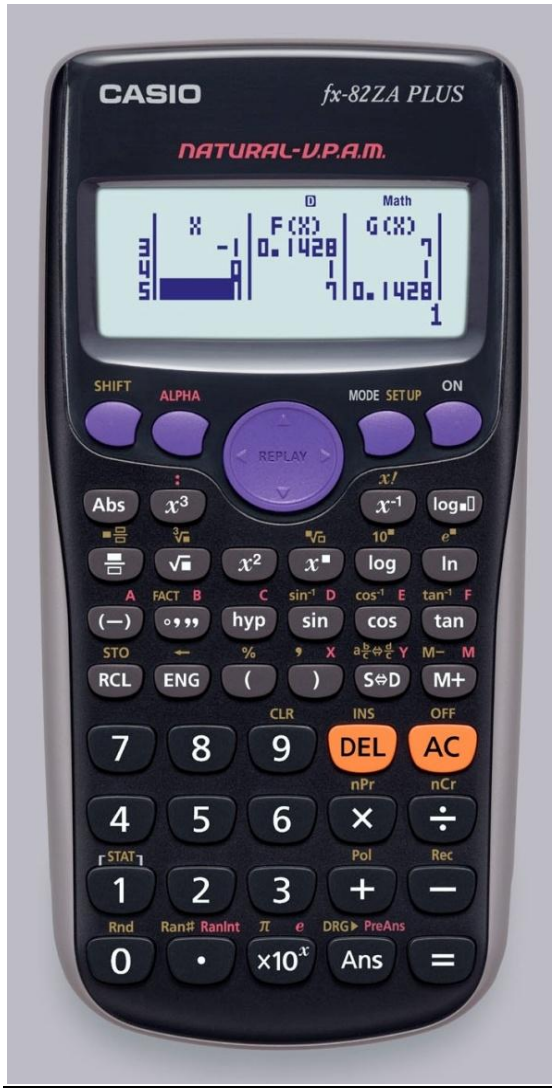
CASIO

FX-82ZA PLUS



1. **MthI0 (Maths Input / Output format)**
2. LineI0 (Linear Input / Output format)
3. **Deg (Degrees – angle unit)**
4. Rad (Radians – angle unit)
5. Gra (Gradians – angle unit)
6. Fix (number of Decimal places)
7. Sci (number of Significant digits)
8. **Norm (Exponential display range)**

▼

1. ab/c (Mixed fraction format)
2. **d/c (Improper fraction format)**
3. STAT (Frequency column on / **off**)
4. TABLE (f(*x*) / **f(*x*) and g(*x*)**)
5. Disp (Decimal Point: **Dot** / Comma)
6. Auto Power Off (**10min** / 60min)
7. CONT (Adjusts display contrast)

(BOLD = default settings)

[MODE] 1. Computational – normal scientific calculations
2. Statistics – data handling & regression
3. Table – graph work & functions

How to CLEAR (Initialise) your calculator:

SHIFT 9 3 = AC

This returns the mode & setup to the initial default settings & clears the memory.

MODE 1: Computational

COMMON FRACTIONS

$\frac{9}{5}+\frac{1}{4}$

9 ab/c 5 ▶ + 1 ab/c 4 =

$= \frac{41}{20}$ Improper fraction

= 2,05 Decimal

$= 2\frac{1}{20}$ Mixed number

Convert solution to a decimal

S⇔D

Convert solution to a mixed number

SHIFT S⇔D

MIXED NUMBERS

SHIFT ab/c

$2\frac{3}{4}\times 4\frac{5}{12}$

2 SHIFT ab/c 3 ▶ 4 ▶ × 4 SHIFT ab/c 5 ▶ 1 2 =

$= \frac{583}{48}$ **OR** 12,14583333 **OR** $12\frac{7}{48}$

Casio Scientific Technology Tip

ONLY use ON when switching the scientific calculator on.

To clear your screen, rather use AC this saves your calculator's temporary memory (see the ▲ in the top right corner of the screen)

Use ▲ ▼ to review previous calculations.

EXPONENTS

$2^6 + 3^2$

2 $x^{\blacksquare}$ 6 ▶ + 3 x^2 =

= 73

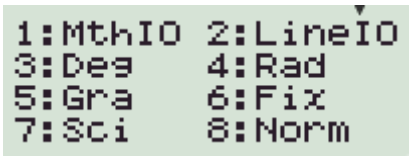
$(4^2)^5$

(4 x^2) $x^{\blacksquare}$ 5 =

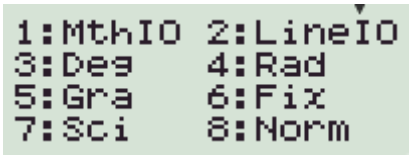
= 1 048 576

SURDS	  
$\sqrt{\frac{9}{4}}$ √■ 9 ▤ 4 = $=\frac{3}{2}$ **OR** 1,5 **OR** $1\frac{1}{2}$	$\sqrt[7]{78125}-\sqrt[6]{1000}$ 7 SHIFT $x^{\blacksquare}$ 7 8 1 2 5 ▶ − 6 SHIFT $x^{\blacksquare}$ 1 0 0 0 = =1,83772234

How to set your calculator to round off to 2 decimal places

	SHIFT MODE 6 Now select decimal places 2	

How to clear your calculator from rounding off to 2 decimal places

	SHIFT MODE 8 Select 2	
Norm 1 is the **default setting** and gives answers in scientific notation. e.g. $1 \div 50\,000 = 2 \times 10^{-5}$ Norm 2 is **generally preferred** as answers are only expressed in scientific notation when they are too big to fit on the screen. e.g. $1 \div 50\,000 = 0.00002$		

PERCENTAGES

A. WRITING A FRACTION AS A PERCENTAGE

Write $\frac{126}{150}$ as a percentage. = 84%	1 2 6 ▤ 1 5 0 ▶ × 1 0 0 =

B. FINDING THE PERCENTAGE OF AN AMOUNT

Find 15% of 1 250. = 187,5	1 5 SHIFT (× 1 2 5 0 = S⇔D

C. PERCENTAGE INCREASE

Increase 2 000 by 15% = 2 300	2 0 0 0 + 2 0 0 0 × 1 5 SHIFT (=

D. PERCENTAGE DECREASE

Decrease 2 000 by 15% = 1 700	2 0 0 0 − 2 0 0 0 × 1 5 SHIFT (=

SCIENTIFIC NOTATION

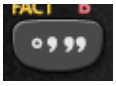
1. CONVERTING FROM SCIENTIFIC NOTATION TO A WHOLE NUMBER OR DECIMAL

Convert to a whole number 3×10^4 =30 000	 3 ×10^x 4 =

2. CONVERTING TO SCIENTIFIC NOTATION

Convert to scientific notation with four significant digits: 12 673 1 2 6 7 3 = $=1{,}267 \times 10^4$	Set your calculator to **SCIENTIFIC NOTATION**: SHIFT MODE 7 Select how many **significant digits** Sci 0~9? 4

HOUR/DEGREE, MINUTE, SECOND CALCULATIONS



A. CONVERTING FROM A DECIMAL TO HOURS, MINUTES & SECONDS

How long will it take to travel a distance of 534km, if your average speed is 90km/h?

$$\text{Time} = \frac{\text{distance}}{\text{speed}} = \frac{534}{90}$$

5 3 4 ÷ 9 0 = S⇔D

$= 9{,}333\ldots$ °’’’

= 5 hours 56 minutes 0 seconds

B. CONVERTING FROM HOURS, MINUTES & SECONDS TO A DECIMAL

At what speed are you travelling if 150km takes 1 hour 16 minutes and 17 seconds?

$$\text{Speed} = \frac{\text{distance}}{\text{time}} = \frac{150}{1°16°17°}$$

[1] [5] [0] [▪] [1] [°'"] [1] [6] [°'"] [1] [7] [°'"] [=]

$$= 117{,}981... \text{km/h}$$

PRIME FACTORISATION

[FACT B °'"] [SHIFT] [°'"]

Find the prime factors of 458 631 $=3^2 \times 131 \times 389$	[4] [5] [8] [6] [3] [1] [=] [SHIFT] [°'"]

TRIGONOMETRY

A. FINDING THE VALUE OF TRIG IDENTITIES

[sin] [cos] [tan]

Find the value of:

$$\frac{\sin 315° \cos 150°}{\tan 60° \cos 300°}$$

[sin] [3] [1] [5] [)] [cos] [1] [5] [0] [)] [▪] [tan] [6] [0] [)] [cos] [3] [0] [0] [)] [=]

$$= \frac{\sqrt{2}}{2}$$

B. FINDING TRIG ANGLES

[sin⁻¹ D sin] [SHIFT] [sin] [cos⁻¹ E cos] [SHIFT] [cos] [tan⁻¹ F tan] [SHIFT] [tan]

Find the value of θ

$$\sin\theta = \frac{\sqrt{3}}{2}$$

[SHIFT] [sin] [√▪] [3] [▶] [▪] [2] [=] $\theta = 60°$

MEMORIES (A, B, C, D, E, F, X, Y)

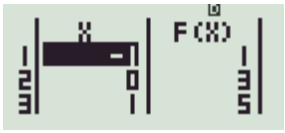
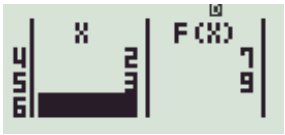
To assign the result of 3 + 5 to variable A	3 + 5 SHIFT RCL (−)
To multiply the contents of variable A by 10	ALPHA (−) × 1 0 =
To recall the contents of variable A	RCL (−)

On the calculator financial maths calculations are done as a continuous calculation.
If you use the memory keys you do not have to key in the same numbers repeatedly.

MODE 3: Table

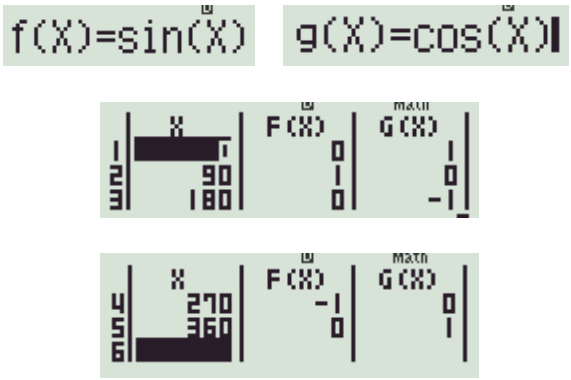
A.GENERATE TABLES TO SKETCH GRAPHS

1. $y = 2x + 3$ $\quad -1 \leq x \leq 3$

Key Sequence:	**On screen:**
• Input *f(x)*formula = **to input the variable *x*:** ALPHA) • *g(x)* = = • Set boundaries for your table: Start? (−) 1 = End? 3 = Step? 1 = • And the co-ordinates to plot are: (-1 ; 1)(0 ; 3)(1 ; 5)(2 ; 7)(3 ; 9)	f(X)=2X+3  

Remember: AC returns you to the formula

2. Compare: y = sin *x* and y = cos *x* for *x* ε [0° ; 360°]

Key Sequence:	**On screen:**
• Input *f(x)* formula = • Input *g(x)* formula = • Set boundaries for your table: Start? 0 = End? 3 6 0 = **You need to carefully select the STEPS (or INTERVALS) for your graph. Consider the equations as a guideline.** Step? 9 0 =	

B. FINANCIAL MATHS IN TABLE MODE

R1 000 is invested at a compound interest rate of 10% per annum. Calculate the value of the investment after:

i. 1 year
ii. 2 years
iii. 3 years
iv. 4 years

It is useful to do this in TABLE mode because n is changing.

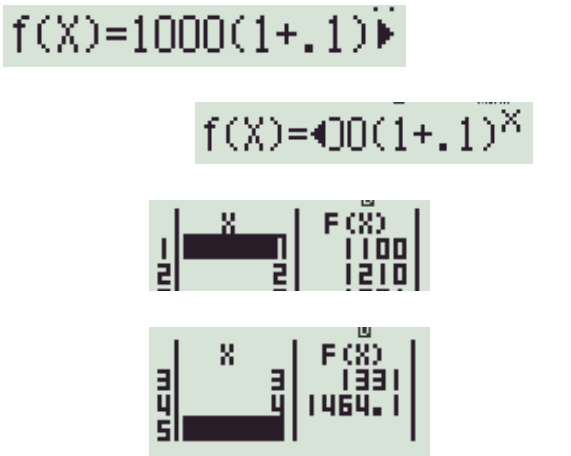
Given:

P = 1000

$i = 10\% = \frac{10}{100} = 0{,}1$

$n = x$

A = ? **$A = 1000\,(1 + 0{,}1)^{n}$**

Key Sequence:	**On screen:**
• Input *f(x)*formula = • *g(x)* = = • Set boundaries for your table: Start? 1 = End? 4 = Step? 1 = i. 1 year; A = R1 100,00 ii. 2 years; A = R1 210,00 iii. 3 years; A = R1 331,00 iv. 4 years; A = R1 464,10	

MODE 2: Statistics

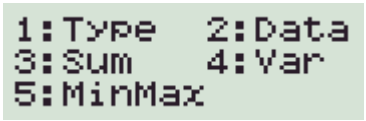
1. **Single variable / Data handling**
2. **Linear regression**
3. Quadratic regression
4. Logarithmic regression
5. Exponential regression
6. AB exponential regression
7. Power regression
8. Inverse regression

1. DATA HANDLING

Example: The following data set represents the maximum temperatures over a 5 day period, determine the:

a. Sum of the data set
b. Number of elements in the data set
c. Arithmetic mean
d. Standard deviation

Temperature (°C)
22
25
26
25
27

Solution:	**Key Sequence:**
Set your calculator to Stats mode for Single variable data	MODE 2 1
Enter the data into the table 	2 2 = 2 5 = 2 6 = 2 5 = 2 7 =
Clear the screen - ready for the **Single variable sub menu** 	AC SHIFT 1

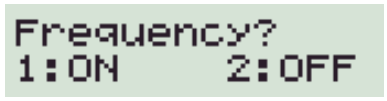
Breakdown of **Single variable sub menu**

Key	Menu Item	Explanation
1: Type	Stats menu	Change statistical calculation type
2: Data		Displays inputted data
3: Sum	1:Σx² 2:Σx	1. Sum of squares 2. Sum
4: Var	1:n 2:x̄ 3:σx 4:sx	1. Number of samples 2. Mean **3. Population standard deviation** 4. Sample standard deviation
5: MinMax	1:minX 2:maxX	1. Minimum value 2. Maximum value

Solution:	Key Sequence:
a. Sum of the data set Σx = **125**	3 2 =
b. Number of elements in the data set n = **5**	SHIFT 1 4 1 =
c. Arithmetic mean $\bar{x}$ = **25**	SHIFT 1 4 2 =
d. Standard Deviation σx = **1,673320053**	SHIFT 1 4 3 =

How to set up a frequency table:

SHIFT MODE ▼ 3 1

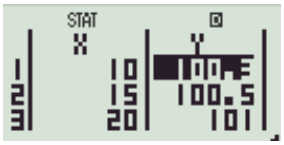
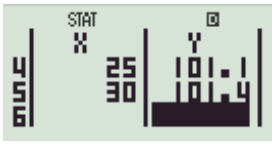
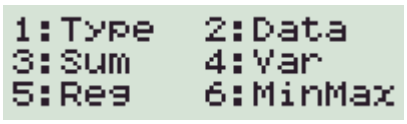


2. LINEAR REGRESSION

Example: Let's investigate whether there is a linear relationship between temperature and atmospheric pressure. The data is shown in the table below:

x **Temperature (°C)**	***y*** **Atmospheric pressure (kPa)**
10	100,3
15	100,5
20	101,0
25	101,1
30	101,4

The pressure depends on the temperature so;
Temperature is the *x* variable and Pressure the *y* variable.

Solution:	Key Sequence:
Set your calculator to Stats mode for Bivariate data	MODE 2 2
Enter the data into the table: Input *x*-values Use the [REPLAY] arrows to move the cursor to the *y*-column. Input *y*-values  	1 0 = 1 5 = 2 0 = 2 5 = 3 0 = ▼ ▶ 1 0 0 • 3 = 1 0 0 • 5 = 1 0 1 = 1 0 1 • 1 = 1 0 1 • 4 =
Clear the screen - ready for the **Regression sub menu** 	AC SHIFT 1

Breakdown of **Regression sub menu**

Key	Menu Item	Explanation
5: Reg		1. Regression co-efficient of A 2. Regression co-efficient of B 3. Correlation co-efficient r 4. Estimated value of x 5. Estimated value of y

Solution:	Key Sequence:
Calculate the Correlation co-efficient r = **0,9826073689**	5 3 =

r is very close to +1, telling us there is a **strong positive linear correlation** between temperature and atmospheric pressure.

We can now work out the values of A and B in the equation of the regression line (**line of best fit**): $y = A + Bx$

Calculate the value of **A** A = **99,74**	SHIFT 1 5 1 =
Calculate the value of **B** B = **0,056**	SHIFT 1 5 2 =
y = 99,74 + 0,056*x*	

Once you know the equation of the regression line you can then make projections about the atmospheric pressure for other temperatures or the temperature for other pressures.

What is the temperature if the atmospheric pressure is 100 kPa. 100 = **4.642857143**	1 0 0 SHIFT 1 5 4 =
What is the atmospheric pressure when the temperature is 18°C. 18 = **100.748**	1 8 SHIFT 1 5 5 =

PERMUTATIONS & COMBINATIONS

When we want to find the number of possible ways of picking ***r* objects** from a **group of *n***:

PERMUTATIONS 

when order **matters**

COMBINATIONS 

when order **does not matter**

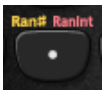
Example: When playing the lotto, a player chooses 6 numbers from 49.
It costs R3,50 to play a set of numbers.
How much would it cost to buy every possible combination of 6 numbers, to ensure obtaining the winning combination?

<u>Combinations</u>: 4 9 SHIFT ÷ 6 = **13 983 816**

<u>Cost</u>: Ans × 3 • 5 = **R48 943 356,00**

SELECTING RANDOM SAMPLES

Let **the calculator** choose a random sample of Integers between 1 and 49, to play the lotto:



ALPHA • 1 SHIFT) 4 9) =

NOTE every calculator will give a different string of numbers (Integers are repeated)

Calculators play a vital role in the classroom:
not by *substituting* Mathematics,
but by *supplementing* our subject.
It's conventional Mathematics by new methods.