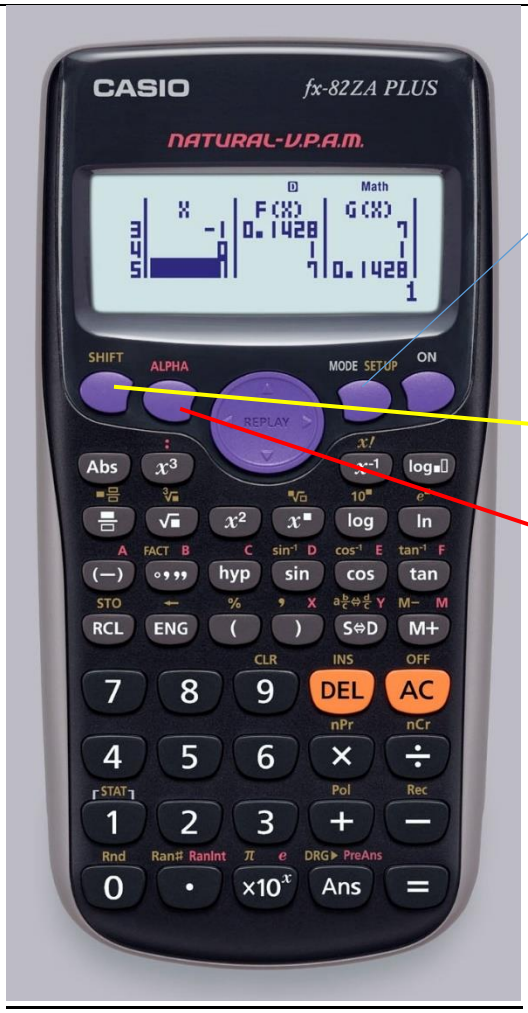
Grade 12 Maths Training for the King Cetshwayo District



MODE

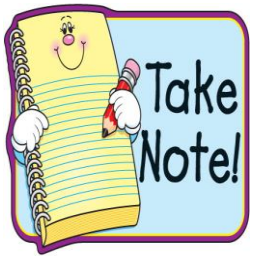
```
1:COMP   2:STAT
3:TABLE
```

SHIFT Select second options.

ALPHA Select the variables or third options.

SHIFT MODE

```
1:MthIO  2:LineIO
3:Deg    4:Rad
5:Gra    6:Fix
7:Sci    8:Norm
```



There is a difference between OFF AC and ON

Before we start we are going to clear and set up the calculator

1) Resetting/ Clearing	2) Normal Mode
SHIFT 9	SHIFT MODE
Clear? 1:Setup 2:Memory 3:All	1:MthIO 2:LineIO 3:Deg 4:Rad 5:Gra 6:Fix 7:Sci 8:Norm
3	8
Reset All? [=] :Yes [AC] :Cancel	Norm 1~2?
=	2
Reset All Press [AC] key	We select Option 2 so that our answers appear in a decimal format and not scientific notation.

Rounding Off:

We are able to 'fix' numbers to a selected decimal place.

SHIFT MODE

1:MthIO 2:LineIO
3:Deg 4:Rad
5:Gra 6:Fix
7:Sci 8:Norm

Choose Option 6
Select the number of Decimal Places you want
Note the word FIX on the top of your screen.
Your answer will now be rounded off to a selected decimal place.
BUT
This must be undone, as it does not automatically go away. Meaning all answers will continuously be rounded to a selected number of decimals and not only the final answers rounded.

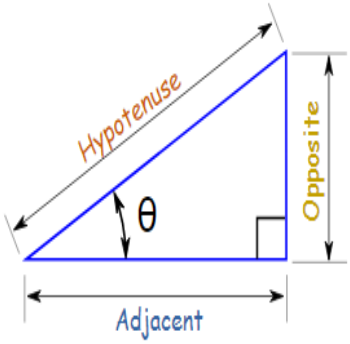
Go back to Norm Mode

Let's start with the basics

$\sin\theta = \frac{\text{Opposite}}{\text{Hypotenuse}}$

$\cos\theta = \frac{\text{Adjacent}}{\text{Hypotenuse}}$

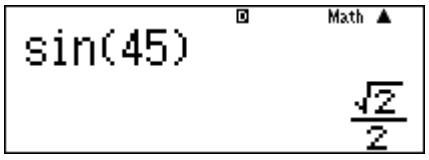
$\tan\theta = \frac{\text{Opposite}}{\text{Adjacent}}$



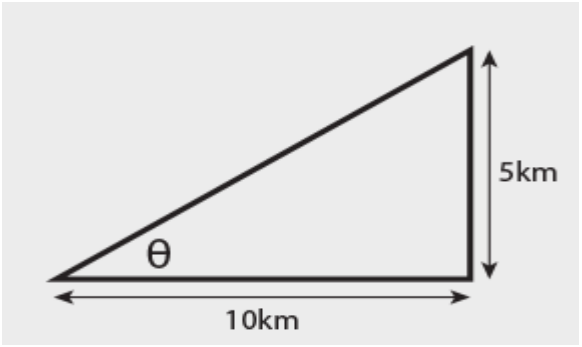
	0°	30°	45°	60°	90°
$\sin\theta$	0	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	1
$\cos\theta$	1	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$	0
$\tan\theta$	0	$\frac{\sqrt{3}}{3}$	1	$\sqrt{3}$	$\pm\infty$

Find the value of the following:

1) Sin(45°)=



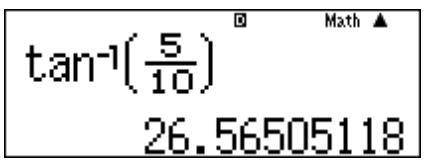
2) Use the triangle below to find θ



We have been given the opposite and the adjacent sides therefore we will be using tan.

We need to use the inverse as we are now finding an angle.

Follow the key sequence:

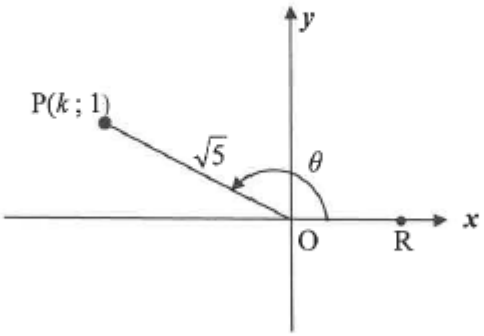


Therefore θ = 26.565°

Let's apply this to an exam situation:

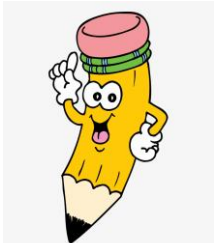
QUESTION 5

5.1 In the diagram, P(k ; 1) is a point in the 2nd quadrant and is $\sqrt{5}$ units from the origin. R is a point on the positive x-axis and obtuse $\hat{ROP} = \theta$.



5.1.1 Calculate the value of k. (2)

5.1.3 **Use a calculator** to calculate the value of $\tan(2\theta - 40°)$ correct to ONE decimal place. (3)



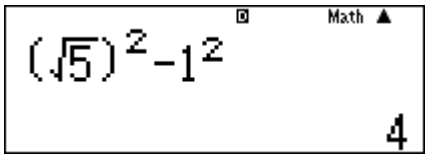
If the question says without the use of a calculator remember that you may use a calculator to check your answers!

5.1.1) To work out k, we will make use of pythagoras.

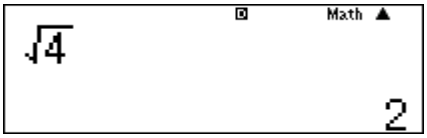
$$k^2 = \left(\sqrt{5}\right)^2 - 1^2$$

Follow the key sequence:

(√ 5 ▶) x^2 − 1 x^2 =



√ 4 =

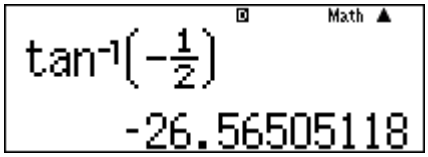


But k will =-2 (on the negative x axis)

5.1.3) $\tan(2\theta - 40°)$

Calculate tanθ first

Follow the key sequence: SHIFT tan (−) (▪) 1 ▼ 2 ▶) =



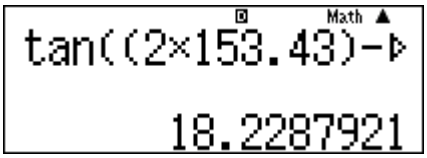
Therefore tanθ = 26.57°

θ= 180°-26.57°

θ= 153.43°

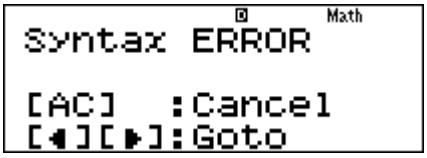
$\tan(2\theta - 40°)$ =

tan (2 × 1 5 3 • 4 3) − 4 0) =



Therefore =18.2

What do I do if I get a syntax error?



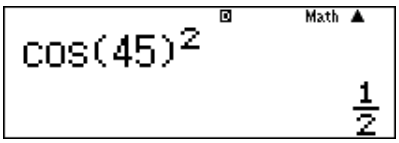
Use the 

to go directly to your mistake.

A commonly asked question: How do I enter $\cos^2 45°$ on the calculator?

$\cos^2 45°$ is exactly the same as $\cos 45°^2$.

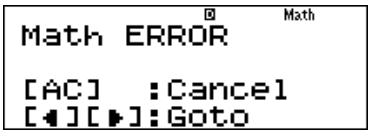
Follow the key sequence: cos 4 5) x^2 =



EXTRAS

Math Error:

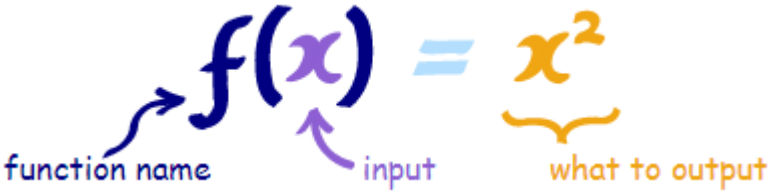
Eg: tan90°=



The answer is undefined.

What is a Function?

A function relates an input to an output.



How can a calculator assist us with functions?

Let's look at a few different examples.

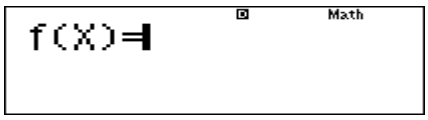
1) Directions: Complete the table of values to graph each function.

f(x) = x² – 6x +5

x	0	1	2	3	4	5	6
f(x)							

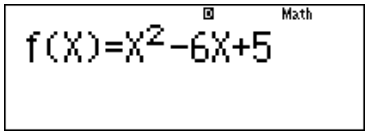
Step 1: Change into Tables Mode

Key Sequence: MODE 3

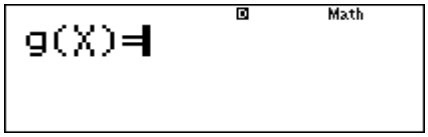


Step 2: Enter in the function given

Key Sequence: ALPHA) x^2 − 6 ALPHA) + 5



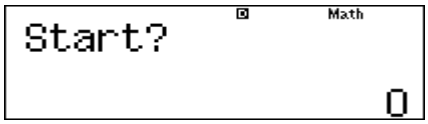
Step 3: Press =



Press = again

This is due to us only having one function.

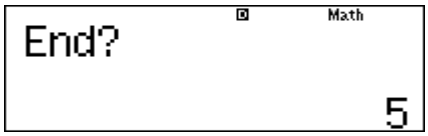
Step 4:



Refer back to the table the lowest x- value is 0.

Key sequence: [0] [=]

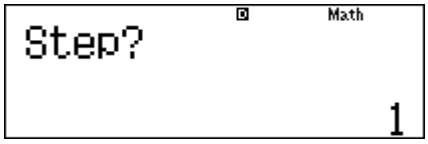
Step 5:



The highest x- value is 6.

Key sequence: [6] [=]

Step 6:



The table goes up in intervals of 1.

Key sequence: [1] [=]

Notes:

What is a start?

This is the point you would like to start at.

We use the lowest x- value as our starting point.

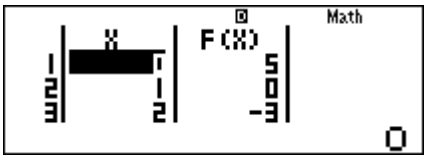
What is an end?

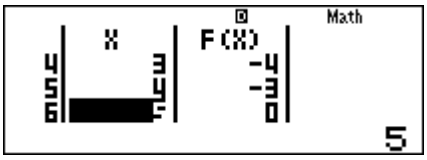
This is the point that you would like to end at.

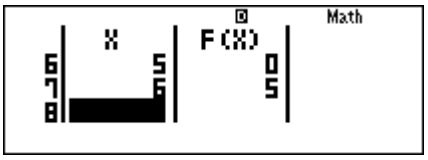
We use the highest x- value as our end point.

What is a step?

A step is the intervals you want to go up in.





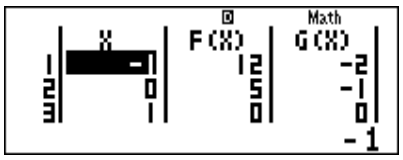


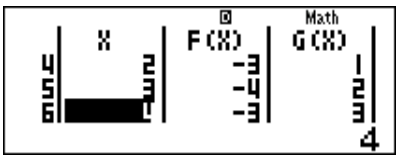
We can now complete our table using this information provided.

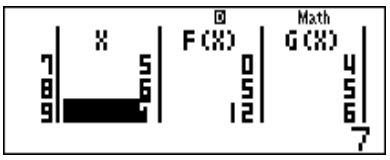
x	0	1	2	3	4	5	6
f(x)							

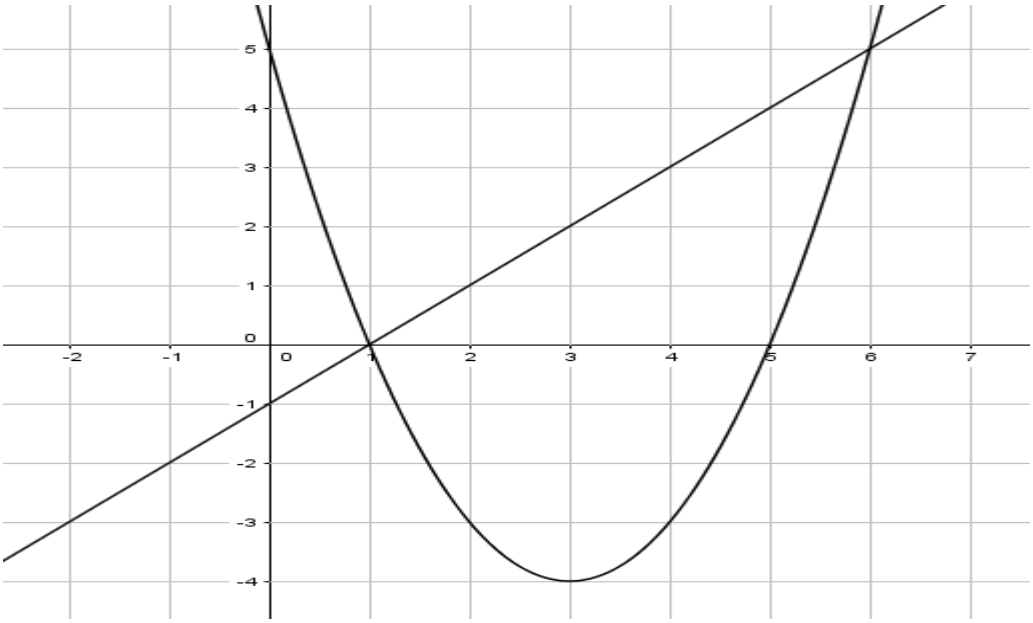
2) Draw the graphs of $f(x)=x^2-6x+5$ and $g(x)=x-1$ given that $(-1\leq x\leq 7)$ on the same set of axes.

Key Log	Screen Capture
ALPHA) x^2 − 6 ALPHA) + 5	f(X)=X²−6X+5
=	
ALPHA) − 1	g(X)=X−1
=	
− 1 =	Start? -1
7 =	End? 7
1 =	Step? 1





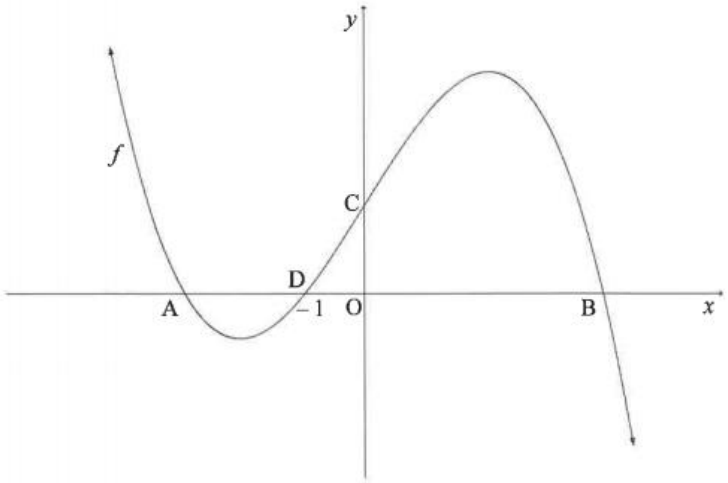




Let's apply this to an exam situation:

QUESTION 8

The graph of $f(x) = -x^3 + 13x + 12$ is sketched below.
A, B and D(–1 ; 0) are the x-intercepts of f.
C is the y-intercept of f.



8.1 Write down the coordinates of C. (1)

8.2 Calculate the coordinates of A and B. (5)

This is how we feel when we see this question!

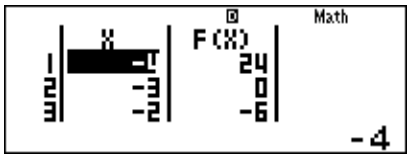
Do not fear, you have a calculator near!

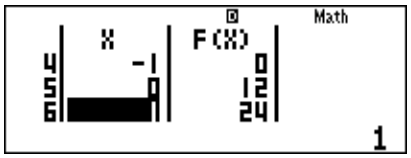
Take a nice deep breath and use tables mode to help you out.

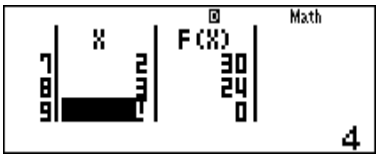
8.1) What is C on the graph? y- intercept

8.2) What are A and B? x- intercepts

Key Log	Screen Capture
(−) ALPHA) x^3 + 1 3 ALPHA) + 1 2 then =	f(X)=−X³+13X+12
We do not have a g(x) so we do not need to enter anything in here. Just press =	g(X)=
No start point is given so you can choose where you would like to start	Start? -4
No end point is given so you can choose where you would like to end	End? 4
Try where you can to step in whole numbers.	Step? 1







How does this help us?

Look for where x=0 to find the y- intercept.

Look for where y=0 to find the x- intercept.

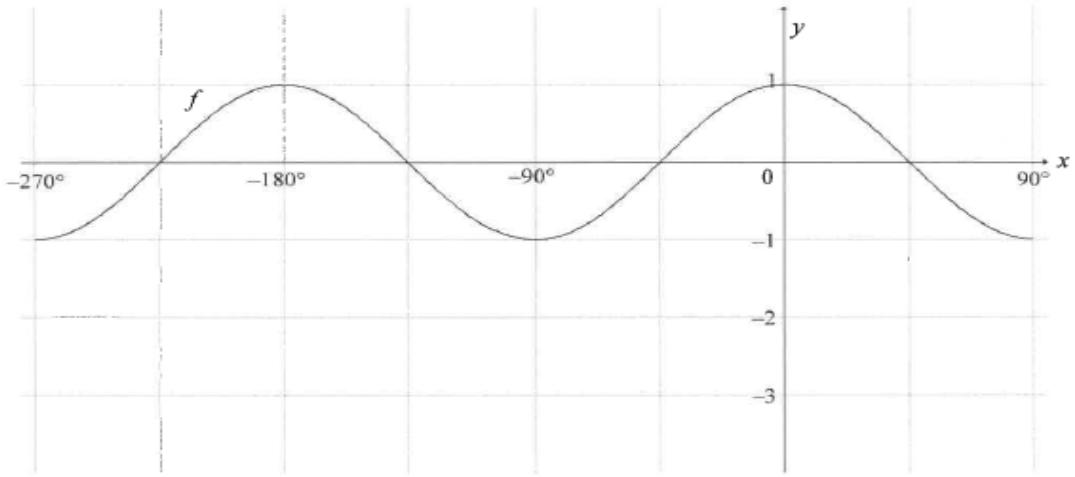
8.1) Co- ordinates of C (0;12)

8.2) Co- ordinates of A (-3;0) and B (4;0)

Remember that no working means no marks. Use the calculator to check answers.

QUESTION 6

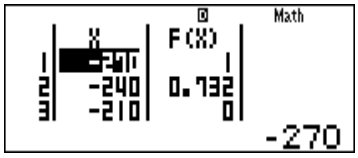
In the diagram, the graph of $f(x) = \cos 2x$ is drawn for the interval $x \in [-270°; 90°]$.

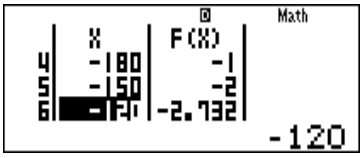


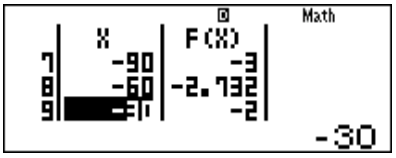
6.1 Draw the graph of $g(x) = 2\sin x - 1$ for the interval $x \in [-270°; 90°]$ on the grid given in your ANSWER BOOK. Show ALL the intercepts with the axes, as well as the turning points. (4)

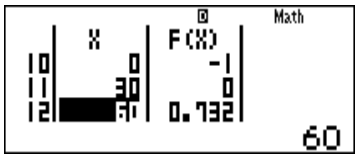
Remember 2sin(x)-1 and 2sin(x-1) are 2 different questions

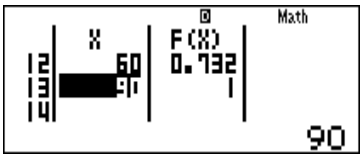
Key Log	Screen Capture
2 sin ALPHA)) − 1 then =	f(X)=2sin(X)−1
=	g(X)=
− 2 7 0 and =	Start? -270
9 0 and =	End? 90
3 0 and =	Step? 30


Math
X
F(X)
1
-270
2
-240
0.732
3
-210
0
-270

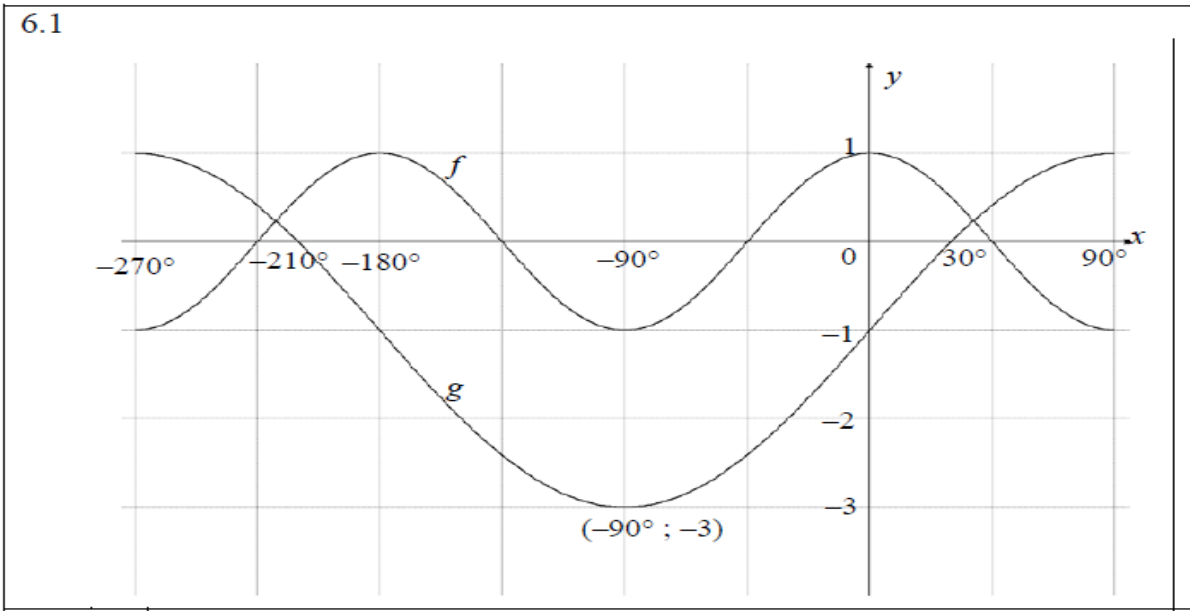

Math
X
F(X)
4
-180
-1
5
-150
-2
6
-120
-2.732
-120


Math
X
F(X)
7
-90
-3
8
-60
-2.732
9
-30
-2
-30


Math
X
F(X)
10
0
-1
11
30
0
12
60
0.732
60

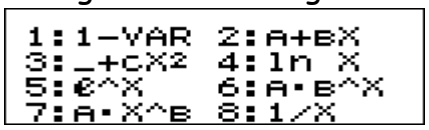

Math
X
F(X)
12
60
0.732
13
90
1
14
90

6.1


y
x
f
g
1
−1
−2
−3
−270°
−210°
−180°
−90°
0
30°
90°
(−90° ; −3)

In this section we will look at Data Handling and Linear Regression

Step 1: Go into Stats Mode MODE 2



Our focus will only be on:

1: 1- VAR (Single Variables/ Data Handling)

2: A+Bx (Linear Regression)

Let's look at an example

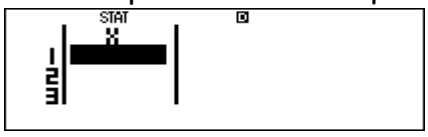
1) A short test was marked out of 10. The marks of 14 learners are: $4; 5; 6; 7; 8; 8; 6; 9; 9; 2; 10; 3; 5; 6.$

a) Determine the average marks of the learners.

b) Calculate the range of the learners marks.

Step 1: Select Option 1 for this question.

1



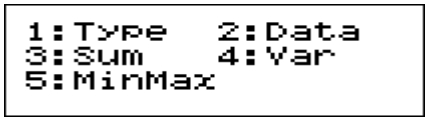
Step 2: Enter the data given.

Your data does NOT have to be in ascending order!

4 = 5 = 6 = 7 = 8 = 8 = 6 = 9 =
9 = 2 = 1 0 = 3 = 5 = 6 =

Always go back and check that your data is correct.

Step 3: AC SHIFT 1



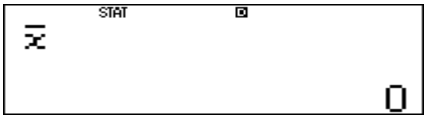
A Stats menu will appear:

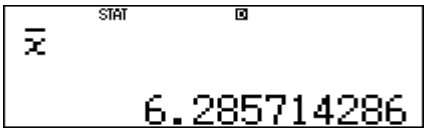
Key	Menu Item	Explanation
1. Type	Stats Menu	Changes stats type
2. Data		Displays the data that you input
3. Sum	1. Σx^2 2. Σx	1. Sum of the squares 2. Sum/ Total of data
4. Var	1. n 2. $\bar{x}$ 3. δx 4. sx	Number of samples Mean Population standard deviation Sample standard deviation
5. MinMax	1. Min 2. Max	1. Indicates the minimum value 2. Indicates the maximum value

Now we can answer our questions.

a) Select [4] then [2]

followed by [=]





Therefore the average mark is 6.29

Always read instructions as often in statistics rounding is required.

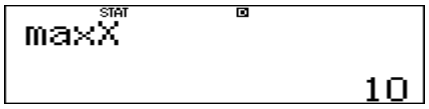
To return to the stats menu [AC] [SHIFT] [1]

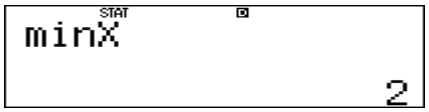
b) Select [5] then [2] [=]

followed by [AC] [SHIFT] [1]

Select [5] then [1] [=]

Ans: 10-2=8.





Let's see how we can apply this to an exam situation:

QUESTION 2

A survey was conducted among 100 people about the amount that they paid on a monthly basis for their cellphone contracts. The person carrying out the survey calculated the estimated mean to be R309 per month. Unfortunately, he lost some of the data thereafter. The partial results of the survey are shown in the frequency table below:

AMOUNT PAID (IN RANDS)	FREQUENCY
$0 < x \leq 100$	7
$100 < x \leq 200$	12
$200 < x \leq 300$	a
$300 < x \leq 400$	35
$400 < x \leq 500$	b
$500 < x \leq 600$	6

You will need to calculate a & b before we can enter the data.

$$7+12+a+35+b+6=100$$
$$b=40-a$$

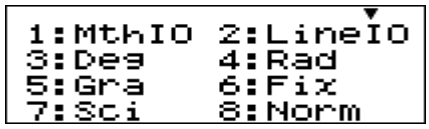
$$309=\frac{(50\times 7)+(150\times 12)+(250\times a)+(350\times 35)+(450\times b)+(550\times 6)}{100}$$
$$309=\frac{(50\times 7)+(150\times 12)+(250\times a)+(350\times 35)+(450\times (40-a))+(550\times 6)}{100}$$
$$350+1800+250a+12250+1800-450a=30900$$
$$200a=4\,800$$
$$a=24$$
$$b=16$$

For this question we need to turn a frequency table on.

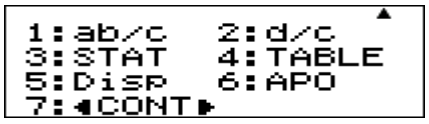
<u>Turning a frequency table on:</u>

Key Sequence:

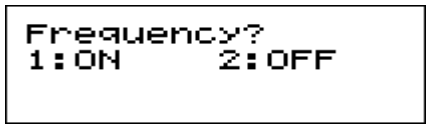
[SHIFT] [MODE]



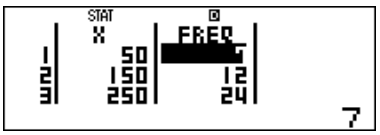
▼

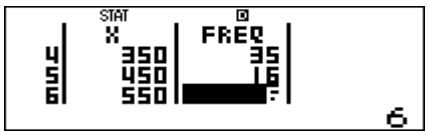


[3]



Enter the data





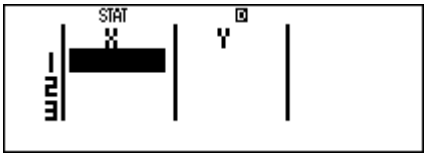
[AC] [SHIFT] [1] This takes you back to the stats menu

Remember to turn off the frequency table when you are finished with it.

Linear Regression

Set your calculator to calculate bi- variate data.

MODE 2 2



Linear regression is used to determine if there is a linear relationship between different variables.

Let's apply this to an exam situation:

QUESTION 1

The table below shows the monthly income (in rands) of 6 different people and the amount (in rands) that each person spends on the monthly repayment of a motor vehicle.

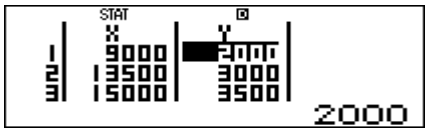
MONTHLY INCOME (IN RANDS)	9 000	13 500	15 000	16 500	17 000	20 000
MONTHLY REPAYMENT (IN RANDS)	2 000	3 000	3 500	5 200	5 500	6 000

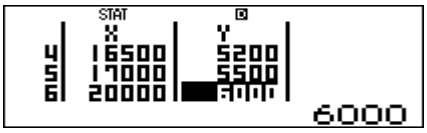
1.1 Determine the equation of the least squares regression line for the data. (3)

1.2 If a person earns R14 000 per month, predict the monthly repayment that the person could make towards a motor vehicle. (2)

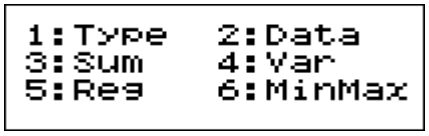
1.3 Determine the correlation coefficient between the monthly income and the monthly repayment of a motor vehicle. (1)

Enter the data

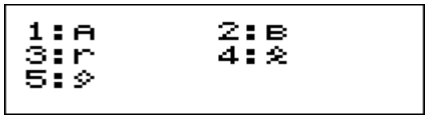




AC SHIFT 1



Go into 5



Breakdown of Regression Menu:

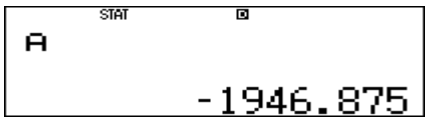
Menu Item	Explanation
1. A	Regression co- efficient of A
2. B	Regression co- efficient of B
3. r	Correlation co- efficient
4. $\hat{x}$	Estimated value of x
5. $\hat{Y}$	Estimated value of y

Now we can answer the questions:

1.1) Least squares regression line is y=A+Bx

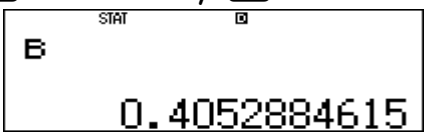
We need to find A and B

[1] [=]



[AC] [SHIFT] [1] followed by [5]

[2] [=]



Therefore y=-1946.875+0.41x

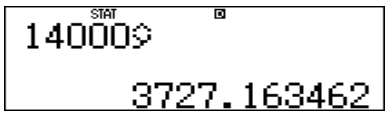
[AC] [SHIFT] [1] followed by [5]

1.2) Interpolation (inside the data set)

We have been given the estimated x- value of R14 000. We need to find the estimated value of y.

[5] [◀] [1] [4] [0] [0] [0]

[=]

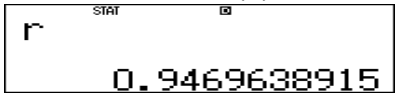


The monthly repayment would be R 3 727.16.

[AC] [SHIFT] [1] followed by [5]

1.3) Correlation Co- efficient (r)

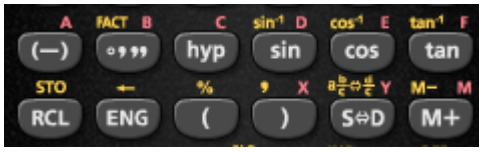
[3] [=]



Therefore r= 0.946/ 0.95

Often in Financial Maths we need to carry values or answers down into questions

A useful tool that we have on our calculator is the ability to store values and recall them to use at a later stage.



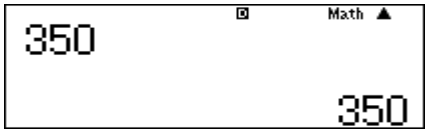
We can use the red functions

A- F, X, Y and M to store.

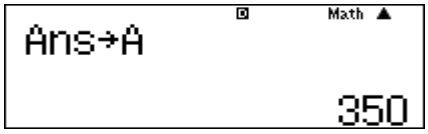
This is called variable memory

How do I store?

Enter in the value 3 5 0 =



Let's store this in A SHIFT RCL (−)



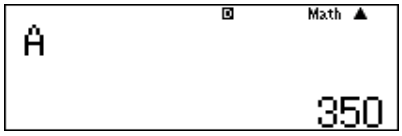
This indicates that the value entered can now be found in A.

How do I use this value?

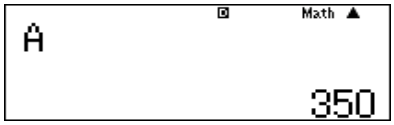
There are different ways we can do this. Either by using the variable itself or by recalling what is in A.

Let me explain.

ALPHA (−) =

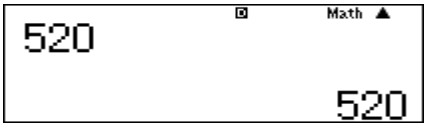


Or RCL (−)

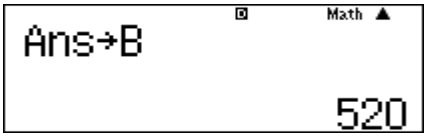


We can do the same for B and any of the other variables

Enter in the value 5 2 0 =



Let's store this in B SHIFT RCL °,,,



This indicates that the value entered can now be found in B.

Let's look at a past paper question now:

QUESTION 6

6.1 Two friends, Kuda and Thabo, each want to invest R5 000 for four years. Kuda invests his money in an account that pays simple interest at 8,3% per annum. At the end of four years, he will receive a bonus of exactly 4% of the accumulated amount. Thabo invests his money in an account that pays interest at 8,1% p.a., compounded monthly.

Whose investment will yield a better return at the end of four years? Justify your answer with appropriate calculations. (5)

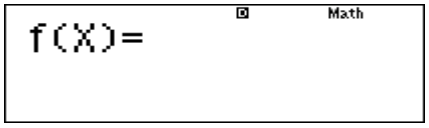
We need to do some calculations

Step 1: Kuda : $A=P(1+in)x1.04$

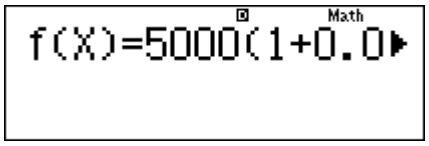
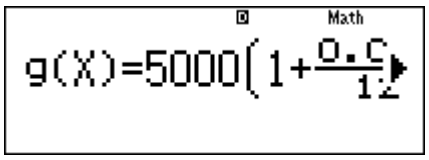
Thabo : $A=P(1+i)^n$

Step 2: Let's look at this in Tables Mode

MODE 3

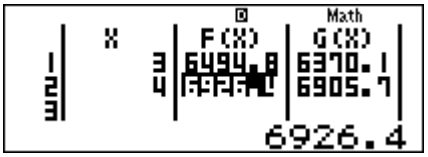


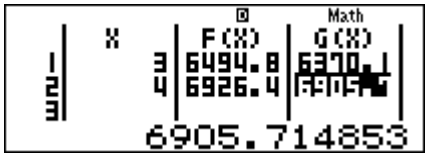
Enter in the equation and use x in place of the number of years.

Key Log	Screen Capture
5 0 0 0 (1 + 0 • 0 8 3 × ALPHA)) × 1 • 0 4 =	
5 0 0 0 (1 + 0 • 0 8 1 ▼ 1 2 ▶) $x^{\square}$ 1 2 × ALPHA) =	

Step 3: You only want to see the comparison at the end of year 4. Therefore we will start at year 3 and end at year 4. This gives us the ability to look at only 1 year.

3 =	Start? 3
4 =	End? 4
1 =	Step? 1





What does this mean???

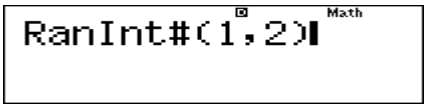
We can now see that in Year 4 Kuda will have R6926.40 and Thabo will have R6905.71.

Therefore we can conclude that Kuda will have the better investment.

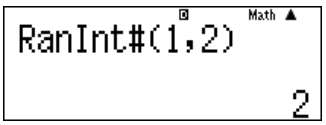
Now for some fun, let's look at a coin. It has heads and it has tails. We can use the calculator to experiment with probability.

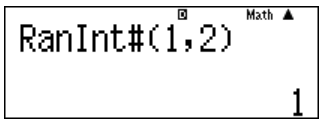
Let heads be 1 and tails be 2.

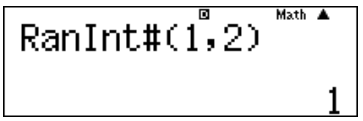
ALPHA • 1 SHIFT) 2)

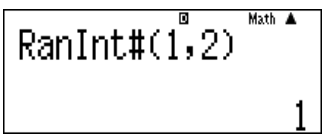


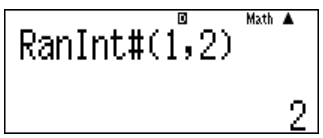
Let's look at what happens if the coin is tossed 5 times. Press = 5 times.











My results are as follows: Tails, Heads, Heads, Heads and Tails.

This is a useful way to show learners probability. ☺