PARTICIPANT'S HANDOUT

2019 TRAINING WORKSHOP NO.2

MATHEMATICS

GRADE 4-7

PILO
IMPROVING LEARNER PERFORMANCE

education

Department:
Education
PROVINCE OF KWAZULU-NATAL

Grades 4 to 7
Just-in-Time Training Workshop
2019: No. 2

Participant's Handout

Mathematics

Endorsed by:

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what I do matters

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WORKSHOP PROGRAM – GRADES 4 to 7 *(page 1 of the Participants' Guide)*	
Session 1: 2 hours	**THREE-DIMENSIONAL OBJECTS** **Pre-workshop activity** **1.1 What does the CAPS say?** Use Appendix 1 to list the 3D objects that have to be taught in Grades 4 to 7, and to list the grades when faces, edges and vertices are introduced. **1.2 Making models using nets** Cut out the nets given in Appendix 2 and fold and glue them to create 3D models. **1.3 Comparing the 3D Objects** Find similarities and differences amongst the 10 models made in 1.2.
Session 2: 2 hours	**MORE THREE-DIMENSIONAL OBJECTS** **2.1 Why is it important for the learners that they work with actual 3D objects?** Use the two given extracts to answer questions about teaching 3-D objects in class. **2.2 Drawing 2D pictures of 3D objects** Follow the instructions explaining how to draw Oblique drawings of 3D objects on square dotted paper and blank paper. **2.3 Capacity, Area, Surface Area and Volume in the CAPS** Use Appendix 4 to answer questions about area, surface area, capacity and volume
Session 3: 2 hours	**PERCENTAGES IN GRADES 6 AND 7** **3.1 What is a Percentage?** Discuss types of fractions and percentages and complete Activity 1 **3.2 Equivalent Fractions** Revise conversions between fractions, decimals and percentages and complete Activities 2, 3, 4, 5 and 6 **3.3 Finding the Percentage of a Quantity** Revise finding the percentage of a quantity and complete Activity 7 **3.4 Percentage Change** Revise working out both percentage change and percentage profit or loss and then complete Activity 8.

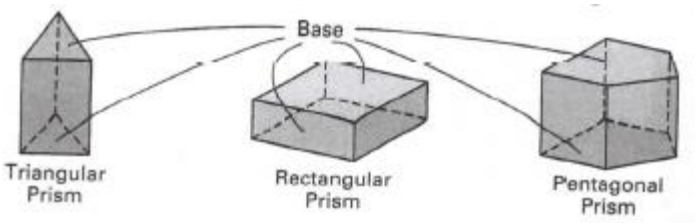
SESSION 1: THREE-DIMENSIONAL OBJECTS

1.1. What Does the CAPS say?

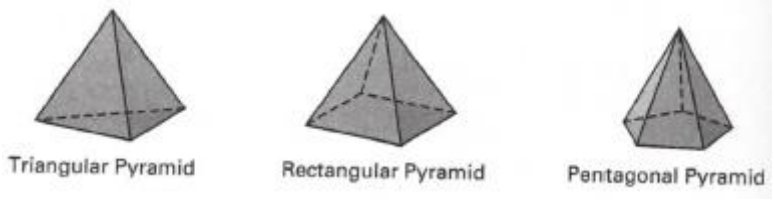
Work with your group.
You will need to look at the Extract from SHAPE AND SPACE in APPENDIX 1 (on pages 1 to 3 in the Resources Handout).

VOCABULARY

A **prism** is a three-dimensional object, with two parallel congruent faces called bases. The other faces are always rectangles. A prism is named by the shape of its bases



A **pyramid** is a three-dimensional object. Its base is a polygon (a flat shape with straight sides) and its sides are triangles which meet at the top (apex).

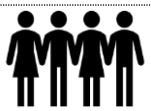


- Read through the extract from the CAPS and then answer the following questions

1) List all of the 3D objects studied in Grades 4 to 7

2) In which grades are learners introduced to:
   a) Faces of a 3D object?
   b) Edges of a 3D object?
   c) Vertices of 3D objects?

1.2. Making Models Using Nets



Work with your group. Your group is going to have to make ten (10) 3D objects between you. You will need the NETS OF 3D OBJECTS in APPENDIX 2 (on pages 4 to 13 in the Resources Handout).

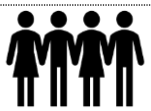
Your group is going to need

i) A copy of the nets
ii) A pen/pencil and ruler
iii) Glue

PROCEDURE

1) Before you cut out the nets allocated you, write the name of the 3D object on one of the faces.
2) Cut out the net and the tabs very carefully
3) Use a pen/pencil and a ruler to draw along the fold-lines
4) Put glue on the tabs. If necessary, put the glue on both pieces that have to be stuck together.
5) Carefully stick the 3D object together as accurately as you can. Accuracy is VERY important.

1.3. Comparing the 3D Objects



Work with your group.
Your group is going to have to use the ten (10) 3D objects to answer the questions that follow.
They will also need a sphere

1) List the ten 3D Objects you have made

I. _____

II. _____

III. _____

IV. _____

V. _____

VI. _____

VII. _____

VIII. _____

IX. _____

X. _____

2) The word "*polygon*" comes from the Greek. It translates to mean many (*poly*) angles (*gon*).
Write down a definition / description of a polygon, giving examples of polygons.

3) The prisms and the pyramids are all polyhedra (singular: polyhedron and plural: polyhedra). The word *"polyhedron"* comes from the Greek. It translates to mean many *(poly)* faces *(hedron)*.
Write down a definition / description of a polygon, giving examples of polygons and examples of 3D objects that are NOT polygons.

4) Put all the prisms together

a) Name the prisms

b) What is the same about these prisms?

c) What is different about these prisms?

5) Put all the pyramids together

a) Name the pyramids

b) What is the same about these pyramids?

c) What is different about these pyramids?

6) Compare the tetrahedron and the triangular pyramid

a) What is the same?

b) What is different?

7) Compare the prisms and the pyramids

a) What is the same?

b) What is different?

8) Look at the cylinder, cone and sphere. Compare them to the prisms and the pyramids.

a) What is the same?

b) What is different?

9) In the Clarification of Gr 7 Content (page 2 of the Resource Handout), it talks about cylinders having 2 circular faces and a curved edge that opens out into a rectangle.

From this extract from the CAPS, we can conclude that ***a face*** *is a 2-D shape that is either a polygon (has straight sides) or a circle (has curved sides).*

In general, ***an edge*** is where two faces meet, and ***a vertex*** is the point or corner of a 3-D objects
This means that a cylinder does not have an edge, as its two circular faces don't meet. It also doesn't have a vertex. It also means that a cone doesn't have an edge as it only has one circular face. It does, however, have a vertex. A sphere doesn't have any faces, edges or vertices.

Using this information, complete the table on the next page.

OBJECT	NUMBER OF FACES	SHAPE OF THE FACES	NUMBER OF EDGES	NUMBER OF VERTICES
I. Cube				
II. Cuboid				
III. Triangular prism				
IV. Pentagonal prism				
V. Tetrahedron				
VI. Triangular pyramid				
VII. Square pyramid				
VIII. Pentagonal pyramid				
IX. Cylinder				
X. Cone				
XI. Sphere				

SESSION 2: MORE THREE-DIMENSIONAL OBJECTS

2.1 Why is it important for the learners that they work with actual 3D Objects?

Work with your group.
The following two extracts will help you answer the question.

On page 3 of the Resources Handout, under the heading ***Interpreting drawings of 3-D objects*** it states that "Learners need to work with real objects. However, they also need to do written exercises on 3-D objects".

Why work with actual 3D objects?

- When teaching a new concept, it is always better to introduce it in a concrete way. Only when the concepts are fully understood, should the teaching focus on semi-concrete illustrations of the concepts. After the learners are fully comfortable with the semi-concrete illustrations, can the focus move to the abstract.
- Teaching 3D object topics lends itself to concrete methods. Cutting out nets, folding and gluing them to create a 3D object, will help children become familiar with the features of these solids (such as their faces, edges and corners). Also, having the 3D objects for the learners to hold and manipulate in their hands provides important support for many of them when having to draw 2-D views of 3-D objects.
- As well as covering the topic of nets, these resources could then be used to look at other 3-D object topics including surface area and volume. In fact, getting the learners to calculate surface area of the net first is a great way to introduce the concept of surface area.
- Another worthwhile activity is to cut open solids and unfold these to view a net. For example, an empty tissue box could be cut open and folded out to see the net of a rectangular prism.

- Use the two extracts to help you answer the following:

1) Why is it important for learners to work with real 3D objects?

2) What problems do educators have when using real 3D objects with their learners, and how can these problems be overcome?

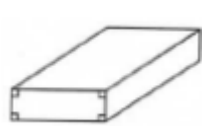
NOTE:

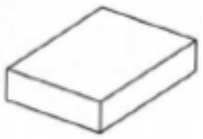
- *On page 1 of Appendix 1 we see that the CAPS states: Grade 6 learners need to make 3D models using drinking straws, toothpicks, etc.*
- *In Appendix 3 on pages 15 to 17 you will find some online resources (internet articles, You Tube videos and a worksheet) that to assist you with this.*

2.2 Drawing 2D pictures of 3D Objects

Work with a partner.
The following activity is adapted from Graham D and C, **Mainstream Mathematics for GCSE**, (1996) Macmillan Press Ltd, London

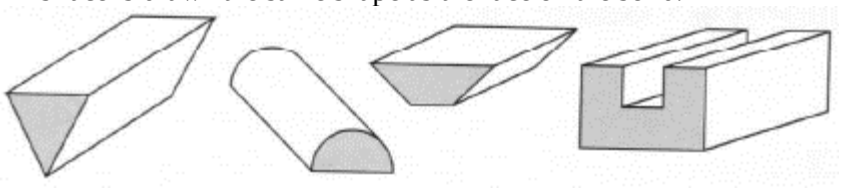
We can draw an **oblique** diagram of a prism or we can draw an **isometric** diagram of a prism, as can be seen by these two diagrams. In this workshop we will be focussing on Oblique Drawings of 3-D objects.


Oblique drawing


Isometric drawing

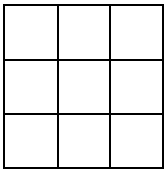
a) OBLIQUE DRAWINGS

→ As can be seen below, in an oblique drawing of a solid, one face is seen 'straight' on. This face is drawn the same shape as the face on the solid.

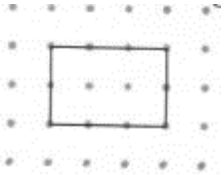
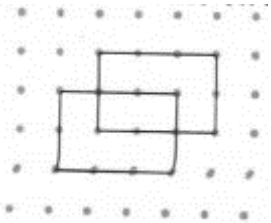
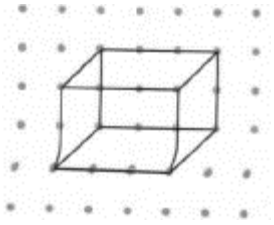


→ We will start off by using square dotty paper or squared paper to make the oblique drawings

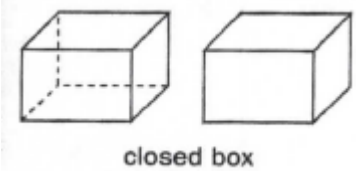

Square dotty paper


Squared paper

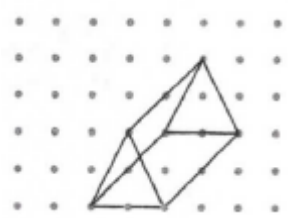
→ To make an oblique drawing of a rectangular prism (cuboid) on squared dotty paper, follow these steps. This gives a 'skeleton' picture of the cuboid. You can see all the edges.

STEP 1:	**STEP 2**	**STEP 3**
Draw the *'front face'* (a rectangle) 	Draw the *'opposite face'* that is the same size as the front face.  Place the 2nd face behind but slightly to one side of the 1st face.	Join the *'matching corners'* of the two faces. 

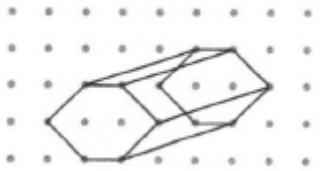
→ In most cuboids, some edges are hidden. In drawings you can either make hidden edges dotted or rub them out.



→ If we draw a different shape for the front face, we get a different prism.



Triangular Prism



Hexagonal Prism

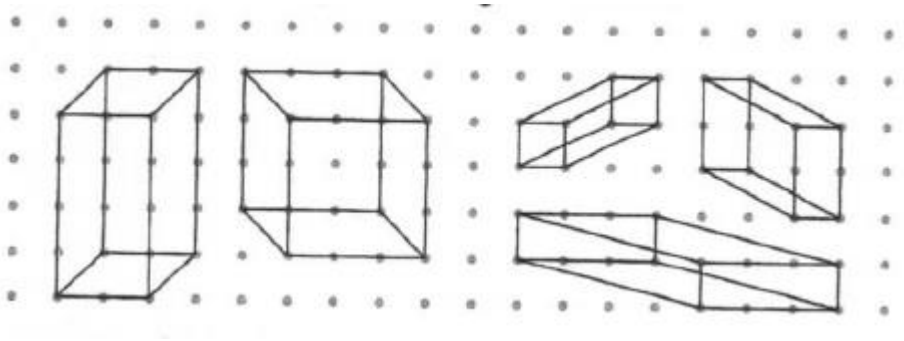
ACTIVITY 1

- Use the two pages of square dotted paper that follow to do the following drawings.

1) Study these oblique drawings of cuboids.

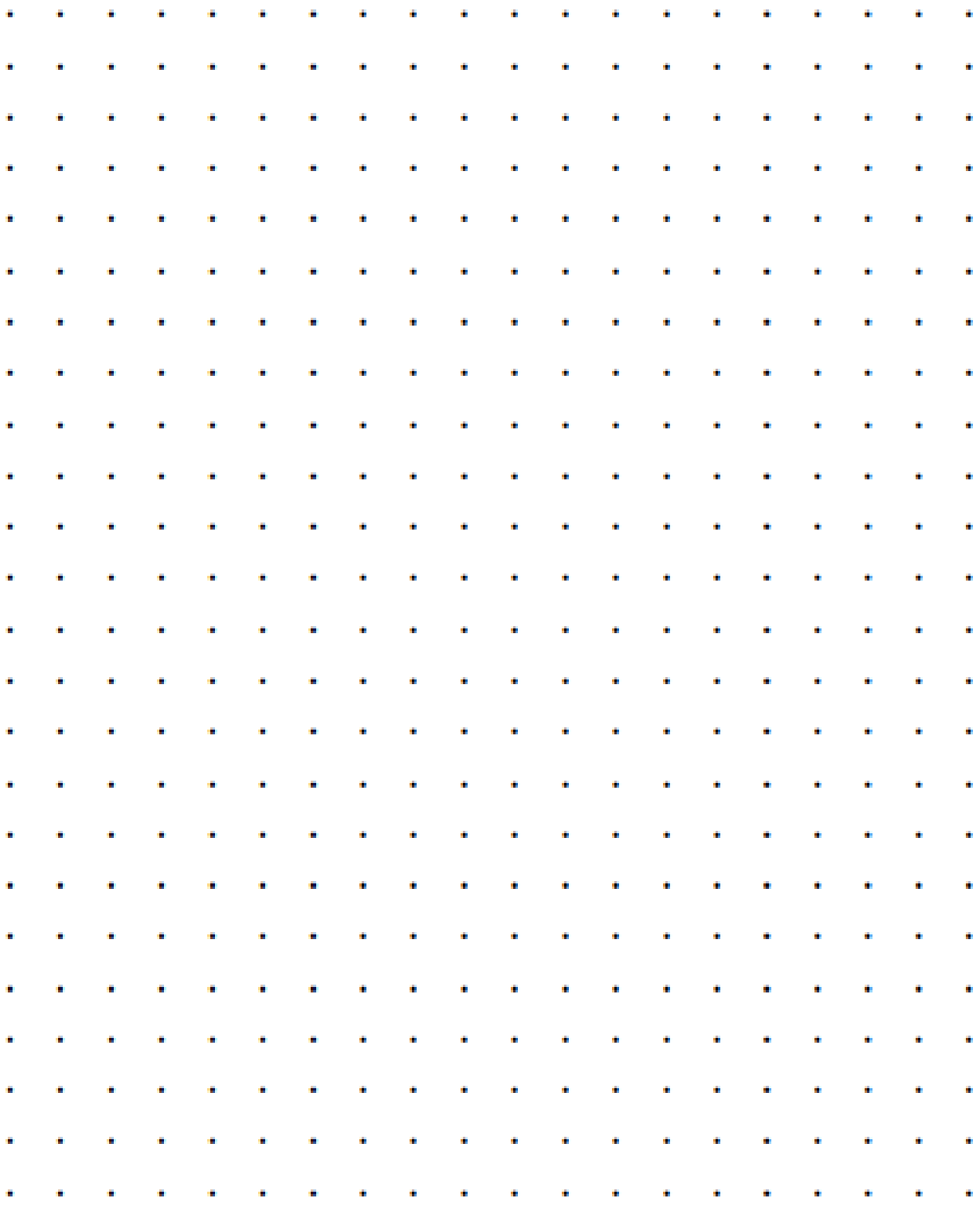
a) Copy these oblique drawings of cuboids onto the square dotted paper

b) Which one looks like a cube? .....



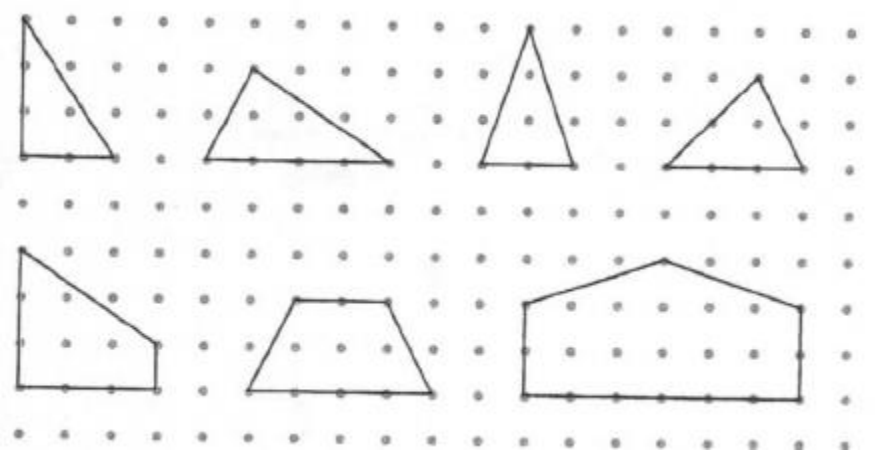
ACTIVITY 1 (continued)

2) Copy the drawings again on the square dotted paper. Rub out lines to make them look like an open box.



ACTIVITY 1 (continued)

3) On the square dotted paper make oblique drawings of prisms with these front faces. (You can move the faces around the page if you want to.)

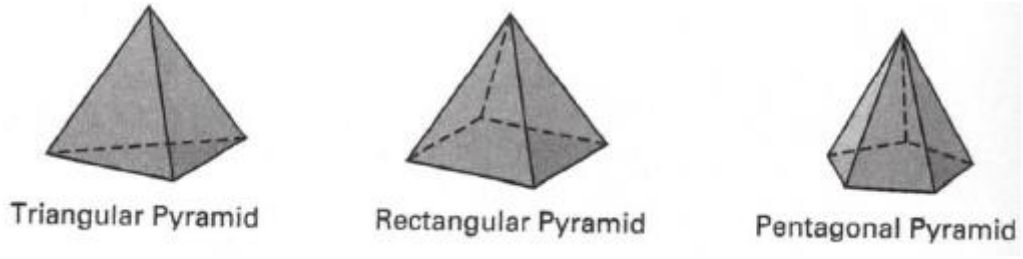


b) DRAWING PYRAMIDS

To draw a pyramid, start with one of the slanting triangular faces, and then add in the other faces

ACTIVITY 2

In the space below draw diagrams of the following three pyramids



2.3 Area, Surface Area, Capacity and Volume in the CAPS

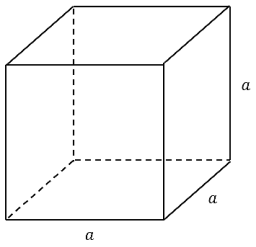
Work with your group.
Use the Extract from MEASUREMENT OF 3-D OBJECTS in Appendix 4 (pages 17 to 19) to assist you with some of the following questions.

1) Grade 7 learners need to know the difference between **area** and **surface area.**
   a) What is the difference between calculating the **area** of something and finding the **surface area** of something?

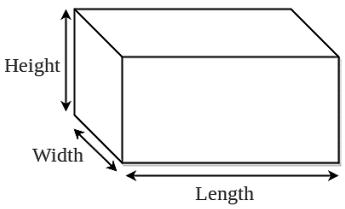
   b) What units do you use for each measure?

   c) Grade 7 learners need to be able to calculate the surface area of a cube and a rectangular prism. If necessary, use the cube and rectangular prism that you made in the first session to help you write down the formula for finding the surface area of

      i) a cube



      ii) a rectangular prism (also called a cuboid)



2) On page 18 of Appendix 4 of the Resource Handout, under the headings **"Formulae"** and **"Volume"** in the Grades 4, 5 and 6 column, and under the heading **"Formulae"** in the Grade 7 column, the difference between the volume concepts taught in Grades 4, 5, 6 and 7 is listed.

a) Explain how learners find the volume of objects in Grades 4, 5 and 6.

b) Explain how learners find the volume of objects in Grade 7.

3) Learners often struggle with the meaning of the word ***volume***.
One of the roadblocks that could cause this struggle, is the fact that the word "volume" has many meanings.

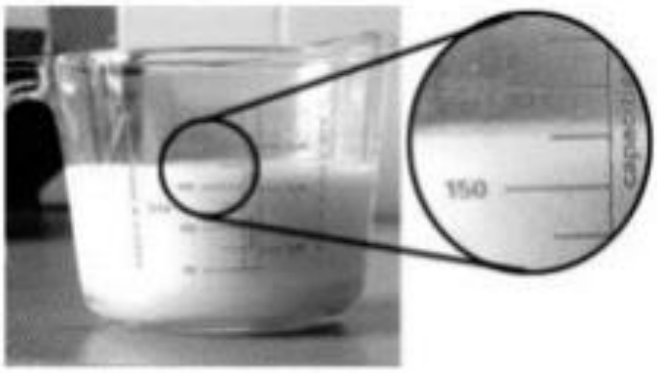
Misunderstandings about the word Volume in the Primary School
https://mathsmattersresources.com/thinking-about-volume-capacity-in-the-primary-school/
In this article, the author points out:
"For primary students, Volume is one of the most misunderstood sub strands in Mathematics.
In fact, learner blockages can be quite profound.

- *For a start the word volume is commonly linked to sound on a computer, TV or radio.* That sort of volume makes sense to learners.
- Learners also understand *volume 1 and 2 in a book* such as an encyclopaedia.

So, we need to acknowledge these meanings of volume whenever we start a class discussion about it.

Another roadblock is that learners struggle to explain the difference is between the concept of **capacity** and the concept of **volume.**

The measuring jug in this picture has a capacity of 250 *ml* and the volume of milk in this jug is 175 *ml.* In other words, the capacity of this jug and the volume of milk in the jug are two different measures.



On page 19 of Appendix 4 of the Resource Handout, under the heading **"What is capacity? What is volume?"** the two concepts are defined.

a) Explain, in your own words and in a way that a Grade 5 learner would understand, what the difference is between volume and capacity.

,

b) Say which units are used for the measurement of capacity and which units are used for the measurement of volume.

c) What capacity and volume conversions do learners have to know in Grades 4 and 5, in Grade 6 and in Grade 7?

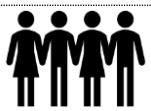
d) Explain how you can use the fact that *1 cm = 10 mm* to explain
   i) Why 1 cm^2 = 100 mm^2
   ii) Why 1 cm^3 = 1 000 mm^3

e) Use 5 pieces of string 1 m long to explain what the size is of 1 kℓ

f) Draw a cube that has the capacity of 1 mℓ.

SESSION 3: PERCENTAGES IN GRADES 6 AND 7

3.1. What is a Percentage?



The Facilitator revises different types of fractions and percentages with the Participants. The Participants work on Activity 1 with a partner, and this is marked.

a) TYPES OF FRACTIONS

A **fraction** is a part of whole. Its size can be given in different ways.

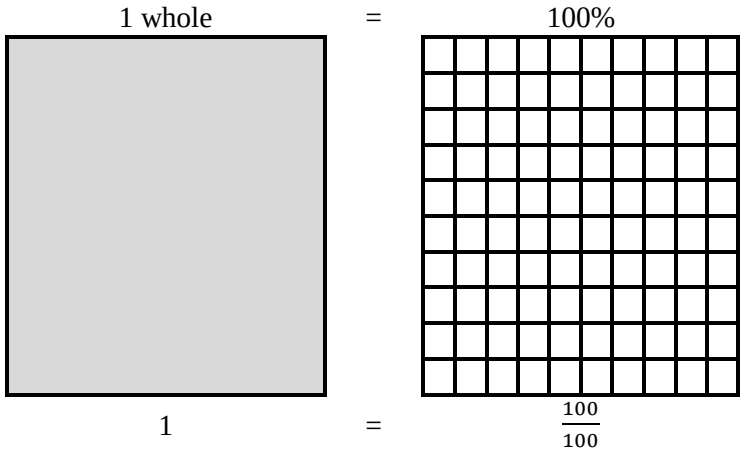
- Numbers like $\frac{1}{2}$ and $\frac{3}{4}$ are **common** or **vulgar fractions**. You write them as one number over another number.
  - A **proper fraction** is a fraction whose numerator is smaller than its denominator. Examples of proper fraction are $\frac{1}{2}$ and $\frac{3}{4}$.
  - An **improper fraction** is a fraction whose numerator is equal to or greater than its denominator. Examples of improper fractions are $\frac{5}{2}$, $\frac{8}{5}$ and $\frac{7}{7}$.
- Numbers like 0,5 and 0,75 are **decimal fractions**. In South Africa we write decimals with a decimal comma. In other parts of the world, decimal fractions are written with a decimal point.
- Numbers like 50% and 75% are **percentages**. You write them with a 'per cent' or %.

When we say 'fractions' we usually mean 'common fractions.'
'Decimal fractions' are often just called 'decimals'.

b) PERCENTAGES

Per cent (%) means 'per 100'
Or 'for every 100'
Or 'out of 100'.

A **percentage** tells you 'an amount out of 100'
OR 'a number of hundredths'



100 percent or 100% means 100 out of 100 or $\frac{100}{100}$.

So, 100% of something means 'all of it'. All the percentage parts of something must add up to 100%. Sometimes we use this to find a 'missing percentage'.

NOTE:
In general:

- We use the word ***percent*** as part of a numerical expression (e.g. Only two percent of the students failed.).
- We use the word ***percentage*** to suggest a portion (e.g. The percentage of students who failed has decreased.).

Activity 1

1) Write each of these percentages as a fraction with 100 as a denominator
   a) 13%
   b) 73%
   c) 97%

2) Write each of these as a percentage
   a) 26 out of 100
   b) 8 out of 100
   c) 100 out of 100

3) On Saturday, 64 out of the first 100 customers at a petrol station bought unleaded petrol. What percentage of the customers bought unleaded petrol?

4) The label on a cotton and polyester shirt states 60% cotton". What percentage is polyester?

5) In a recent survey, 68% of the people asked said they would definitely vote at the next election and 21% were not sure. What percentage of the people asked were definitely NOT going to vote at the next election?

6) One Thursday evening before a long weekend, travellers at Park Station, Johannesburg were asked where they were going to. 34% of them said Polokwane, 26% said Mbombela, 24% said Taung and 21% said Mafikeng. Explain why these figures should be treated with caution.

3.2 Equivalent Fractions

The Facilitator revises Equivalent Fractions with the Participants.
The Participants work on Activities 2, 3, 4, 5 and 6 with a partner, and this is marked.

Equivalent fractions are different fraction names for the *same amount*. They have the same value, but 'look' different. You can change

- a common fraction to an equivalent fraction.
- A common fractions to decimals and percentages
- A decimals to fractions and percentages
- A percentages to fractions and decimals.

a) CHANGING FRACTIONS TO DECIMALS

To change a fraction to a decimal, divide the top number by the bottom number

	USING A CALCULATOR
e.g. $\frac{5}{8}$ = 5 ÷8 = 0,625	6 ÷ 8 =

- 0,625 is a **terminating decimal**. Every division works out exactly and the decimal comes to an end (terminates).

- Not all fractions give terminating decimals. Some decimals continue without an end. These are called **non-terminating decimals** or **recurring decimals**. A digit or group of digits is repeated for ever.
  For example
  $\frac{1}{3} = 0{,}333\ 333\ 333\ \ldots$ the 3s repeat for ever. We write this $\frac{1}{3} = 0,\dot{3}$ or $\frac{1}{3} = 0,\overline{3}$.
  $\frac{3}{11} = 0{,}272\ 727\ 272\ 7$ ... the 27s repeat for ever. We write this $\frac{3}{11} = 0,\dot{2}\dot{7}$ or $\frac{3}{11} = 0,\overline{27}$.
  $\frac{4}{7} = 0{,}571\ 428\ 571\ 42$ ... the 571 428s repeat for ever. We write $\frac{4}{7} = 0,\dot{5}71\ 42\dot{8}$ or $\frac{4}{7} = 0,\overline{571\ 428}$

Activity 2

1) Write each of these fractions as a decimal
   a) $\frac{3}{5}$
   b) $\frac{9}{12}$
   c) $\frac{18}{25}$

2) Write each of these in recurring decimal form
   a) $\frac{2}{3}$
   b) $\frac{5}{6}$
   c) $\frac{5}{22}$
   d) $\frac{21}{37}$
   e) $\frac{6}{13}$

Activity 2 (continued)

3) Change these fractions to decimals. What do you notice?

a) $\frac{1}{7}$

b) $\frac{2}{7}$

c) $\frac{3}{7}$

d) $\frac{4}{7}$

e) $\frac{5}{7}$

f) $\frac{6}{7}$

b) CHANGING FRACTIONS TO PERCENTAGES

A percentage is an amount 'out of 100'.

- If a fraction has 100 in the denominator is easy to change to a percentage. The numerator tells you the percentage. e.g. $\frac{9}{100} = 95\%$
- Any fraction can be written as a percentage by multiplying the fraction by 100%.
  e.g. to change $\frac{3}{4}$ to a percentage, you work out $\frac{3}{4}$ of 100% or $\frac{3}{4} \times 100\% = 75\%$

  You can work this out on a calculator.
  - Divide the numerator by the denominator and then multiply by 100.

	USING A CALCULATOR
e.g. $\frac{3}{4} = 3 \div 4 = 75\%$	3 ÷ 4 × 1 0 0 =

  - Some calculators have a [%] key.is out on a calculator. Divide the numerator by the denominator and then press the % key ([SHIFT] [(])

	USING A CALCULATOR
e.g. $\frac{3}{4} = 3 \div 4 = 75\%$	3 ÷ 4 SHIFT (=

A COMMON ERROR

A common error is to multiply a fraction by <u>100</u> and not by <u>100%.</u>

Remember that 100% = 1 and 100 = 100

So, you can multiply any number by 100% (× 100%), but you CANNOT multiply any number by 100.

e.g. $\frac{3}{4} \times 100 = \frac{300}{4} = 75$ but $\frac{3}{4} \times 100\% = \frac{300}{4}\% = 75\%$

- When the fraction gives a *non-terminating decimal*, you have to give the decimal correct to the stated number of **decimal places** or **significant figures.**

  e.g. $\frac{2}{3} = \frac{2}{3} \times 100\% = 66{,}666\ldots\% = 66{,}7\%$ (correct to 1 decimal place) OR ($\approx 66{,}7\%$)

  e.g. $\frac{5}{11} = \frac{5}{11} \times 100\% = 45{,}454\,54\ldots\% = 45{,}5\%$ (correct to 1 decimal place) OR ($\approx 45{,}5\%$)

  e.g. $\frac{7}{27} = \frac{7}{27} \times 100\% = 25{,}925\,92\ldots\% = 25{,}9\%$(correct to 1 decimal place) OR ($\approx 25{,}9\%$)

Activity 3

1) Write each of these fractions as a percentage

   a) $\frac{2}{5}$ ..... b) $\frac{3}{16}$ ..... c) $\frac{23}{40}$ .....

2) Write each of these as a percentage. Give your answers correct to 1 decimal place.

   a) $\frac{6}{13}$ ..... b) $\frac{7}{17}$ ..... c) $\frac{9}{13}$ .....

   d) $\frac{7}{9}$ ..... e) $\frac{1}{6}$ ..... f) $\frac{4}{19}$ .....

   g) $\frac{2}{21}$ ..... h) $\frac{5}{27}$ ..... i) $\frac{9}{11}$ .....

c) CHANGING DECIMALS TO PERCENTAGES

A decimal number is used to represent numbers that are smaller than the unit 1.
Decimals are written to the right of the unit's place and are separated from the whole number by a comma (used in quite a few countries including South Africa) or a point (used in many other countries).

- **To write a decimal as a fraction,** look at the last digit in the decimal.
  Its place value tells you the value of the denominator/

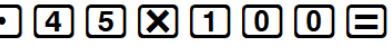
  e.g. 0,<u>9</u> = 9 tenths = $\frac{9}{10}$

  0,0<u>7</u> = 7 hundredths = $\frac{7}{100}$

  0,2<u>1</u> = 21 hundredths = $\frac{21}{100}$

  0,08<u>3</u> = 83 thousandths = $\frac{83}{1000}$

- **To write a decimal as a percentage** multiply the decimal by 100%. You could do this in your head or you could do this on your calculator

	USING A CALCULATOR
e.g. 0,45 = 0,45 × 100% = 45%	

Activity 4

1) Write each of these decimals as a fraction out of 10, 100 or 1 000.

a) 0,05 ..... b) 0,26 ..... c) 0,007 .....

d) 0,013 ..... e) 0,85 ..... f) 0,027 .....

2) Write each of these decimals as a percentage. Give your answers correct to 1 decimal place.

a) $\frac{5}{7}$ ..... b) $\frac{6}{13}$ ..... c) $\frac{7}{17}$ .....

d) $\frac{9}{13}$ ..... e) $\frac{7}{9}$ ..... f) $\frac{1}{6}$ .....

d) CHANGING PERCENTAGES TO FRACTIONS AND DECIMALS

- **We can easily change a percentage to a fraction** because a percentage gives a number out of 100.

  e.g. 1% means '1 out of 100' or $\frac{1}{100}$.

  29% means '29 out of 100' or $\frac{29}{100}$.

  So, it is easy to give any percentage as a fraction with 100 in the denominator.

  Sometimes you can cancel the fraction to a simplest form.

  e.g. 36% = $\frac{36}{100} = \frac{36 \div 4}{100 \div 4} = \frac{9}{25}$

  It is useful to know these as you often use them:

1% = $\frac{1}{100}$	75% = $\frac{3}{4}$	$33\frac{1}{3}\% = \frac{1}{3}$
5% = $\frac{1}{20}$	50% = $\frac{1}{2}$	$66\frac{2}{3}\% = \frac{2}{3}$
10% = $\frac{1}{10}$	25% = $\frac{1}{4}$	
20% = $\frac{1}{5}$	12,5% = $\frac{1}{8}$	

- **To write a percentage as a decimal,** divide the number by 100. You can do this in your head, or you can use a calculator.

	USING A CALCULATOR
e.g. 9% = $\frac{9}{100}$ = 9 ÷ 100 = 0,09	9 ÷ 1 0 0 = S⇔D Or 9 ÷ 1 0 0 =

It is useful to know these as you often use them:

1% = 0,01	75% = 0,75
5% = 0,05	50% = 0,5
10% = 0,1	25% = 0,25
20% = 0,2	12,5% = 0,125

Activity 5

1) Write each of these percentages to a fraction in simplest form

a) 17% ..... b) 30% ..... c) 80% .....

d) 2% ..... e) 12% ..... f) 38% .....

2) Write each of these percentages as decimals

a) 17% ..... b) 26% ..... c) 30% .....

d) 9% ..... e) 99% ..... f) 4% .....

e) CHANGING FRACTIONS TO PERCENTAGES

Most people find percentages easier to compare than fractions.

EXAMPLE

Smangele got most marks in History (70), but she cannot tell whether it is her best test result.

a) Change each result to a percentage

b) Put Smangele's subjects and marks in order, largest percentage first.

Smangele's Test Results	
Maths $\frac{67}{100}$	English $\frac{66}{75}$
History $\frac{70}{80}$	Natural Sciences $\frac{15}{20}$

SOLUTION

a) Maths mark = $\frac{67}{100} = 67\%$

English mark = $\frac{66}{75} \times 100\% = 88\%$

History mark = $\frac{70}{80} \times 100\% = 87{,}5\%$

Natural Sciences mark = $\frac{15}{20} \times 100\% = 75\%$

USING A CALCULATOR
6 7 ÷ 1 0 0 × 1 0 0 =
6 6 ÷ 7 5 × 1 0 0 =
7 0 ÷ 8 0 × 1 0 0 = S⇔D
1 5 ÷ 2 0 × 1 0 0 =

b) English (88%); History (87,5%); Natural Sciences (75%); Maths (67%)

Activity 6

1) For the fractions $\frac{5}{6}, \frac{2}{3}, \frac{7}{9}$ and $\frac{11}{15}$

a) Change each fraction to a percentage. Where necessary, write to 1 decimal place

$\frac{5}{6}$ ..... $\frac{7}{9}$ .....

$\frac{2}{3}$ ..... $\frac{11}{15}$ .....

b) Write the fractions in order, starting with the smallest:

.....

.....

Activity 6 (continued)

2) Steven wanted to compare his test marks with his friends' marks. These marks are:

Steven: $\frac{31}{50}$ Blessing: $\frac{13}{20}$ Annah: $\frac{19}{50}$ Lily: $\frac{12}{25}$ Paul: $\frac{4}{5}$ Nomsa: $\frac{9}{10}$

a) Change each test score to a percentage

b) Who has the highest percentage score?

c) Who has the lowest test score?

d) Write the scores and names in order, starting with the lowest.

3.3 Finding the Percentage of a Quantity

The Facilitator revises Finding the Percentage of a Quantity with the Participants.
The Participants work on Activity 7 with a partner, and this is marked.
This topic is covered in Grade 6 (finding the percentage of whole numbers) and Grade 7 (finding the percentage of a part of a whole).

You can work out some simple percentages of calculators without using a calculator. You do this by using fractions instead of percentages. They are generally easier to calculate with. Look out for percentages that are *simple fractions*

- For example, 50% = $\frac{1}{2}$ and 25% = $\frac{1}{4}$
  So, to find 50% of an amount, divide the amount by 2.
  And to find 25% of an answer, divide the amount by 4.

- 10% is the same as $\frac{1}{10}$. So, to find 10% of a quantity, divide the quantity by 10.

- 5% is the same as half of 10%. So, to find 5% of a quantity, divide it by 10 and then divide it by 2.

- 1% is the same as $\frac{1}{100}$. So, to find 1% of a quantity, divide it by 100

There are several ways to find the percentages of quantities using a calculator

- Without using the percentage key

  Find 12% of 15

  So, 12% of 15 = 1,8

USING A CALCULATOR
1 2 ÷ 1 0 0 × 1 5 =

- Using the percentage key

  Find 12% of 15

  So, 12% of 15 = 1,8

USING A CALCULATOR
1 2 SHIFT (× 1 5 = S⇔D

You often have to work out **percentages of money**.
After a money calculation, look carefully at the answer you get.
Make sure that you know whether the answer is in rand or cents, and always round off to 2 decimal places.

Example:

a) Find 20% of R2 143,50

20% × R2 143,50

Add 0 to the calculator answer

So, 20% of R2 143,50 = R426,70

USING A CALCULATOR
2 0 SHIFT (× 2 4 1 3 • 5 = S⇔D
Calculator answer: 426,7

b) Find 37,5% of R2 143,50

37,5% × R2 143,50

Round answer to 2 decimal places

So, 37,5% of R2 143,50 = R803,81

USING A CALCULATOR
3 7 • 5 SHIFT (× 2 1 4 3 • 5 0 = S⇔D
Calculator answer: 803,8125

Activity 7

1) Find the following without using a calculator

   a) 25% of R40 .....

   b) 10% of R50 .....

   c) 5% of R40 .....

   d) 1% of R300 .....

   e) 2% of R30 .....

   f) 75% of R80 .....

   g) 10% of R165 .....

   h) 5% of R165 .....

2) Use your calculator to find the following

   a) 14% of R26 .....

   c) 31% of 15 ℓ .....

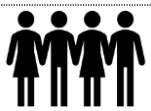
   e) 16% of 14 m .....

   c) 72% of R85 .....

   d) 13% of 28 kg .....

   e) 42,5% of R2 143,50 .....

3.4 Percentage Increase or Decrease of Whole Numbers



The Facilitator revises Percentage Change with the Participants.
The Participants work on Activity 8 with a partner, and this is marked.
This topic is covered in Grades 7.

a) WORKING OUT THE PERCENTAGE CHANGE.

You may have to work out an *actual change* in the value of a quantity. This change could be an increase or decrease and is often given as a **percentage change.**

NB: Always work out the change as a percentage of *the quantity you started with.*

We use the formula $\boldsymbol{Percentage\ change} = \frac{\boldsymbol{Actual\ change}}{\boldsymbol{Original\ quantity}} \times \mathbf{100}\%$

EXAMPLE 1

A football stadium can seat 14 500 people, some sitting on grandstands and others sitting on the grass. It is decided to turn it into an "all seat" stadium. This reduces the seating capacity to 9 425 people.

a) What is the reduction in the seating capacity of the stadium?
b) By what percentage will the capacity be reduced?

SOLUTION

a) The reduction in the seating capacity = 14 500 – 9 425 = 5 075 seats.
b) Percentage change $= \frac{\text{reduction in seating capacity}}{\text{original seating capacity}} \times 100\% = \frac{5\,075}{14\,500}\ 100\% = 35\%$

Key Sequence: [5] [0] [7] [5] [÷] [1] [4] [5] [0] [0] [×] [1] [0] [0] [=]

b) WORKING OUT THE PERCENTAGE PROFIT OR LOSS.

Profit and Loss are often given as percentages of the ***COST PRICE*.** This makes it easier to compare the profit or loss made on different items.

We use the formula $\boldsymbol{Percentage\ profit\ (or\ loss)} = \frac{\boldsymbol{Profit\ (or\ loss)}}{\boldsymbol{Cost\ price}} \times \mathbf{100}\%$

OR $\boldsymbol{Percentage\ profit} = \frac{\boldsymbol{Selling\ price - Cost\ price}}{\boldsymbol{Cost\ price}} \times \mathbf{100}\%$

AND $\boldsymbol{Percentage\ loss} = \frac{\boldsymbol{Cost\ price - Selling\ Price}}{\boldsymbol{Cost\ price}} \times \mathbf{100}\%$

EXAMPLE 2

a) A vegetable shop makes R15 profit on a bag of oranges that costs R60. What is the percentage profit?
b) This same vegetable shop paid R40 for some potatoes and sold them for R52,50. What percentage profit was made?
c) On which item did the vegetable shop make the better profit?

SOLUTION

a) Percentage profit on the oranges $= \frac{\text{profit}}{\text{cost price}} \times 100\% = \frac{\text{R15}}{\text{R60}} \times 100\% = 25\%$

Key Sequence: [1] [5] [÷] [6] [0] [×] [1] [0] [0] [=]

b) Percentage profit on the potatoes $= \frac{\text{Selling Price} - \text{Cost Price}}{\text{Cost Price}} \times 100\%$

$= \frac{\text{R52,50} - \text{R40}}{\text{R40}} \times 100\% = \frac{12{,}50}{40} \times 100\% = 31{,}25\%$

Key Sequence: [1] [2] [•] [5] [0] [÷] [4] [0] [×] [1] [0] [0] [=] [S⇔D]

c) The vegetable shop made a better profit on the potatoes.

Activity 8

Where necessary, give your answers correct to the nearest 1%.

1) Calculate the percentage increase or decrease in each of the following

	Original quantity	*New quantity*	
a)	25 g	30 g	
b)	50 m	75 m	
c)	R80	R70	
d)	50 cm	44 cm	
e)	R60	R45	
f)	8 litres	7 litres	

2) Two years ago, there were 950 learners enrolled at our school. The number of learners increased each year, and this year we had 1 026 learners enrolled at our school. What is the percentage increase in the number of learners in the school?

3) Quicksale Motors bought a car for R79 990 and only managed to sell it for R52 500. What was the percentage loss made by Quicksale Motors on the sale of the car?

Activity 8 (continued)

4) Mr Gama bought 20 dozen small toys for R375 per dozen. He sold each toy for R33. What was his percentage profit?

5) Mary sells oranges. She buys 100 oranges for R350 and sells them for R48 per dozen. What percentage profit or loss does she make?

6) Sipho bought a second-hand machine for his factory for R80 000. It cost him R1 000 to transport the machine to his factory and he spent R5 000 on repairing the machine. After a year he sold it for a profit of 25%. At what price did he sell the machine?

Planning Session

First complete the Post Workshop Activity and hand it in.
Then, work with the whole class on this Activity

The topics you asked for was Capacity/Volume/Surface Area, 3D Objects as well as Decimals and Percentages.
However, as you can see, there is a lot of work under these topics.

Discuss with the class the following

1) Does the work covered today meet your needs?
2) What do you think should have been left out? And what still needs to be added in?
3) How are you going to manage your time with the teachers so that you cover everything in this handout?
4) The topics suggested for the JiT 3 are "Geometric and Algebraic Patters", "Length and Mass Conversions" and "Multiplication and Division".
   - Are you happy with these topics?
   - What particularly would you like to be covered?