

# Maths Webinar with the Sharp EL-W535SA

# SHARP

# Plan of Action

- Introduction
- Basics
  - Where to download the simulator
- Maths stuff
  - Highest common factor, lowest common multiples and prime factors
  - Maths skills
    - Integers
    - Fractions
    - Percentages
    - Decimals and recurring decimals
  - Factorisation
    - Quadratic Formula
  - Laws of exponents
    - And surds
  - Trigonometry
- Special Requests
  - Probability
  - Calculus
  - Financial Maths
  - Statistics
  - Euclidean Geometry\*

# Calculator Introduction

- 422 Functions
- Upgraded for the CAPS curriculum
- 500 000 calculators given to No-Fee students in Gauteng
  - With a 40% improvement between the pre- and post-tests after training.



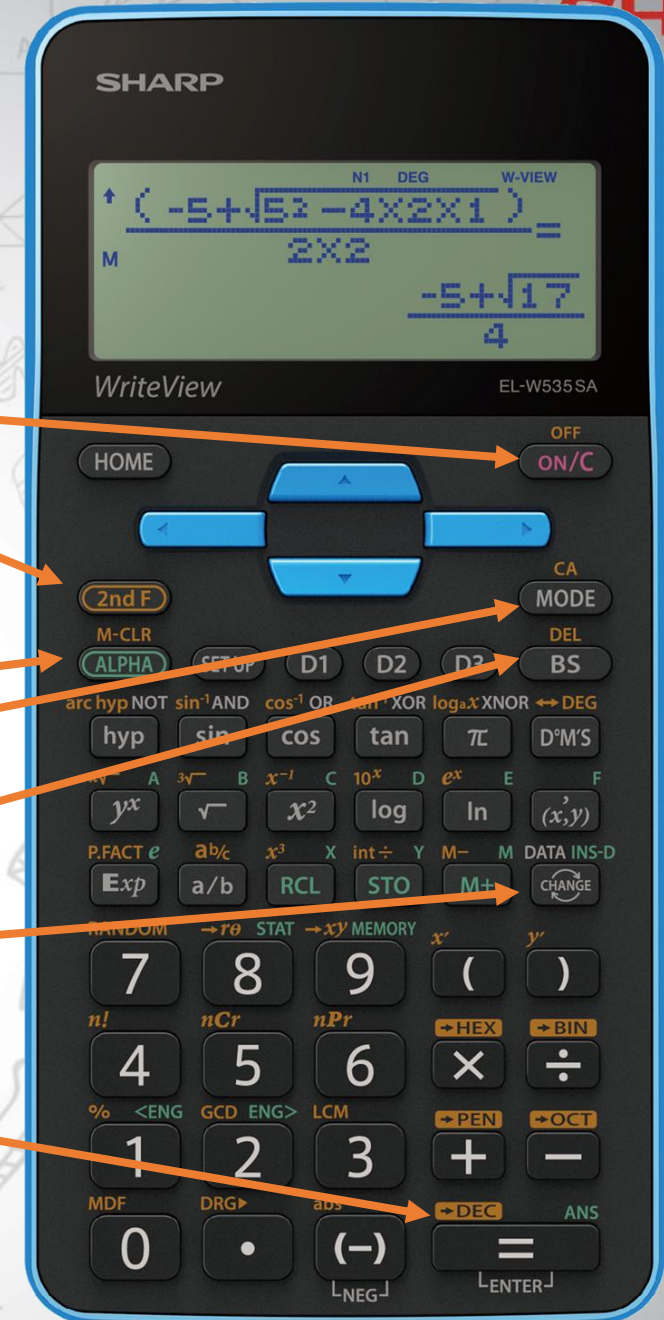


# Free Downloads and Resources

- Download the simulator
  - [Link](#)
- Download Geogebra
  - [Link](#)
- Worksheets
  - [www.mathsatsharp.co.za](http://www.mathsatsharp.co.za)
  - [www.e-classroom.co.za](http://www.e-classroom.co.za)
  - [www.math-drills.com](http://www.math-drills.com)
  - <https://www.mathx.net/>
  - <https://www.worksheetworks.com/> (one of my favourites for younger grades and fully customisable)
  - <https://www.mathwarehouse.com/sheets/> (FET mostly)

# Calculator Basics

- Turn the calculator on
- 2<sup>nd</sup> Function – used to activate orange functions
  - Turn the calculator off by pressing 2<sup>nd</sup> F and ON
- ALPHA – used to activate teal functions
- Mode – change to different modes
- BS – backspace – to delete something.
- Change – change between mixed, improper and decimal answers.
- Equals – to find an answer or used as enter.



# Modes

- Press
- 0: Normal
  - Fractions, integers, probability, trigonometry and much more
- 1: Stat
  - Single data, linear regression and more
- 2: Table
  - Functions but can also be used for teaching finance
- 3: Drill
  - Mental maths fun!





# Teacher Shortcut – Classmarks

- E.g. First 3 students get 40, 55 and 23 out of 70 for test.
- To calculate their percentages quickly:
- Press

1 0 0 ab/c a/b  
7 0 ▶  
× 4 0  
=  
 DATA INS-D DATA INS-D  
CHANGE CHANGE

NI DEG W-VIEW

$$\frac{100}{4}$$

NI DEG W-VIEW

$$\frac{100}{70}$$

NI DEG W-VIEW

$$\frac{100}{70} \times 40$$

NI DEG W-VIEW

$$\frac{100}{70} \times 40 = 57\frac{1}{7}$$

NI DEG W-VIEW

$$\frac{100}{70} \times 40 = 57.14285714$$

- For the next mark just type in the mark

5 5

- And press

=

55\_ NI DEG W-VIEW

Kx55= NI DEG W-VIEW  
78  $\frac{4}{7}$

↑ Kx55= NI DEG W-VIEW  
↓ 78.57142857

- And again, mark

2 3

=

23\_ NI DEG W-VIEW

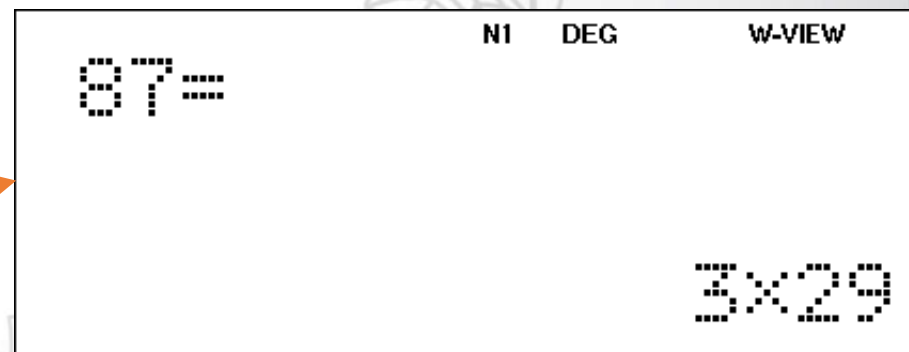
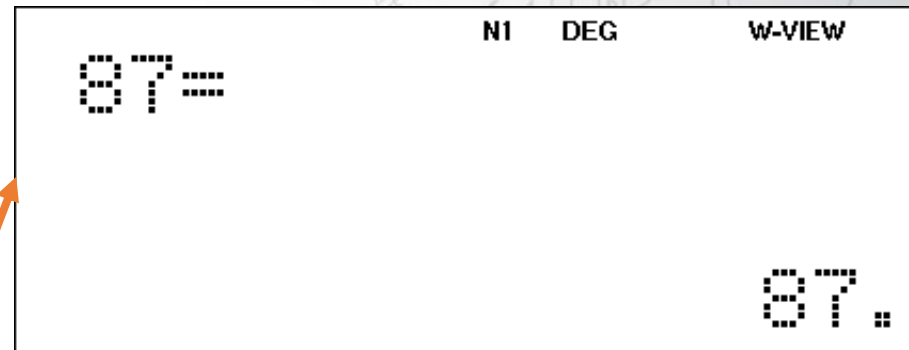
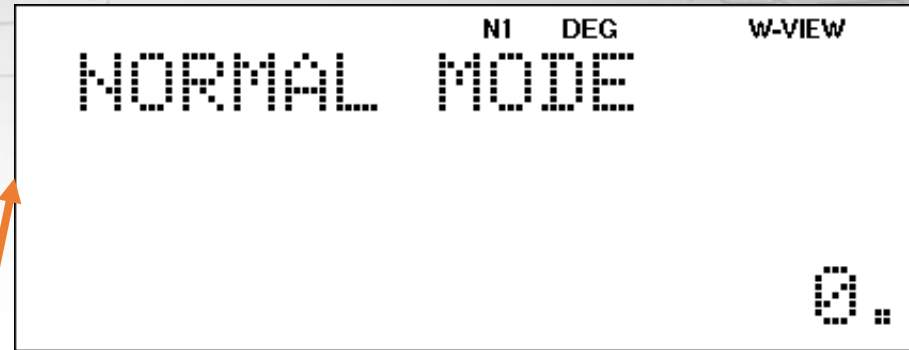
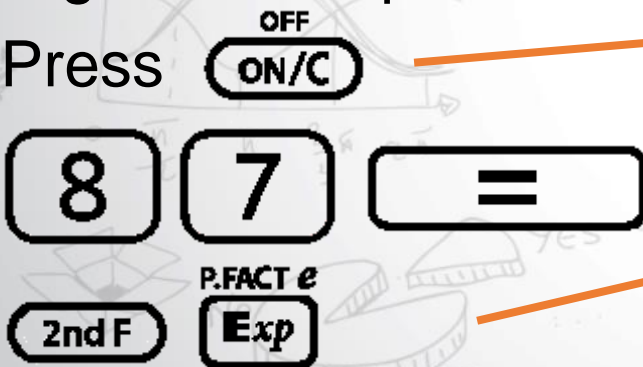
Kx23= NI DEG W-VIEW  
32  $\frac{6}{7}$

↑ Kx23= NI DEG W-VIEW  
↓ 32.85714286



# Prime Factors

- We can do prime factors using the long method
  - Ladder or
  - Tree
- We can also use the calculator to check:
- E.g. Find the prime factors of 87:
- Press



# Highest Common Factor

- Lets find the highest common factor of 85 and 100

- Press **8** **5**

**GCD ENG>**  
**2nd F** **2**

**1** **0** **0**

**=**

N1 DEG W-VIEW  
85\_

N1 DEG W-VIEW  
85GCD\_

N1 DEG W-VIEW  
85GCD100\_

N1 DEG W-VIEW  
85GCD100=  
5.

# Lowest Common Multiple

- Lets find the lowest common multiple of 85 and 100

- Press **8** **5**

**LCM**  
**2nd F** **3**

**1** **0** **0**

**=**

NI DEG W-VIEW  
85...








NI DEG W-VIEW  
85LCM...

NI DEG W-VIEW  
85LCM100...

NI DEG W-VIEW  
85LCM100=  
1'700.



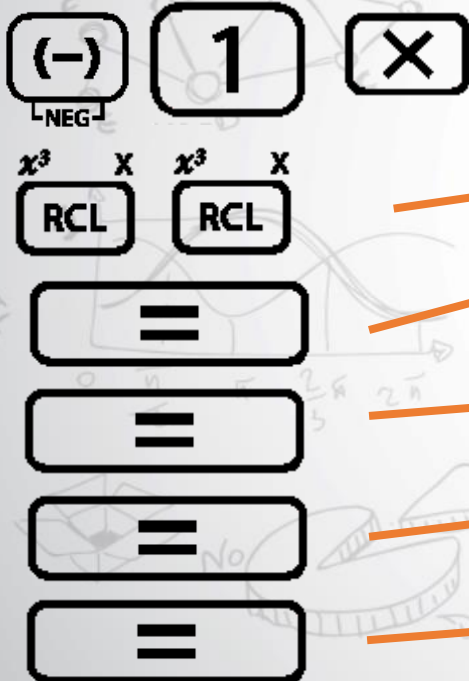
# Integers

- We use the  button.
- Eg. Find  $-6 \times -3$
- Press      



# Integer Rules

- Press **MODE** **2**
- Now we are going to say -1 times any number by pressing



NI DEG W-VIEW  
TABLE MODE  
Function1?

NI DEG W-VIEW  
-1X\_

NI DEG W-VIEW  
-1XX\_

NI DEG W-VIEW  
Function2?

NI DEG  
X\_Start: 0.  
X\_Step: 1.

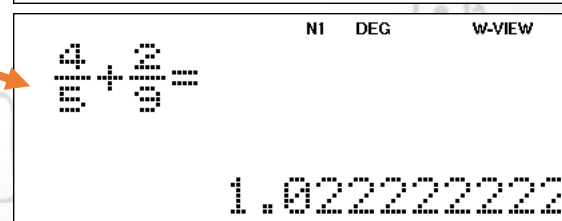
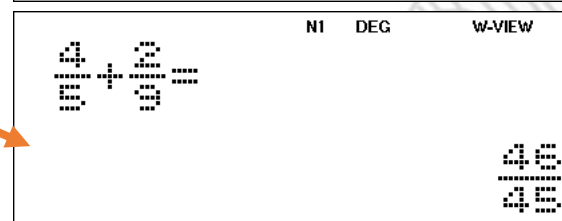
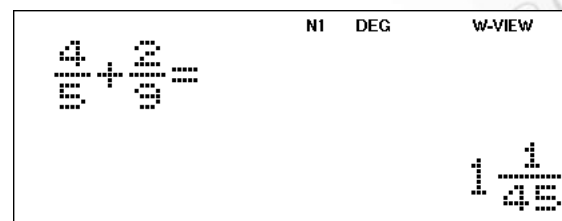
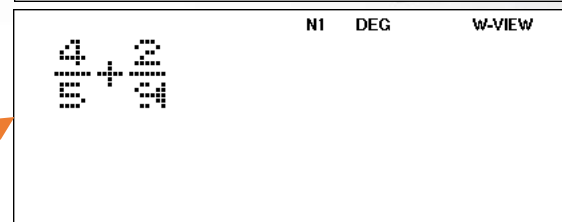
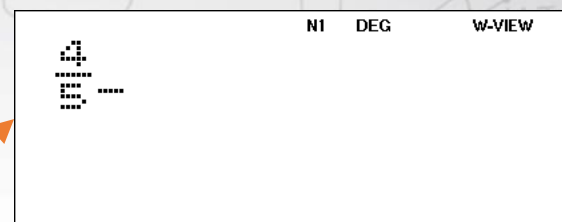
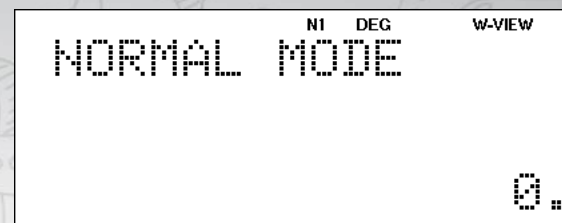
NI DEG

X	ANS
0	0
1	-1
2	-2

0.

# Fractions

- Press **HOME**
- E.g. Add  $\frac{4}{5} + \frac{2}{9}$
- Press 4 **a/b** 5 **▶**
- **+** 2 **a/b** 9 **=**
- Press **CHANGE** to change between the various ways to write the answer (mixed fraction, improper fraction, decimal)

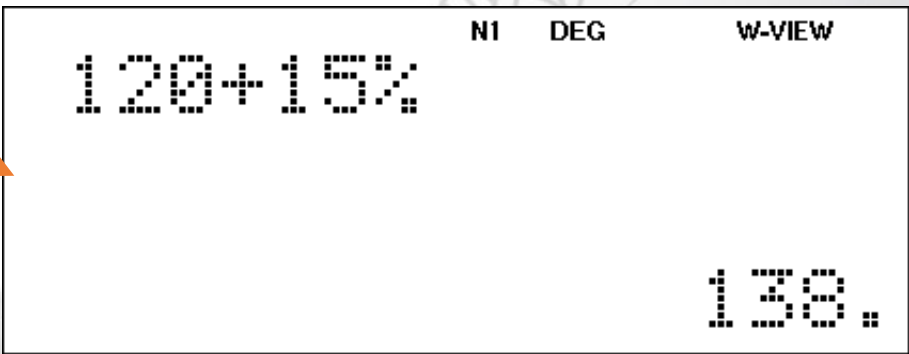
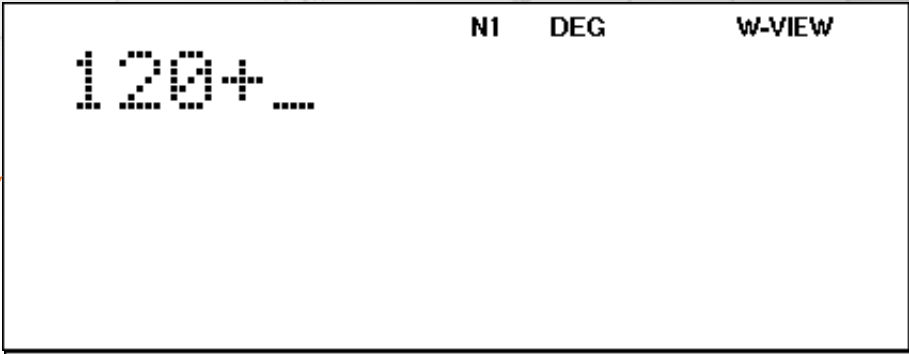
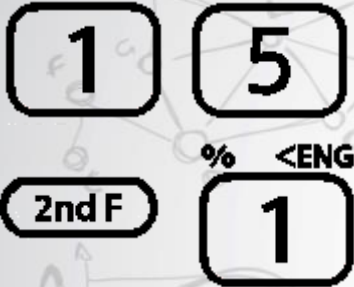





# Percentages

- Adding 15% to 120:

- Press **1** **2** **0** **+**



# Recurring decimals

- The calculator can also show recurring decimals.
- Press **SET UP** 
- Choose **5**
- And press **1** to turn it on
- Press **CHANGE** to see the recurring decimal format of the number

N1 DEG W-VIEW

$$\frac{4}{5} + \frac{2}{3} =$$

$$1.02222222$$

N1 DEG W-VIEW  
<SET UP> 1/2

DRG     FSE  
 EDITOR    CONTRAST  
 -----

N1 DEG W-VIEW  
↑ <SET UP> 2/2

RECURRING DECIMAL  
 DECIMAL POINT

N1 DEG W-VIEW  
<<RECURRING DEC>

OFF  
 ON

N1 DEG W-VIEW

$$\frac{4}{5} + \frac{2}{3} =$$

$$1\frac{1}{15}$$

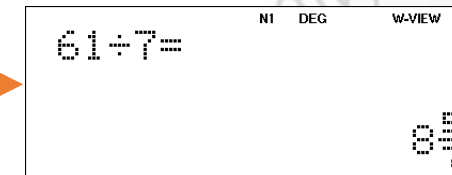
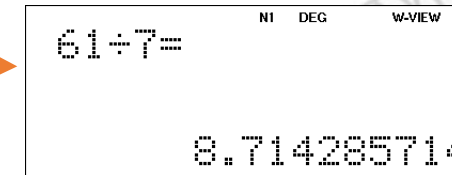
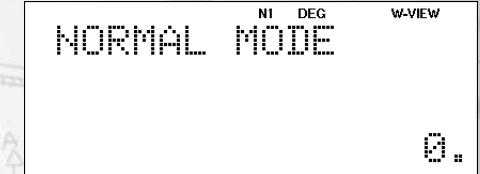
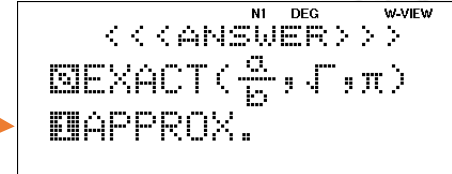
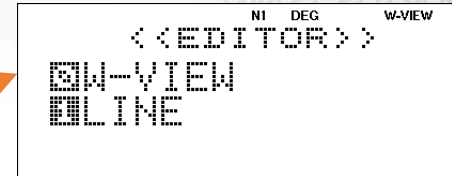
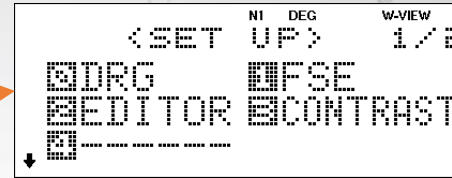
N1 DEG W-VIEW

$$\frac{4}{5} + \frac{2}{3} =$$

$$1.0\bar{2}$$

# Changing the way answers are displayed.

- Press **SETUP**
- And choose **2** for EDITOR
- Choose **0** for W-VIEW
- **1** for APPROX
- Test **6** **1** **+BIN** **÷**  
**7** **=**
- Press **CHANGE** to see the fraction forms.



To change back to the original setting: **SETUP** **2** **0** **0**



# Factor Pairs

- Press **MODE** **2**
- Lets find the factors of 36
- Press **3** **6** **a/b**



NI DEG W-VIEW  
 $\frac{36}{1}$

NI DEG W-VIEW  
 $\frac{36}{2}$

NI DEG W-VIEW  
 Function2?

NI DEG  
 X\_Start: 0.  
 X\_Step: 1.

NI DEG  
 X\_Start: 0.  
 X\_Step: 1.

NI DEG  

X	ANS
1	36
2	18

# Factorising Trinomials

- Rules to remember:
  - $ax^2 + bx + c$
  - Look at the sign in front of the c:
    - If it is plus the signs in both brackets are the same, and you add your two factors to find the value of b.
      - The sign in front of b tells you which sign to put into your two brackets.
    - If the sign is negative, subtract one factor from the other, and the signs in the brackets are different.

- E.g.  $x^2 + 5x + 6$

- $x^2 - 5x + 6$

- $x^2 - x - 6$

# Quadratic Formula

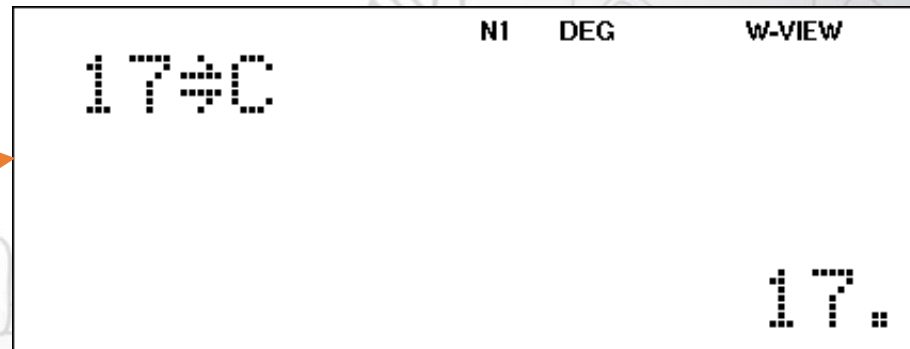
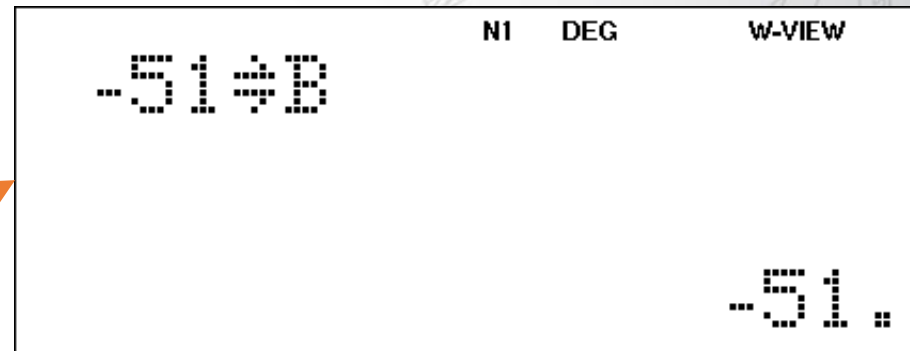
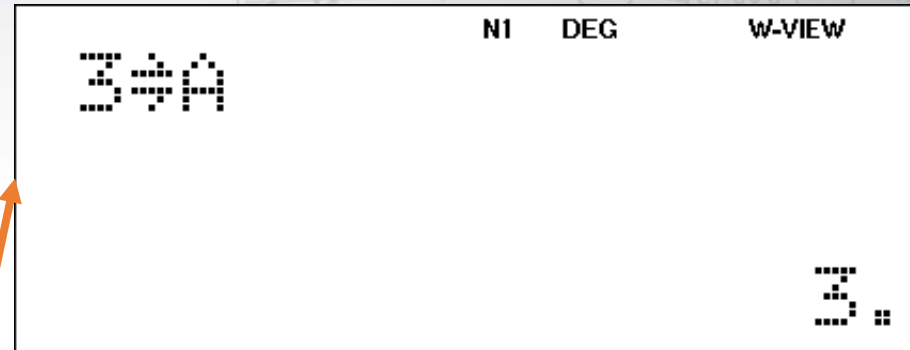
HOME

- $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
- If we have:  $3x^2 - 51x + 17$
- So we have:  $a = 3$ ,  $b = -51$  and  $c = 17$ .
- Save each one into the memory keys:

• 3  $\xrightarrow{\text{int} \div Y}$  **STO**  $\xrightarrow{x^Y A}$  **y<sup>x</sup>**

• **(-)** 51  $\xrightarrow{\text{int} \div Y}$  **STO**  $\xrightarrow{3^Y B}$  **y<sup>x</sup>**

• 17  $\xrightarrow{\text{int} \div Y}$  **STO**  $\xrightarrow{x^{-1} C}$  **x<sup>2</sup>**



- Now we type in the formula.
- Use  $\alpha$  to get the memory key letters.

- Press  $\frac{a}{b}$   $(-)$

$\alpha$   $\frac{a}{b}$   $(-)$   
 $\alpha$   $\sqrt{\quad}$   $+$   
 $\sqrt{\quad}$   $\alpha$   $\sqrt{\quad}$   $x^{-1}$   $C$   $x^2$   
 $-$   $4$   $\alpha$   $x^y$   $A$   $yx$   
 $\alpha$   $x^{-1}$   $C$   $x^2$   
 $\downarrow$   $2$   $\alpha$   $x^y$   $A$   $yx$   
 $=$

NI DEG W-VIEW  
0/0

NI DEG W-VIEW  
 $\frac{-4}{0}$

NI DEG W-VIEW  
 $\frac{-B+4}{0}$

NI DEG W-VIEW  
 $\frac{-B+\sqrt{B^2}}{0}$

NI DEG W-VIEW  
 $\frac{-B+\sqrt{B^2-4A}}{0}$

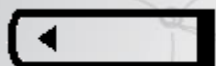
NI DEG W-VIEW  
 $\frac{-B+\sqrt{B^2-4A}}{0}$

NI DEG W-VIEW  
 $\frac{-B+\sqrt{B^2-4AC}}{2A}$

NI DEG W-VIEW  
 $\frac{-B+\sqrt{B^2-4AC}}{2A}$   
16.65986111



- To get the second x:
- Press



N1 DEG W-VIEW

$$\frac{-B + \sqrt{B^2 - 4AC}}{2A}$$

N1 DEG W-VIEW

$$\frac{-B + \sqrt{B^2 - 4AC}}{2A}$$

N1 DEG W-VIEW

$$\frac{-B + \sqrt{B^2 - 4AC}}{2A}$$

N1 DEG W-VIEW

$$\frac{-B \sqrt{B^2 - 4AC}}{2A}$$

N1 DEG W-VIEW

$$\frac{-B - \sqrt{B^2 - 4AC}}{2A}$$

N1 DEG W-VIEW

$$\frac{-B - \sqrt{B^2 - 4AC}}{2A}$$

0.34013889

# Exponents

- Teaching the multiplication rule:

- Press **2**  **$y^x$**  **3** **→**
- ×** **2**  **$y^x$**  **4** **=**

NI DEG W-VIEW

$$2^3$$

NI DEG W-VIEW

$$2^3 \dots$$

NI DEG W-VIEW

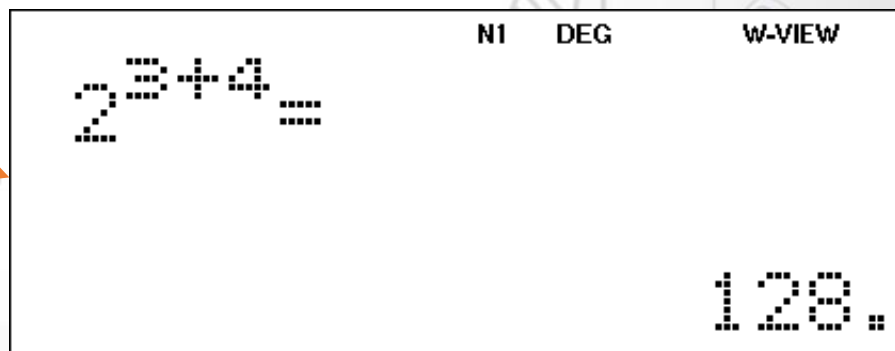
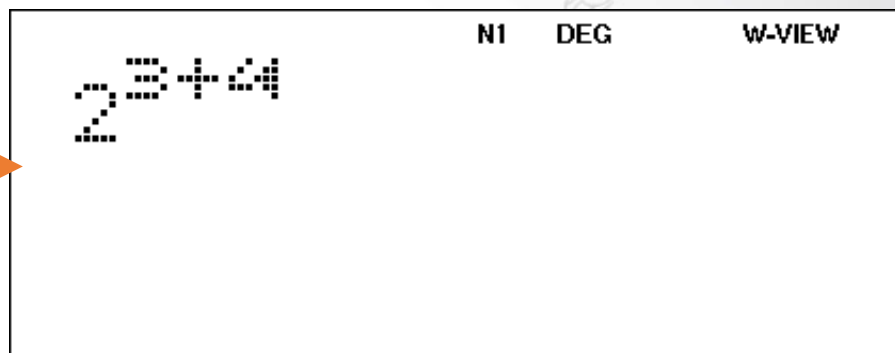
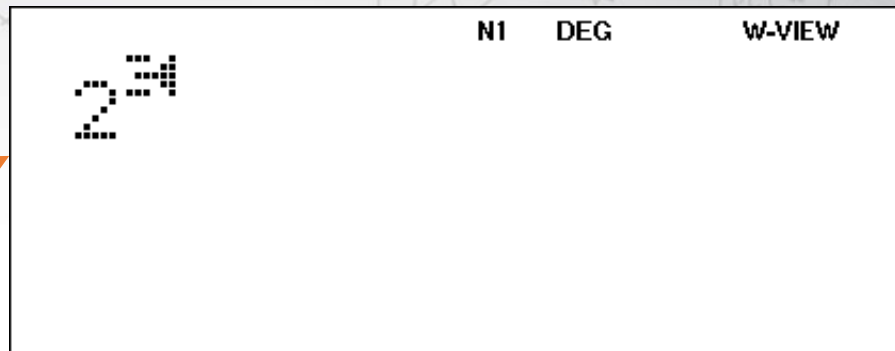
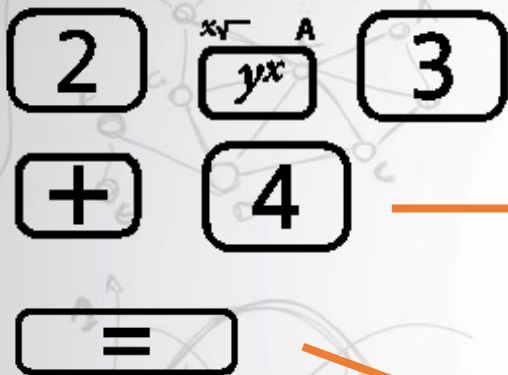
$$2^3 \times 2^4$$

NI DEG W-VIEW

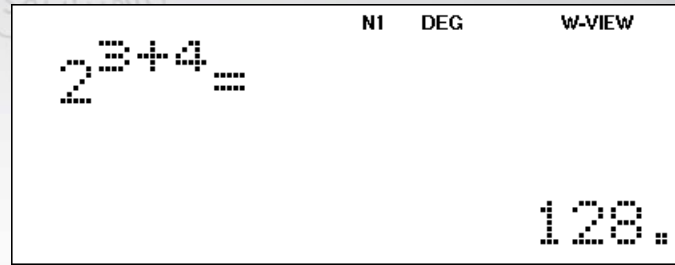
$$2^3 \times 2^4 =$$

128.

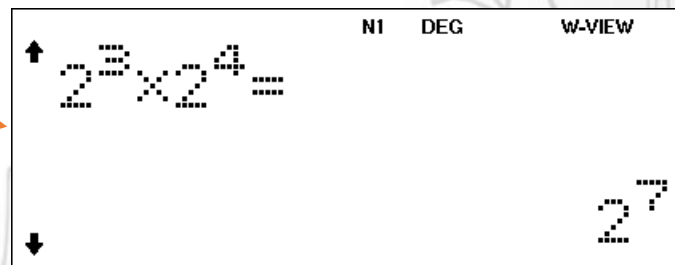
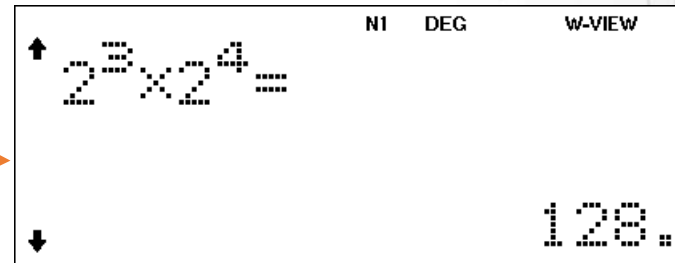
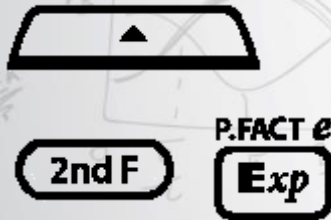
- Two ways to prove it:
- Press



- Now we can use:



- Now scroll up to previous example:





# Surds

- We can also use this idea to teach surds:

$$\sqrt{2} \times 2$$

$$\sqrt{2} \times 3$$

$$=$$

$$\sqrt{2}$$

$$\sqrt{2} \times 2$$

$$\sqrt{2} \times 3 = \sqrt{6}$$

- And:

$$\sqrt{2} \times 3$$

$$=$$

$$\sqrt{2} \times 3$$

$$\sqrt{2} \times 3 = \sqrt{6}$$

# Logs

- Base 10 button:  $\log$
- Different base: e.g.  $\log_2 8$

• Press:  $\text{2ndF}$   $\log_a x \text{XNOR}$   $\pi$

$2$   $\rightarrow$

$8$

$=$

NI DEG W-VIEW  
 $\log_4 (4)$

NI DEG W-VIEW  
 $\log_2 (4)$

NI DEG W-VIEW  
 $\log_2 (8)$

NI DEG W-VIEW  
 $\log_2 (8) =$   
 $3.$

# Trigonometry

- Short cut:
  - Save your inverse sin, cos and tan into your D keys.

• Press  $\overset{\text{int} \div \text{Y}}{\text{STO}}$   $\text{D1}$

$\overset{\text{sin}^{-1} \text{AND}}{\text{2ndF}}$   $\text{sin}$

• Test by pressing  $\text{D1}$

$\text{1}$   $\overset{\text{a} \div \text{b}}{\text{a/b}}$   $\text{2}$

$=$

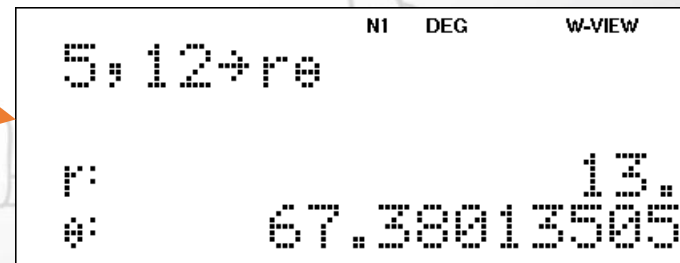
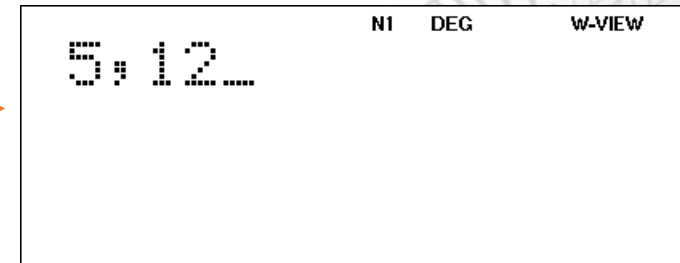
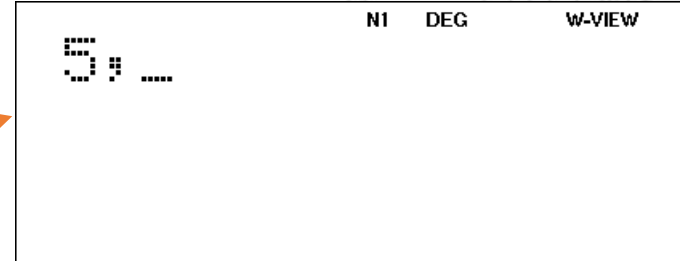
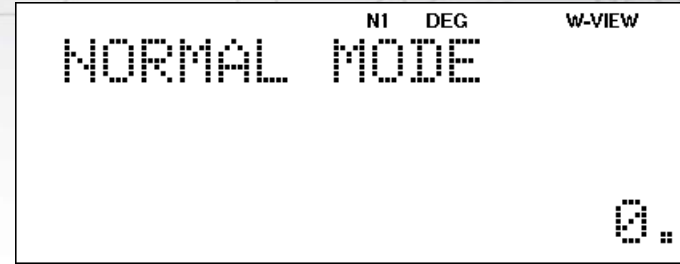
The calculator screen captures are as follows:

- Screen 1: N1 DEG W-VIEW  
STORING D1  
SELECT FUNCTION
- Screen 2: 2ndF N1 DEG W-VIEW  
STORED!
- Screen 3: N1 DEG W-VIEW  
sin<sup>-1</sup> L
- Screen 4: N1 DEG W-VIEW  
sin<sup>-1</sup> 1/2
- Screen 5: N1 DEG W-VIEW  
sin<sup>-1</sup> 1/2 =  
30.

# Trigonometry Short cut

- Pythagoras Shortcut

- Point (5,12) on the cartesian plane to make a triangle.
- Press





# The CAST Diagram

- Press **MODE** **2**
- Start with the sin graph so press **sin** **RCL** **RCL**

**=**

**=**

**=**

**1** **5**

**=**

sinX\_ NI DEG W-VIEW

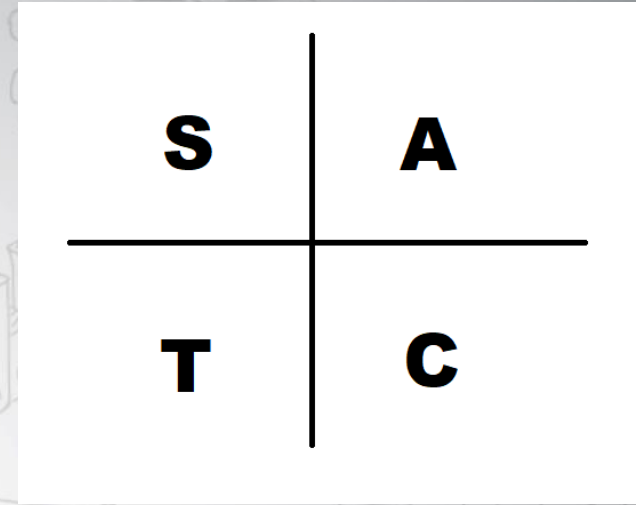
Function2? NI DEG W-VIEW


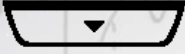
X\_Start: 0.  
X\_Step: 1.

X\_Start: 0.  
X\_Step: 15.

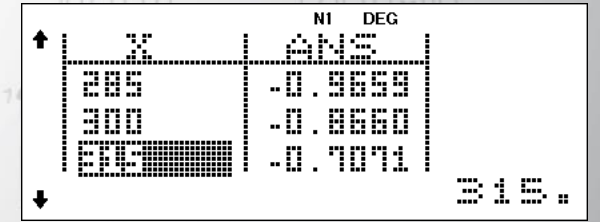
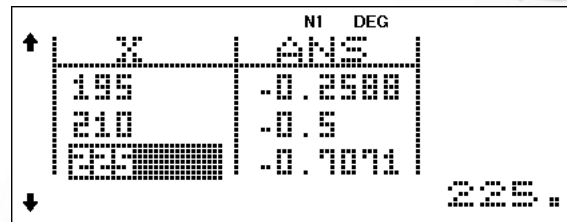
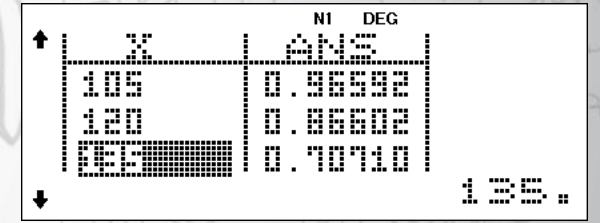
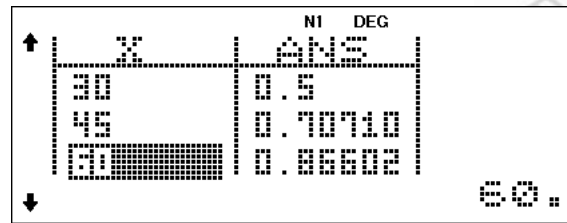
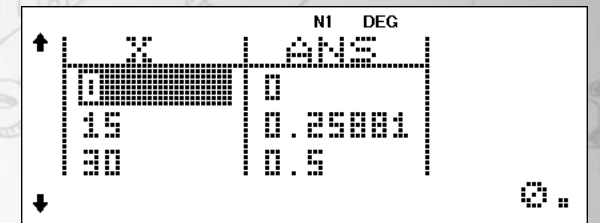
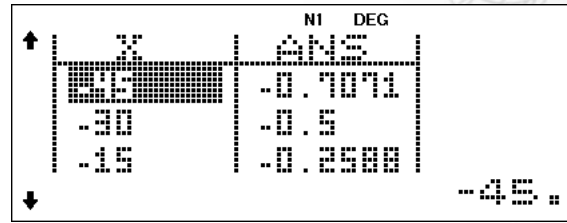
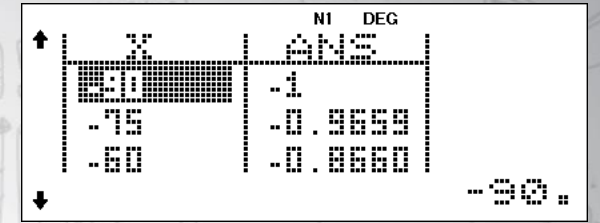
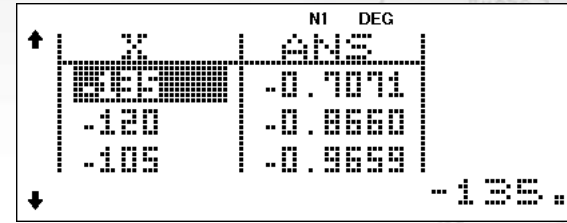
X	ANS
0	0
15	0.25001
30	0.5

NI DEG W-VIEW



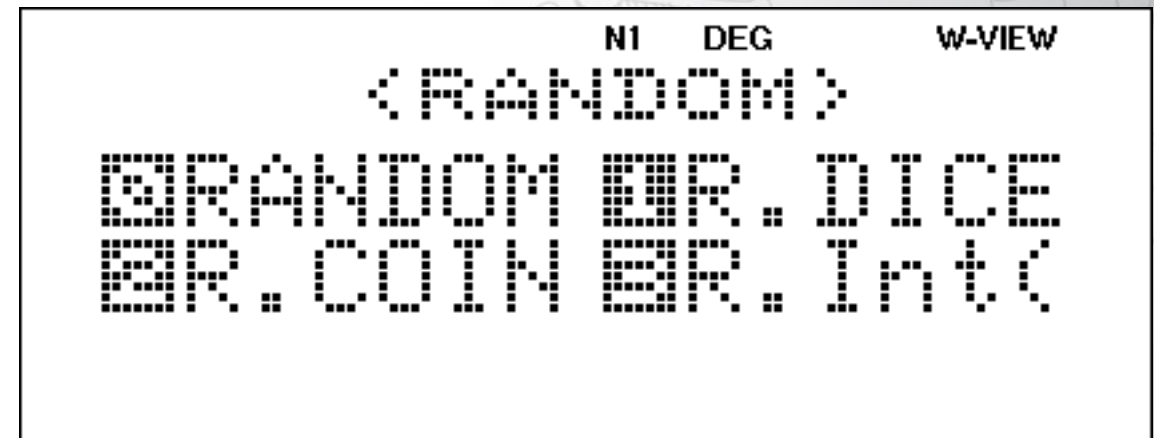
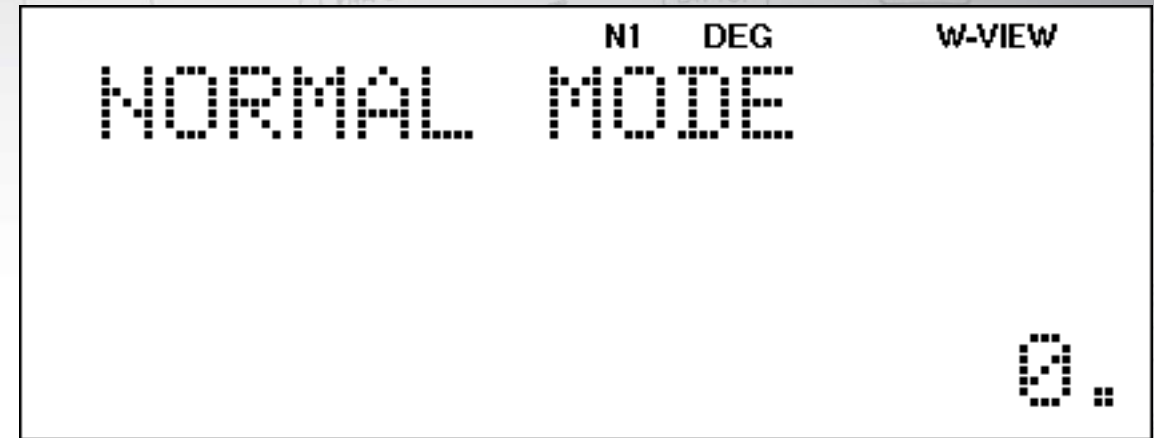
- Go through the table using your  and  arrow keys and plot where sin is positive and negative.

Values	Sin	Cos	Tan
-180 to -90	-		
-90 to 0	-		
0 to 90	+		
90 to 180	+		
180 to 270	-		
270 to 360	-		



# Probability

- Press **HOME**
- The random function:
- Press **2ndF** **7**
  - 0: Random
    - Random decimals between 0 and 1 to 3 decimal places
  - 1: R.Dice
    - Random numbers between 1 and 6
  - 2: R.Coin
    - Heads and Tails displayed as 0 or 1
  - R.Int(
    - Random whole number between any two numbers given



# Playing the lottery

- Press **2ndF** **7**
- Choose **3**
- Type in **1**
- Then press **(x,y)**
- Type in **5** **2**
- Press **=** to generate the random numbers.

```

NI DEG W-VIEW
<RANDOM>
RANDOM R. DICE
R. COIN R. Int(
    
```

```

NI DEG W-VIEW
R. Int(
    
```

```

NI DEG W-VIEW
R. Int(1
    
```

```

NI DEG W-VIEW
R. Int(1;
    
```

```

NI DEG W-VIEW
R. Int(1;52
    
```

```

NI DEG W-VIEW
R. Int(1;52=
30.
    
```

```

NI DEG W-VIEW
R. Int(1;52=
22.
    
```

```

NI DEG W-VIEW
R. Int(1;52=
5.
    
```



# Permutations & Combinations

- If order doesn't matter
  - Combination
  - We are throwing all the elements into a bag.
- If order does matter
  - Permutation
  - The different elements are lined up in different ways.



# Permutation:

- To find a permutation:
- 4 different options, 3 spaces:
- Press

**4**

$nPr$

**6**

2nd F

**3**

**=**

N1 DEG W-VIEW  
4P\_

N1 DEG W-VIEW  
4P3\_

N1 DEG W-VIEW  
4P3=  
24.

# Combination

- To find a combination:
- 4 different options, 3 spaces:
- Press **4**

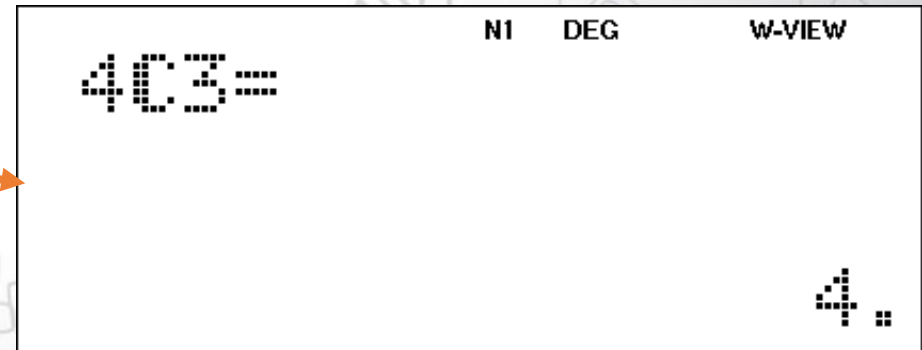
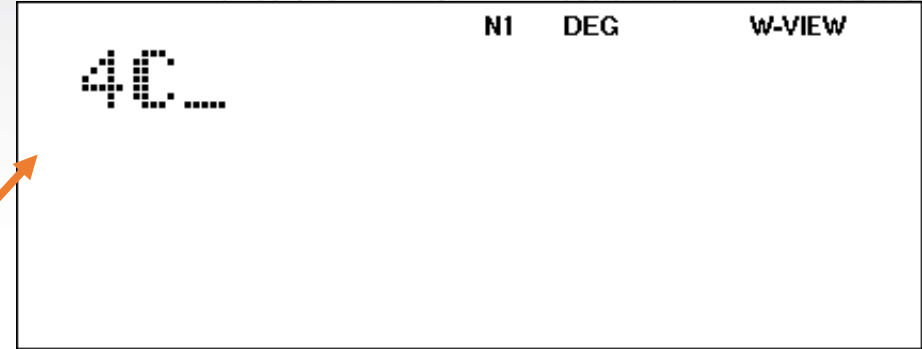
**4**

nCr CONV


**2ndF** **5**

**3**

**=**

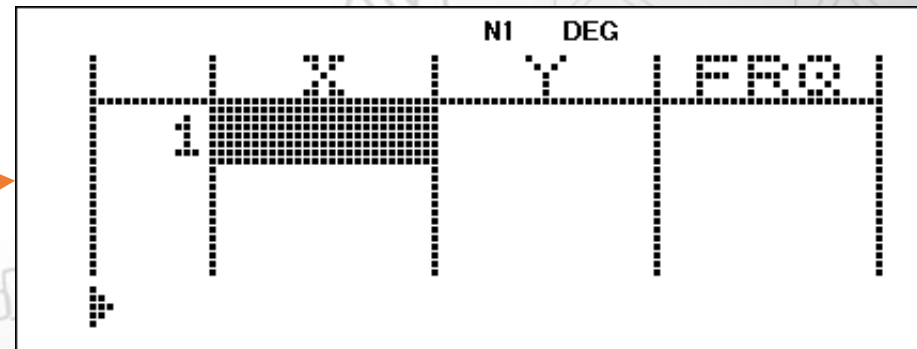
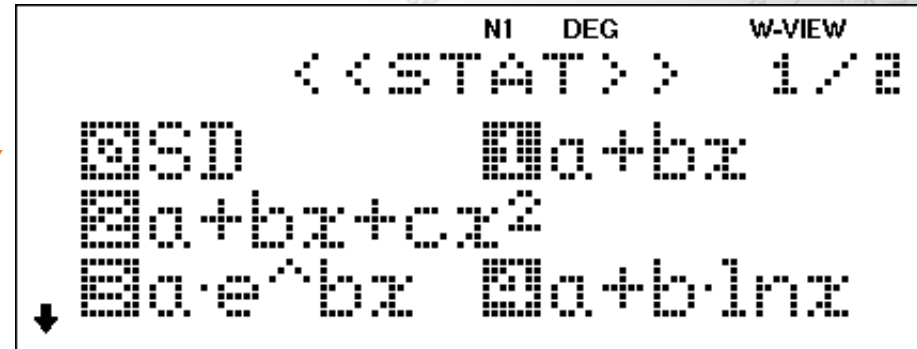
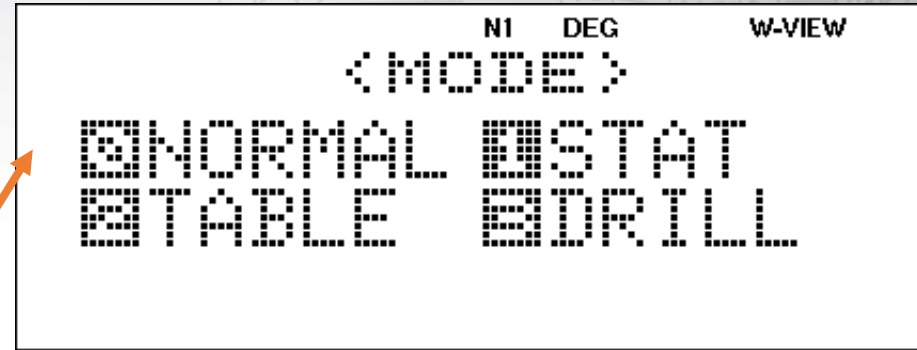


# Calculus

- Gradient at a point –
- We can use our linear regression function to find the average gradient between two points.
- E.g. (3; 4) and (5; 10)
- Press 

1

1





- Type in each coordinate:

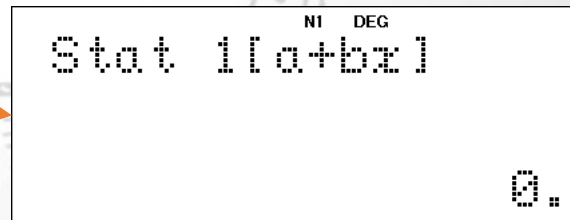
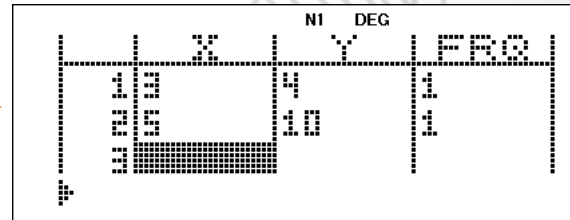
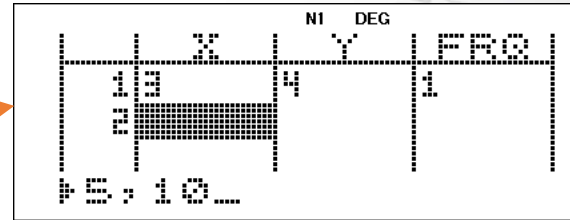
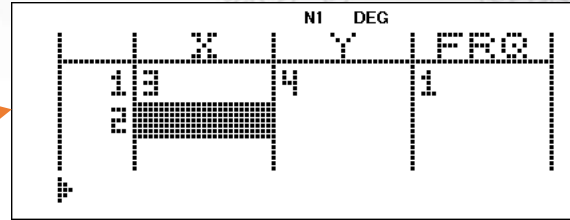
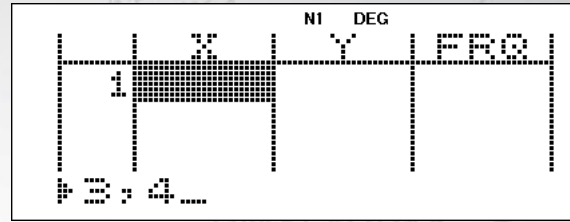
3  $(x, y)$  4

=

5  $(x, y)$  1 0

=

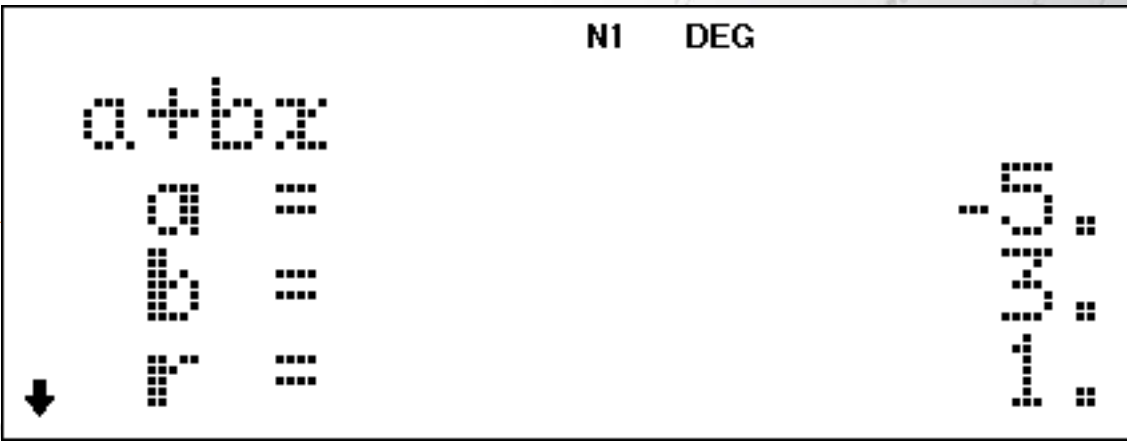
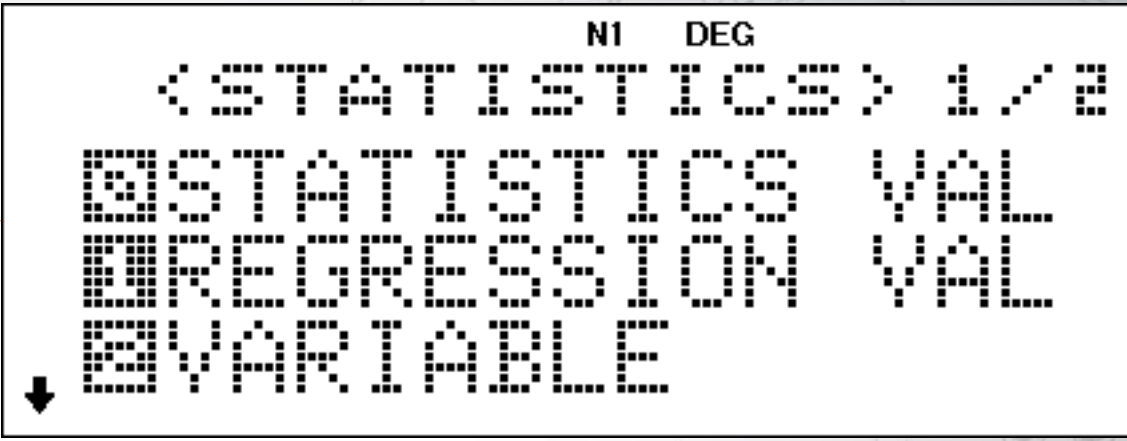
- Press  $\text{DATA INS-D CHANGE}$  when you are done.



- Now we find the gradient:

- Press **M-CLR** **ALPHA** **8**

**1**

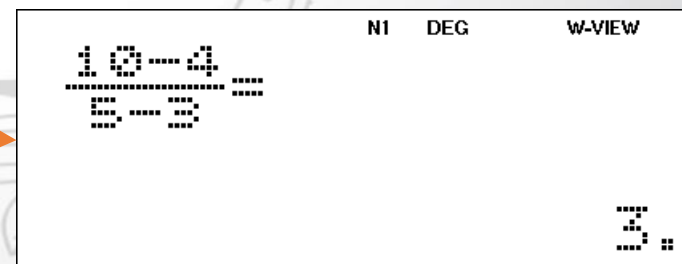
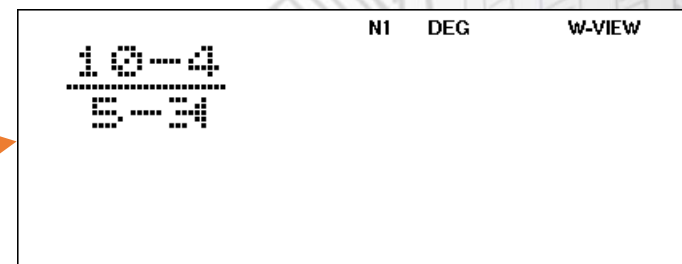
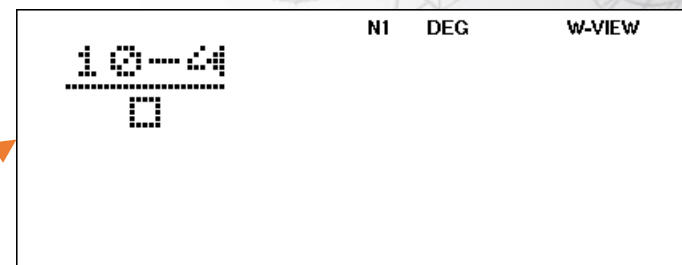
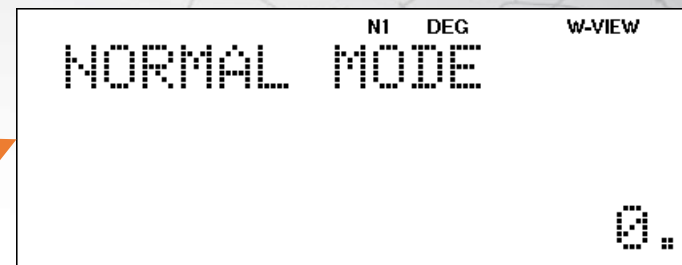
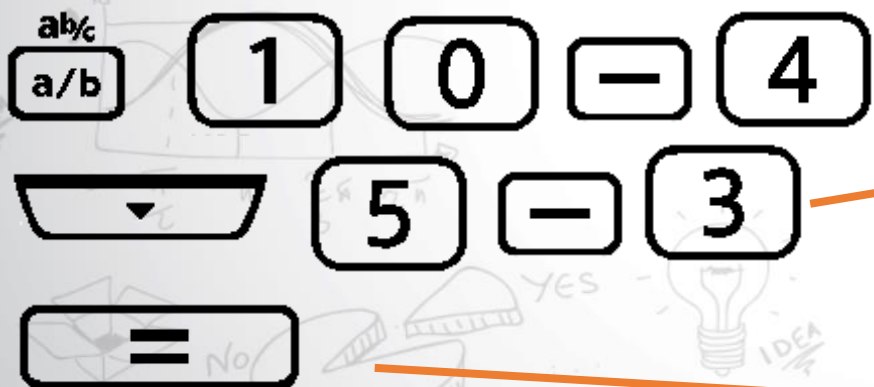


- Traditional route:

- $m = \frac{y_2 - y_1}{x_2 - x_1}$

- $m = \frac{10 - 4}{5 - 3}$

- Press **HOME**



# Calculus graphs and roots

- $y = x^3 + 13x^2 + 34x - 48$
- Press **MODE** **2**
- Type in the expression:

Calculator keypad sequence:

- MODE** **2**
- RCL** **x<sup>3</sup>** **+** **1** **3** **RCL** **x<sup>2</sup>** **+** **3** **4** **RCL** **x** **-** **4** **8** **=**

NI DEG W-VIEW  
TABLE MODE  
Function1?

NI DEG W-VIEW  
X<sup>3</sup>\_

NI DEG W-VIEW  
X<sup>3</sup>+13X<sup>2</sup>\_

NI DEG W-VIEW  
X<sup>3</sup>+13X<sup>2</sup>+34X\_

NI DEG W-VIEW  
X<sup>3</sup>+13X<sup>2</sup>+34X-48\_

NI DEG W-VIEW  
Function2?



- Skip function 2 for now so press **=**
- Leave start and step as is so press **=** **=**
- Use your up and down arrows to scroll through the table.
- To find the roots find where ANS or y is equal to 0.

NI DEG

X_Start:	0.
X_Step:	1.

NI DEG

X_Start:	0.
X_Step:	1.

NI DEG

X	ANS
0	.48
1	0
2	.88

0.

NI DEG

X	ANS
0	.48
1	0
2	.88

1.

NI DEG


X	ANS
0	.48
1	0
2	.88
3	1.28
4	1.68
5	2.08
6	2.48

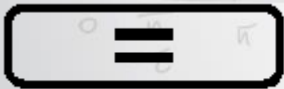
-6.

NI DEG

X	ANS
0	.48
1	0
2	.88
3	1.28
4	1.68
5	2.08
6	2.48
7	2.88

-9.

- Remember our equation:
- $y = x^3 + 13x^2 + 34x - 48$
- And what about the gradient?
- $y' = 3x^2 + 26x + 34$
- Lets put this into function 2:
- Press 



- Remember our equation:
- $y = x^3 + 13x^2 + 34x - 48$
- And what about the gradient?
- $y' = 3x^2 + 26x + 34$
- Lets put this into function 2:
- Press



- Type in the expression for the derivative:

3  $x^3$  RCL  $x$   $x^3$  RCL  $x$   $x^{-1}$  C  $x^2$   
+ 2 6  $x^3$  RCL  $x$   $x^3$  RCL  $x$   
+ 3 4  
=  
=  
=

NI DEG W-VIEW  
3X<sup>2</sup>\_

NI DEG W-VIEW  
3X<sup>2</sup>+26X\_

NI DEG W-VIEW  
3X<sup>2</sup>+26X+34\_

NI DEG  
X\_Start: 0.  
X\_Step: 1.

NI DEG  
X\_Start: 0.  
X\_Step: 1.

NI DEG

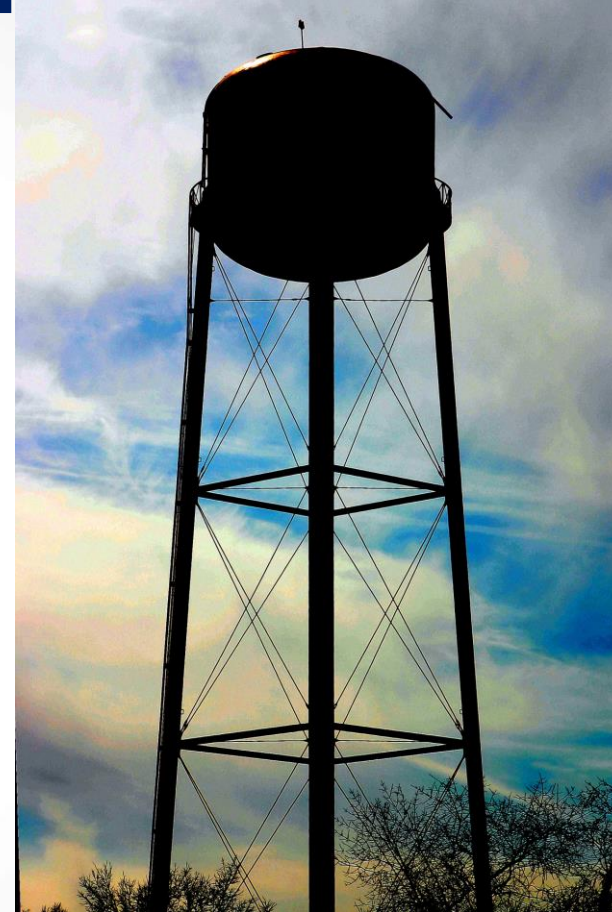
X	ANS1	ANS2
0	34	34
1	60	60
2	100	100

0.



# E.g. From Handbook and Study Guide Kevin smith (Grade 12) pg. 203

- The volume of water in a rainwater collection tank  $t$  minutes after it starts to empty is given by the equation  $V(t) = 4(5 - t)^2$  where volume is measured in litres (l)
  - a) Determine the initial volume of water in the tank.
  - b) At what rate is the water in the tank changing after 180 seconds?
  - c) How long will it take for the tank to empty?

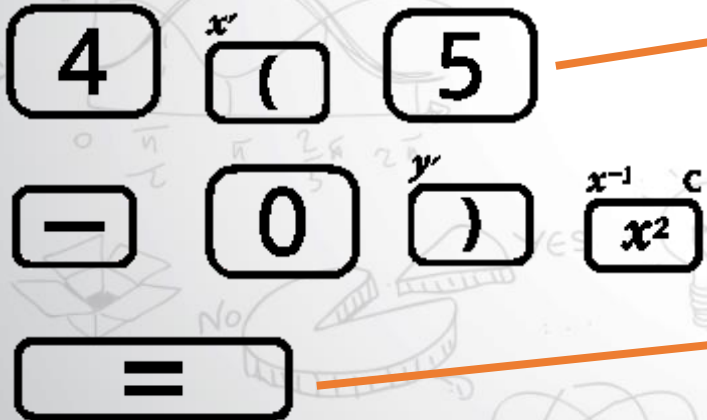


[This Photo](#) by Unknown Author is licensed under [CC BY-SA](#)



# a) Determine the initial volume of water in the tank.

- $V(t) = 4(5 - t)^2$
- Initial volume means that  $t = 0$
- And we substitute in:
- $V(0) = 4(5 - 0)^2$
- Type this into your calculator:



N1 DEG W-VIEW  
4(5...

N1 DEG W-VIEW  
4(5-0)^2...

N1 DEG W-VIEW  
4(5-0)^2=  
100.

## b) At what rate is the water in the tank changing after 180 seconds?

- $V(t) = 4(5 - t)^2$
- Rate means we need gradient, which means we need to differentiate:
- First simplify / multiply out:
  - $V(t) = 4(5 - t)$
  - $V(t) = 4(25 - (5 - t)10t + t^2)$
  - $V(t) = 100 - 40t + 4t^2$
- Now we can differentiate:
- $V'(t) = -40 + 8t$

- We have that  $t = 180$  seconds so we have  $t = 3$  minutes and we substitute in:
- $V'(180) = -40 + 8(3)$
- Type this in:

**(-)** **4** **0** **+**

NEG

**8** **(** **3** **)**

**=**

N1 DEG W-VIEW  
-40+...

N1 DEG W-VIEW  
-40+8(3)...

N1 DEG W-VIEW  
-40+8(3)=  
-16.

# c) How long will it take for the tank to empty?

- What is  $t$  when  $V(t) = 0$ ?
- $V(t) = 4(5 - t)^2$
- Substitute:
- $0 = 4(5 - t)^2$
- Solve for  $t$ :
- $0 = (5 - t)^2$
- $0 = 5 - t$
- $t = 5 \text{ minutes}$

N1 DEG W-VIEW

$$4(5-X)^2$$

N1 DEG

X	ANS
100	100
1	64
2	36

0.

N1 DEG

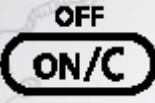
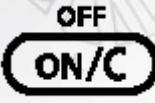
X	ANS
3	16
4	4
5	0

5.



# Finance

- Simple Interest

- Press  

- E.g.  $A = 1000 (1 + 5\% \times n)$

- Press     

NI DEG W-VIEW  
TABLE MODE  
Function1?

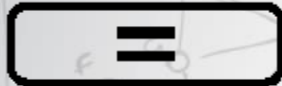
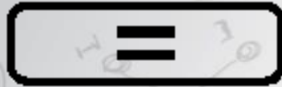
NI DEG W-VIEW  
1000(

NI DEG W-VIEW  
1000(1+

NI DEG W-VIEW  
1000(1+ $\frac{5}{100}$

NI DEG W-VIEW  
1000(1+ $\frac{5}{100} \times X$ )

• Press



NI DEG W-VIEW  
Function2?

NI DEG  
X\_Start: 0.  
X\_Step: 15.

NI DEG  
X\_Start: 0.  
X\_Step: 15.

NI DEG  
X\_Start: 0.  
X\_Step: 1

X	ANS
0	1000
1	1050
2	1100

0.

X	ANS
6	1300
7	1350
8	1400

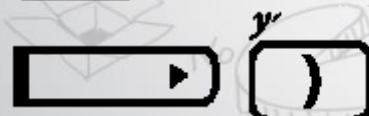
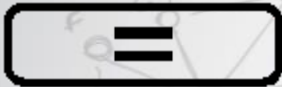
8.

X	ANS
19	1950
20	2000
21	2050

20.

# Compound interest

- Lets add compound interest into function 2.
- Press **ON/C**



$$1000\left(1+\frac{5}{100} \times X\right)_-$$

Function2?

$$1000($$

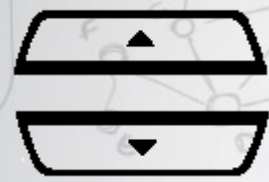
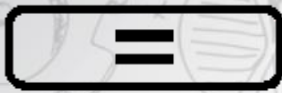
$$1000(1+_$$

$$1000\left(1+\frac{5}{100}\right)$$

$$1000\left(1+\frac{5}{100}\right)_-$$

$$1000\left(1+\frac{5}{100}\right)^{24}$$

• Press



NI DEG

X_Start:		0.
X_Step:		1.

NI DEG

X	ANS1	ANS2
1	1000	1000
1	1050	1050
2	1100	1102.5

NI DEG

X	ANS1	ANS2
4	1200	1215.50
5	1250	1276.28
6	1300	1340.09

NI DEG

X	ANS1	ANS2
18	1800	2406.61
19	1950	2526.95
20	2000	2653.29

NI DEG

X	ANS1	ANS2
34	2750	5516.01
35	2800	5791.81
37	2850	6081.40



# Decay

- We can change it to decay as well:

- Simple Decay:

- $A = P(1 - in)$

- Compound Decay:

- $A = P(1 - i)^n$

- Press **OFF** **ON/C**

- **←** x 10

**DEL**  
**BS**

**-**

**=**

NI DEG W-VIEW  
 $1000(1 + \frac{5}{100} \times X) -$


NI DEG W-VIEW  
 $1000(1 - \frac{5}{100} \times X)$

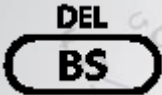
NI DEG W-VIEW  
 $1000(1 - \frac{5}{100})^X$

NI DEG W-VIEW  
 $1000(1 - \frac{5}{100} \times X)$

NI DEG W-VIEW  
 $1000(1 + \frac{5}{100})^X -$

- Let's edit the compound interest formula for decay:

- Press  x 11



NI DEG W-VIEW

$$1000\left(1 + \frac{5}{100}\right)^x$$

NI DEG W-VIEW

$$1000\left(1 - \frac{5}{100}\right)^x$$

NI DEG W-VIEW

$$1000\left(1 - \frac{5}{100}\right)^x$$

NI DEG W-VIEW

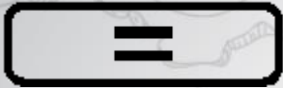
$$1000\left(1 - \frac{5}{100}\right)^x$$



NI DEG

X\_Start: 0.

X\_Step: 1.

- Leave the start and step as is, press



- Use your  and  arrow keys to scroll through various values
- You can use the simple increase but not the compound because of where the substitution takes place.

N1 DEG	
X_Start:	0.
X_Step:	1.

N1 DEG	
X_Start:	0.
X_Step:	1.

N1 DEG		
X	ANS1	ANS2
0	1000	1000
1	950	950
2	900	902.5

N1 DEG		
X	ANS1	ANS2
4	800	814.506
5	750	773.780
6	700	735.081

N1 DEG		
X	ANS1	ANS2
8	1150	1166.35
-2	1100	1108.03
-1	1050	1052.63

# What about an annuity?

- $PV = \frac{x[1-(1+r)^{-n}]}{r}$
- How much could we borrow with various amounts at 10% interest p.a. compounded monthly, over 5 years?
- Substitute what we know into the formula:

$$PV = \frac{x \left[ 1 - \left( 1 + \frac{10}{100 \times 12} \right)^{-5 \times 12} \right]}{\frac{10}{100 \times 12}}$$



- Lets use table mode: **OFF ON/C** **OFF ON/C**
- Now type this into function 1:

$$x \left[ \frac{1 - \left(1 + \frac{10}{100 \times 12}\right)^{-5 \times 12}}{10} \right]$$

• **a/b** **x<sup>3</sup>** **x** **x<sup>3</sup>** **x** **x<sup>r</sup>**  
**a/b** **RCL** **RCL** **(**

**1** **-** **(** **1**

**+** **1** **0** **a/b** **a/b**

**1** **0** **0** **x** **1** **2**

**▸** **y** **)** **x<sup>r</sup>** **A** **y<sup>x</sup>**

**(-)** **5** **x** **1** **2**

**▸** **y** **)** **▾**

**1** **0** **a/b** **a/b**

**1** **0** **0** **x** **1** **2**

$$\frac{x0}{\square}$$

$$\frac{x(1-(10}{\square}$$

$$\frac{x(1-(1+\frac{10}{4}}{\square}$$

$$\frac{x(1-(1+\frac{10}{100 \times 12}}{\square}$$







$$\frac{x(1-(1+\frac{10}{100 \times 12})^4}{\square}$$

$$\frac{+\frac{10}{100 \times 12})^{-5 \times 12}}{\square}$$

$$\frac{+\frac{10}{100 \times 12})^{-5 \times 12}}{4}$$

$$\frac{+\frac{10}{100 \times 12})^{-5 \times 12}}{\frac{10}{4}}$$

$$\frac{+\frac{10}{100 \times 12})^{-5 \times 12}}{\frac{10}{100 \times 12}}$$

- Press  
- Lets make our payments go up in steps of R100 each time.
- Type in    and press 
- Use your up and down arrows to scroll down the table and see what you can get as a loan.

NI DEG W-VIEW  
Function2?

NI DEG  
X\_Start: 0.  
X\_Step: 1.

NI DEG  
X\_Start: 0.  
X\_Step: 1.

NI DEG  
X\_Start: 0.  
X\_Step: 100.

NI DEG  

X	ANS
0	0
100	4706.53
200	9413.07

0.

NI DEG  

X	ANS
800	37652.2
900	42358.8
1000	47065.3

1'000.

NI DEG  

X	ANS
1800	84717.6
1900	89424.2
2000	94130.7



2'000.

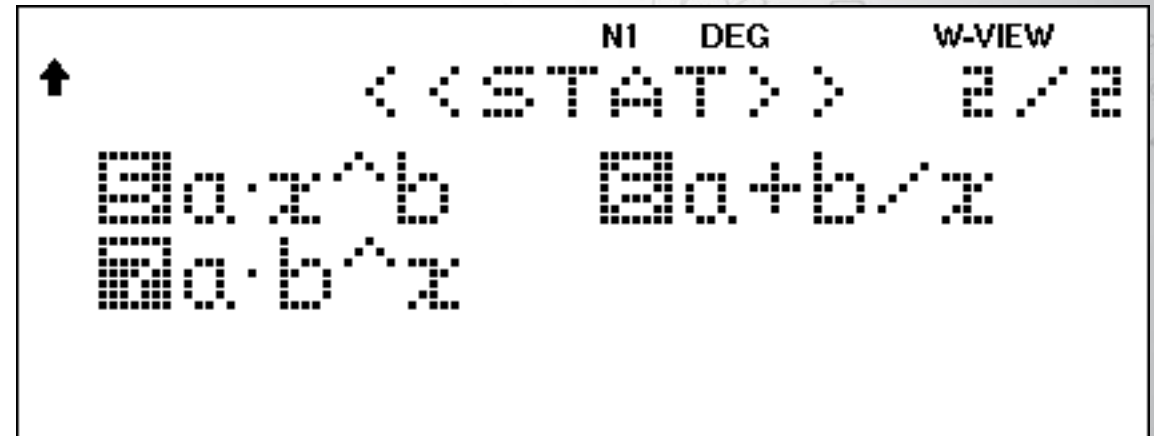
NI DEG  

X	ANS
3100	145902.
3200	150609.
3300	155315.

3'300.

# Statistics Mode

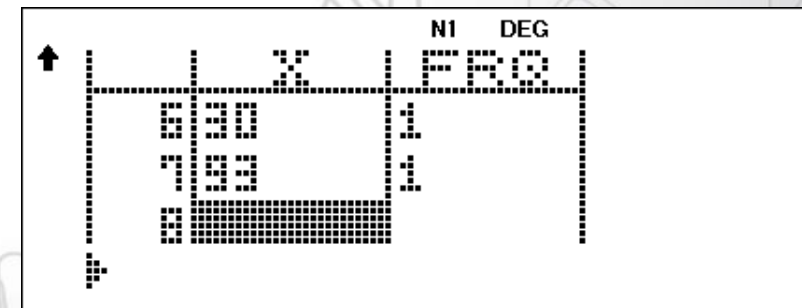
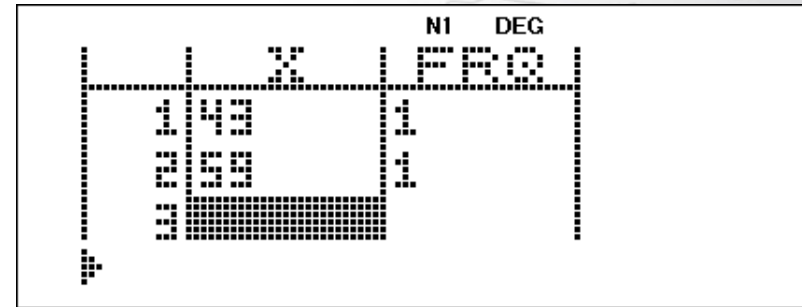
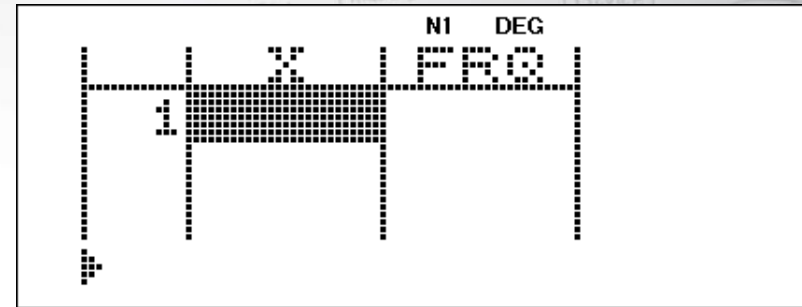
- Press  
- You have several options
  - 0: SD
    - Does statistical analysis for univariate data
  - 1:  $a + bx$ 
    - Does statistical analysis for bivariate data
  - 2:  $a + bx + cx^2$ 
    - Does statistical analysis for quadratic data
  - The rest of statistical analysis options are not relevant to students.





# Univariate Data

- Press **CA MODE** **1** **0**
- Insert data by typing in the data point and pressing **=**
- E.g. Type in the data points below:

- Press **4** **3** **=**
- 5** **9** **=** **8** **4**
- =** **7** **2** **=**
- 6** **1** **=** **3** **0**
- =** **9** **3** **=**





- Press  to change the screen from the data table to the calculation screen.
  - You can also press  to go back to the data table.

- Press  

NI DEG

Stat 0[SD]

0.

NI DEG

<STATISTICS> 1/2

STATISTICS VAL

↓

↓ VARIABLE



NI DEG

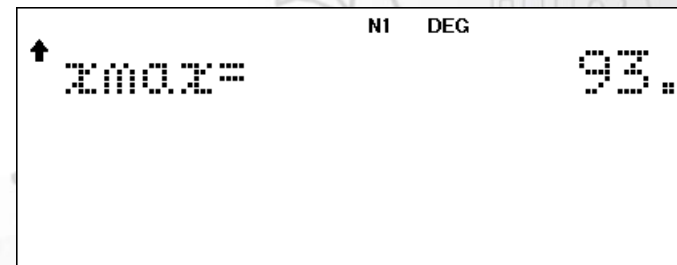
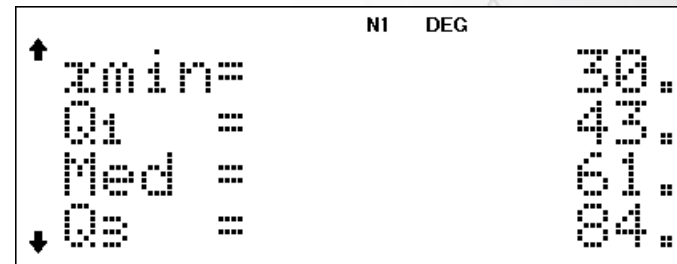
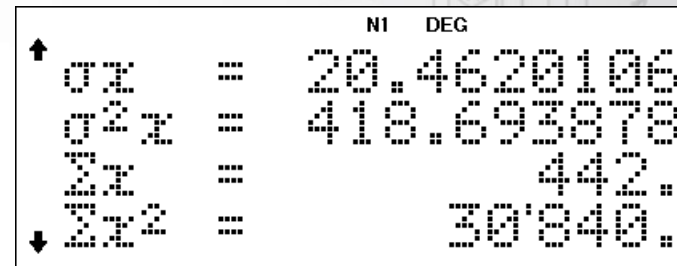
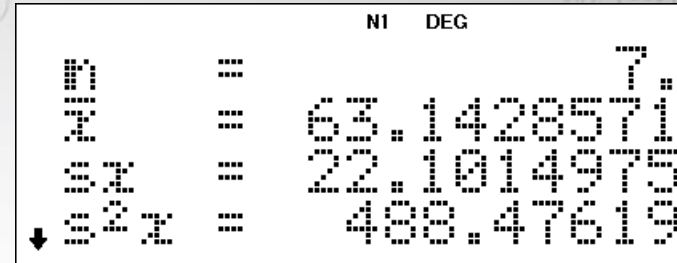
↑ <STATISTICS> 2/2

SUM

MIN/MAX(QUARTILE)

- 0: Statistics Val





- Gives the various values for the statistics.
- Press  to see each of the screens.
- Press  to clear away the statistics.

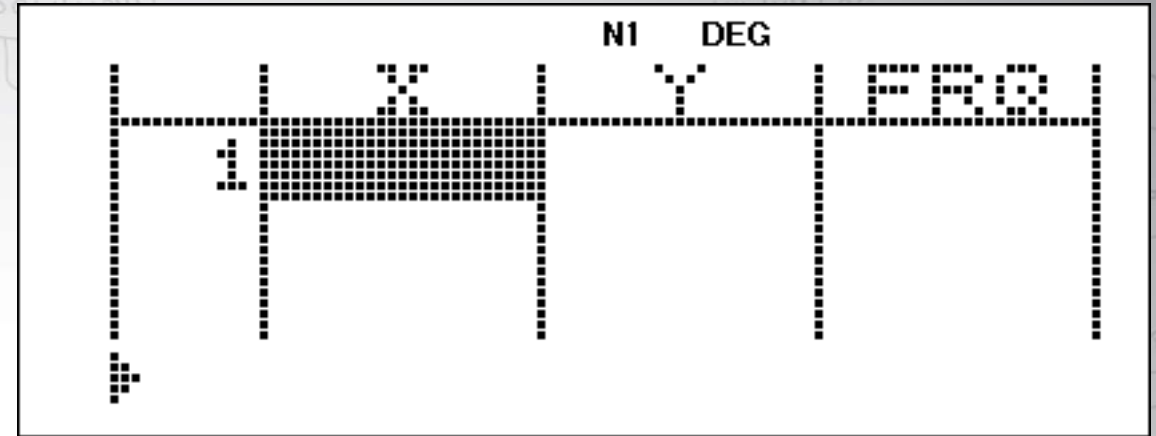


# Linear Regression

- Press   

- You can input the data in two different ways:

- First type in all the x-values (pressing  after each one) then use your arrow keys to move to the top of the y-column, and type in all the corresponding y-values (pressing  after each one).
- Alternatively, type in the x-value, press , type in the y-value and then press . This method is better for showing relationships to students.

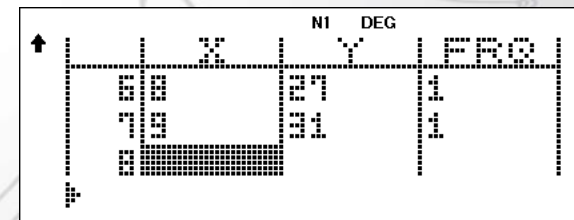
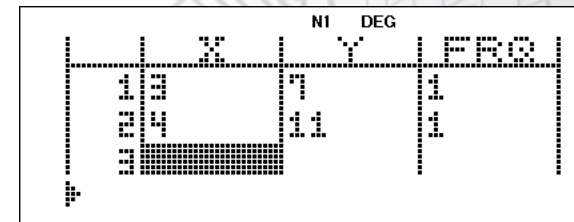


• E.g. Type in the data:


• Press **3**  $\angle$   $\overset{F}{(x,y)}$  **7** **=**

<b>4</b>	$\angle$ $\overset{F}{(x,y)}$	<b>1</b>	<b>1</b>	<b>=</b>
<b>5</b>	$\angle$ $\overset{F}{(x,y)}$	<b>1</b>	<b>5</b>	<b>=</b>
<b>6</b>	$\angle$ $\overset{F}{(x,y)}$	<b>1</b>	<b>9</b>	<b>=</b>
<b>7</b>	$\angle$ $\overset{F}{(x,y)}$	<b>2</b>	<b>3</b>	<b>=</b>
<b>8</b>	$\angle$ $\overset{F}{(x,y)}$	<b>2</b>	<b>7</b>	<b>=</b>
<b>9</b>	$\angle$ $\overset{F}{(x,y)}$	<b>3</b>	<b>1</b>	<b>=</b>

X	Y
3	7
4	11
5	15
6	19
7	23
8	27
9	31





- Now press  to change from the data table to calculation screen.

- Press  

NI DEG

Stat 1 |  $a+bx$  |

0.

NI DEG

<STATISTICS> 1 / 2

STATISTICS VAL

REGRESSION VAL

↓ B VARIABLE

NI DEG

↑ <STATISTICS> 2 / 2


B SUM

B MIN/MAX

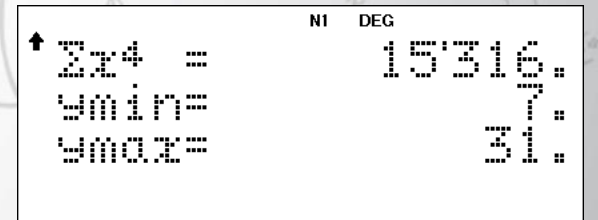
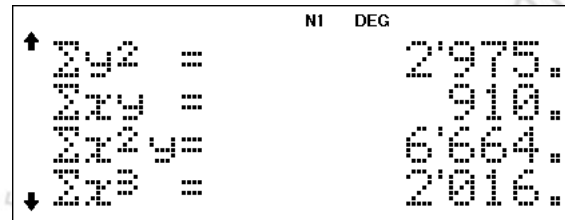
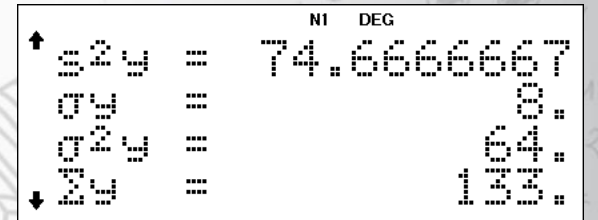
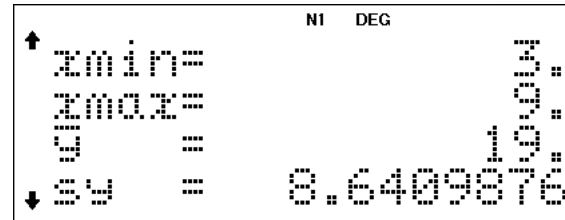
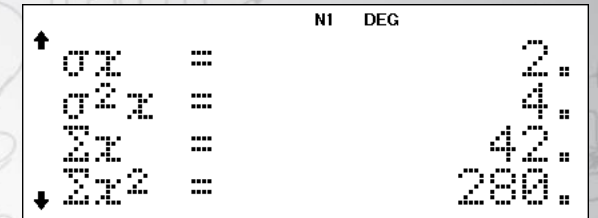
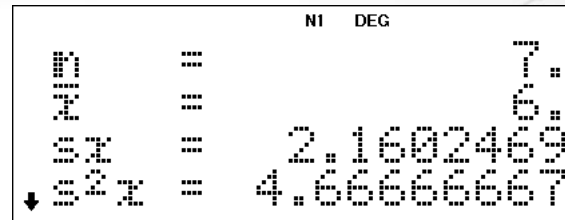
B COEFFICIENT

- 0: Statistics Val

- Press **M-CLR** **ALPHA** **8** **0**

- Press  to see each of the screens.

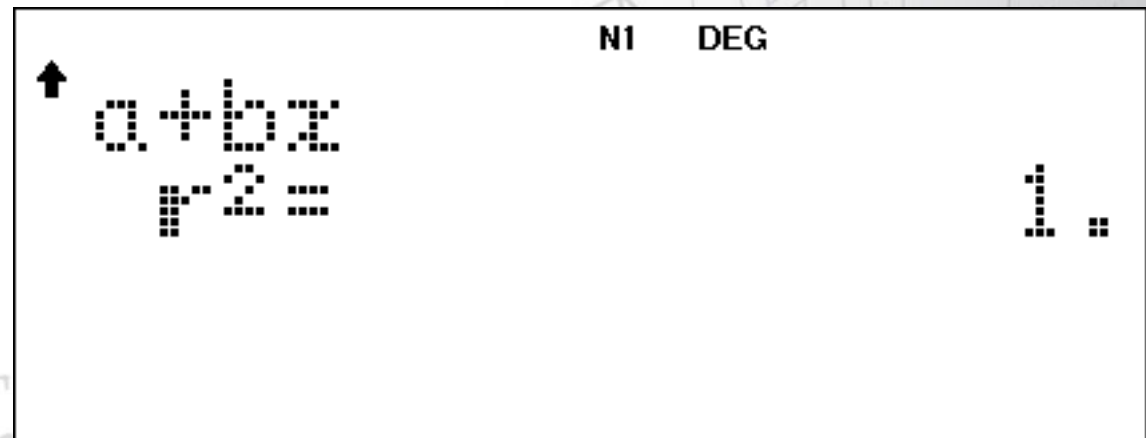
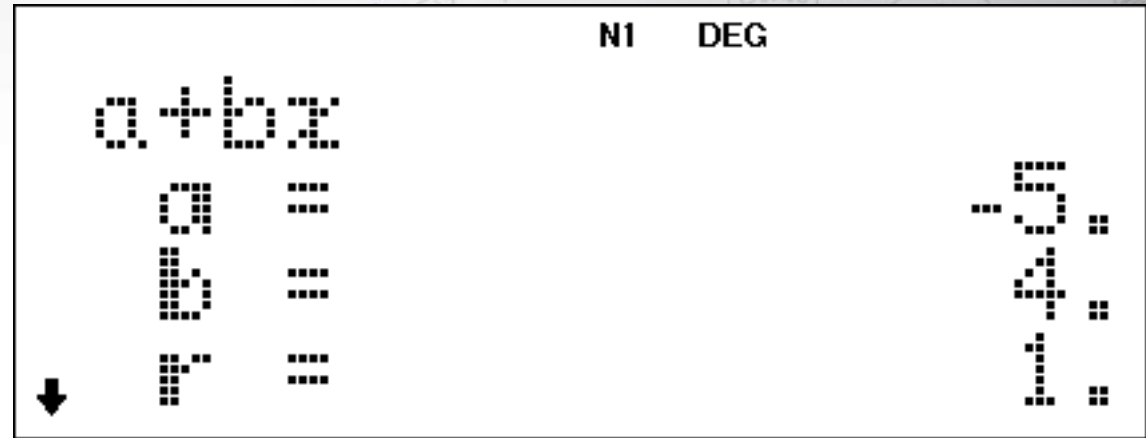
- Press **OFF** **ON/C** to clear away the statistics and do other calculations.



- 1: Regression Values

- Press **M-CLR** **ALPHA** **8** **1**

- Gives the regression line y-intercept (a) and the gradient (b).
    - Gives the correlation coefficient.



# Euclidean Geometry

- With Kevin Smith:
- <https://www.youtube.com/watch?v=d7uMI58sbng>
- Work covered was grade 11 syllabus
- Planning one for - TBC





# Comments

- EL-W535SA approved by the department of education.
- Can be ordered in bulk from SMD directly at better than retail pricing.
- On special now for R149.99!
- Available at Takealot, Pick 'n Pay, Checkers, Game, Makro, PNA and more!



# Thank you for your valuable time!

Free worksheets and simulator:

[www.mathsatsharp.co.za](http://www.mathsatsharp.co.za)

