shown below. (*See printable worksheet on the next page)*

- Ask each pair to take **twelve** counters and share them equally.
- Demonstrate how to complete the second row of the worksheet. Use counters and draw the findings on the board for the whole class to see.
- Let the learners do the rest of the worksheet by themselves.

1. Why is it a good idea to take the learners outside at the beginning of this lesson before moving onto the worksheet activity?
2. Does this activity involve parts of a continuous or discontinuous whole? Explain why you say so.
3. If you have 12 counters, how many different equal sized groups can you divide them into?
4. Talk through the division of 12 into thirds.
    a. What will you say while you find one third of 12?
    b. Use counters to demonstrate the process.
    c. Draw the final layout of the counters into three groups of equal size.

   d. How many counters in one third of 12?
   e. How many counters in 2 thirds of 12?
   f. How many counters in 3 thirds of 12?
5. Talk through the division of 12 into quarters.
   a. What will you say while you find one quarter of 12?
   b. Use counters to demonstrate the process.
   c. Draw the final layout of the counters into three groups of equal size.
   d. How many counters in one quarter of 12?
   e. How many counters in 2 quarters of 12?
   f. How many counters in 3 quarters of 12?
   g. How many counters in 3 quarters of 12?
6. In your groups work through the activity on the printable sheet. Discuss each row as you do so using the correct language of fractions.
7. Design another worksheet for a Grade 3 class on sharing leading to finding fractions.

Printable worksheet – sharing leading to fractions

Name:		Date:
Share twelve counters equally in each row.	**Write a sentence to show what you have found.**	**Write a number sentence that describes each of the fractions you made.**
	I shared __ counters into __ groups of equal size. Each group had __ counters. __ is half of 12.	$\frac{1}{2}$ of 12 is 6
	I shared __ counters into __ groups of equal size. Each group had __ counters. __ is _______ of 12.	___ of 12 is __
	I shared __ counters into __ groups of equal size. Each group had __ counters. __ is _______ of 12.	___ of 12 is __
	I shared __ counters into __ groups of equal size. Each group had __ counters. __ is _______ of 12.	___ of 12 is __
	I shared __ counters into __ groups of equal size. Each group had __ counters. __ is _______ of 12.	___ of 12 is __

Session 2: Adding and subtracting on number line (1 ½ hours = 90 min)

In this session the following lesson plans from the Term 1 Jika iMfundo FP Maths materials are relevant:

- *Grade 1 Term 1 lessons 13-16.*
- *Grade 2 Term 1 lessons 8, 9, 12, 13, and 14.*
- *Grade 3 Term 1 lessons 8 and 9.*

Materials: When you work through this activity you will need a set of about 20 counters.

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.

Scale

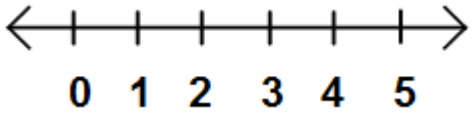
Number lines are often used to represent numbers. To draw a number line correctly you need to choose an appropriate *scale*. You should always try to measure accurately when you do number line representations and encourage your learners to do the same. This gives them practice in using a ruler and helps them to realise the importance of accuracy.

Reflection

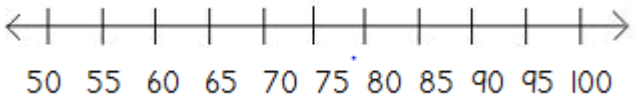
When do you need to start the labels of a number line with the label '0' (zero)?

You also need to decide what *number range* you need to include on your number line as that affects the scale you choose. The number range will be determined by the context of the question. For example, in Grade 1, for a question that involves smaller numbers, you will usually be able to label unit counts on a number line and start the counting with zero. But for a Grade 3 question involving three digit numbers you will need to start the number line higher up in the number count and choose a scale that will allow you to represent the numbers in the question most effectively.

Examples:
A Grade 1 number line, using a scale of 1 and a range of 0-5 will be labelled like this using unit counts:



A Grade 3 number line, using a scale of 5 and a range of 50 - 100 will be labelled like this in 5s:



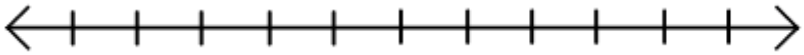
Here are some exercises for you to try.

Activity 1

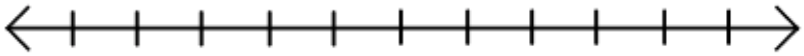
Choose a scale and label the following number lines. In each case explain your choice.

1. You want to represent the solution of the following addition questions on a number line:
   a. 2 + 3 on a number line in a Grade 1 lesson.

   b. 11 + 6 on a number line in a Grade 2 lesson.

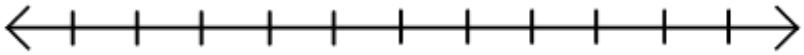


   c. 54 + 40 on a number line in a Grade 3 lesson.

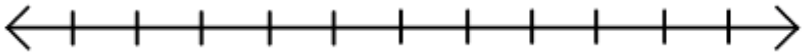


2. You want to represent the solution of the following subtraction questions on a number line:
   a. 5 – 1 on a number line in a Grade 1 lesson.

   b. 20 – 15 on a number line in a Grade 2 lesson.



   c. 90 – 80 on a number line in a Grade 3 lesson.



Teaching addition and subtraction using number lines allows you to give a visual representation of the number calculation and at the same time consolidate number concept (placing numbers on a number line involves a good understanding of numbers) and scale (as discussed above).

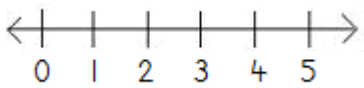
In Grade 1, the number range for addition and subtraction in Term 1 is 0 to 5. This means that you will work with short number lines which are labelled using unit counts. Lesson 15 of Grade 1 Term 1 calls on the use of number lines in the lesson activities.

Since the number lines are short and have only a few labels, you can draw number lines on the floor in grade 1 and allow the learners to walk along them according to the questions you give them.

Refer to this lesson plan extract for the next activity.

Grade 1 Lesson 15: Activity 2:

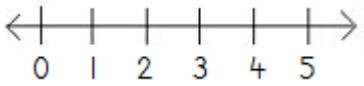
- Draw a 0-5 number line like the one below on the board before the lesson starts.
- Give each learner a number line card (0-5), or ask them to copy it into their books from the board.



- Do the following practically with them.
- Take **1** yellow block and **4** blue blocks, and place them on the number line.
- Ask the learners to show **1** jump and then **4** more jumps on the number line.
- Repeat with all the bonds of 5.

Activity 2

1. The activity above links teaching using a number line and teaching using blocks. On the number line below fill in the blocks and show the jumps for the first question in the activity: 1 + 4



2. How do you count the blocks on the number line?

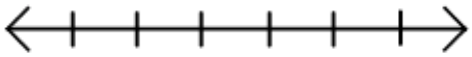
3. How do you count the jumps on the number line?

4. What do grade 1 learners learn about using a number line through doing this activity?

5. What other learning is consolidated by such an activity?

6.i Practise talking about using a number line to show addition of the bonds of five by completing the number line demonstrations for the other bonds of 5:

a. 0 + 5



b. 2 + 3

c. 4 + 1

d. 3 + 2

e. 5 + 0

6.ii What other mathematical conceptual learning is embedded in this question?

The number range for addition and subtraction increases in Grade 2 and so the range that can be displayed on a number line is higher. Grade 2 Term 1 Lesson 13 involves the use of a number line when doing addition and subtraction.

In term 1 Grade 2 the number range for addition and subtraction is 20. This means that the choice of length of number line and the scale is still not too complex but Grade 2 learners might already start to make choices about scale.

Activity 3

1. Why is it good idea to start talking about scale and number range to Grade 2 learners even though the number range for addition and subtraction in Term 1 is only 0-20?

2. The activity below links teaching using a number line and teaching using blocks as in the Grade 1 lesson activity that you just discussed. Work through the lesson activities in your group.

Grade 2 Lesson 13: Counting on and back – addition and subtraction

Activity 1: Give each learner 20 counters.

- Ask the learners to count out **seven** counters and then, starting at the eighth counter, count out **three** more until they have **10** counters.
- Ask the learners to count out **6** counters and then, starting at the seventh counter, count out **8** more. Add them together as a class.
- Ask the learners to demonstrate: 8 + 11 = 19 using counters.
- Ask the learners to use counters to demonstrate 9 + 9.

Activity 2: Give each learner 20 counters. Draw a 0 to 20 number line on the board.

- Ask the learners to count out **10** counters. Then take **3** counters away. How many are left? (7)
- Repeat with 12 – 6 = __, 14 – 7 = __, 20 – 8 = __.
- Repeat the sum 10 – 3 = __ on the number line.

---

3. In what way are the counters and number lines used differently in this Grade 2 lesson to the way they were used in the Grade 1 lesson?

4. How does the link between counters and number lines included here help learners to consolidate their understanding of the concept of subtraction?

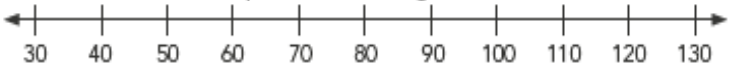
The Grade 3 number range for addition and subtraction is even higher. This increases the complexity of the activity in relation to scale and range choices that learners need to make when they do number line representations of addition and subtraction. Grade 3 Term 1 Lessons 8 and 9 call on the use of a number line when doing addition and subtraction.

In the next two activities you will work through these two lessons while you think about using number lines in Grade 3 when teaching addition and subtraction.

Grade 3 Lesson 8 – Addition on a number line

Activity 1:

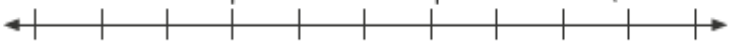
Draw a number line on the board. Point out the two arrowheads as you draw the number line.
Mark the number line in equidistant markings, and write the numbers in multiples of ten from **30** to **90**.



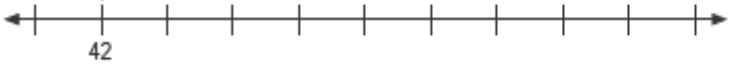
- Ask learners to tell you where you should write the following numbers:
  - **45** (exactly between the **40** and the **50**)
  - **59** (on the left of **60**, right next to it)
  - **67** (between **60** and **70** but more towards the right of where the **65** would go)
  - **32**, **86** and **42** etc.

Activity 2 (adding multiples of ten):

Write the following number sentence on the board: **42 + 30 = ...** Tell learners that they are going to use a number line to solve this problem. Draw an open number line (a number line with no numbers).



- Ask, **What is the first number in the number sentence?** (42)
- Ask, **Where should we write 42 on the number line?** (Since the number sentence is addition, and the numbers will get bigger when we add, it should be somewhere on the left hand side.) Find a place for **42**, mark the place, and write **42**.

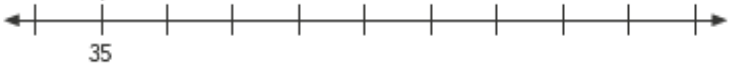


  - Do the same with 35 + 40 = ... and 63 + 40 = ...

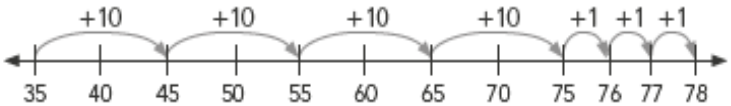
Activity 3 (adding multiples of ten and ones):

Write the following number sentence on the board: **35 + 43 = ...** Draw an open number line on the board.

- Ask, **What is the first number in the number sentence?** (35)
- Ask, **Where should we write 35 on the number line?** (Since the number sentence is addition, and the numbers will get bigger when we add, it should be somewhere on the left hand side.) Find a place for **35**, mark the place and write **35**.



- Say: **So we need to add. How many jumps of 10s and 1s will we take from 35?** (**4** tens and **3** ones)
  As you take the jump, say aloud the numbers aloud and point to them, e.g: **We needed to add 43 and we have added 4 tens. We still need to add the 3 ones. We take one jump at a time. The first jump gets us to 76, the second jump gets us to 77 and the third jump gets us to 78.**



  - Say, **Let's complete the number sentence: 35 + 43 =** (78)
- Do the same with: 27 + 42 = (69), 56 + 24 = (70), 27 + 47 = (74), 56 + 25 = (81)

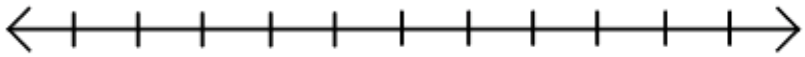
Activity 4

1. Work through the lesson activities from Grade 3, Term 1 Lesson 8.

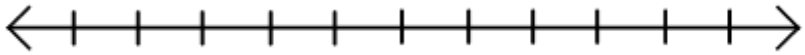
2. In what way does the lesson teach learners how to choose a scale for a number line representation of addition?

3. Use number lines in any way you choose to represent the following addition. Discuss the different ways in which group members choose scales and did their representations.

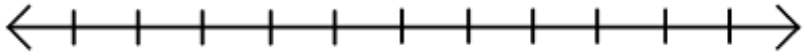
   a. 75 + 10 = ___

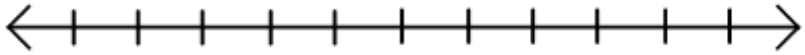
   b. 56 + 30 = ___

   c. 40 + 27 = ___

   d. 46 + 25 = ___

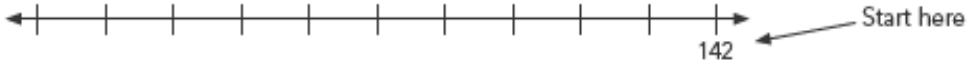
4. Discuss the value of using number lines for addition of bigger numbers in Grade 3.

Grade 3 Lesson 9 – Subtraction on a number line

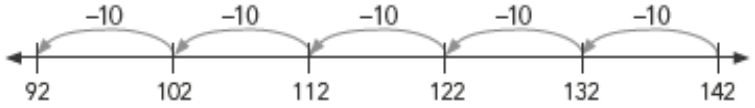
Activity 1 (subtraction with multiples of ten on a number line):

Write the following number sentence on the board: **142 – 50 = ...**
Tell learners that they are going to use a number line to solve this problem. Draw an open number line (a number line with no numbers).

- Ask, **What is the first number in the number sentence?** (142)
- Ask, **Where should we write 142 on the number line?** (Since the number sentence is subtraction, and the numbers will get smaller when we subtract, the number **142** should be somewhere on the right hand side.) Find a place for **142**, mark the place, and write **142**.
- Ask learners to read the rest of the number sentence. (– 50 = ...)
- Say: **We need to subtract. This means that we are jumping backwards. How many jumps of 10 will we take backwards from 142?** (5)



- As you take the jump, say the numbers aloud and point to them, e.g. **That's one jump of 10 backwards from 142. It gets us to... (132), then another jump of ten, and we landed on... (122)** (Write down the next number in the appropriate spaces below the number line as you jump.) **Another jump takes us to... (122)**. Continue until you have taken **5** jumps of **ten**. Also write the '**–10**' above the jumps to show that you are subtracting.

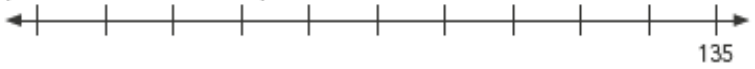


- Write down the answer to **142 – 50**. (92)
- Do the same with **135 + 40** (95) and **165 + 60** (105).

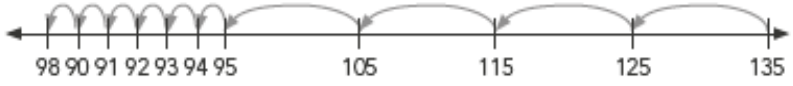
Activity 2:

Write the following number sentence on the board: **135 – 46 = ...** Draw an open number line on the board.

- Ask, **What is the first number in the number sentence?** (135)
- Ask, **Where should we write 135 on the number line?** (It should be somewhere on the right hand side since the number sentence is a subtraction one, and the numbers will get smaller when we subtract.) Find a place for **135**, mark the place, and write **35**.



- Ask learners to read the rest of the number sentence. (– 46 = ...)
- Say, **We need to subtract. How many jumps of 10s and 1s will we take from 135?** (4 tens and 6 ones)



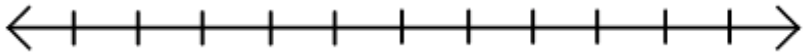
- Say, **Let's complete the number sentence 135 – 46 (89).**
- Do the same with 156 – 24 (70), 127 – 42 (69) and 127 – 49 (74).

Activity 5

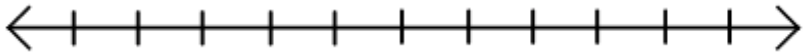
1. Work through the lesson activities from Grade 3, Term 1 Lesson 9.

2. In what way does the lesson teach learners how to choose a scale for a number line representation of subtraction?

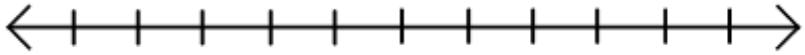
3. Use number lines in any way you choose to represent the following subtraction. Discuss the different ways in which group members choose scales and did their representations.
   a. 75 – 30 = ___



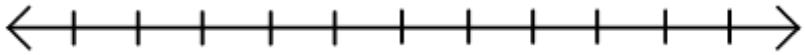
   b. 50 – 33 = ___



   c. 125 – 62 = ___



   d. 130 – 85 = ___



4. Discuss the value of using number lines for subtraction of bigger numbers in Grade 3.

Session 3: SA SAMS (1 hour = 60 min)

The purpose of this session is to assist teachers with the entry of the marks for assessment in the lesson plans in SA SAMS.

Materials: When you work through this activity you will refer to the two mark sheet extracts provided at the end of this handout.

This activity includes background information about SA SAMS and shows how the Jika iMfundo Lesson Plans can be aligned with SA SAMS. It also involves sets of questions to guide the discussion for about 60 minutes as you familiarise yourself with this information.

Your facilitator will guide you as you break into groups and have large group discussions throughout this time.

SA SAMS background

In SA SAMS for mathematics schools enter marks for activities that are parts of tasks. Tasks in SA SAMS are named according to the CAPS content topics (Number, operations and relationships; Patterns, functions and algebra; Space and shape; Measurement and Data handling).

The SA SAMS automatically has a place for the prescribed number of marks to be entered – but teachers can make provision for more marks for more activities to be entered if they wish. For example, in Mathematics Term 1 Grade 1, SA SAMS allows for one assessment activity mark in all of the topics, this can be used or it could be changed to allow for more marks. (Note that the topics are not listed in the standard order that they are given in the CAPS.) There is also provision for one "Provincial Assessment" in the Term 1 Grade 1 SA SAMS mark sheet.

In mathematics CAPS does not prescribe the number of marks for any of the assessment tasks although it gives guidelines as to the number of tasks pert term. Teachers may set activities and allocate marks at their discretion. Teachers are able to enter the mark that their activity is out of in SA SAMS when they set it up for their subject and grade. For example, in Mathematics Term 1 Grade 1, the teacher's exemplar set up shows 10 marks for Space and shape and 5 marks for all of the other topics but these can be changed by the teacher if necessary when the marks are entered into SA SAMS.

The SA SAMS sheets are set up to work out the mark for the different topics and to weight them as they should be weighted according to the CAPS automatically. It does not matter what the activity entered by the teacher was 'out of' – the correct weighting will be applied. Teachers do not have to adjust the weighting – although they can if they want to – unless it is in *red* in SA SAMS. Anything which is *red* in SA SAMS cannot be adjusted by teachers.

SA SAMS also automatically converts the learners' mark for a task to CAPS levels – teachers do not have to do this themselves.

In short therefore, teachers have to enter the marks for each mathematical topic but they don't have to work out the content weighting or the final levels achieved by the learners.

Input about how the Jika iMfundo lesson plans align to SA SAMS

The lesson plans were designed to be CAPS aligned for both content and assessment requirements. In the lesson plans, the formal assessment activities are grouped together into tasks according to the number of tasks required by the CAPS. (For example in Term 1, Grades 1, 2 and 3 all have two assessment tasks.) The lesson plans include more than one assessment activity per task, as CAPS requires that in the FP continuous assessment should be carried out in order to give learners multiple opportunities to show learning gains. Lesson plan assessment activities include oral, practical and written assessment activities as called for by the CAPS.

The assessment mark record sheet (given at the end of the tracker) allows teachers to enter marks for every activity in the lesson plans. For example, since according to CAPS in Term 1, Grade 1 has two assessment

tasks, in the tracker there were assessment record sheets for the two tasks. Each sheet made provision for all of the lesson plan assessment activities which were combined to give the task mark for the term. This assessment record sheet has now been revised for 2017 in order to group the assessment activities into the mathematical topics so that these marks can be entered into the SA SAMS more easily and efficiently.

There are more assessment activities in the lesson plans than have been provided for in the basic SA SAMS template, but teachers can adjust to this in the way that they prefer (mentioned above). Teachers can either add activities to the SA SAMS mark sheets or add up marks for the activities to enter only one mark into SA SAMS. The mark sheet in the tracker has been revised for Term 1, 2017. This will make the combination of marks easier for teachers and enable you to enter just one mark into the column for each of the five CAPS mathematics topics.

Teachers should note that in SA SAMS the order of the topics is not the same as CAPS and nor is it the same for each grade. In the Jika iMfundo recommended mark sheet the order of mathematical topics is consistently in the same order as in the CAPS. You need to read each column header carefully to check which topic it indicates and enter marks accordingly.

Activity 1

Refer to the following two exemplars which are given on page 21 and 22 of this handout..

SA SAMS Exemplar mark sheet: Mathematics Term 1 Grade 1
Exemplar Tracker 2017 Grade 1 Recommended Assessment Mark Record sheet

1. What are the tasks named in SA SAMS? List them in the order they are given in SA SAMS.
2. How many marks can be entered per topic in the SA SAMS mark sheet?
3. What are the assessment activities given in the Jika Grade 1 Recommended Assessment Mark Record sheet in the 2017 tracker? List them in the order they are given in the tracker mark sheet.
4. What is the difference between the SA SAMS ‘tasks’ and the tracker ‘assessment activities’?
5. You are allowed to change the SA SAMS mark allocations. How would you adjust the mark total per topic on the SA SAMS sheet so that it matches the Jika iMfundo entry sheet.
6. Do teachers have to work out the levels for learners after entering the marks into SA SAMS?
7. Do teachers have to calculate the correct weighting (according to CAPS) when using the SA SAMS mark sheets?
8. What could teachers do to align the LP activities to SA SAMS where there are more activities in the Lesson Plans than in SA SAMS?

NOTE:
All questions relate to the exemplars but these questions could be considered for other grades (or terms) when the material is at hand.