A Guide to Measurement

Teaching Approach

In Grade 10, Measurement is covered in the first, second and third terms according to the CAPS documents. The total teaching time is over a period of 6 – 7 weeks in total. The following sections need to be covered:

Term 1:   Conversions & Time (1 week)
Term 2:   Measuring length, weight, volume & temperature (2 weeks)
Term 3:   Perimeter, Area & Volume (3 weeks)

The videos included in the Grade 10 Measurement will be of most benefit if watched in order. If used for revision purposes, then any video can be used to revise a specific topic or section. Summaries of the skills and contexts of each video are in this document, allowing you to find something appropriate quickly and easily. On average each video is 10 minutes and would easily fit into a lesson with time to discuss the content and do some exercises or activities related to the content or topic.

You will find a selection of tasks covering the required skills in the task video. These tasks have not been linked to the videos so that they can be used without viewing them.

When teaching Measurement, it is tempting to stick to the basic skills and not allow the learners to use them in context. Let the learners practically apply the skills they learn in everyday contexts. Make them apply all their skills to real-life and relevant situations. Do not just make them to mindless, repetitive calculations with no purpose. Let the learners think of their own examples where they can apply the skills. When dealing with a specific concept, ask the learners to give ideas where they would use the concept in real life. Let them make up their own questions relating to the topic and real-life situations.

Most of all, these topics allow you to get the learners to practically apply their skills. Let them do lots of practical work, so that they fully understand the concept of measurement. If you as the teacher make it enjoyable and you extend your class, you will be amazed at how the learners start enjoying the subject and as a result achieve good results in their assessments. Be creative by trying to find various practical activities that the learners can do. When doing measurement, let them experience using all types of measuring instruments. Let them actually bake a cake, or grow a vegetable garden at the school, etc.

Video Summaries

Some videos have a 'PAUSE' moment, at which point the teacher or learner can choose to pause the video and try to answer the question posed or calculate the answer to the problem under discussion. Once the video starts again, the answer to the question or the right answer to the calculation is given.

Mindset suggests a number of ways to use the video lessons. These include:

- Watch or show a lesson as an introduction to a lesson
- Watch of show a lesson after a lesson, as a summary or as a way of adding in some interesting real-life applications or practical aspects
- Design a worksheet or set of questions about one video lesson. Then ask learners to watch a video related to the lesson and to complete the worksheet or questions, either in groups or individually
- Worksheets and questions based on video lessons can be used as short assessments or exercises
- Ask learners to watch a particular video lesson for homework (in the school library or on the website, depending on how the material is available) as preparation for the next days lesson; if desired, learners can be given specific questions to answer in preparation for the next day's lesson

1. Time Measurement and Units

This video deals with time. It looks at converting from different forms of time as well as converting from different time units. Later in the video they look at planners and calendars.

2. Metric Units of Measurement

In this lesson we look at different types of units for measurements. We go through some of the ways in which we measure and discuss the units we use for these measurements.

3. Working with Metric Units of Measurement

In this lesson we focus on metric units of measurement again. We use a recipe to calculate larger quantities for a big meal, while still using the same metric units.

4. Measuring Length

This video looks at different methods of measuring length. It starts off by looking at "rule-of-thumb" methods of measuring and then how to measure using proper and accurate measuring equipment.

5. Measuring Mass

This video looks at the different ways of measuring an object's mass (weight). It then looks at converting masses and doing simple calculation.

6. Measuring Volume

This video looks at measuring volume. Practical real-life examples are used to develop the concepts and skills that are developed. We make different fruit juice cocktails to develop the concepts of measuring volume.

7. Measuring Temperature

This video looks at measuring and doing calculations with temperature. A practical example of looking at the weather bureau's reporting of minimum and maximum temperatures for a week is used to develop this section.

8. Calculating Perimeter and Area and Volume

This video examines the calculation of perimeter and area. It looks at the definitions of perimeter and area and also the formulas that we use for calculating perimeter and area in basic 2D plane figures.

9. Practical Surface Area Calculations

In this lesson learners use their measurement skills to work out what they need to tile a floor.

Resource Material

Resource materials are a list of links available to teachers and learners to enhance their experience of the subject matter. They are not necessarily CAPS aligned and need to be used with discretion.

1. Time Measurement and Units	www.timeanddate.com/worldclock/ www.timeanddate.com/ http://en.wikipedia.org/wiki/Time	These are websites that offer various calendars and information relating to this section of time.
2. Metric Units of Measurement	https://www.youtube.com/watch?v=meMJBqamL1E	This is a video clip note on how to use sigma notation and how it links to series.
	www.onlineconversion.com/	The website has an online conversion calculator for every quantity imaginable. There are also a range of conversion calculators that you can download so that you don't have to be online to use them.
3. Working with Metric Units of Measurement	www.infoplease.com/ipa/A0001723.html	This website is very useful for cooking measurement conversions
	www.metric-conversions.org/	This is another site that gives conversions for metric units.
	www.sciencemadesimple.com/conversions.html	Science made simple is a website with many scientific and mathematical concepts covered. This specific link takes you to a page with many different calculators including conversion calculators.
4. Measuring Length	http://math.pppst.com/measurement.html	This website contains many PowerPoint Presentations relating to many topics including measurement.
	http://www.superteacherworksheets.com/	The following website contains many downloadable worksheets. Unfortunately, not all of them are available free, but for a small annual fee, you then have access to all worksheets and information contained on the website.
5. Measuring Mass	http://math.pppst.com/measurement.html	This website contains many PowerPoint Presentations relating to many topics including measurement.
	http://www.superteacherworksheets.com/	The following website contains many downloadable worksheets. Unfortunately, not all of them are available free, but for a small annual fee, you then have access to all worksheets and information contained on the website.
6. Measuring Volume	http://math.pppst.com/measurement.html	This website contains many PowerPoint Presentations relating to many topics including measurement.
	http://www.superteacherworksheets.com/	The following website contains many downloadable worksheets. Unfortunately, not all of them are

		available free, but for a small annual fee, you then have access to all worksheets and information contained on the website.
7. Measuring Temperature	http://math.pppst.com/measurement.html	This website contains many PowerPoint Presentations relating to many topics including measurement.
8. Calculating Perimeter, Area and Volume	http://math.pppst.com/measurement.html	This website contains many PowerPoint Presentations relating to many topics including measurement.
	http://easycalculation.com/area/learn-triangular-prism.php	The website below has guide explanations on how to calculate perimeter, area and volume of various 2D and 3D shapes. It also has useful information for other sections as well.
9. Practical Surface Area Calculations	http://www.wikihow.com/Calculate-Area-of-an-Object	This page has examples of how to calculate a surface area.

Task

Question 1

Convert:
1.1 180 sec to min
1.2 264 hours to days
1.3 12 days to min
1.4 8 min 15 sec to sec
1.5 36 000 sec to hours
1.6 70 sec to min

Question 2

Paula baked 12 dozen muffins for her school market day. She can only fit one dozen muffins in the oven at the time. Each batch of muffins has to bake for 16 minutes. If the first batch of muffins was put in the oven at 08h00, what time did the last batch come out of the oven?

Question 3

3.1 Convert:
    3.1.1   1,35 m to mm
    3.1.2   5 219 m to km
    3.1.3   750 ml to litres
    3.1.4   4,2 l to ml
3.2 John's car measures 425 cm. How long is his car in m?
3.3 Susan filled a bucket with 2 350 ml of water. How many litres of water was in the bucket?

Question 4

4.1 Convert:
    4.1.1   149 g to kg
    4.1.2   0,62 kg to g
    4.1.3   3 cups to ml
    4.1.4   25 tsp to ml
4.2 Thandi bought 3 packets of mealie meal. Each packet had a mass of 2,5 kg. How many grams of mealie meal did she buy?
4.3 Jane needs 60 ml of stock powder for the stew she is making. She only has a tablespoon measure. How many tablespoons of stock powder must she use?

Question 5

Peter wants to paint a wall that is 5,8 m long and 4,1 m high. The paint that he uses says that 1 litre covers 7 m^2 per coat. He decides to paint 2 coats of paint on the wall.
5.1 Calculate the area of the wall Peter wants to paint.
5.2 Calculate how much paint he must buy to give the wall two coats of paint.

Question 6

Mr Naidoo travels from home to work on a daily basis. He decides he wants to work out how far he travels on a monthly basis and how much petrol he uses to go to work and back every month.
6.1 He decides to measure the distance from home to work one day. When he leaves home his car's odometer shows that the car has travelled 74 486 km. When he arrives at work it shows that the car has travelled 74 502 km. How far does he travel to work?
6.2 Calculate how far he travels in a month if he works 20 days per month on average.

6.3 His car's petrol consumption averages 7,2 l/100km. How much petrol will he use per month to travel to work and back?

6.4 Assume that petrol costs R10,86/litre. Calculate how much it costs him on a monthly basis to travel to and from work.

Question 7

Solly goes to Fruit 'n Veg City to buy some fruit and vegetables.
He makes the following purchases:

1,5 kg Bananas	@ R7,95/kg
6 apples	@ R2,50 each
6 kg onions	@ R6,75/kg
A 1,8 kg pumpkin	@ R12,99/kg
3 bunches spinach	@ R3,85/bunch
2 boxes grapes	@ R21,65/box
2,4 kg tomatoes	@ R12,98/kg
1 cabbage	@ R4,99 each

Calculate the total cost he has to pay for the fruit and vegetables that he buys.

Question 8

Thando felt that he had a fever. At 11h10 he took his temperature with a thermometer and found that his body temperature was $39,4^0$C. He took some medication for fevers. The directions read that you must take 15 ml every four hours. After taking the medication, his temperature dropped to 37^0C. At 14h00 his temperature had risen to $38,4^0$C. Assuming that normal body temperature is 37^0C, answer the following questions:

8.1 How much above normal was Thando's temperature at 11h10?

8.2 How many teaspoons of medication did he take?

8.3 How much above normal was his temperature at 14h00?

8.4 How long must Thando wait before he can take another dose of medicine?

8.5 What time would he be able to take more medicine?

Question 9

The Ndlovu family have bought a new family home for a bargain price but as a result, need to do a number of renovations to their new house. The Ndlovu family want to build a precast wall around the entire perimeter of their property. The property is a rectangular shape which is 38 m long and 24,8 m long.

9.1 Calculate the perimeter of the property.

9.2 Calculate the cost of the wall if Mr Ndlovu was quoted R286,50/metre.

9.3 Calculate the area of the driveway in m^2.

9.4 Concrete is made of cement, sand and stone. The builder estimates that he needs 3 bags of cement, 6 wheelbarrows of sand and 6 wheelbarrows of stone. Cement costs R61,50/bag, sand costs R19,42/wheelbarrow and stone costs R26,20/wheelbarrow. Calculate how much the concrete will cost.

9.5 Mr Ndlovu wants to make a circular flower bed in the back garden. He needs to put a special dressing, which contains compost and fertilizer already mixed together, in the bed before he can plant any plants. The instructions say that you must use one bag of dressing per 5 m^2 of garden. Calculate the area of the garden if the circular flower bed has a diameter of 4,8 m. Use $\pi = 3,142$.

9.6 Calculate how many bags of special dressing he must buy.

9.7 Calculate the total cost if the special dressing costs R125,00 per bag.

Task Answers

Question 1

1.1 180 sec
    = 180 ÷ 60
    = 3 min

1.2 264 hours
    = 264 hours ÷ 24 hours/day
    = 11 days

1.3 12 days
    = 12 days x 24 hours/day
    = 288 hours x 60 min/hr
    = 17 280 min

1.4 8 min 15 sec
    = 8 min x 60 sec/min + 15 sec
    = 480 sec + 15 sec
    = 495 sec

Question 2

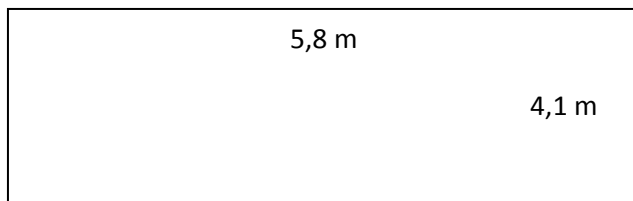As she only can bake one dozen at a time, she will have to bake the muffins in 12 batches of 12.

∴ Total time that the oven will be used

= 12 x 16 min = 192 min

= 3 hours 12 min

∴The last batch will come out the oven at

= 08h00+3 hours 12 min

= 11h12

Question 3

3.1.1 1,35 m
    = 1,35 x 1000 mm/m
    = 1 350 mm

3.1.2 5 219 m
    = 5 219 m ÷ 1 000 m/km
    = 5,219 km

3.1.3 750 ml
    = 750 ml ÷ 1 000 ml/l
    = 0,75 l

3.1.4 4,2 l
    = 4,2 l x 1 000 ml/l
    = 4 200 ml

3.2 John's car's length in metres is:
    425 cm
    = 425 cm ÷ 100 cm/m
    = 4,25 m

3.3 2 350 ml
    = 2 350 ml ÷ 1 000 ml/l
    = 2,35 l

Question 4

4.1.1 149 g

  = 149 g ÷ 1 000 g/kg

  = 0,149 kg

4.1.2 0,62 kg

  = 0,62 kg x 1 000 g/kg

  = 620 g

4.1.3 3 cups

  = 3 cups x 250 ml/cup

  = 750 ml

4.1.4 25 tsp

  = 25 tsp x 5 ml/tsp

  = 125 ml

4.2 Total mass of mealie meal

  = 3 x 2,5 kg

  = 7,5 kg

  = 7,5 kg x 1 000 g/kg

  = 7 500 g

4.3 Stock powder

  = 60 ml

  = 60 ml ÷ 5 ml/tsp

  = 12 tsp

Question 5

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┌─────────────────────────────────────────┐
│                                          │
│              5,8 m                        │
│                                          │
│                          4,1 m           │
│                                          │
│                                          │
└─────────────────────────────────────────┘
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5.1 Area of wall = length x breadth

      = 5,8 m x 4,1 m

      = 23,78 m^2

5.2 Since we are painting two coats, we have to double the area that is going to be painted.

   ∴ Painted area = 23,78 m^2 x 2 = 47,56 m^2

   1 litre of paint covers 7 m^2

   ∴ Amount of paint required = 47,56 m^2 ÷ 7 m^2/litre

             = 6,794...... litres

             ≈ 7 litres of paint

Question 6

6.1 Distance to work

  = 74 502 – 74 486

  = 16 km

6.2 Daily trip

  = 2 x 16 km

  = 32 km

  Total monthly distance (20 days/month)

  = 20 x 32 km

  = 640 km

6.3 Petrol used
= 640 km ÷ 100 x 7,2 l/100 km
= 46,08 litres

6.4 Total cost
= 46,08 l x R10,86/l
= R500,43

Question 7

Total cost for the fruit and vegetables
= (1,5 x R7,95) + (6 x R2,50) + (6 x R6,75) + (1,8 x R12,99) + (3 x R3,85) + (2 x R21,65) + (2,4 x R12,98) + (1 x R4,99)
= R11,93 + R15,00 + R40,50 + R23,38 + R11,55 + R43,30 + R31,15 + R4,99
= R181,80

Question 8

8.1 Temp. above normal
= 39,40C – 370C
= 2,40C

8.2 No. of teaspoons
= 15 ml ÷ 5 ml/tsp
= 3 teaspoons

8.3 Temp. above normal
= 38,40C – 370C
= 1,40C

8.4 4 hours

8.5 11h10 + 4 hours
= 15h10
i.e. 10 past 3 in the afternoon

Question 9

9.1 Perimeter of property
= 2 x 38 m + 2 x 24,8 m
= 76 m + 49,6 m
= 125,6 m

9.2 Cost of wall
= 125,6 m x R286,50/m
= R35 984,40

9.3 Area of driveway
= 10 m x 254 cm
= 10 m x 2,54 m
= 25,4 m^2

9.4 Cost of concrete
= (3 x R61,50) + (6 x R19,42) + (6 x R26,20)
R184,50 + R116,52 + R157,20
= R458,22

9.5 Area of circular flower bed
= πr^2
= 3,142 x (2,4 m)^2
= 18,10 m^2

9.6   Number of bags
      $= 18,10 \text{ m}^2 \div 5 \text{ m}^2/\text{bag}$
      = 3,62 bags
      $\approx$ 4 bags

9.7   Total cost
      = 4 bags x R125,00/bag
      = R500,00

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