HOW A CASIO SCIENTIFIC CALCULATOR CAN ASSIST MATHS LITERACY LEARNERS WITH CALCULATIONS

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The Maths Literacy CAPS (p8) states: *As a rule of thumb, if the required calculations cannot be performed using a basic four-function calculator, then the calculation is, in all likelihood, not appropriate for Maths Literacy.*

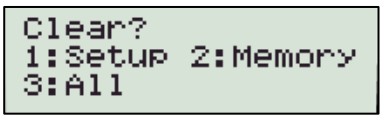
Contrary to what is stated in the CAPS, I feel that Maths Literacy learners should be using a scientific calculator as it makes the calculations that they are required to do in both Paper 1 and Paper 2 of the matric exam much easier to do.

In this workshop we will be looking at some of the functions of the CASIO *fx-82ZA PLUS* that would assist the Maths Literacy learner and then use these functions to solve selected Maths Literacy questions.

BEFORE YOU START: CLEAR (initialise) your calculator

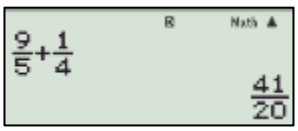
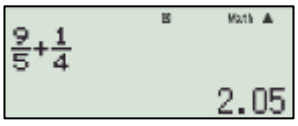
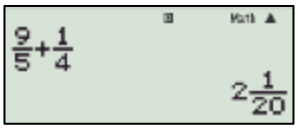
1) Access the ***CLEAR Setup*** by pressing [SHIFT] [9]

2) Choose 3:All by pressing [3] [=] [AC]



WORKING WITH FRACTIONS

1) Calculate $\frac{9}{5}+\frac{1}{4}$.
Write the answer as an improper fraction, as a decimal and as a mixed number.

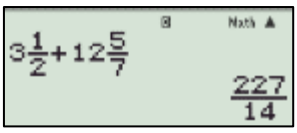
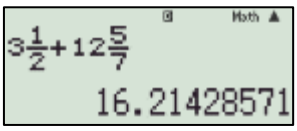
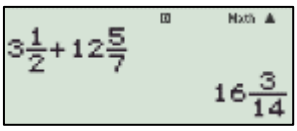
CALCULATION	KEY SEQUENCE	DISPLAY
$\frac{9}{5}+\frac{1}{4}=\frac{41}{20}$	[9] [▭] [5] [▶] [+] [1] [▭] [4] [▶] [=]	
$\frac{9}{5}+\frac{1}{4}=\frac{41}{20}=2{,}05$	[S⇔D]	
$\frac{9}{5}+\frac{1}{4}=\frac{41}{20}=2\frac{1}{20}$	[SHIFT] [S⇔D]	

THE MIXED NUMBER KEY

You get to the mixed number key by pressing SHIFT [mixed number key]

2) Calculate $3\frac{1}{2}+12\frac{5}{7}$

Write the answer as an improper fraction, as a decimal and as a mixed number.

CALCULATION	KEY SEQUENCE	DISPLAY
$3\frac{1}{2}+12\frac{5}{7}=\frac{227}{14}$	SHIFT [mixed number key] 3 ▶ 1 ▶ 2 ▶ + SHIFT [mixed number key] 1 2 ▶ 5 ▶ 7 ▶ =	
$3\frac{1}{2}+12\frac{5}{7}=16{,}214\ 285\ 71$	S⇔D	
$3\frac{1}{2}+12\frac{5}{7}=16\frac{3}{14}$	SHIFT S⇔D	

EXERCISE 1

Calculate the following and write the answers as improper fractions, decimals and mixed numbers (where possible)

1. $\frac{3}{4}+\frac{5}{6}=$…… $\frac{19}{12}$; 1,583 333 333; $1\frac{7}{12}$
2. $\frac{9}{4}-\frac{1}{8}=$…… $\frac{17}{8}$; 2,125; $2\frac{1}{8}$
3. $\frac{8}{3}\times\frac{7}{2}=$…… $\frac{28}{3}$; 9,333 333 333; $9\frac{1}{3}$
4. $\frac{1}{2}\div\frac{1}{3}=$…… $\frac{3}{2}$; 1,5; $1\frac{1}{2}$
5. $2\frac{3}{4}\times 4\frac{5}{12}=$…… $\frac{583}{48}$; 12,145 833 33; $12\frac{7}{48}$
6. $-1\frac{1}{2}-3\frac{1}{4}=$…… $-\frac{19}{4}$; -4,75; $-4\frac{3}{4}$
7. $3\frac{1}{2}\times\frac{5}{7}\div 2\frac{1}{5}=$…… $\frac{25}{22}$; 1,136 363 636; $1\frac{3}{22}$
8. $3\frac{1}{2}-2\frac{1}{4}\div 2\frac{3}{4}=$…… $\frac{59}{22}$; 2,681 818 182; $2\frac{15}{22}$

CLEARING THE SCREEN

- ONLY use [ON] when switching the calculator on.
- To clear your screen, rather use [AC]. This saves your calculator's temporary memory. (See the ▲ in the top right corner)
- Continue pressing ▲ to review previous calculations

ROUNDING OFF NUMBERS

For every Maths Literacy exam, the following point is made under INSTRUCTIONS AND INFORMATION (page 2 of each exam):

> 7. Round off ALL final answers appropriately according to the given context unless stated otherwise

WHAT TO DO	KEY SEQUENCE	DISPLAY
a) Access ***FIX*** For 2 decimal places, press ***2***	[SHIFT] [MODE] [6] [2]	Fix 0~9?
b) To change to 3 decimal places, ***access FIX again*** and press ***3***	[SHIFT] [MODE] [6] [3]	Fix 0~9?
c) To ***clear FIX, access NORM.*** • **Norm 1** is the default setting and gives larger numbers in scientific notation. • **Norm 2** is generally preferrred as answers are only expressed in scientific notation when they are too big to fit on the screen. • Press ***2***	[SHIFT] [MODE] [8] [2]	Norm 1~2?

EXERCISE 2

Use FIX to write each of the answers in Exercise 1

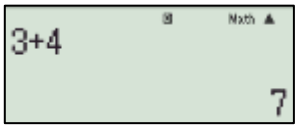
a) correct to 2 decimal places
b) correct to 3 decimal places.

1. 1,5833	a) …….	b) …….
2. 2,125	a) …….	b) …….
3. 9,333 333 333	a) …….	b) ……..
4. 1,5	a) …….	b) …….
5. 12,145 812	a) …….	b) …….
6. – 4,75	a) …….	b) …….
7. 1,832 516	a) …….	b) …….

CORRECTING ERRORS & INSERTING MISSING NUMBERS

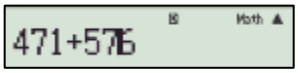
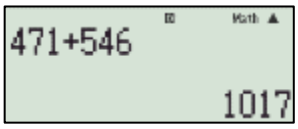
Sometimes you make a mistake when you type in the number

1) CORRECTING THE LAST NUMBER OR OPERATION YOU ENTERED:

WHAT TO DO	KEY SEQUENCE	DISPLAY
Suppose you want to enter 3 + 4 but enter 3 + 5 by mistake: use the DEL to correct the error	Enter 3 + 5: 3 + 5 Delete the 5 using the DEL key and enter the 4 instead: DEL 4 =	

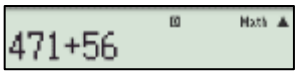
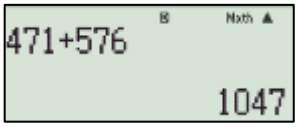
2) CORRECTING OTHER ERRORS (EITHER NUMBERS OR OPERATIONS) USING THE NAVIGATION BUTTON


The navigation button

WHAT TO DO	KEY SEQUENCE	DISPLAY
Suppose you want to enter 471 + 546 but enter 471 + 576: use the navigation button and DEL	Enter 471 + 576 4 7 1 + 5 7 6 Use the ***left arrow*** to get to the ***right*** of the wrong number. Delete the 7; type in the 4 and then the equals sign ◀ DEL 4 =	 

NOTE: By using either of these methods you can replace one or more digits or one or more operation keys (+; −; ×; ÷)

3) INSERTING MISSING NUMBERS OR OPERATIONS

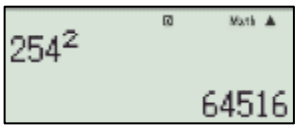
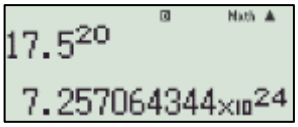
WHAT TO DO	KEY SEQUENCE	DISPLAY
Suppose you typed 471 + 56 but really wanted to type 471 + 576: use the navigation key to get to the correct place in the number and type in the missing digit.	Enter 471 + 56 4 7 1 + 5 6 Use the ***left arrow*** to get to the ***right*** of the missing digit. Type in the 7 and then the equals sign. ◀ 7 =	 

RAISING TO A POWER AND FINDING A ROOT

1) RAISING TO A POWER

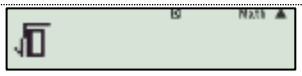
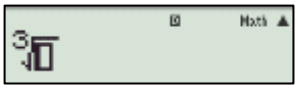
The CASIO *fx-82ZA PLUS* has three keys for raising to a power

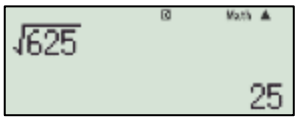
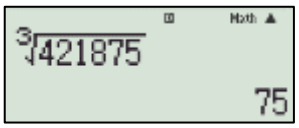
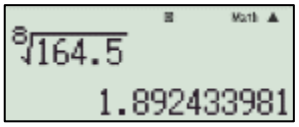
- x^2 the squaring key
- x^3 the cubing key
- $x^{\blacksquare}$ raising to any power.

CALCULATION	KEY SEQUENCE	DISPLAY
a) Calculate 254^2	2 5 4 x^2 =	
b) Calculate $17{,}5^{20}$ The answer is too big to fit in the display so the calculator automatically converts the answer to scientific notation	1 7 • 5 $x^{\blacksquare}$ 2 0 =	

2) FINDING A ROOT

The CASIO *fx-82ZA PLUS* has three keys for finding a root

Finding a square root of a number	$\sqrt{\blacksquare}$	
Finding a cube root of a number	SHIFT $\sqrt{\blacksquare}$	
Finding any root of a number	SHIFT $x^{\blacksquare}$	

CALCULATION	KEY SEQUENCE	DISPLAY
a) Calculate $\sqrt{625}$	$\sqrt{\blacksquare}$ 6 2 5 =	
b) Calculate $\sqrt[3]{421\,875}$	SHIFT $\sqrt{\blacksquare}$ 4 2 1 8 7 5 =	
c) Calculate $\sqrt[8]{164{,}5}$	SHIFT $x^{\blacksquare}$ 8 ▶ 1 6 4 • 5 =	

EXERCISE 3

Use your calculator find the following answers:

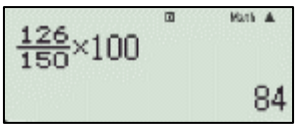
1) 17^2	289
2) 8^{10}	1 073 741 824
3) $(0{,}4)^6$ *(you do NOT have to type the brackets first)*	$\frac{64}{15625} = 0{,}004096$
4) $5^{0,4}$	1,903 653 939
5) $\sqrt{156{,}25}$	$\frac{25}{2} = 12{,}5$
6) $\sqrt[3]{1\,124{,}864}$	$\frac{52}{5} = 10{,}4$
7) $2^6 + 3^4$	145
8) $(4^2)^5$	1 048 576
9) $\sqrt{\frac{9}{4}}$	$\frac{3}{2} = 1{,}5$
10) $\sqrt[3]{19\,683} - \sqrt[3]{729}$	18
11) $\sqrt[7]{78\,125} - \sqrt[6]{1\,000}$	1,837 722 34
12) $\sqrt{13^{0,5} - 2} \times \sqrt{13^{0,5} + 2}$	3

USING PERCENTAGES

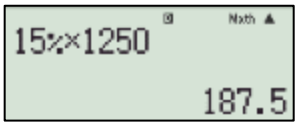
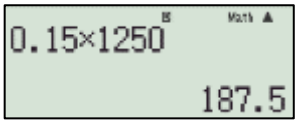
The CASIO *fx-82ZA PLUS* has a percentage key which is found by entering [SHIFT] [(]

Remember that $\mathbf{27\% = \frac{27}{100} = 0,27}$

1) WRITING A FRACTION AS A PERCENTAGE

CALCULATION	KEY SEQUENCE	DISPLAY
Write 126 out of 150 as a percentage	Enter $\frac{126}{150}$ [1] [2] [6] [▭] [1] [5] [0] Multiply by 100 (actually by 100%) [▶] [×] [1] [0] [0] [=] Remember to add in a % sign when writing down the answers.	

2) FINDING A PERCENTAGE OF A QUANTITY

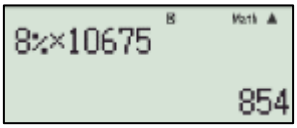
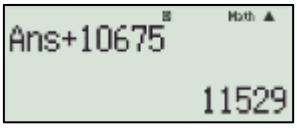
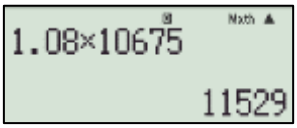
CALCULATION	KEY SEQUENCE	DISPLAY
Find 15% of 1 250	Enter 15% [1] [5] [SHIFT] [(] Multiply by 1 250 [×] [1] [2] [5] [0] [=] Write as a decimal [S⇔D]	
ALTERNATE METHOD 15% = 0,15	Enter 0,15 [0] [•] [1] [5] Multiply by 1 250 [×] [1] [2] [5] [0] [=] Write as a decimal [S⇔D]	

3) PERCENTAGE CHANGES

The increase or decrease in a quantity (for example profit and loss; price rises and discounts) is often described as a percentage.

To ***increase a quantity by a percentage:***

- Either you can work out the actual increase and then add it to the original quantity to find the actual new quantity, OR
- You take the original amount to be 100% and then increase or decrease it by the percentage change.
  - This means that a 25% increase means that you have to find (100% + 25%) = 125% = 1,25 of an amount.
  - It also means that a 25% decrease means that you have to find (100% – 25%) = 75% = 0,75 of an amount.

CALCULATION	KEY SEQUENCE	DISPLAY
The 2009 the population of a town was 10 675. By 2013 the population had increased by 8%. What was the population in 2013?	Enter 8% [8] [SHIFT] [(] Multiply by 10 675 [×] [1] [0] [6] [7] [5] [=] Add the new amount to 10 675 [+] [1] [0] [6] [7] [5] [=]	 
ALTERNATE METHOD An 8% increase means that the original amount (100%) has been increased by 8%. 100% + 8% = 108%. Find 108% of 10 675 = 1,08 of 10 675	Enter 1,08 [1] [•] [0] [8] Multiply by 12 675 [×] [1] [0] [6] [7] [5] [=]	

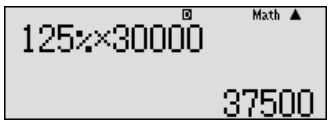
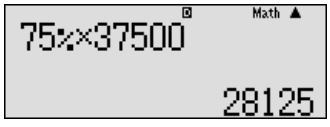
4) FINDING THE ORIGINAL AMOUNT

If you are given the final amount and the percentage change, you can find the original amount.

CALCULATION	SOLUTION	KEY SEQUENCE & DISPLAY
A shop sells a t-shirt for R72 and makes a profit of 20% when it is sold. What did the shop pay for the t-shirt?	$\text{Cost price} = 100\%$ $\text{Selling price} = 120\% \times \text{Cost price}$ $\therefore \text{Cost price} = \frac{\text{Selling price}}{120\%}$ $= \frac{\text{R72}}{120\%} = \text{R60}$	Enter $= \frac{\text{R72}}{120\%}$ [7] [2] [▤] [1] [2] [0] [SHIFT] [(] [=] 

5) INCREASING AND DECREASING BY THE SAME PERCENTAGE

It is important to realise that an increase of *x*% is not cancelled by a decrease of *x*%. This is because the percentage change is always found as a percentage of the original amount.

CALCULATION	SOLUTION	KEY SEQUENCE & DISPLAY
A car dealer bought a second-hand car for R30 000 and sold it at a profit of 25% The buyer then had to sell the car back to the dealer at a loss of 25%. How much did the buyer get for the car?	For the car dealer: Cost price = R30 000 Selling price = (100% + 25%) × Cost price = 125% × R30 000 = R37 500 For the buyer: Cost price = R37 500 Selling price = (100% - 25%) × R37 500 = 75% × R37 500 = R28 125	Enter 125% × R30 000 [1] [2] [5] [SHIFT] [(] [×] [3] [0] [0] [0] [0] [=]  Enter 75% × R37 500 [7] [5] [SHIFT] [(] [×] [3] [7] [5] [0] [0] [=] 

EXERCISE 4

Use your calculator find the following answers:

1) Last year there were 480 sheep on a farm. This year the flock had increased by 15%. How many sheep are there now on the farm? [552 sheep]

2) The price of oranges at a local supermarket has fallen by 5% this week. Last week they cost R15,40 per bag. What is the cost of the oranges this week? [R14,63]

3) The normal price of a microwave is R960. It goes on sale at two different shops.
The Central Store offers ¼ off the normal price. [R720]
The Super Market offers 20% off the normal price. [R768]
How much more will the microwave cost at the Super Market than at the Central Store? [R48]

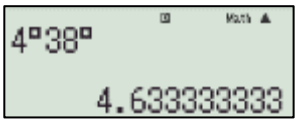
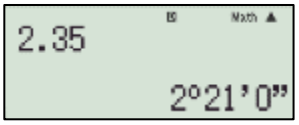
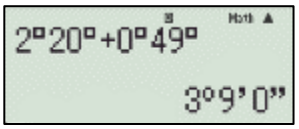
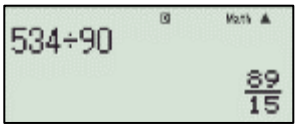
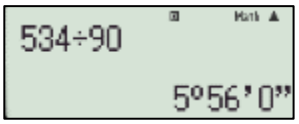
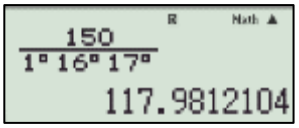
4) A shopkeeper sells jeans for R400 and shirts for R260. He makes a 25% profit on the jeans and a 30% profit on the shirts. How much did he pay for each item? [R320 and R200]

5) At the beginning of 2010 there were 800 learners in a particular school.
During 2010 the number of learners at the school increased by 20%. [960]
During 2011 the number of learners decreased by 20%.
How many learners were there at the school at the end of 2011? [768]

TIME CALCULATIONS

The ***Degree, Minute, Second key*** [°'''] can also be used for ***Hours, Minutes and Seconds.***

- To enter a time reading into the calculator, enter ***hours*** [°'''] ***minutes*** [°'''] ***seconds*** [°'''].
- Note that you must always input something for the hours and minutes, even if they are zero.

CALCULATION	KEY SEQUENCE	DISPLAY
a) Write 4 h 38 min as a decimal	[4] [°'''] [3] [8] [°'''] [=] [S⇔D] [S⇔D]	
b) Write 2,35 h in hours and minutes	[2] [•] [3] [5] [=] [°'''] Note that you must first press enter before pressing the Degree-Minute-Second key The answer is 2 hour 21 minutes	
c) Find the sum of 2 h 20 min and 49 min	[2] [°'''] [2] [0] [°'''] [+] [0] [°'''] [4] [9] [°'''] [=] The answer is 3 hours 9 minutes	
d) How long will it take to travel a distance of 534 km at an average speed of 90 km/h? Give the answer in hours, minutes and seconds.	Time $= \frac{\text{distance}}{\text{speed}} = \frac{534}{90}$ [5] [3] [4] [÷] [9] [0] [=] Convert to hours and minutes: [°'''] The answer is 5 hours 56 minutes	 
e) At what speed are you travelling if it takes you 1 hour 16 minutes and 17 seconds to travel 150 km? Give the answer correct to the nearest whole number.	Speed $= \frac{\text{distance}}{\text{time}} = \frac{150\text{ km}}{1\text{h }16\text{ min }17\text{sec}}$ [▤] [1] [5] [0] [▶] [1] [°'''] [1] [6] [°'''] [1] [7] [°'''] [=] Speed = 118 km/h	

EXERCISE 5

Use your calculator find the following answers:

1) Give these times in hours and minutes
   a) 0,25 hours
   b) 3,7 hours
   c) 1,266 666 666 hours
   d) 7,061 666 666 hours

a) 0 h 15 min
b) 3 h 42 min
c) 1 h 16 min
d) 7 h 3 min 42 sec

2) These times are given in seconds. Change them to minutes and seconds or hours, minutes and seconds as necessary
   a) 243 sec
   b) 1 482 sec
   c) 12 733 sec
   d) 17 394 sec

a) 4 min 3 sec
b) 24 min 42 sec
c) 3 h 32 min 13 sec
d) 4 h 49 min 54 sec

3) Charlie drove 385 km at an average speed of 90 km/h. How long did his journey take?

4 h 16 min 40 sec

4) In a 10 km race, one of the competitors starts at 11:48 and finishes at 13:03.
   a) How long did this competitor take to run the race?
   b) What is the competitor's average speed?

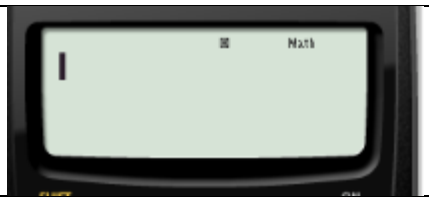
a) 1 h 15 min
b) 8 km/h

5) Mohammed cycles from his home to work every day. His average time for the journey is 20 minutes. He lives approximately 6,5 km from work. Estimate his average cycling speed in kilometres per hour for the journey.

19,5 km/h

APPENDIX:
GETTING TO KNOW THE KEYS OF THE CALCULATOR

When you switch the calculator on, this is what the is shown on the display



THE MODE KEY

When you press the MODE key, you can choose your ***CALCULATION MODE***:

1:COMP	This is the ***Computational mode.*** This is the mode to use for basic mathematical calculations.
2:STAT	This is the ***Statistics mode***. It is used for data handling and regression calculations.
3:TABLE	This is the ***Table mode***. A table comes up on the display.

THE SETUP KEY

When you press the SHIFT MODE key, you get **SETUP:**

a) Changing how the numbers are shown on the display:	
1:MthIO	This is the ***Maths Input/Output setup***. This setup gives the numbers in the display as fractions
2:LineIO	This is the ***Linear Input/Output setup***. This setup gives the numbers in the display on one line.

b) Changing the angle unit:	
3:Deg	This gives the angles in ***Degrees***.
4:Rad	This gives the angles in ***Radians.***
5:Gra	This gives the angles in ***Gradians.***

c) Changing how calculation results are displayed:	
6:Fix	This fixes the ***number of decimal places***, from 0 to 9. Calculation results are rounded off to the specified digit before being displayed.
7:Sci	This gives a number in ***scientific notation***. The value you specify (from 1 to 10) controls the number of significant digits. Calculation results are rounded off to the specified digit before being displayed.
8:Norm	This cancels the currently configured Fix and Sci settings ***Norm 1*** converts from a fraction to scientific notation ***Norm 2*** converts from a fraction to a decimal and is the form usually used.

The ***arrow*** at the top right of the screen indicates that there is ANOTHER screen below this one.

Press the down arrow ⊛ on the navigation button to get to the SECOND screen.


Navigation Button

SETUP (continued)

d) Changing how fractions larger than 1 are shown on the display:	
1:ab/c	This specifies that fractions are shown as ***mixed numbers.***
2:d/c	This specifies that fractions are shown as ***improper fractions.***

e) The rest of the setup options	
3:STAT	This specifies ***whether or not to display a FREQ (frequency) column*** in the Mode Stat Editor
4:TABLE	This specifies ***whether to use the table function with only one function: f(x) or with two functions: f(x) and g(x)***
5:Disp	This specifies w***hether to show a dot or a comma*** in the display to show a decimal.
6:APO	APO stands for ***Auto Power Off***. You can choose whether the calculator switches itself off automatically after ***1: 10 minutes or 2: 60 minutes***.
7:◀CONT▶	CONT stands for ***Contrast***.You can make the screen lighter or darker by pressing ◀ or ▶.