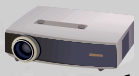


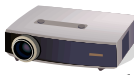
Lecture slide
#1-3

Module 1

Numbers – calculate and measure using numbers in the workplace

After completing this module, students will be able to:

- Use numbers correctly when working with problems in a personal and familiar context and in the workplace
- Perform calculations accurately/correctly to solve problems in a personal and familiar context and in the workplace
- Identify and use appropriate measuring tools and techniques to solve problems in a personal and familiar context and in the workplace


Lecture slide #4

Introduction

Introduce the topic of mathematical literacy to students and explain the importance of numbers, from determining salaries, to every bit of construction that takes place. Numbers are in just about everything that we do in daily life, and understanding them is vitally important.

1. Use numbers correctly

At the end of this outcome, students will be able to:

- Count, order and estimate.
- Know that positive and negative numbers have direction.
- Work with fractions, decimals and percentages.
- Understand different time notations.


Lecture slide #5-10

Case Study

Activity regarding:

- Calculations with numbers,
- Conversion of measurements,
- Scale,
- Time calculations,
- Rate of travel.

You may not be able to answer these questions before working through all of the learning activities in the module. Therefore, read the Case Study and questions and come back to it at the end of the module. Do it with a friend.

Your mother owns a small guest house in Genadendal close to Caledon in the Cape. Genadendal has a rich history as a Moravian mission station and, as such, the old buildings and the museum are visited by many tourists. There are also day-hikes in the mountains which flank the small village. Some of the tourists will drive **from Cape Town International Airport** through Stellenbosch and Franschhoek and others will drive **from George Airport**, thus seeing some beautiful parts of the Southern Cape coast. The visitors all want to know how long it will take them from their specific airport to the guest house. Your mother asks you to calculate this for her.

Questions

1. Use a map similar to the one shown and measure the distance on the map from Cape Town International Airport with a piece of string. Then **measure the length** of string in millimetres on your ruler.
   By Google Earth the distance approximates to 120km. Distance in mm should therefore be approx 110mm (student's measurements may be somewhat shorter, as this method takes into account the finer details of the road)
2. **Convert the millimetre measurements** to the actual distances traveled in kilometres by using the scale of **1: 1 100 000**. The millimeter measurement on a similar map from George Airport is 310 mm. Also convert this measurement to kilometers, but with a scale of **1:1 250 000.**
   For Cape Town to Genadendal the distance would be around 120km. For George to Genadendal the distance would be 310mm x 1 250 000 ÷ 1 000 000 = 387.5km.

3. Use an **average estimated travel speed of 100 km/h to** calculate **approximately** how long it will take them to reach the guest house. *From Cape Town to Genadendal: 120km @ 100km/h = 1h12min or approximately 1hr15. From George to Genadendal: 387 @ 100km/h = 3.87hrs = Approximately 4 hours. While one could calculate these figures accurately, there seems little point, as 100km/h is at best a rough approximation of the speed that would be travelled.*
4. Look at the tables and decide which flights will be the best option for the two different groups of tourists. Keep in mind that traffic might be a problem and make sure that the tourists will not be late for their flights. Also determine for which time the tourists must set their alarm clocks if they have to leave early:
   a. Tourist group A wants to return via Cape Town International Airport and has to be back in Johannesburg by 13H00 on a Wednesday. The flight from Cape Town to Johannesburg takes approximately 2 hours and 10 minutes. Fill in the times of arrival of the flights in the table.
   b. Tourist group B has to return via George Airport to Port Elizabeth and has to be in PE by 16H00 on a Thursday. Flying time from George to PE in a small Express Jet is approximately 35 minutes. Fill in the times of arrival in the table.

   Given the fact that is isn't reasonable to ask people who are on holiday to get up at 4AM, and it is reasonable to expect to take 2hrs to travel the distance plus another one hour waiting time, gives you three hours. The best departure time would therefore be 10:35 allowing the guests to leave at 7:35AM and get to JHB before 13:00. For the George flight: Given that the express Jet is 35min and they need to be in PE by 16:00, they could take the 15:20 flight – this would mean that they should aim to by at the airport by 14:20 which means they should leave Genadendal by 10:20.

Flight schedule for a weekday – Cape Town to Johannesburg

Flight no.	**Time of departure**	**Time of arrival – digital**	**Time of arrival – analogue**
ZAN 164	06H25	*08:35*	*8:35AM*
ZAN 165	08H20	*10:30*	*10:30AM*
ZAN 166	10H35	*12:45*	*12:45PM*
ZAN 167	12H15	*14:25*	*2:45PM*

Flight schedule for a weekday – George to PE

Flight no.	**Time of departure**	**Time of arrival – digital**	**Time of arrival – analogue**
ZAN 134	08H15	*08:40*	*8:40AM*
ZAN 135	11H20	*11:55*	*11:55AM*
ZAN 136	14H40	*15:15*	*3:15PM*
ZAN 137	15H20	*15:55*	*3:55PM*

5. There is a very real possibility that the government will instate DST (daylight savings time) in South Africa as a result of the electricity crisis. This will mean that in summertime Cape Town time will be one hour behind Johannesburg. Port Elizabeth will be in the same time zone as Cape Town. Determine whether tourist group A can still leave on the same flight and re-calculate their time of departure from the guest house in order to be on time for the flight.
One hour behind JHB means that you will need to bring everything forward by one hour in Cape Town. The tourist group will still leave on the same flight, however, all their actions in Cape Town will need to be moved 1hr forward, in other words they would have to leave 6:45AM Cape Town time. Depending on how the flights times are calculated, for the George flight, they may need to move an hour forward.

Flight schedule for a weekday – Cape Town to Johannesburg.

Flight no.	Time of departure	Time of arrival – digital	Time of arrival – analogue
ZAN 164	06H25	*08:35*	*8:35AM*
ZAN 165	08H20	*10:30*	*10:30AM*
ZAN 166	10H35	*12:45*	*12:45PM*
ZAN 167	12H15	*14:25*	*2:45PM*

Flight schedule for a weekday – George to PE

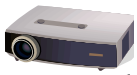
Flight no.	Time of departure	Time of arrival – digital	Time of arrival – analogue
ZAN 134	08H15	*08:40*	*8:40AM*
ZAN 135	11H20	*11:55*	*11:55AM*
ZAN 136	14H40	*15:15*	*3:15PM*
ZAN 137	15H20	*15:55*	*3:55PM*

6. You tell your mother that you do not want to redo this calculation for other tourists and suggest that you do it now for all the different flight times so that she can use these calculations for future visitors. Draw up two tables, one for the Cape Town to Johannesburg flights and one for the George to PE flights.
Flight schedule for a weekday – Cape Town to Johannesburg.

Flight no.	Time of departure	Time of arrival – digital	Time of arrival – analogue
ZAN 164	*05H25*	*08:35*	*8:35AM*
ZAN 165	*07H20*	*10:30*	*10:30AM*
ZAN 166	*09H35*	*12:45*	*12:45PM*
ZAN 167	*11H15*	*14:25*	*2:45PM*

Flight schedule for a weekday – George to PE

Flight no.	Time of departure	Time of arrival – digital	Time of arrival – analogue
ZAN 134	*07H15*	*07:40*	*7:40AM*
ZAN 135	*10H20*	*10:55*	*10:55AM*
ZAN 136	*13H40*	*14:15*	*2:15PM*
ZAN 137	*14H20*	*14:55*	*2:55PM*


Lecture slide #11-12

1.1 Count, order and estimate

In this section, students will have to explain the various types of numbers e.g. Cardinal numbers, ordinal numbers, dimensions and codes, as well as ordering numbers and estimating.

Game Time!!!
Explain that the aim of the easy magic square is to get all the columns, rows and diagonals to sum to the same amount.

Easy Magic Square:

9	*2*	*7*
4	6	*8*
5	*10*	3

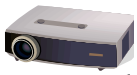
Sudoku:

6	8	7	9	5	1	4	3	2
3	5	2	7	4	6	9	1	8
1	4	9	8	3	2	6	7	5
5	1	6	3	9	7	8	2	4
2	9	8	6	1	4	3	5	7
4	7	3	5	2	8	1	9	6
9	6	1	4	7	5	2	8	3
8	2	5	1	6	3	7	4	9
7	3	4	2	8	9	5	6	1

Questions
1. How many 9 block squares are there in this example?
2. Complete the "Painless" Sudoku.
3. Find a Sudoku puzzle in a newspaper or magazine, complete it and bring it to class.

Activity 1
(Count, order, estimate numbers)

1. For the following Lotto ticket, decide what the different numbers represent. Next to each number, write what the numbers mean and, where possible, add whether you consider the number to represent:
   - Quantity (cardinal number),
   - Order (ordinal number),
   - Dimension (i.e. size), or a
   - Code (a code may also include letters of the alphabet).


Lecture slide #14-21

On ticket from top downwards Type of number

1 Date: *Ordinal number*
2 Draw number: *Ordinal numbers.*
3 Lotto number choices: *Ordinal numbers.*
4 *Amounts of money*
5 *Percentage*
6 *Code of the agen*t
7 *Coupon number: Ordinal number*
Bottom row: Bar code with bar code numbers above it.

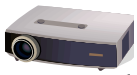
2. Order the following numbers from the largest to the smallest, i.e. arrange in descending order:

a.	0,4285	0,4258	0,0488	O,2485
	0,4285	*0,4258*	*0,2485*	*0,0488*
b.	1,011	1,11	11,01	111,0
	111,0	*11,01*	*1,11*	*1,011*
c.	0.9995	0,9955	0,99	0,099999
	0.9995	*0,9955*	*0,99*	*0,099999*
d.	45,28	44,98	47,99995	47,999
	47.99995	*47.999*	*45.28*	*44.98*
e.	1000,98	1001,06	999,99	1000½
	1001,06	*1000,98*	*1000½*	*999,99*

3. Order the following fractions from the smallest to the largest i.e. arrange in ascending order.

a.	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{3}$	$\frac{1}{8}$
	$\frac{1}{8}$ (0,625)	$\frac{1}{4}$ (0,25)	$\frac{1}{3}$ (0,33)	$\frac{1}{2}$(0,5)
b.	$\frac{2}{3}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{4}{5}$
	$\frac{5}{8}$ (0,625)	$\frac{2}{3}$ (0,666)	$\frac{3}{4}$ (0,75)	$\frac{4}{5}$ (0,80)
c.	$\frac{7}{10}$	$\frac{68}{100}$	$\frac{538}{1000}$	$\frac{7321}{10000}$
	$\frac{538}{1000}$ (0,538)	$\frac{68}{100}$ (0,68)	$\frac{7}{10}$ (0,7)	$\frac{7321}{10000}$ (0,7321)
d.	$\frac{45}{200}$	$\frac{16}{40}$	$\frac{95}{1000}$	$\frac{99}{300}$
	$\frac{95}{1000}$ (0,95)	$\frac{45}{200}$ (0,225)	$\frac{99}{300}$ (0,3)	$\frac{16}{40}$ (0,4)
e.	$\frac{5}{6}$	$\frac{7}{10}$	$\frac{9}{20}$	$\frac{7}{8}$
	$\frac{9}{20}$ (0,45)	$\frac{7}{10}$ (0,70)	$\frac{5}{6}$ (0,83)	$\frac{7}{8}$ (0,875)

4. Give a sensible estimate:
   a. 219 pigeons flocked down to feed on the stale bread thrown to them from your restaurant kitchen. More or less how many pigeons came to feed?
   About 200
   b. An educare student buys stationery to the value of R52,45. Approximately how much money did she spend?
   Approximately R50.
   c. 69 913 people attended the final game of the Rugby World Cup in 2007. Close to how many spectators were at the game?
   Close to 70 000 people.
   d. Another 5 498 745 watched the game on T.V. at home. What number of spectators would a journalist report watched the game?
   Approximately 5,5 million people.
5. a. Estimate the following total expenses of a health worker.
   Estimate of the total expenses: 450 + 380 + 670 + 260 + 100 + 125 + 45 = R2030
   b. Then calculate the total expenses accurately.
   Total expenses calculated accurately: R2036,75
   c. Calculate the difference between the estimated and the calculated totals.
   Difference = R6,75
   Anti-histamine tablets for allergies – R 452,68
   Vitamin C tablets for colds and flu – R 382,35
   Codeine tablets for colds and headaches – R 674,27
   Iodine ointment for disinfectant purposes – R 259,64
   Iodine fluid for water purification purposes – R 96,75
   Adhesive plaster for cuts - R 125,44
   Cotton wool to apply disinfectant – R 45,62.
   d. Will the estimated answer be sufficient for tax purposes?
   No, exact amounts are required with proof.
   e. For what purpose could the estimated answer be used?
   To decide whether you might have sufficient money left over for any other purchases.


Lecture slide #23-24

Assignment 1

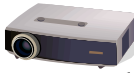
This activity is to be completed by students in their own time. They will have to go and investigate the prices of the various items. It would probably be best for students to work in groups of two for this assignment.

A chef at a college hostel has to cook breakfast for 39 students. He has to order sufficient eggs, bread, fruit juice and small yoghurt containers for the meal. He does not know who will eat what – some students might only drink coffee and eat a slice of bread, while others might eat everything presented to them. He decides to order the following for each person: two eggs, one 250 ml container of yoghurt, three slices of bread and 250 ml of fruit juice. He realises that his order will still only be an estimate as he does not know exactly what each student prefers for breakfast.

Questions:

a. Find the prices of the different items and arrange the information in a table.
b. Calculate the total bill that he will have to pay.
c. The following was actually eaten at breakfast: 24 of the students drank fruit juice, and 6 of them asked for a second glass; 9 students ordered two eggs, and 16 ordered one egg; 30 students took a tub of yoghurt; 23 students ate two slices of bread and 3 students ate four slices of bread. Calculate how much of each food item was used and decide whether the chef should change the order for the next day. Once again tabulate your calculations.
d. What fraction of the students drank fruit juice and what percentage of these students drank a second glass of juice?
e. What fraction of the students ate eggs and what percentage of the egg-eaters ate two eggs?
f. The inflation rate is about 8,6% p.a. Calculate what the chef would probably have to pay next year for the same food items.
g. Calculate what the breakfasts for the weekdays of one calendar month will cost him.

1.2 Positive and negative numbers


Lecture slide #25

This section introduces negative numbers. One of the best ways to explain negative numbers is to use the idea of motion. For example, if a car has a positive velocity when it is going forward what is happening when it is going backwards or if I jump 10 cm high, and I come back down to earth, how far have I gone (10 - 10 = 0 cm).

Explain how the number line works...

$-\infty$ ..... −8 −7 −6 −5 −4 −3 −2 −1 0 1 2 3 4 5 6 7 8 ..... ∞

Lecture slide #26-29

Activity 2

This is an individual activity, which students can complete in class or for homework.

1. You have a balance of R652,98 in your savings account and you buy a carpet for R500; a cell phone card for R55; stationery to the value of R76,82; a bicycle pump worth R12; cigarettes for R28 and you have your hair cut for R95. First estimate and then calculate whether you would have a positive or a negative balance in your account after paying all your expenses.

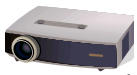
500 + 60 + 80 + 10 + 30 + 100 = 780; Negative balance of 655 – 780 = - R125

2. On a winters day in Sutherland, in the Karoo, the temperature is 19 degrees Celsius. The temperature drops 25 degrees during the night. What is the new temperature reading? You have just calculated 19 – 25. Do this on your calculator and notice the display method.
   19 - 25 = -6 degrees Celsius
3. Johannesburg is approximately 5 000 ft above sea level. A mine-worker in one of the many gold mines in Egoli descends in a shaft for his daily shift. The lift goes down for a distance of 1 000 m. At what depth with regards to sea-level is he working? You will find conversions between feet and metres later on in this module.
   35000 x 0,3048 = 1524 metres; 1524 – 1000 = 524 metres a.s.l

Interpret the news – Crime figures April to September 2006/7 from Mail and Guardian dated 14th March 2008.

Fill in the missing numbers

Crime category	April to Sept 2006	April to Sept 2007	% change
Robbery, aggravating circumstances	*65 787*	59 998	-8,8%
Carjacking	*7 265*	7 214	-0,7%
Truck hijacking	390	*598*	+53,3%
Home robberies	*6271*	6 711	+7%
Business robberies	3 433	4 438	+29,3%
Bank robberies	60	53	*-11.67%*
Cash-in-transit heists	281	*206*	-26,7%
Illegal possession of fire-arms	7 185	6 649	*-7,45*



Lecture slide #30-38

1.3 Normal fractions, decimal fractions and percentages

- *Explain that decimals are made up from numbers from 0-9 which fit into decimal places. Each decimal place to right diminishes in value by 10 times, so that 987,654 = 900 +80 + 7 + 0.6 + 0.05 + 0.04*
- *Explain what fractions are, and how they work, making sure that students know the terms denominator and numerator, and can simply fractions.*

- *Explain how to convert fractions to decimals by dividing the numerator by the denominator.*
- *Show how decimals and fractions fit onto the number line, and how the number line can get increasing dense as you zoom in.*
- *Explain that per cent means out of 100, and how percents can be expressed as fractions by putting them over 100.*
- *Lastly, explain the uses of percentages and how to calculate a number from a percentage and a percentage from a number.*

Lecture slide #39-45

Activity 3

This is an individual activity that students can complete in class or for homework.

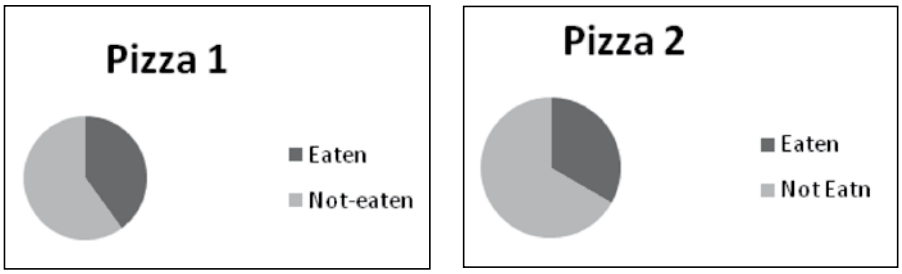
You are working with rational numbers, i.e. numbers that can be written as fractions.

1. Complete the following conversions between common and decimal fractions and percentages:

Common fraction	**<u>Decimal fraction</u> (top number of a common fraction divided by the bottom number = decimal fraction)**	**<u>Percentages</u> (decimal fraction times 100 = percentage)**
$\frac{3}{8}$	0,375	37,5
⅝	0,625	62,5
$\frac{15}{45}$	0,333	33,3
$\frac{16}{20}$	0,8	80%
¾	0,75	*75%*
$\frac{25}{100}$	*0,25*	*25%*
$^{1452}/_{2000}$	0,7265	*72,65%*
$^{66}/_{125}$	*0,528*	52,8 %
$\frac{4}{5}$	*0,80*	*80%*

2. Simplify (reduce) the following fractions:
   a. = ½ $\frac{48}{96}$
   b. = $^{3}/_{70}$ $\frac{15}{350}$
   c. = ⅓ $\frac{48}{144}$
   d. = $^{1}/_{60}$ $\frac{25}{1500}$
   e. = ¼ $\frac{13}{52}$

3. Sketch two pizzas. Divide the one into ten pieces and the other into nine pieces. Of the first one you eat four tenths, and of the second one you eat three ninths. Name the fractions of the pizza's that remain. Simplify these fractions.



4. Increasing density of the system:
   a. Draw the number line from 3,0 to 4,0 and insert tenths between the two numbers.
      3,0 3,1 3,2 3,3 3,4 3,5 3,6 3,7 3,8 3,9 4,0
   b. Draw the number line between 3,1 and 3,2 and place hundredths in between.
      3,1 3,11 3,12 3,13 3,14 3,15 3,16 3,17 3,18 3,19 3,20
5. Write the following whole numbers/integers in fraction form:
   13; 146; 1208; 916.
   $^{13}/_{1}$; $^{146}/_{1}$; $^{1208}/_{1}$; $^{916}/_{1}$

Lecture slide #46-48

Assignment 2

Students will need to complete this activity in their own time, as they will need to do their own research. It is recommended that students either work alone or in groups of two. Explain to students how to calculate the previous year's price from today's price as follows:
If bread now costs R10,00 per loaf and the price rise was 10,7%, then the price last year was:

$$110{,}7\% = R10{,}00$$
$$100\% = {}^{10}\!/_{110{,}7} \times 10 = R9{,}03$$

Interpret the news

The annual budget is presented by the Minister of Finance at the end of February of each year. The inflation rate has a big influence on the budget. Until recently the minister has attempted to keep the inflation rate between 4% and 6%. The consumer price index (CPIX) is an indicator of inflation rate and is based on the price rise of a "basket" of commonly used products which include fuel price rises.

1. On 10th March 2008 the following information was printed in Die Burger.

Item bought	Year-on-year price rise	Present price	Previous year's price
White bread (700g)	10,7%		
1 l full cream milk	6,2%		
750 g instant coffee	7,0%		
1 kg chicken drumsticks	4,5%		
1 kg beef mince	9,6%		
1,5 kg bag of apples	8,0%		
7 kg bag of potatoes	14,0%		
Tin of popular soft drink	5,8%		
8 kg Homebrand dog food	11,4%		
1 kg hake	15,3%		
2,5 kg mealie meel	9,2%		
2 kg parboiled rice	12.5%		

   a. Get the present price of the most popular of each of these items in your vicinity.
   b. Calculate the previous year's price.

2. The price of petrol and diesel has risen between 2004 and 2008. Calculate the percentage rise in price.

Fuel	2004	2008	% rise in price
Petrol	R4,29	R7,50	*74,8%*
Diesel	R3,73	R7,42	*98,9%*

1.4 Time notation

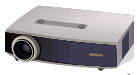
- *Explain to student the concepts involved in time notation i.e. 12 hour time notation and 24 hour time notation. Most students will probably understand this section quite well already.*
- *Explain how to convert from 12 hour notation to 24 hour notation.*

Lecture slide #50-51

Activity 4

1. a. Name three things that you do in the a.m. hours?
   b. Do you sleep more a.m. hours or p.m. hours?
   c. Why is the second part of daylight hour time called the afternoon?

2. Sketch watches displaying the given times:
   a. A quarter past four in the afternoon on an analogue watch.
   b. Three o'clock in the morning in digital time.
   c. Half past one in the day on a digital watch.
   d. Twenty to six in the morning on an analogue watch.


Lecture slide #52

2. Accurate answers to problems (Solve problems accurately)

At the end of this outcome, students will be able to:
- Calculate using pen and paper or in your head.
- Estimate and round off numbers.
- Add and multiply to simplify calculations where possible.
- Use ratio and proportion in problems.

2.1 Estimation and approximation /rounding

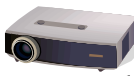
- *Explain what estimation is, and why we estimate.*

Assignment 3
Student's should complete this assignment in groups of two to four. It is not an overly complicated activity, but they should have at least one weekend to complete it.

A municipality sent the following estimated information with regard to water usage to its rate payers:
- Twintub wash and rinse = 150 l per minute.
- Coffee = 1 – 2 l per boil.
- Laundry = 50 l per wash by hand and 30 l with a washing machine.
- Dishes = 30 l per wash.

Choose two of these activities and investigate whether the estimates are close. If not, calculate the percentage difference.

Round up and round down = round off/approximate:
- *Explain the difference between rounding off and estimating.*
- *Explain the contexts in which we would round upwards and round downwards*
- *Explain how to round off, giving examples.*



Lecture slide #53-57

Activity 5
Students can complete this activity individually in class or for homework.

1. Which number is the best estimate for 551 × 53?
   a. 10 000 b. 20 000 *c. 30 000*

2. Which number is the best estimate for 1 275 × 78?
   a. 50 000 b. 150 000 *c. 100 000*

3. First estimate, then calculate:
   a. 39 × 156 b. 52 × 238 c. 1,87 × 4 688
   a. 6084 *b. 12 376* *c. 877.56*

4. Approximate/round off the following figures:

Approximate **to the nearest:**	Actual figure	Approximated figure
thousand	65 875	*66 000*
	12 689	*13 000*
	7 892	*8 000*
hundred	55 439	*55 400*
	667	*700*
	142 985	*143 000*
ten	1 588	*1 590*
	55	*60*
	61	*60*
whole number or unit	498 625,467	*498 625*
	32 453,92	*32 454*
	62,25	*62*
first decimal place	567,89	*567,9*
	64,48	*64,5*
	5 23,63	*523,6*

5. One way to calculate your safe exercise heart rate is to subtract your age from 220 and take of the difference, rounded to the nearest whole number.
   a. Calculate your safe exercise heart rate.
   b. Calculate the safe exercise heart rate of a 40-year-old person.
      0,75 x 200 = 135 beats per minute
   c. After running you find that your heart rate is 190. You are 20 years old. Is that a safe heart rate?
      No. Safe heart rate = 200 x 0,75 = 150

6. You have R220 which you can spend on clothes. You buy three items of clothing at a sale at a discount of 25%.
   a. Estimate whether you have enough money to buy the following items: a T-shirt priced at R64,99; a pair of shorts priced at R84,95; and a cap priced at R58,55.
      Estimate = 65 + 85 + 60 = 210. Yes, you have enough.
   b. Calculate your actual cost and change if you hand the teller R220.
      Actual cost = R208.49; change = R11,51

Lecture slide #58-61

2.2 Calculations

To illustrate the use of a calculator, a useful site to go to is metacalc (www.metacalc.com/#). This will bring up a calculator in your web browser. You can save this calculator for offline use, and increase it to full screen size. This will allow you to show the various key-strokes as needed. Though leaners may have different calculators, the different functions remain the same. You will need to explain the following:

- *The basic usage of the calculator including the C and CE keys*
- *Additive and multiplicative inverses to undo incorrect operations*
- *The memory keys*
- *Constant functions.*

Lecture slide #62-64

Activity 6

Students can do this activity in class or as homework.

1. Do the following calculations using the M+ and MRC keys on the calculator. Write down the complete keystroke sequence.
   64 578 + 3 429 =
   64 578 > M+ > 3429 > + > RCM > = 68 007
   64 578 – 4 562 =
   RCM > - > 4562 = 60016
   64 578 × 28 =
   RCM > X > 28 > = > 1808184
   64 578 ÷ 9 =
   RCM > 9 > = 7175,33

2. A second-hand car salesman adds R356 to the price of each vehicle sold, to compensate for damages suffered during a burglary. Calculate the prices of the following cars by programming your calculator to do a constant addition.

R 70 650 = *R71 006*	R 45 295 = *R45 651*
R 49 475 = *R49 831*	R 85 855 = *R86 211*
R 38 975 = *R39 331*	R 149 999 = *R50 355*

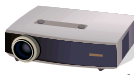
3. A bill for 8 of each of following items has to be calculated. Work out the bill, item by item. Then write the total for the bill. Work out the bill again, but this time use the short-cut methods on your calculator. Then write down the keystroke sequence that you could use with your short-cut method.

Price of 1 item	**Price of 8 of these items**
R235,68	R1 885,44
R 52,75	R422,24
R 98,52	R788,16
R 49,87	R398,96
Total amount owed	R3 494,80
Keystroke sequence for shortcut method: 8 x = 235,68 = 52,75 = 98,52 = 49,87 =	

Lecture slide #65-66

Sequence of calculations

- Explain the sequence of BODMAS, giving examples of each.



Lecture slide #67-73

Activity 7

Students can complete this activity in class or as homework.

1. Calculate and check your answers.

Calculation	Your answer	Correct answer
a. 148 – 12 × 7 + 28 =		92
b. 6222 + 148 ÷ 2 – 25 =		6271
c. 750 – (47 - 18) =		721
d. 6 × (42 + 14 + 23) =		474
e. 1600 ÷ (135 – 25 - 23) =		18,39
f. 726 – 12 × 4 + 68 =		746
g. 612 + 426 ÷ 12 – 25 =		622,5
h. 520 – (15 +32 + 67) =		406
i. 1000 × (30 + 65) =		95 000
j. 2000 ÷ (30 – 5) =		80
k. 387 – 3 × 6 + 19 =		388
l. 247 - 363 ÷ 3 + 45 =		171
m. 400 – (60 - 18) =		358
n. 75 × (52 + 18 + 12) =		6150
o. 5000 ÷ (25 - 15) =		500

The following word problems deal with the four basic operations of arithmetic.

2. At a certain gold mine there are 1 568 employees. Due to the electricity blackouts 750 of them will lose their jobs. How many employees will remain at the mine?
   Number of employees left = 1568 - 750 = 818
3. If in the year 2007 there were 120 500 students enrolled at FET colleges throughout South Africa for a certain programme and 66 250 of them passed, how many failed?
   Number failed = 120500 - 66250
4. When a number is increased by 38 945 it becomes 100 000. Find the number.
   Number = 100 000 – 38945 = 61055
5. A worker on a fruit farm packs 1 475 peaches. 22 of them are rotten. She packs the remainder in boxes, each containing 12 peaches. How many such boxes can she fill?
   Number of boxes = (1475 - 22) 12 = 121 boxes (121,0833 boxes)
6. 62 farm workers and 26 children go on a trip to the sea on a Saturday morning. The total bus fare is R985,00. Each child has to pay R7. How much do the adult farm workers have to pay per person?
   Total amount adult tickets = 985 - 182 = R800
   Number of adults = 62 – 26 = 36
   Adult ticket price = 800 36 = R22,22

7. Every day Sam saves 50 cents and his sister Jemima saves half as much. How long will it take them to save R60 together?
   50 + 25 = 75cents
   60 0,75 = 80 days

Lecture slide #74-77

Case Study (calculations):

Noluthando has a small laundry business called Little Laundry, which she runs from home.

A relative recently left Noluthando R30 000 in a will and she decided to spend this on her business.

She bought a washing machine, and a small van with which to collect and deliver the washed and ironed laundry.

The washing machine cost her R5 025,74.

The washing machine was delivered and installed at a cost of R195,45.

The small second-hand delivery van cost R39 000. She paid a deposit of R10 000 and has to repay the rest of the cost over a period of 24 months. The interest rate for the loan amount is 15% p.a.

Petrol costs her approximately R800 per month.

She decided to do her own deliveries and had to go for six driving classes at a cost of R120 per class. The student's license cost R100, the final license cost another R100 and the license photo's cost R30. The cost of putting the van through the roadworthy test was R150 and of registering the van in her name was R468,27.

Her monthly running cost for the Little Laundry includes 8 kilogram of soap powder at R47,58 per kilogram, and approximately R400 per month for water and electricity.

She has a starting balance in her savings account of R1587,23.

Her income per month from the laundering work is R5 450 on average.

Transaction	Balance	Credit	Debit
Balance brought forward	1587,23		
Inheritance	31587,23	30000,00	
Washing machine	26561,99		5025,74
Installation	26366,54		195,45
Deposit on car	16366,54		10000,00
Classes	15646,54		720,00
Learner's licence	15446,54		100,00
Photo's	15416,54		30,00
Roadworthy test	15266,54		150,00
Car registration	14798,27		468,27
Petrol	13998,27		800,00
Water	13598,27		400,00
Soap	13217,63		380,64
Monthly income	18667,63	5450,00	
Balance at end of first month	18667,63		

1. Draw up a financial statement for Noluthando's business for the first three months after the buying of the washing machine and the van.
2. Is she in the red or in the black at the end of the three months?
   In the black. Her positive balance in the bank is R18667,63.

3. Round up all of the monies to the nearest ten rand and see whether the end result differs much.

Transaction	Balance	Credit	Debit
Balance brought forward		1590	
Inheritance		30000,00	
Washing machine			5030
Installation			200
Deposit on car			10000
Classes			720
Learner's licence			100
Photo's			30
Roadworthy test			150
Car registration			470
Petrol			800
Water			400
Soap			380
Monthly income		5450,00	
Balance at end of first month			18280

The rounded balance differs by R92,37 from the accurate balance.

4. Explain what "on average" and "approximately" means.
   "On average" means "more or less the amount or number that is mostly found"; "approximately" means : "almost equal to, but not quite".

2.3 Ratio, proportion and rate

Lecture slide #78

Ratio:

- Comparison between two or more similar quantities can be given as a ratio.
- The ratio of x to y can be expressed as or x : y.
- Dividing x and y by a common factor will simplify a ratio.
- E.g. 3 : 2 is the simplest form of the ratio 6 000: 2 000.
- A ratio does not have units.

Lecture slide #79-85

Activity 8

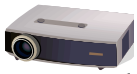
This is a single-person activity that students can complete in class or for homework

1. Express the following ratios in the simplest form:
   a. 64 : 800 *2:25*
   b. 39 : 930 *13:310*
   c. $\frac{60}{144}$ *5:12*
   d. $\frac{250\text{mm}}{75\text{cm}}$ *1:3*

2. R48 550 has to be shared between Katie and Simon. Calculate Katie's share if the money is divided in the ratio:
   a. 3 : 7 *R14 565*
   b. 5 : 8 *R18673,08*
   c. 4 : 5 *R21 577,78*

3. Divide R780 between three labourers. The one labourer worked for two hours, the other for three hours and the third one for six hours.
   R141,82; R212,73 and R425,46
4. A chemical mixture has four components in the ratio 2 : 4 : 5 : 8 by mass. This mixture has to be added to the municipal water supply to purify the water. You have to add a total mass of 24,5 kg of the mixture. How much of each ingredient do you have to add?
   2578,95g; 5157,89g; 6447,37g; 10 315,79g
5. The workers in a clothing factory include 45 men and 80 women.
   a. Give the simplified ratio of men to women.
   b. Give the simplified ratio of women to the total number of workers.
   9:16; 16:25
6. A silk screen artist is creating a design for material to be made up for a dress designer. She decides to print rectangles and uses the golden ratio between the breadth and the length of the rectangles - two parts divided into the ratio 1 : 1,618 because this ratio presents a pleasing image to the human eye. If the rectangles that she sketches have a side length of 25mm, what must the breadth of the rectangle be?
   Breadth = 15,45 mm
7. Water leaks from a tap at a rate of 100 ml every 90 seconds.
   Calculate how much water has gone to waste in:
   a. 24 hours, *95 999,997 ml per day*
   b. one week, *671 999,97 ml per week*
   c. one month, *2687 999,8 ml per month*
   d. one year. *32 255 977 ml per year = 32,26kl per year*

Discuss the probable cost of the lost water to the home owner.



Lecture slide #86-87

Case study 3: Ratio – recipe

Student's can complete this activity individually in class or for homework.

Most people love chocolate. Here is a recipe for "Chocolate Vanilla Fudge." The recipe makes 30 pieces. You decide to make enough of this fudge to give **eight pieces** to each of your class mates as a small Easter gift. Adapt the recipe for the class of 15 people.

Ingredients:
500 g dark chocolate
75 g unsalted butter
400 ml condensed milk
5 ml vanilla essence

Method:
Grease a 20cm square cake tin. Break the chocolate into pieces and place in a large saucepan with the butter and milk. Heat gently, stirring until the chocolate and butter melt and the mixture is smooth. Do not allow to boil. Remove from the heat. Beat in the vanilla essence, then beat the mixture for a few seconds until thickened. Pour into prepared tin and level the top. Chill in the refrigerator until firm. Tip fudge onto a cutting board and cut into squares.

30 pieces divided by 8 = 3,75 people
Dark chocolate: *500 ÷ 3,75 x 15 = 2000g = 2kg*
Butter: *75 ÷ 3,75 x 15 = 300g*
Condensed milk: *400 ÷ 3,75 x 15 = 1 600ml = 1,6 litres*
Vanilla essence: *5 ÷ 3,75 x 15 = 20 ml*


Lecture slide #88-90

Proportion:

- *Explain the concepts of proportionality*
- *Explain the difference between direct and indirect proportionality (one quantity increasing while the other decreases)*
- *Explain the concept of a rate (used to describe different kinds of quantities, use the word per to separate terms)*

Scale on sketches and maps:

- When a draughtsman sketches a house, he cannot make the sketch of the same size as the house. The sketch has to be much smaller.
- A scale or multiplication factor is included on sketches and maps.
- The scale states that a certain ratio exists between the lengths on the sketch and the lengths on the actual building.



Lecture slide #91-95

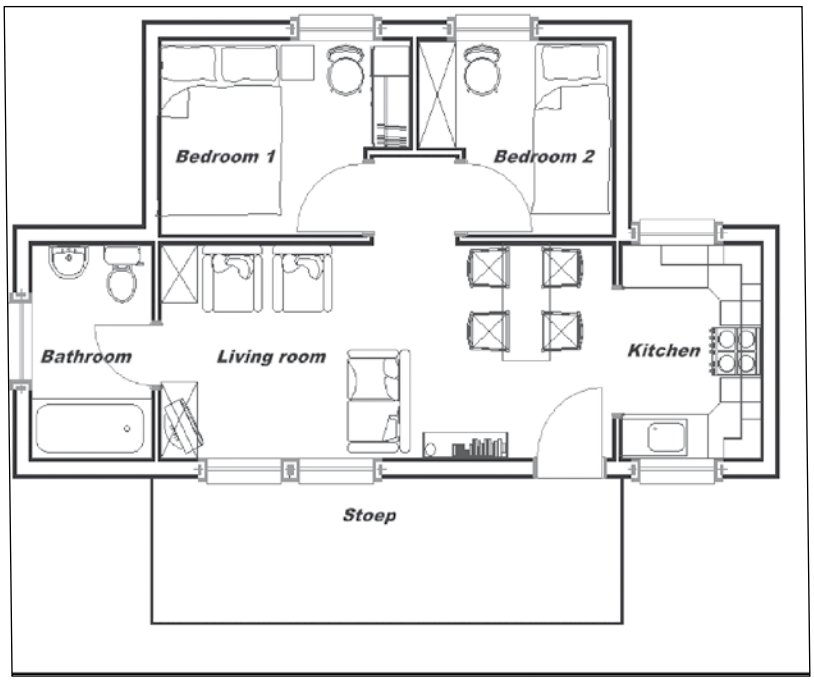
Activity 9
Student's can complete this activity individually in class or for homework.

1. Measure on the sketch of the floor plan of the house below:
   a. The length and width of the two bedrooms.
   b. The length and width of the kitchen.
   c. The floor areas of these three rooms.
   d. Organise the information in a table i.e. tabulate the data.

Room	L (mm)	L (act)	W (mm)	W (act)	Area
Bdrm 1	32	3,8m	30	3,6m	13,68m^2
Bdrm 2	30	3,6m	24	2,88m	10,37m^2
Ktchn	31	2,52m	21	3,72m	9,37m^2

A scale is given for the house of **1 : 120,** which implies that for each one millimetre measured on the sketch, you will measure 120 mm on the actual building. And for 1 cm measured on the sketch, you will measure 120 cm on the actual building. For 2 cm on the sketch you will measure 2 × 120 cm on the actual building etc. Lengths on the building are 120 times that on the sketch.
It is a conversion factor – you are converting the measurements on the sketch to the measurements on the actual building.

Now calculate the actual lengths on the building.
a. The length and width of the bedroom.
b. The length and width of the kitchen.
c. The floor areas of these two rooms.

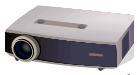


2. Convert the following imperial measurements to metric measurements:

Imperial measurement	Metric measurement
26 inches	*66,144 m*
900 yards	*822,96 m*
60 miles	*96,56 km*
16 pints	*9,09 L*
46 gallons	*209,12 L*
35 ounces	*992,25 g*
96 pounds	*43,55 kg*
60 tons	*60963,6 kg*

A conversion table: The following relationships exist between measurements in these two systems.

Imperial measurement	Metric measurement	Conversion method
1 inch	2,544 cm	times the inches by 2,544
1 foot (12 inches)	0,3048 m	times the feet by 0,3048
1 yard (3 feet)	0,9144 m	times the yards by 0,9144
1 mile (1 760 yards)	1,6093 km	times the miles by 1,6093
1 pint	0,5683 litres	times the pints by 0,5683
1 gallon (8 pints)	4,5461 litres	times the gallons by 4,5461
1 ounce	28,35 g	times the ounces by 28,35
1 pound (16 ounces)	0,4536 kg	times the pounds by 0,4536
1 ton (2 240 pounds)	1016,06 kg	times the ton by 1016,06


Lecture slide #96-102

Case study 4: Calculations and rates

Ashley Abrahams has now moved into a new house. At the end of the month he has to pay his municipal account. He notices that the account consists of two sections. The one section requires payment for basic services such as sewage, rubbish removal, and property tax. The other section requires payment for the supply of water and electricity; there is a basic amount that has to be paid even though no water or electricity is used and then there is a sliding scale for both water and electricity.
Look at his account and answer the questions.

	Amount payable
Section A	
Property Tax	214,46
Rubbish removal	105,30
Sewage	25,58
Basic sewage	27,78
Sub-total (VAT inclusive)	373,12

Section B	**Units used**	**Amount for usage**	**Basic levy**	**Amount payable**
Water	44	*172,62*	12,31	*184,93*
Electricity	*503,5*	186,31	126,14	*312,45*
Total				*870,50*

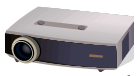
Questions

1. This is a monthly account. How much property tax does he pay in one year?
   1. *Annual property tax = 214,46 x 12 = 2573,52*
2. a. What does "VAT inclusive" mean?
   Value added tax has been included into the total amount.
   b. For the A section of the account he is asked R19,48 VAT inclusive. Calculate on which items of the account the VAT is calculated.
   VAT is 14%. Therefore the amount paid will be 114%.
   Inspect all of the amounts as follows:
   For sewage: 114 % = 25,58
   Therefore 100 % = 100/114 x 25,58/1 = 22,44; and the VAT was 25,58 – 22,44 = 3,14
   For rubbish removal: 114% = 105,30
   Therefore 100 % = 100/114 x 105,30 = 92,37; and the VAT was 105,30 – 92,37 = 12,93 For Basic sewage: 114% = 27,78
   Therefore 100 % = 100/114 x 27,78 = 24,37; and the VAT was 27,78 – 24,37 = 3,41
   VAT is charged on these three items : 3,14 + 12,93 + 3,41 = 19,48
3. For electricity usage there is a fixed rate of 37c per unit. Calculate how many units Ashley and Beverley used during the month.
   For electricity usage there is a fixed rate of 37c per unit. Electricity usage = 18631 ÷ 37 = 503,5 units

4. For water usage there is the following sliding scale:

Kilolitres used	Price per kilolitre
≤ 6	Free
7 - 10	R1,95
11 – 30	R3,88
31 – 55	R6,23
56 – 80	R8,04
≤80	R10,83

   a. Calculate how much the water that they used during the month cost them. Remember that the price on the account is VAT inclusive.
   (6 x 0) + (4 x 1.95) + (20 x 3.88) + (14 x 6.23) = R172,62
   b. It is summer and Ashley waters the garden in the evening as he has been told that it is illegal to water the garden between 10H00 and 16H00. One evening he forgets to close the sprinkler systems. His water usage jumps to 75 kilolitres that month. How much does he have to pay for water?
   6(0) + 4 (1,95) + 20(3.88) + (25 x 6,23) + 20(8.04) = R401,95
5. Calculate his total account for the month.
   (see table above)


Lecture slide #103-107

3. Numbers in measurements

At the end of this outcome, students will be able to:
- Be able to read measuring instruments.
- Be able to estimate measurements.
- Use formulae to calculate measurements.
- Be able to convert measurements between different units.

3.1 Units of measurement and conversion between units of measurement

Explain the use of the following units:
- distance, the **metre (abbreviated as m);**
- volume, the **cubic metre (m^3)** - however, the unit of volume most frequently encountered, is the **litre (ℓ)**;
- mass, the **kilogram (kg);**
- time, the **second (s),**

and the milli and kilo conversions.

Convert
Explain how to convert from milli to the unit to kilo and vice-versa.

3.2 Measuring instruments

Explain the use of various measuring instruments including scales, vernier calipers

Lecture slide #108-118

Activity 10
Conversion of measurements and measuring instruments
Students can complete this activity in class or at home as homework. Note that students may struggle with question 3, so it may be better to do this as a class discussion.

1. Convert the quantities in the first column to the units in the second column:

0,9251 kg	*925,1 g*	241,06 km	*241,06 m*
56,785 kl	*56,785 ℓ*	0,2975 g	*0,2975 mg*
399,001 m	*399001 mm*	290,05 ℓ	*290050 ml*
23986 mm	*23,986 m*	22,652 ml	*0,022652 ℓ*
198,056	*198056 ml*	1250,5 km	*1250500 m*
55,75 kg	*55750 g*	5365 g	*5,365 kg*

2. Complete the table of conversions between measuring units:

Smaller measuring unit	Medium measuring unit	Larger measuring unit
3000 mm	**3 m**	*0,003 km*
25 000ml	**25 ℓ**	*0,025 kl*
5 400 000 mg	**5 400 g**	*5,4 kg*
3 500 mm	**3,5 m**	*0,0035km*
25 850 ml	**25,85 ℓ**	*0,02585kl*
5 400 950 mg	**5 400,95 g**	*5,4 kg*
2 567 mm	*2,567m*	*0,002567 km*
3 592 448 ml	*3 592,448l*	*3,592448kl*
6 793 235 mg	*6 793,235g*	*6,793235kg*
7 200 000 cm	*72 000m*	**72 km**
84 000 000 ml	*84 000 l*	**84 kl**
36 000 000 mg	*36 000g*	**36 kg**
320 000	**320 g**	*0,32kg*
654 000 000 ml	654 000l	*654 kl*
67,4 mm	*6,74cm*	*0,0674 m*
7 783 000 ml	**7 783 ℓ**	*7,783kl*
42 895 000 mg	*42 895g*	**42,895 kg**
652 897 000 ml	*652 897l*	*652,897kl*
89 562 220 cm	**8 956 222 m**	*8 956,222km*

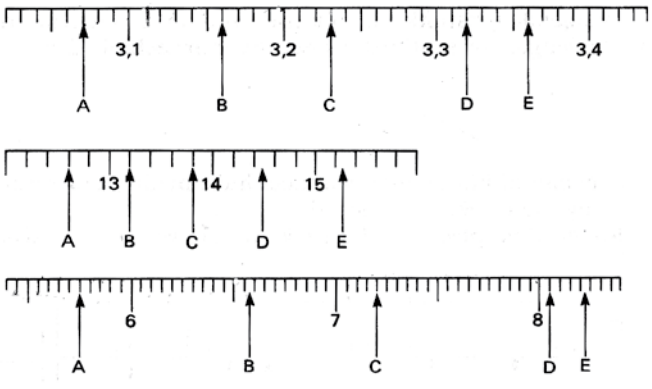
3. Select the correct measuring unit and measuring instrument to complete the table:
   Measuring instruments to select answers from: kitchen scale, tape measure, measuring jug, pipette, burette, trundling wheel, vernier caliper, water displacement method, municipal water meter, bathroom scale.

Dimension to be measured	**Unit of measurement**	**Measuring instrument/method**
Distance ran on a marathon route.	*km*	*Odometer, trundling wheel*
Fluid measured to exact millimeter amount by sucking out of a container.	*ml*	*pipette*
External diameter of an electrical wire.	*mm*	*Vernier caliper*
Weight of a large fish caught from a deep-sea boat.	*kg*	*scale*
Mass of a person before and after going on a diet.	*kg*	*bathroom scale*
Mass of ingredients used to bake a cake.	*g*	*kitchen scale*
Mass of a ship.	*ton*	*water displacement*
Size of virus through a microscope lense.	*nanometre*	*electron microscope*
Amount of water used by a family during one month.	*kl*	*municipal water meter*
Fluid measured in laboratory by opening a small tap in a glass tube to add drop by drop to a mixture.	*ml*	*burette*

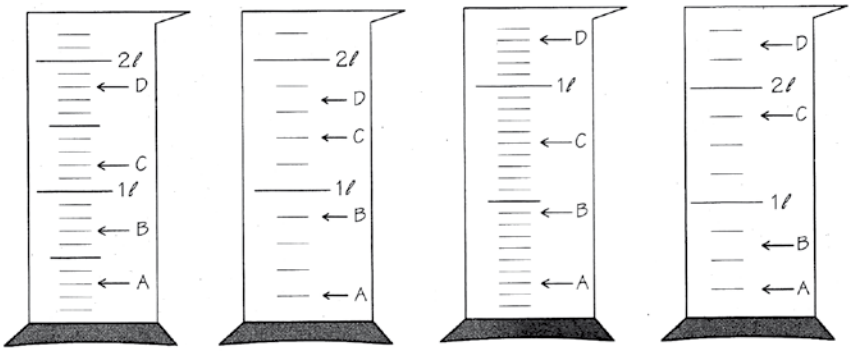
4. Sketch the following:
   a. A thermometer measuring 37,5 degrees Celsius.
   b. An oven dial reading 450 degrees Fahrenheit.
   c. A tape measure reading 45,5 cm.
   d. A bathroom scale showing 64,6 kg.
   e. A line measuring 163 mm.
   f. A vernier caliper measuring 3,56 cm.
   g. A kitchen scale measuring 755 g.

5. Read the measurements below as accurately as possible and give your answers with the correct SI abbreviation for the units of measurement.

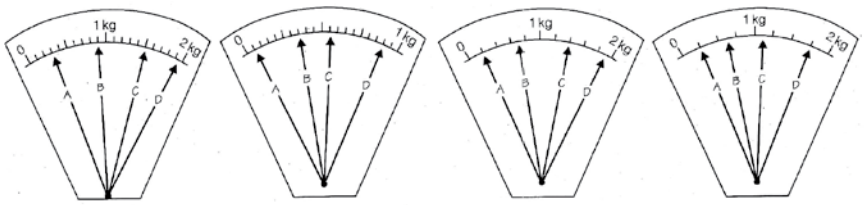
   a. Distance



b. Volume:



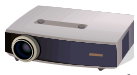
c. Mass:



6. Use the information in the table of conversions to change from Imperial to metric measurements.

Imperial measurement	Metric measurement	Conversion method
1 inch	2,544cm	times the inches by 2,544
1 foot (12 inches)	0,3048 m	times the feet by 0,3048
1 yard (3 feet)	0,9144 m	times the yards by 0,9144
1 mile (1 760 yards)	1,6093 km	times the miles by 1,6093
1 pint	0,5683 litres	times the pints by 0,5683
1 gallon (8 pints)	4,5461 litres	times the gallons by 4,5461
1 ounce	28,35 g	times the ounces by 28,35
1 pound (16 ounces)	0,4536 kg	times the pounds by 0,4536
1 ton (2 240 pounds)	1016,06 kg	times the ton by 1016,06

Imperial measurement	Metric measurement
56 inches	*142,464cm*
750 yards	*685,8m*
85 miles	*136,7905km*
29 pints	*16,4807l*
23,75 gallons	*107,97l*
92,3 ounces	*2,616kg*
196 pounds	*88,9056kg*
25 tons	*25,401 metric tons*



Lecture slide #119-124

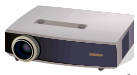
Case study 5: Measurements

Students should work in groups to complete this activity. Since this activity involves no research, students can complete it in class. Note that for question A, there are two different methods for calculating the problem. Since the conversion given between the 3,5m strips and the per square meter costs isn't accurate, students will get different answers. As a challenge, see if students can diagnose why this is the case.

The Drakenstein municipality carries 8% of the provincial housing backlog. In real terms this translates to over 32 000 people on the waiting list for houses in the Drakenstein area. Ashley and Beverley Abrahams will soon move into one of these houses in Fairyland close to Paarl. Use the floor plan given in Activity 15 with a scale of 1:100.

The couple consults you in your capacity as a builder and requests a quote for floor options. Make a table of the information, i.e. organise the information.

a. Ashley and Beverley decide to carpet the living room. The carpet is available in strips 3,5 m wide and costs R90 per square metre which translates into R220 per metre length. Calculate how many square metres they have to order and how much the carpeting for this room will cost them.
   Method A: Total Cost = (9 x 220) + (1 x 90) = R2070
   Method B: Total Cost = (3,6 x 9) = R2916
b. Do the same for the bedroom which they also want to carpet. The carpet that they choose costs R260 per metre length and it is also 3,5 m wide.
   Bedroom 1 area : 13,68 m². Width of carpet = 3,5 m. Use this width for one side of the bedroom.
   Cost: 260 x 3,88 = R1008,80
   Bedroom 2 area : 10,37 m²
   Cost: 260 x 3,8 = R988
   A strip of 5 cm remains open on each side.
c. They want to paint the passage and bathroom floors with a floor paint that specifies a coverage of 10 square metres per litre. Calculate how much paint they have to buy to apply two coats over this area.
   Bathroom area: 18 x 31 mm 2,16 x 3,72 m = 8,04m They need only one litre of paint
d. Ashley wants to surprise Beverley with a tiled floor in the kitchen and finds that the tiles he selected cost R56,90 per square metre. The tiles are square with side length of 30 cm. Calculate how many tiles he will have to order and how much the tiles will cost him.
   Kitchen area: 9,37 m²
   Cost : 9,37 x 56,90 = R533,15
   This is about 9 tiles/m²
   9,37 x 9 = 84,33tiles
   Thus order about 90 tiles to allow for possible breakage.

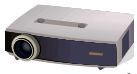


Lecture slide #125

3.3 Using a formula to calculate a measurement

Table of formulae from different problem contexts:

Formula	Subject of formula	Explanation of the letter symbols
SI =	SI = simple interest	P = principal amount; t = time in years; r = rate of interest
V = L.b.h	V= volume of a rectangular prism	L = length; b = breadth; h = height
S =	S = speed	D = distance; t = time
C = (F - 32)	C = degrees Celsius	F = degrees Fahrenheit
C = 2πr	C = circumference of a circle	r = radius of the circle; π = 3,14159
A = πr	A = area of a circle	r = radius of the circle; π = 3,14159
A = πr + 2πrh	A = total external area of a cylinder	r = radius of the base of the cylinder; h = height of the cylinder; π = 3,14159
P = 2(L + b)	P = perimeter of a rectangle	L = length of the rectangle; b = breadth of the rectangle



Lecture slide #126-127

Activity 11 - use of formulae

Students can complete this activity in class or as homework.

1. Calculate with the above formulae using the given substitution values:
   a. SI if P = R3 000; t = 6 years and r = 17%
      R3 060
   b. S if d = 40 km and t = 2,5 hours
      16 km/h
   c. Area of a circle if r = 25 cm
      1963,49cm²
   d. Circumference of a circle if r = 25 cm
      157,08cm
   e. Volume if L = 10 ; b = 7 and h = 25.
      1759 cubic units
   f. P if L = 75 and b = 25.
      200 units
   g. Degrees C if degrees F = 212.
      100 Degrees Celcius

2. Select the correct formula from the above table to calculate the following problems by substituting the given values:
   a. Calculate the average speed of an aircraft that takes 3 hours to fly 1 800 km.
      600km.h⁻¹
   b. Calculate the circumference of a circle with radius 1,5 m.
      9,42m
   c. Convert 76 degrees Fahrenheit to degrees Celsius.
      24,44 degrees Celcius
   d. What is the total external surface area of a cylinder, which has a radius of 25 cm and a height of 350 mm.
      157,08cm

e. How many cubic metres of water is there in a swimming pool which is 15 metres long, 5 metres wide and 200 centimetres deep?
150 cubic metres

f. If you borrow R800 from a friend and he charges you simple interest at a rate of 6% per year, calculate the amount of interest that you have to add to the initial amount when repaying your friend after 5 years.
R240

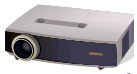
g. What is the length of fencing that a farmer has to buy to fence his farm which is 2 000 m long and 850 m wide?
5700m wide

Case study 6

You have to order the correct volume of paint for the outside surface of a cylinder. The cylinder has a radius of 1,5 m and a height of 3,25 m.
Use a value of 3,14159 for π and calculate how much paint to order.
Formula for total external surface area of a cylinder $= \pi r^2 + 2\pi rh$
Area = 14,137155 + 30,630502 = 44,77m²
The covering properties of the paint will then determine the volume to be ordered.


Lecture slide #128

3.4 Measurement values determined by indirect methods


Lecture slide #129

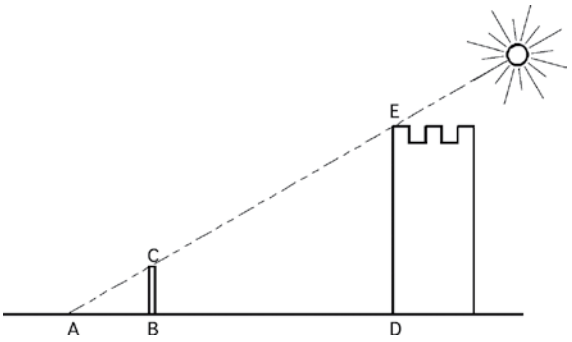
Indirect measurement is when you get a measurement of something by measuring something else. The sought-for value is found on the basis of a known relationship. Give students examples of using indirect measurement.


Lecture slide #130-131

Activity 12

Since this is a group activity, students should be given time to complete this activity in class. For question 2, students should assume that the walking speed is 5 km / h.

1. Study the information on ratio on page 21 and then answer the following. In the sketch C is the top of a stick BC which is 2 metres long. AB is the shadow of the stick and is 2,5m. If AD is 23m, how tall is the tower ED?



Tower = (23 / 2.5) x 2 = 25,6 metres

2. If the scale on a map is given as 1:250 000 calculate how long it will take you to walk a map-measured distance of 16cm.
Distance = 16 x 250 000 = 4 million cm = 40km. Assuming a walking speed of 5km/h gives 8 hours.

3. The traffic department tells you that if you keep to the speed limit of 60km/h, you will catch all the robots green along one 6km stretch of the main road in a town. If the robots are all 500m apart:
   a. How many robots are there?
      13 robots
   b. How long does it take between robots?
      30 seconds

3.5 Mixing rate

Mixing rate is an example of using ratio. If you are studying hair dressing, you might use this knowledge in the mixing of tint to peroxide.
Revise with students the concepts of rates and proportion so that they can complete the activity.

Lecture slide #132-134

Activity 13
Since this is an individual activity, students can complete this activity in class or for homework. 1 teaspoon = 5ml.

1. A worried mother is given the following anti-dehydration advice for her small son who has diarrhoea: "Don't give him merely water. Instead add half a teaspoon of salt and eight teaspoons of sugar to each litre of water."
   a. Translate/convert this information into millilitres.
      2,5 : 40 : 1000
   b. Calculate how much salt and sugar must be added to 500 ml of water.
      1,25 : 20 : 500
   c. You are a health worker and there is an outbreak of diarrhoea in your vicinity. Think of an easy way to mix large volumes of water, salt and sugar in the correct ratio for the community.
      See above ratio
2. To sterilise unsafe drinking water a health worker uses one teaspoon of bleach to 25 litres of water.
   a. Express this ratio in millilitres and then simplify the ratio.
      5 : 25 000 = 1: 5 000
   b. Calculate how much bleach the municipality should add per kilolitre of water.
      200ml
3. Brandy has an alcohol content of 34 g/100 ml. If a 100 kg man has consumed 5 tots of brandy his blood alcohol content is 0,121 g/100 ml. If the brandy is consumed over a period of 5 hours and the elimination rate from the body is 0,015 g per hour, what will his blood alcohol concentration be after the five hours?
   0,121 - (0,015 x 5) = 0,046 gm / 100ml