



2017 TRAINING WORKSHOP NO.9
MATHEMATICS



FOUNDATION PHASE



education

Department:
Education

PROVINCE OF KWAZULU-NATAL

**Foundation phase
Just-in-Time Training Workshop 9
May 2017**

Facilitator's Guide

Maths



Jika iMfundo
what I do matters

Endorsed by:



Jika iMfundo
Foundation Phase JIT
Workshop 9 Mathematics: May 2017
Workshop guide for facilitators

In this workshop participants will find out more about the teaching of space and shape and mental mathematics in the Jika iMfundo FP Mathematics materials. You will also think more deeply about using the continuous assessment activities provided in the Jika iMfundo FP Mathematics materials.

MATERIALS:

- **The facilitator needs to bring a ball/something else to throw around (session 1).**
- **The facilitator needs to bring some balloons, paper cups and string to the workshop (session 3).**
- **Participants need paper to work on.**
- **They should refer to their Term 2 lesson plans and trackers, if possible.**

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 also be able to share key ideas together with the large group.

Workshop plan

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

8.30 – 09.30 – Session 1: Mental mathematics in the Foundation phase (60 min)

09.30-11.00 – Session 2: 2-D and 3-D shapes/objects in the Jika iMfundo lesson plans (1½ hours = 90 min)

11.00-11.30 – Break

11.30-12.30 – Session 3: Teaching position, views and direction (1 hour = 60 min)

12.30 – 13.30 – Session 4: Continuous assessment in Jika iMfundo FP Mathematics (1 hour = 60 min)

Session 1: Mental mathematics in the Foundation phase (60 min)

Materials: When you work through this activity you could refer to your Term 2 lesson plans.

Warm up activity: Bean bag bounce...

Take a ball (or something else that you can throw around from learner to learner).

- Ask a question. The person who catches the ball must answer the question. The person then makes up a question and throws the ball to another person who has to answer.
- Give an instruction for counting in a particular way. e.g. 5s, starting at 5. Throw the ball. The learner who catches the ball starts the counting, and then throws the ball to another learner who says the next number in the sequence.
- Counting can start at any number. You can choose the starting number or the learner who starts chooses the starting number. Teachers should check the number range to be sure that learners will manage the given counting.

Do this activity – discuss what is learnt and what is valuable about the activity. What other variations can you think of?

There is some theory presented in the participants guide – allow participants to read it before going in to the discussion questions that follow.

Activity 1

1. Why is mental mathematics useful?

It enables learners to do calculations without having to write things down. It enables learners to apply their knowledge of the basic facts (number bonds and tables) to calculations involving bigger numbers. It teaches learners to think strategically and work out calculations using their brains.

2. Design a chain of questions appropriate for Grade 1 and Grade 2 learners:

- a. Write out the chain.

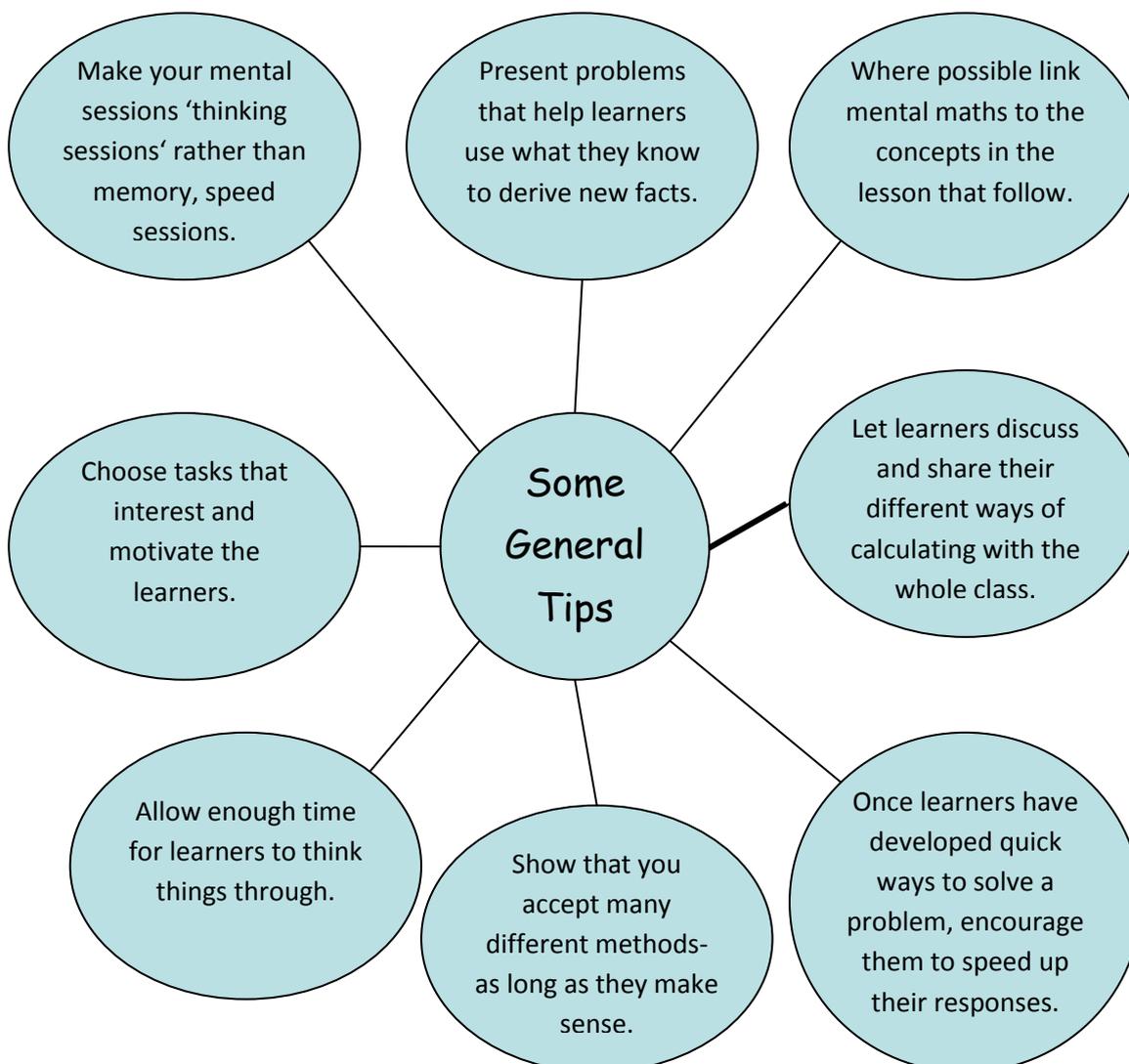
Answers may vary. Discussion and recording of specific chains to stimulate mental maths

calculations and strategic thinking about mental calculations.

For example: Grade 1: Think of a number between 0 and 5, add 3, subtract 2, add 1, subtract your number, add 2 ... what have you got? (The answer should be 4.)

- b. Explain what mental mathematics skill the chain you have designed is developing or testing. The example given here is for Grade 1 learners to consolidate adding and subtracting numbers from 0 to 5. Other examples created by groups should be explained. The example given also could stimulate thinking about “how did the teacher know my answer would be 4?” (the original number was subtracted – so the teacher now controls the answer.)
3. How do compensations help learners do mental calculations?
When learners think about making compensations they are using their knowledge of rounding numbers using basic bonds to simplify a calculation. This is also drawing on their knowledge of numbers. The value of doing this mentally is it stimulates the brain to think mathematically.
4. How does pattern identification help learners do mental calculations?
It gives them a rule to use when doing the progressive calculations. In the two examples shown above, once the learner has identified the pattern (which involves mathematical thinking), the calculations that follow are made easier to do.

Here are some tips to bear in mind when you plan mental maths activities:



Mental mathematics in Jika iMfundo

Discuss the provision of MM in the Jika iMfundo lesson plans.

Activity 2

Look at the activities to see how the planned mental mathematics caters for counting as well as other mental mathematics strategic operations in accordance with CAPS requirements for Term 2.

Discussion. Answers will vary. Make sure participants notice the variety of the activity and realise the importance of doing daily mental mathematics activities.

Look at the activities to see:

1. How do the activities vary across the three grades?
Look at how the Grade 1 MM activities are a bit different from the Grade 2 and 3 activities. Some grade 1 MM activities still allow learners to work with counters. Participants should review the full set of activities in the lesson plans to see how there is a spread of calculation types (the excerpts show this in a limited way). e.g. There is addition, subtraction, doubling, halving, more than. Less than and so on.
2. How do the planned mental mathematics cater for counting?
*Every day there is a suggestion for a counting sequence, in a given number range, with suggestions for starting points given at **1.1 Counting (5 minutes)**. These are just suggestions and could be varied by teachers.*
3. What other mental mathematics opportunities are provided?
*Every day there is a suggested set of mental calculations given at **1.2 Recall and strategies (10 minutes)**. These are just suggestions and could be varied by teachers.*
4. How do these pairs of activities (provided daily in the lesson plans) cater for the CAPS requirements for mental mathematics?
The suggestions are according to the number range specified by CAPS per grade for the term. The also allow for variation of operations.

Session 2: 2-D and 3-D shapes/objects in the Jika iMfundo lesson plans (1½ hours = 90 min)

Materials: When you work through this activity you will need some blank sheets of paper and a pencil. You could refer to your Term 2 lesson plans.

The first two activities give participants the opportunity to draw shapes. It is very important that you circulate and check that everyone is doing the drawings and that you help those who experience any difficulties to overcome their difficulties – so that when they leave this workshop they feel confident to draw shapes (2-D and 3-D) independently. Check how the time is going and move on, even if not all participants have drawn all of the shapes as the drawings are provided below.

In this activity the aim is to arouse interest in the specific naming of the shapes and to motivate teachers to learn the names and characteristics of the different shapes while they take time to draw the shapes. Mathematics teachers should be able to draw and name these shapes with confidence.

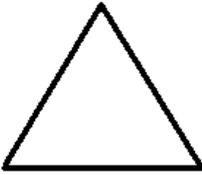
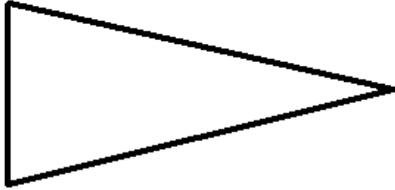
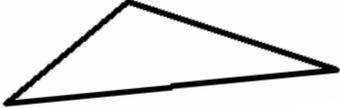
Activity 1

Here are the drawings of the shapes that had to be drawn. It is important to stress things such as:

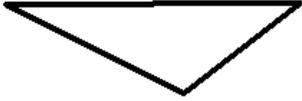
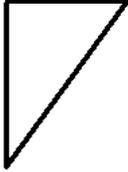
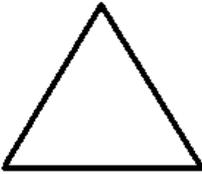
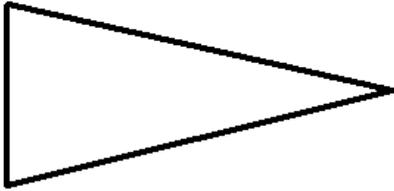
- *All of these shapes should always be closed (there is no opening in the shape)*
- *Straight line edges MUST be straight.*
- *This level of detail in naming shapes is not necessary for FP learners, but FP teachers would do well*

to know the precise names of 2-D shapes that their learners will study in later years and to be able to introduce learners to these names where they show interest and aptitude.

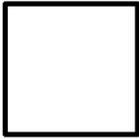
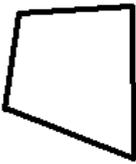
1. Triangles – named according to lengths of sides

Equilateral triangle (three angles equal 60 and three sides of equal length)	Isosceles triangle (has two equal sized angles and two sides of equal length)	Scalene triangle (has all three sides different in length)
		

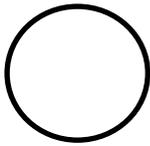
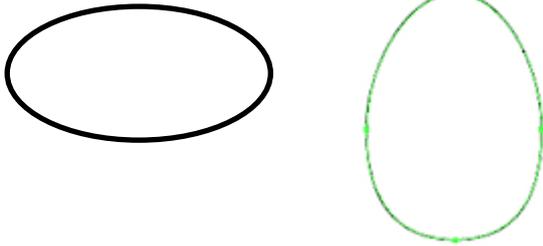
2. Triangles – named according to sizes of angles

Acute angled triangle (has three acute angles)	Obtuse angled triangle (has one acute angle)	Right angled triangle (has one right angle)
		
Equilateral triangle (three angles equal 60 and three sides of equal length)	Isosceles triangle (has two equal sized angles and two sides of equal length)	
		

3. Quadrilaterals

Square (regular quadrilateral) (four sides of equal length and four right angles)	Rectangle (two pairs of opposite sides equal in length and four right angles)	Parallelogram (two pairs of opposite sides parallel and equal in length)	Rhombus (all four sides equal in length)
			
Kite (two adjacent pairs of sides equal in length)	Trapezium (at least one pair of sides parallel)	Irregular quadrilateral (all sides different lengths)	
			

4. Round shapes

Circle (perfectly round shape)	Oval (rounded shape)
	

3-D shapes are more difficult to draw. Allow more time for this in the session. Model the drawing yourself and **link it to the models** of the shapes that you bring with you to the session if possible.

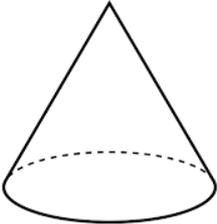
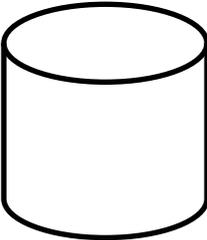
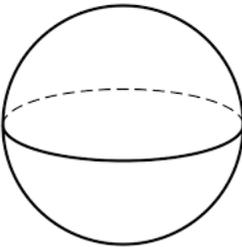
Note that in the curriculum it states that ‘learners should be able to recognise drawings of 3-D shapes’. This means that teachers should be able to draw the 3-D shapes. (Learners themselves do not need to be able to draw the shapes but if they show an interest, teachers could show them how to do it.)

Activity 2

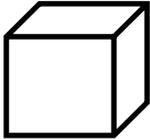
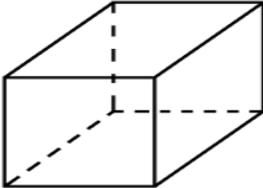
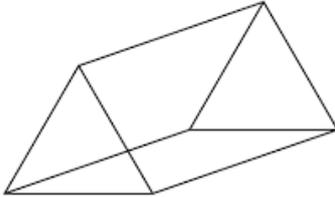
Here are the drawings of the shapes that had to be drawn. It is important to stress things such as:

- The 3-D perspective should be visible and correct.
- Shapes should always be closed (there is no opening in the shape)
- Straight line edges **MUST** be straight.

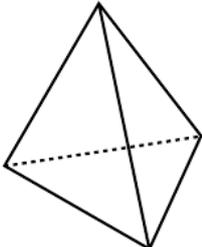
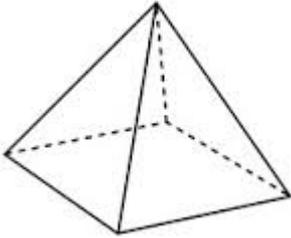
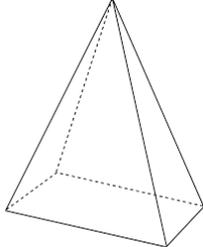
1. Shapes that can roll:

Cone	Cylinder	Ball shape - sphere	Egg shape - ovoid
			

2. Box shapes - prisms

Cube	Rectangular prism	Triangular prism
		

3. Pyramids

Triangular pyramid	Square pyramid	Rectangular pyramid
		

NOTE: Teachers need to realise that it is always important to study the curriculum overview for the specific content they have to teach. This serves two purposes:

1. You make sure you cover everything you have to cover.
2. You see the logic and sequencing in the specified curriculum.

Activity 3

1. Range of shapes/objects:

What do learners have to know in order to be able to ‘Recognise and name’ the specified shapes/objects’?

They have to know the names of the different shapes and recognise the drawing that is shown. Refer to the drawings above to make sure that you know all of the names and can recognise them from drawings. This is more detailed than necessary, but knowing this detail will empower you as a teacher.

2. Features of shapes/objects:

What do learners have to know in order to be able to ‘Describe, sort and compare’ the specified shapes/objects?

They have to be able to look at what kind of shape it is, talk about its characteristics (e.g. is it flat/not, is it round/not, etc.) and use their knowledge of the characteristics to differentiate between the different shapes.

3. Study the content that is specified to answer the following questions:

- a. What is the progression from Grade 1 to Grade 2 in relation to 2-D shapes studied?
One new shape (the rectangle) is introduced in Grade 2.
- b. Which aspects of the content activities in Grade 3 link to the 2-D content from Grades 1 and 2?
2-D shapes from Grade 2 can be recognised as the faces of some of the 3-D objects studied in Grade 3?
- c. How can teachers use these links to the advantage of the learner?
Links make for stronger learning – assist conceptual understanding and memory.

4. Vocabulary of 2-D and 3-D shapes/objects.

- a. Review the extract – discuss the given translations and how you would teach this vocabulary in FP classes.
Various - discussion. Emphasise the importance of using the correct mathematical vocabulary all of the time.
- b. How can teachers make sure that they teach all of the vocabulary in the lessons that they present on the CAPS topics?
Essential make sure that they teach all of the vocabulary in the lessons that they present on the CAPS topics. Concentrate on and think about doing this.

The Jika iMfundo lesson plans include lessons – this gives the participants an opportunity to focus on specific lesson activities (about 2-D and 3-D shapes/objects). You should contextualise these lessons – show/talk about them in relation to the full lesson plan context (using the full LP document) if possible.

Activity 4

For each of the extracts of activities from the Term 2 lessons about 2-D and 3-D shapes/objects in the Jika iMfundo FP Mathematics materials, discuss:

1. What content is covered and how it is presented.
2. How does it relate to the CAPS content specifications?
3. How would you use the activity?
4. Would you add to/change the activity in any way and if so, how and why?

Discussion – facilitate group discussions and share good ideas with the whole group. Facilitate the discussion and ensure all participants are actively involved. Allow report back to the bigger groups where good ideas can be shared more widely.

Session 3: Teaching position, views and direction (1 hour = 60 min)

Materials: Balloons, string and scrap paper. When you work through this activity you could refer to your Term 2 lesson plans.

Some theory is presented in the participants guide – allow them to read it before starting the discussion of the questions that follow.

Activity 1

1. Write as many different mathematical words you can think of that are used in the following contexts:
 - a. Position
List all possible terms. E.g. Under, inside, outside, beside, in between, next to, left, right, near, far away from, on top, above, below, etc.
 - b. Views
List all possible terms. E.g. front, side, back, top, bottom, etc.
 - c. Direction
List all possible terms. E.g. through, towards, forwards, backwards, sideways, across, turn, half a turn, a quarter turn, left, right, etc.
2. Brainstorm some ideas for activities that you could do in lessons on position, views and direction. *Activities in which learners move artefacts from one point to the next and draw representations of the resultant image will enable them to develop concepts of position (including observing features from different positions), direction and distance.*

Possible activities:

- *By providing resources – anti-waste material for example – that learners can manipulate to create roads, enclosures, pathways, bridges, tunnels, rivers, parking spaces, etc. you will give learners opportunities to extend their understanding of concepts of shape and space to create small worlds that fit their purpose. Teaching and learning using ‘small worlds’ can be developed by:*
- *Introducing characters or vehicles that can be moved around the scene in order to give learners a purpose for developing a narrative in which positional language is used.*
- *Involving learners in the setting up of a small world, either by following a simple plan or in the retelling of a story or route.*
- *Encouraging different learners to describe what they see and compare them with those of their peers. A feature near to one child will be far away from the child sitting opposite, for example, thus enabling them to compare their perspectives and to discuss why their views differ.*
- *Varying the place in which small worlds are set up, sometimes on table-tops (perhaps an interest table in a corner of the classroom). This allows learners to get a good view down onto the scene. And sometimes on the floor (allowing learners both to sit around it and to ‘get into’ the scene).*
- *The Jika iMfundo home language listening and speaking posters provide a wonderful resource for discussions on position and, as a result, the enhancement of positional language central to Mathematics.*
- *The following example illustrates how pre Grade R learners typically view different*

*perspectives. The internalisation of logic relating to different viewpoints is a gradual process of cognitive development and hands-on, experiential learning is central to this process. **The Three Mountain Problem.***

According to Piaget, thought in the pre-operation period is egocentric: learners tend to be captured by their immediate concrete perceptions and find it difficult to adopt alternative viewpoints. The three mountain problem illustrates this tendency. Learners are asked to draw how the mountains would look from the doll's point of view. Typically, 3- and 4-year-olds simply draw how the mountains look from their own viewpoint (to show what the doll sees).

The problem is not that young learners don't know that the mountains ought to look different from the other side, they don't always think about it until they have developed their cognitive understanding of different viewpoints.

In experiments where the mountains were surreptitiously shifted while learners were led around the display, learners were surprised to see that the mountains looked just the same from the opposite side.

Giving learners the opportunity to think about how views are different from different viewpoints will enable them to develop cognitively.



To consolidate the theory presented in the first activity and to show an example of an activity that can be used in many ways in FP teaching of position, views and direction, work through the next activity.

Activity 2

1. Make the balloon landing kit. – *Do this and allow time for active participation. Facilitate as needed. In this activity you will use balloons to teach about position, views and direction. Learners need to be able to use the language of position, views and direction – allow them to describe where the balloon is, what would be seen from the balloon when it flies along and the path the balloon follows, to use the vocabulary in relation to a real context. Use the balloon actively to allow this kind of discussion to take place in your class.*
2. Discuss:
 - a. the directions in which the balloon flies,
Answers may vary. Discussion: e.g. describe the path of flight of the balloons and where they land using mathematical vocabulary of direction. For example the balloon flew up, then it turned to the left, flew straight and then flew down and landed on the floor.
 - b. where it is at certain points on its flight and where it lands
Answers may vary. Discussion: e.g. describe the positions of the balloon along its flight and when it lands using mathematical vocabulary of position. For example the balloon was above the ground, it flew over my desk and landed on the floor under the teacher's desk.
 - c. what views could be seen from it as it flies and when it has landed.
Discussion: e.g. describe the views that might have been seen from the balloons (things below them, on either side and in front of them) using mathematical vocabulary of position. You need to encourage teachers to use their imaginations – to think about what they will see when they fly

above certain objects. Use the balloon to demonstrate this flight. For example, from above, my desk looks like a rectangle so the top view of a desk is a rectangle.

The Jika iMfundo lesson plans include lessons – this gives the participants an opportunity to focus on specific lesson activities (about position, views and direction). You should contextualise these lessons – show/talk about them in relation to the full lesson plan context (using the full LP document) if possible.

Activity 3

For each of the activities from the Term 2 lessons about position, views and direction in the Jika iMfundo FP Mathematics materials, discuss:

1. What content is covered and how it is presented.
2. How does it relate to the CAPS content specifications?
3. How would you use the activity?
4. Would you add to/change the activity in any way and if so, how and why?

Discussion – facilitate group discussions and share good ideas with the whole group. Facilitate the discussion and ensure all participants are actively involved. Allow report back to the bigger groups where good ideas can be shared more widely.

Session 4: Continuous assessment in Jika iMfundo FP Mathematics (1 hour = 60 min)

Materials: When you work through this activity you could refer to your Term 2 tracker.

It is important that participants work with the tracker extracts to find out the difference between the checklists and rubrics that are provided.

It is also important to note that formal and informal assessment activities should be done. The difference is that formal activity marks are recorded in the SA SAMS. Informal marks are recorded by the teacher in her observation book in order to keep a record of learner achievement on all topics covered in the course of the year.

Activity 1

Grade 1: This is a practical activity on the topic of length

1. Study the description of the task:
 - a. What CAPS content area does it relate to?
Measurement of length.
 - b. What specific content from the CAPS topic does the activity assess?
Estimate, measure and record lengths using non-standard measures. Use language to talk about ordering and comparing lengths.
 - c. What mark is allocated to the activity?
7
 - d. Is the activity formal or informal? What does this mean?
Informal. This means that the marks recorded are for formative assessment purposes and do not need to be recorded in the SA SAMS mark sheet. But teachers must do the activity and record marks for learners. To reduce pressure, for informal activities, teacher could assess only the weaker learners, since they do not need a mark for every learner in the class for informal activities.
 - e. Where will you record the mark for this assessment?

In the observation book (or other mark record book).

2. The marks/percentages are given in the left hand column. The criteria are given in the right hand column.
 - a. How do the criteria relate to each other?
The criteria relate to the different aspects of the content covered.
 - b. How would you allocate marks using this checklist?
One mark per criterion achieved.
3. Unpack each of the seven criteria – explain what evidence in learners’ work would lead to them achieving each of the criteria. Use drawings in your explanations of necessary to show what you would look for in learners’ work.
Discussion. Do this to establish how to allocate a mark for each criteria – to work out what each one covers.

Activity 2

Grade 2: This is an oral activity on the topic of addition and subtraction

1. Study the description of the task:
 - a. What CAPS content area does it relate to?
Number and operations
 - b. What specific content from the CAPS topic does the activity assess?
Addition and subtraction: Family facts, building up and breaking down, use doubles and near doubles to add
 - c. What mark is allocated to the activity?
7
 - d. Is the activity formal or informal? What does this mean?
Formal. This means that the marks but be used for the SA SAMS mark sheet. Every learner in the class needs a mark.
 - e. Where will you record the mark for this assessment?
In the observation book (or other mark record book) and in SA SAMS.
2. The marks/percentages are given in the left hand column. The criteria are given in the right hand column.
 - a. How do the criteria relate to each other?
The criteria relate to the different aspects of the content covered.
 - b. How would you allocate marks using this checklist?
One mark per criterion achieved.
3. Unpack each of the seven criteria – explain what evidence in learners’ work would lead to them achieving each of the criteria. Use drawings in your explanations of necessary to show what you would look for in learners’ work.
Discussion. Do this to establish how to allocate a mark for each criteria – to work out what each one covers.

Activity 3

Grade 3: This is a practical activity on the topic of position and direction

1. Study the description of the task:
 - a. What CAPS content area does it relate to?
Space and shape
 - b. What specific content from the CAPS topic does the activity assess?
Position and direction: Find objects on maps; give and follow directions on an informal map
 - c. What mark is allocated to the activity?

- d. Is the activity formal or informal? What does this mean?
Formal. This means that the marks but be used for the SA SAMS mark sheet. Every learner in the class needs a mark.
 - e. Where will you record the mark for this assessment?
In the observation book (or other mark record book) and in SA SAMS.
1. The marks/percentages are given in the left hand column. The criteria are given in the right hand column.
 - a. How do the criteria relate to each other?
The criteria relate to the different aspects of the content covered. The criteria build up from little or no knowledge on the topic, to full or extended knowledge of the topic.
 - b. How would you allocate marks using this rubric?
Select the level in the rubric that agrees with the level of knowledge demonstrated by the learner.
 2. Unpack each of the seven criteria – explain what evidence in learners’ work would lead to them achieving each of the criteria. Use drawings in your explanations of necessary to show what you would look for in learners’ work.
Discussion. Do this to establish how to allocate a mark for each criteria – to work out what each one covers.