education

Department:
Education
PROVINCE OF KWAZULU-NATAL

Just-in-Time Training Workshop
Term 2

Facilitator's Notes

Grade 4 Mathematics

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what I do matters

Facilitator notes

Session 2, Activity One:

This is the second tracker participants are using. However, some may not have seen or used the first one. Use pages 8 and 9 to refresh their understanding of the tracker.

Session 2, Activity Two:

Different textbooks cover fractions more or less in Week 2 of Term 2. However, the content implied by CAPS in this term is limited to the basics of fractions, a recap of Grade 3, without introducing fraction symbols. There are some textbooks which have gone on to equivalent fractions and to addition in this term. According to CAPS, these will be covered in Term 3 and Term 4.

Make sure you draw attention to the clarification notes from CAPS on page 11 – 13 and the fraction content for Term 3 and Term 4. The CAPS pages have been inserted here so that participants know that this is directly from CAPS. Note the errors in CAPS wrt term numbers which can confuse teachers.

Reassure participants that they will see good reason to delay the fraction symbols, equivalence and operations on fractions.

Session 3, Activity Three:

Russian peasant multiplication

*Note: Facilitators must not give HODs the notes for this activity until HODs have completed it. HODs, when they train teachers must **not** give the teachers **any** notes on this activity! This is to avoid any teacher trying to teach this method in their classroom.*

*The purpose of this activity is to raise awareness about the way new concepts are taught in the mathematics classroom. The purpose is **not** to give you a new way of multiplying.*

The facilitator/HOD must explain that this is a roleplay. He/she is a teacher and the participants are the learners. Ask participants to answer your questions. They do not need these notes to answer!

Facilitator:	*Morning class. Today I am going to show you a special method of multiplication. I will only show you once so listen carefully and follow the steps. Can somebody give me 2 two-digit numbers please?*
Participant:	49 and 32 *(any two numbers will work)*
Facilitator:	*Thank you. Now I write 49 on the left and 32 on the right.* *I am going to halve the number on the left and double the number on the right. What do I get?*
Participant:	64 on the right but what about the left?
Facilitator:	*When there is an odd number, just throw away the extra one. So we get 24 on the left.* *Now we halve and double again. What numbers will we get?*
Participants giving answers:	12 on the left. 128 on the right. Then 6 and 256 on the right. Then 3 and throw away one. 512 on the right. Lastly, 1 on the left and 1 024 on the right.
Facilitator:	*This is not the answer yet. Now you must underline all those pairs of numbers that have an odd number on the **left**. See, I will underline them.* *Finally, add together the numbers on the right hand side of each pair of numbers.*
Participant:	So that's 32 + 512 + 1 024. That's 1 568.
Facilitator:	*To be sure we are correct, check this answer on a calculator. It's correct.* *So 49 × 32 = 1 568. I can try to explain why this works, but we don't need to understand it at this grade, so treat it as a rule for multiplication.*
Facilitator:	*Do you all understand? Good. You need to memorise the rule until you know it. Tomorrow I will give four more multiplication sums like this to do.*

49	**32**
24	**64**
12	**128**
6	**256**
3	**512**
1	**1 024**

49	**32**
24	**64**
12	**128**
6	**256**
3	**512**
1	**1 024**

1. Let teachers reflect on this activity in pairs first.
    - What was the main purpose of this activity?
    - Are you using *magic and rules* or *logic* to teach fractions?
    - Identify any other topics in mathematic that learners may experience as magic (any rules you teach might be perceived as magic). Consider place value, column method of adding, long division, decimal fractions etc.

2. Have a discussion with the group that should include the following points:
    - There is a mathematical reasoning to this method, but to us, it seems like magic! The rules are too complicated and don't seem to make sense. If you want to use this method, you would need to memorise it 'off by heart' because although it can be explained, it appears that there is no logical way to explain it.
    - This is what our learners experience! They watch you solving questions that make no sense to them. They experience it as a type of magic that somehow produces answers. If learners are able to follow steps and rules and yet not understand *why* those rules work, they are just doing magic and this does not assist them in learning the mathematical concepts involved.

Session 3, Activity 4:

1. a) Share 4 chocolates equally between 3 friends. Use drawings to show how you do this.
   b) What fraction of the chocolates does each friend get?

Answer: one and one third each; or 4 thirds each

The point of this question for teacher is to see that they should allow children to find their own ways to divide up the chocolates

Here are some ways that children use, but there are others:

- *cut each chocolate into thirds and hand out thirds to the 3 friends;*
- *give them a whole chocolate each and cut up the fourth one only.*

This gives the teacher the opportunity to use fraction language informally without using symbols and to get learners to explain their own drawings, fraction pieces or other resources using fraction language.

Note to teachers:
This example raises the issue of choosing questions carefully, considering whether learners can cope with the question eg it is difficult for learners to show thirds of a circle or pizza – it is easier to use chocolates for this purpose; the language used might make it difficult to understand the question before they've even started (eg chocolate is understood, but is chocolate slab/bar understood)? Use a diagram to make it clear. Or bring real chocolate to class!

2. There are 27 children in a class. How many children are there in $\frac{1}{3}$ of the class?

Group the 27 children into 3 groups. There are 9 children in each group. One group is one third of the class. So the answer is 9. Learners can find many ways of solving this problem. Some possible examples:

- *Draw 27 circles and divide into 3 groups. This assumes the learner knows or can work out that 9 × 3 = 2, or that 27 in 3 groups is 9 in each group (division).*
- *Draw 3 boxes. Put one circle in each and continue doing this until there are 27 circles. Count how many in one box.*
- *Use numbers in boxes e.g. start with 5 in each box, continue until 27 is used up.*

5 2 2	5 2 2	5 2 2
9	9	9

27-15=12

12-6=6

None left

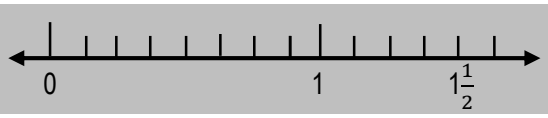
Add them up

3. Two children share one quarter of a pizza equally. What fraction of the pizza do they each get?

This kind of problem helps learners to start understanding equivalent fractions, as well as division of a fraction by a fraction in a problem solving context. It is easy to see in a drawing that half of a quarter is one eighth. This way of dividing should help learners to see that $\frac{1}{4} \div 2 = \frac{1}{8}$ (quarter shared between 2 people is an eighth each) and that $\frac{1}{4} = \frac{2}{8}$

Note: this can be used in Term 3

4. Mark where $\frac{5}{8}$ and $1\frac{1}{4}$ are on this number line.



Learners need an experience of different representation of fractions. In order to answer this question, they need to work out that there are 8 equal parts between 0 and 1, so 5 eighths is at the fifth mark.

The second part of the question is for Term 3! Learners can identify that $1\frac{1}{4}$ *is halfway between 1 and* $1\frac{1}{2}$ *or they can count in eighths to find* $1\frac{1}{4}$

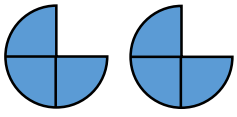
5. Use the fraction wall to order the following fractions: $\frac{2}{3}; \frac{3}{4}; \frac{1}{6}; \frac{5}{8}; \frac{1}{2}$

This is appropriate for use in Term 3. Learners must be given apparatus when they work out equivalent fractions at this stage. Be careful not to teach equivalence using rules (magic!)

Answer: : $\frac{1}{6}; \frac{1}{2}; \frac{5}{8}; \frac{2}{3}; \frac{3}{4}$

6. Calculate: a) $\frac{3}{4} + \frac{3}{4}$ b) $3\frac{1}{6} + 2\frac{2}{3}$

a) *Learners who say that a) is* $\frac{6}{8}$ *are seeing the fractions as whole numbers to add at the top and the bottom of the fractions. If they see a picture, or use fraction shapes, they can see that they are adding 3 quarters and another 3 quarters to get 6 quarters.*



b) *If you used 'magic' or rules on b), you will have calculated using several rules for fractions.*

$3\frac{1}{6} + 2\frac{5}{6} = \frac{19}{6} + \frac{17}{6}$ *(Rule: whole number times denominator + numerator = new numerator over the denominator)*

$= \frac{36}{6} = 6$

A more 'logical' approach would be to add the whole numbers first and then the fractions, using fraction pieces:

$3\frac{1}{6} + 2\frac{5}{6} = 5 + \frac{1}{6} + \frac{5}{6} = 5 + \frac{6}{6} = 6$

Child's example

Draw the participants' attention several things they should have noticed in the example:

- These children perceive the symbol for a fraction to be made up by two whole numbers and they apply whole number strategies.
- They lack a concept of a fraction and the sizes of fractions.
- They have not had enough experiences of problem solving in a context that makes sense to them.
- They have not linked symbols for fractions to a physical understanding of fractions, or to parts of a whole.

Session 4, Activity 6

The sequence of activities suggested here are carefully planned to gradually build understanding of fractions.

Most of the textbooks have used similar types of activities, but in a more random order. In this workshop, teachers have the opportunity to reflect and plan so that the fraction activities and the concepts taught are built up sequentially.

Some of the textbooks will have bigger gaps in the teaching than others. A few have gone too quickly into equivalent fractions and into addition. Teachers using these textbooks will need to supplement the basic fraction activities.

There are some useful assessments, resources and activities for fractions provided in the Tracker (page 96 onwards).

This material has not provided a template for lesson planning. This is because districts specify a template that they should use.

- *Draw attention to the note about resources and activities provided in the Tracker (page 24).*