

# Teaching Maths in a Crazy New World with a Sharp Calculator

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# Agenda

- Sharpies
- Basics
- Teacher Shortcut – Class Marks
- Mental Maths
- Fractions
- Integers
- Probability
- Factorising
- Finance
- Statistics
  - Univariate (single data)
  - Bivariate (linear regression)
- Functions
- Trigonometry

# Sharpies

- A reward program just for teachers
- Earn points for attending this webinar.
- Exchange your points for gifts.
- Sign up – [link](#)
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# SHARPIES



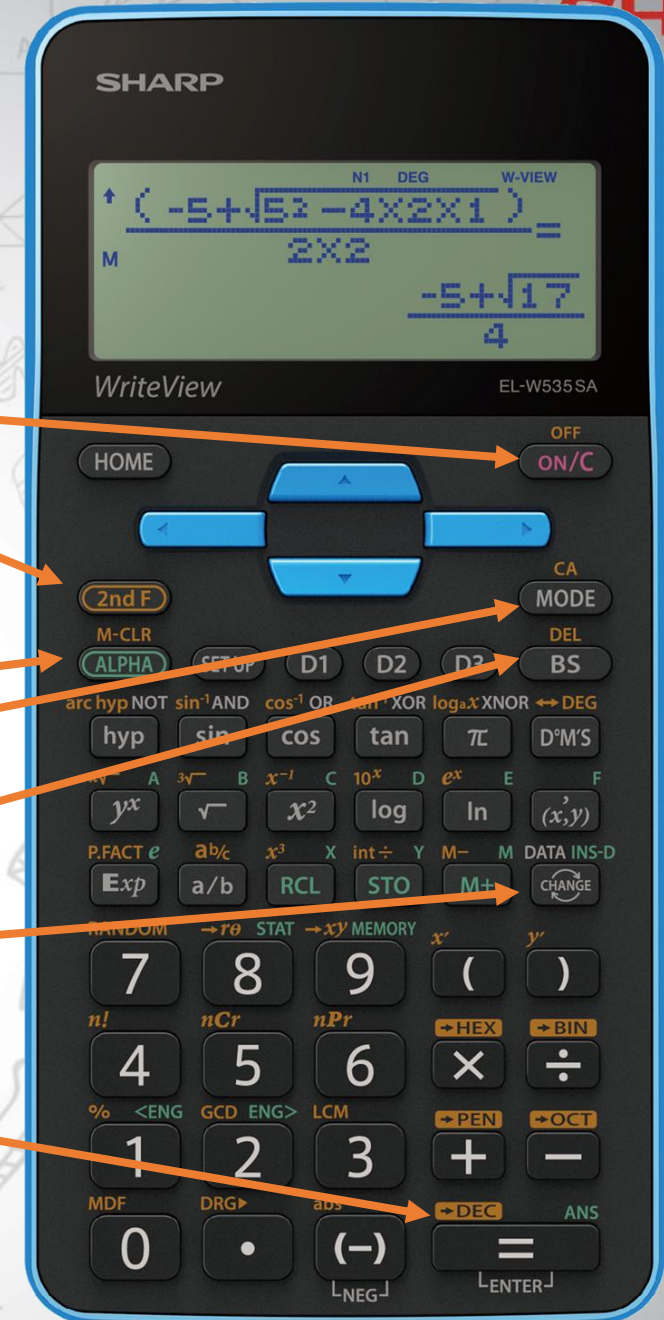


# Free Downloads and Resources

- 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)
- ATP documents ([link](#))
- Available Now: [www.themathsjourney.com](http://www.themathsjourney.com)
- Past workshops on YouTube: <https://www.youtube.com/channel/UCvj4-MV2mvDoTYTAaERGIimg>

# 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

=

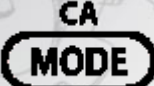




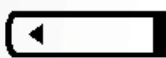
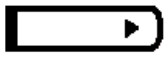

23\_ NI DEG W-VIEW

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

↑ Kx23= NI DEG W-VIEW  
↓ 32.85714286



# Mental Maths Warm Ups

- Press  
- Choose  for Math
  - Use your  and  arrow buttons to choose the number of questions
  - Use your  and  arrow buttons to choose what type of questions you want to do.
  - Press  when you are ready

```

NI DEG W-VIEW
<<DRILL>>
Math
Table
(Multiplication)
    
```

```

Math Drill
Question?
- X + -X+
SELECT & [ENTER]
    
```

```

Math Drill
Question: 25
Type: +-X+
GO!
    
```



- Type in the answer to the first question and press **=** →
- If you are correct it will give you a new question →
- If you are incorrect, it will repeat the question until you get the answer right. →
- If you don't know the answer and need help, leave the answer blank and press **=** →

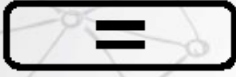
Q 1/25  
✦ 6+14=\_

Q 1/25  
✦ 6+14=20\_

Q 2/25  
✓ 6+14=20  
✦ 10÷ 5=\_

Q 2/25  
✓ 6+14=20  
✕ 10÷ 5=6  
✦ 10÷ 5=\_

Q 3/25  
✕ 10÷ 5=6  
✕ 10÷ 5=2  
✦ 20- 6=\_

- Once all of the questions have been answered, you will see this screen
- Press  to get your results.

0 25/25  
✓ 4x 2-9  
✓ 9- 6-3  
PRESS [ENTER]

Math Drill  
Question: 25  
Type: +-x÷  
✓ : 23 ( 92%)





# 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)

N1 DEG W-VIEW  
NORMAL MODE  
0.

N1 DEG W-VIEW  
 $\frac{4}{5}$


N1 DEG W-VIEW  
 $\frac{4}{5} + \frac{2}{9}$

N1 DEG W-VIEW  
 $\frac{4}{5} + \frac{2}{9} =$   
1  $\frac{1}{45}$

N1 DEG W-VIEW  
 $\frac{4}{5} + \frac{2}{9} =$   
 $\frac{46}{45}$

N1 DEG W-VIEW  
 $\frac{4}{5} + \frac{2}{9} =$   
1.0222222222

# 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 DFSE

EDITOR CONTRAST

0-----

N1 DEG W-VIEW

<SET UP> 2/2

RECURRING DECIMAL

DECIMAL POINT

N1 DEG W-VIEW

<<RECURRING DEC>

OFF

ON

N1 DEG W-VIEW

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

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

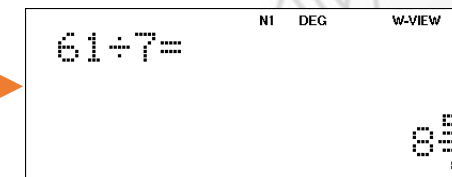
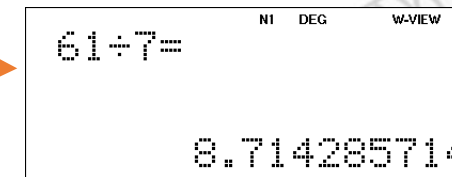
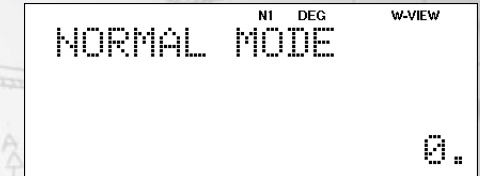
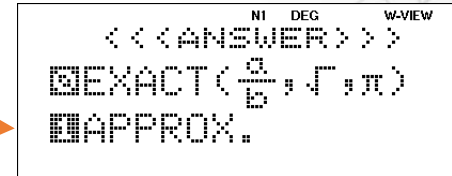
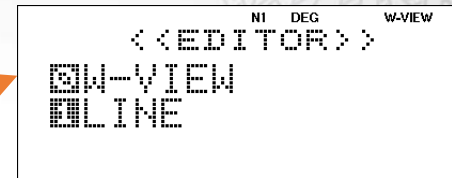
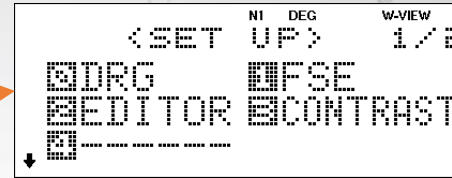
N1 DEG W-VIEW

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

$$1.0\bar{2}$$

# 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**



# Percentages

- Adding 15% to 120:

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

**1** **5**  
% <ENG  
**2ndF** **1**

NI DEG W-VIEW	120+...
NI DEG W-VIEW	120+15...
NI DEG W-VIEW	120+15%
	138.





# Integers

- We use the  button.

- Eg. Find  $-6 \times -3$

- Press   

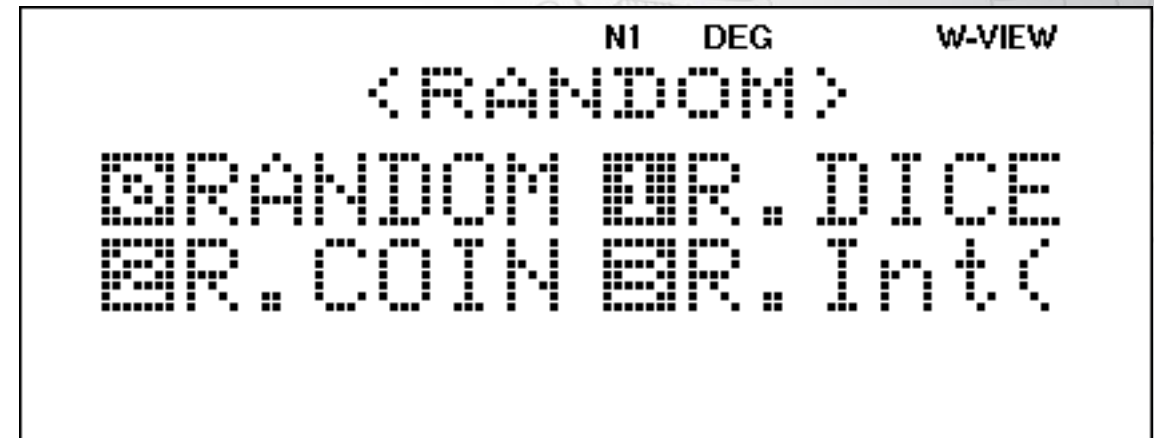
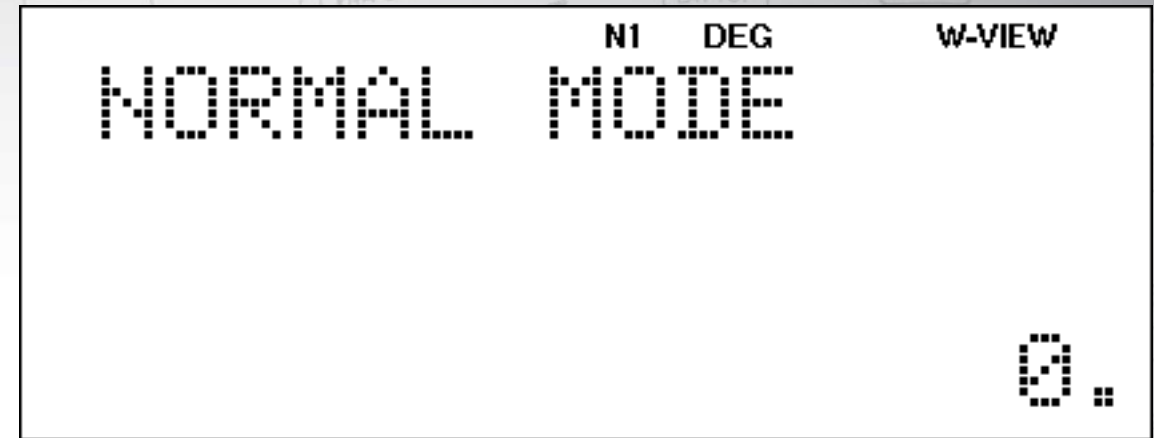






# Probability

- 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



# Some random things to do


- Create tally tables
- Create a poll on zoom
- Play snap in break away rooms
- Use it to test multiples, finding factors and so on.
- My favourite is the lottery
  - Which you could do through the chat function so no cheating happens 😊

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

```
41.
```

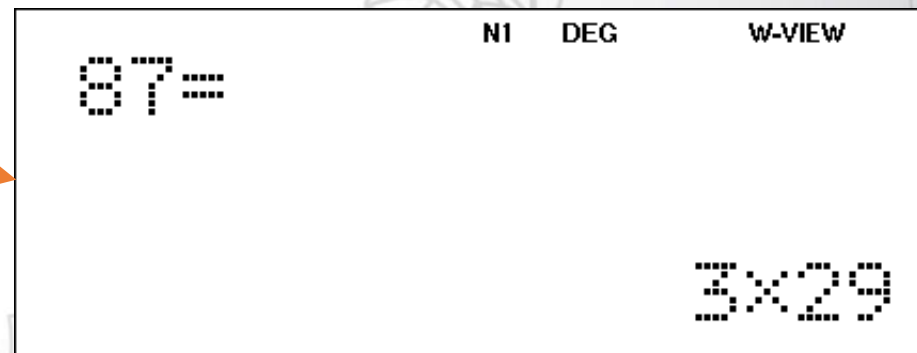
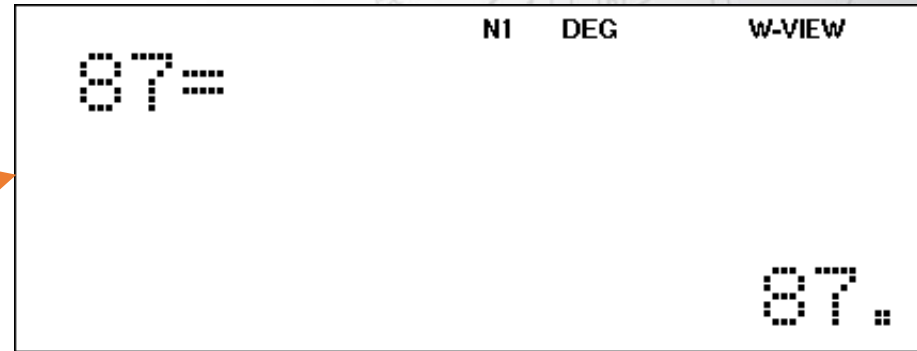
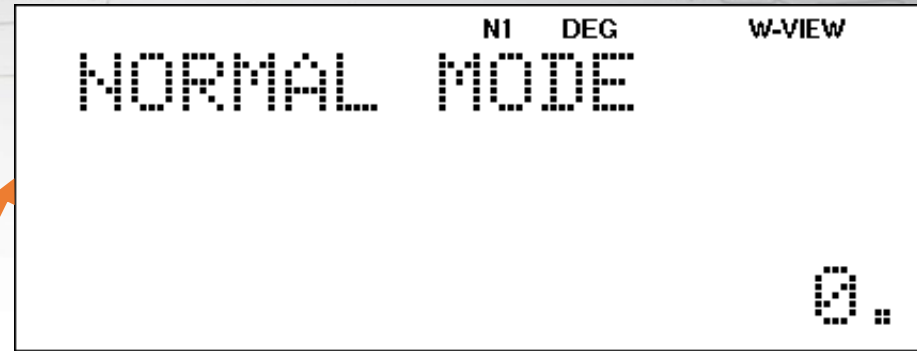


# Prime Factors

- 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.

# Factor Pairs

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



# 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.  $x^2 + 6x + 8$

- $x^2 - 9x + 8$

- $x^2 - 2x - 8$



# Another example:

- $x^2 + 9x + 20$

	N1	DEG	W-VIEW
	20		
	X		

	N1	DEG	
↑	X	ANS	
	1	20	
	2	10	
		6.666666	
↓			3.

	N1	DEG	
↑	X	ANS	
	4	5	
	5	4	
		3.333333	
↓			6.

# Trinomials with $a \neq 1$

- **Several methods:**
  - Airplane Method
  - Cross over method
  - **Grouping (Khan Academy method)**
  - **The Box method**
- Remember to use your factor pairs method with the calculator 😊



# Khan Academy Way (Grouping)

- Start by finding the two numbers (factors) that multiply to  $ac$  and add to  $b$ .
- Use these numbers to split up the  $x$ -term.
- Use grouping to factor the quadratic expression.

$$\bullet 3x^2 - 31x + 70$$

	X	ANS	NI DEG
1		210	
2		105	
3		70	
4		52.5	
5		42	
6		35	
7		30	
8		26.25	
9		23.3333	
10		21	
11		19.0909	
12		17.5	
13		16.1538	
14		15	
15		14	

# Box Method

- Found at [Purple Maths](#)
- Multiply ac and find factors of ac
- Think about your signs
- Insert into box.

$ax^2$	Factor 1
Factor 2	$c$

- Take factors from box.

- $-6x^2 + 15x + 36$



# Solving using a calculator

- $-6x^2 + 15x + 36$

- Go to table mode

- Press **MODE** **2**

- Type in the expression:

**(-)** **6** **RCL** **RCL** **x<sup>2</sup>**

**+** **1** **5** **RCL** **RCL**

**+** **3** **6**

**=**

N1 DEG W-VIEW  
TABLE MODE  
Function1?

N1 DEG W-VIEW  
-6X<sup>2</sup> \_

N1 DEG W-VIEW  
-6X<sup>2</sup>+15X \_

N1 DEG W-VIEW  
-6X<sup>2</sup>+15X+36 \_

N1 DEG W-VIEW  
Function2?

N1 DEG W-VIEW  
Function2?



- Leave Function 2 blank so press 

N1 DEG  
X\_Start: 0.  
X\_Step: 1.

- For now leave the start and step as they are and press



N1 DEG  
↑ X ANS  
0 35  
1 45  
2 42  
↓ 0.

- Use  and  to scroll through the table.

N1 DEG  
↑ X ANS  
-1 15  
0 35  
↓ -2.

N1 DEG  
↑ X ANS  
2 42  
3 27  
4 0  
↓ 4.

N1 DEG  
↑ X ANS  
7 -153  
8 -228  
9 -315  
↓ 9.

- Press **ON/C** to return to expression

NI DEG W-VIEW  
-6X<sup>2</sup>+15X+36\_

- Press **=**

NI DEG W-VIEW  
Function2?

**=**

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

**=**

- Change step to  $\frac{1}{6}$  by pressing

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

**1** **a/b** **6**

NI DEG  
X\_Start: 0.  
X\_Step: 1r6\_

**=**

X	ANS
0	36
0.166666	39.33333
0.333333	40.33333

X	ANS
0	0
-1.33333	5.33333
-2.66666	10.33333

# Quadratic Formula

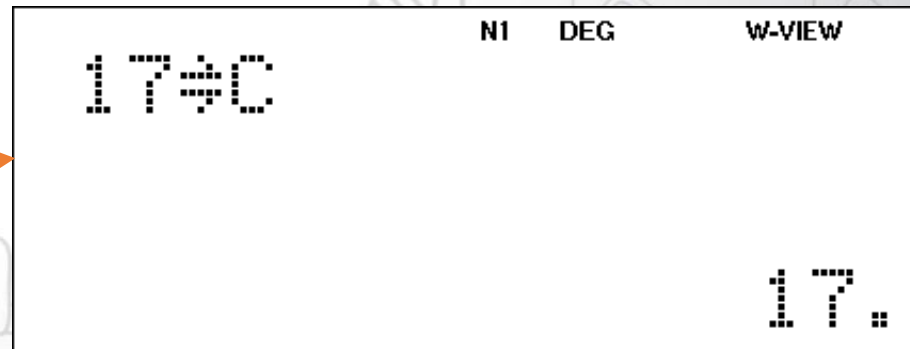
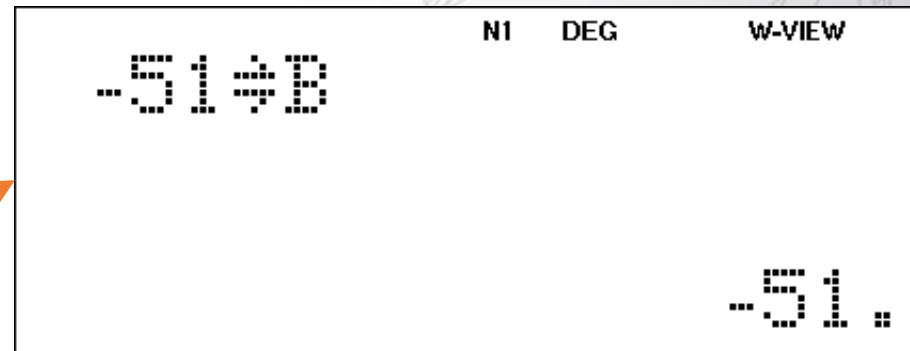
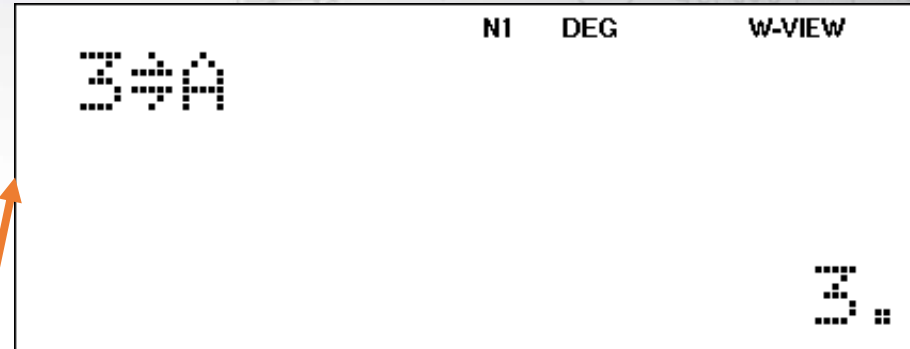
HOME

- $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
- 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>**

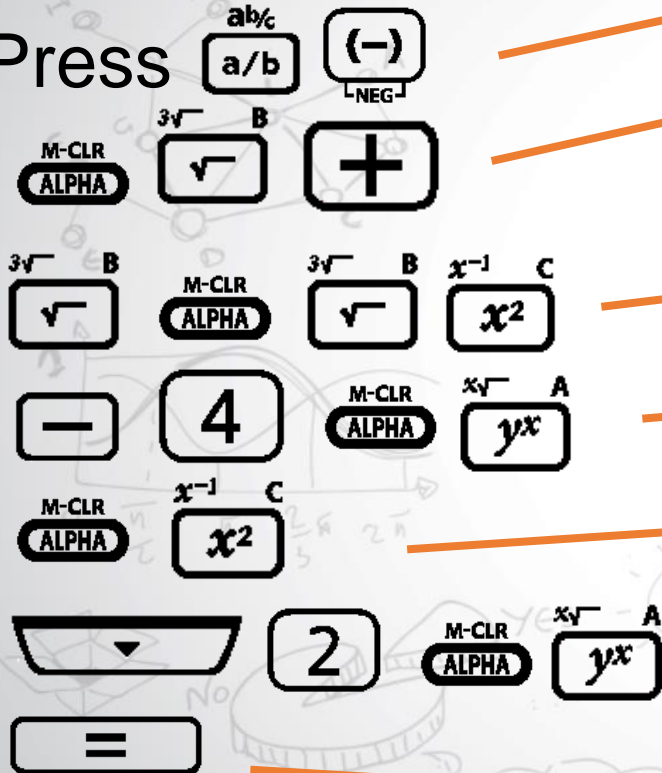
• 17  $\xrightarrow{\text{int} \div Y}$  **STO**  $\xrightarrow{x^{-1} C}$  **x<sup>2</sup>**





- Now we type in the formula.
- Use **M-CLR ALPHA** to get the memory key letters.

- Press **a/b** **(-)**



NI DEG W-VIEW

$$\frac{0}{0}$$

NI DEG W-VIEW

$$\frac{-B}{0}$$

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

$$\frac{-B+\sqrt{B^2-4A0}}{0}$$

NI DEG W-VIEW

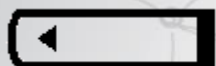
$$\frac{-B+\sqrt{B^2-4AC}}{2A}$$

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



# Simple Interest

- Press **ON/C** **ON/C**
  - E.g.  $A = 1000 (1 + 5\% \times n)$
  - Press **1** **0** **0** **0** **(**
- 1** **+**  
**5** **ab/c** **1** **0** **0**  
**a/b**  
**x<sup>3</sup>** **x** **x<sup>3</sup>** **x** **y<sup>r</sup>**  
**→** **×** **RCL** **RCL** **)**

NI DEG W-VIEW  
TABLE MODE  
Function1?

NI DEG W-VIEW  
1000(

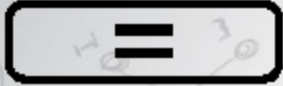
NI DEG W-VIEW  
1000(1+

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

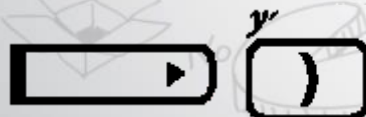
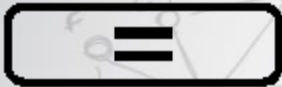
8.

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?

$$1000($$

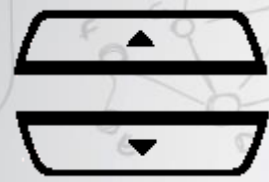
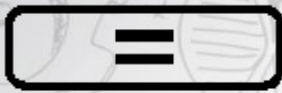
$$1000(1+_$$

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

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

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

• 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

4	1200	1215.50
5	1250	1276.28
6	1300	1340.09

NI DEG

18	1800	2406.61
19	1950	2526.95
20	2000	2653.29

NI DEG

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

$$1000(1 - \frac{5}{100} \times X)$$

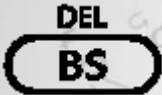
NI DEG W-VIEW

$$1000(1 + \frac{5}{100})^X -$$



- 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**

$$\frac{x \cdot 0}{\square}$$

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

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

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

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







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

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

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

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



- 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.

X	ANS
0	0
100	4706.53
200	9413.07

0.

X	ANS
800	37652.2
900	42358.8
1000	47065.3

1'000.

X	ANS
1800	84717.6
1900	89424.2
2000	94130.7



2'000.

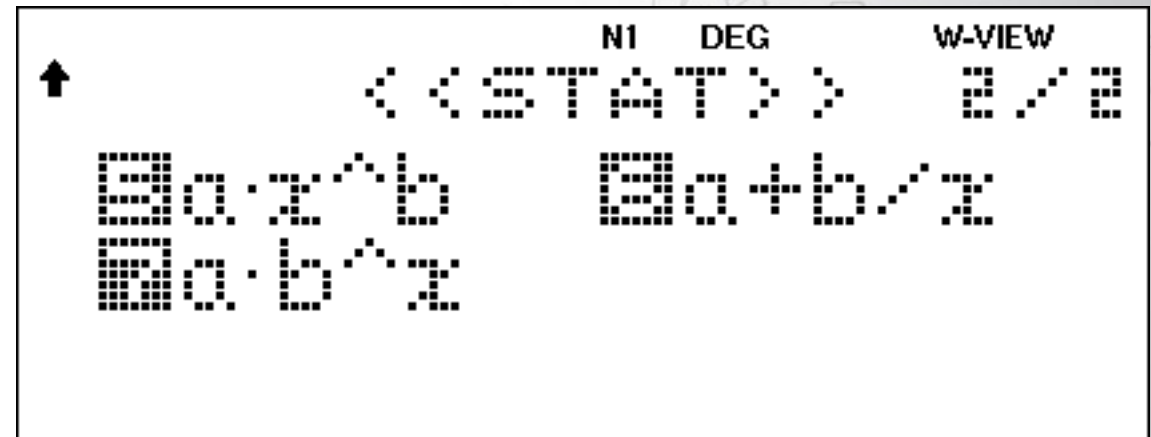
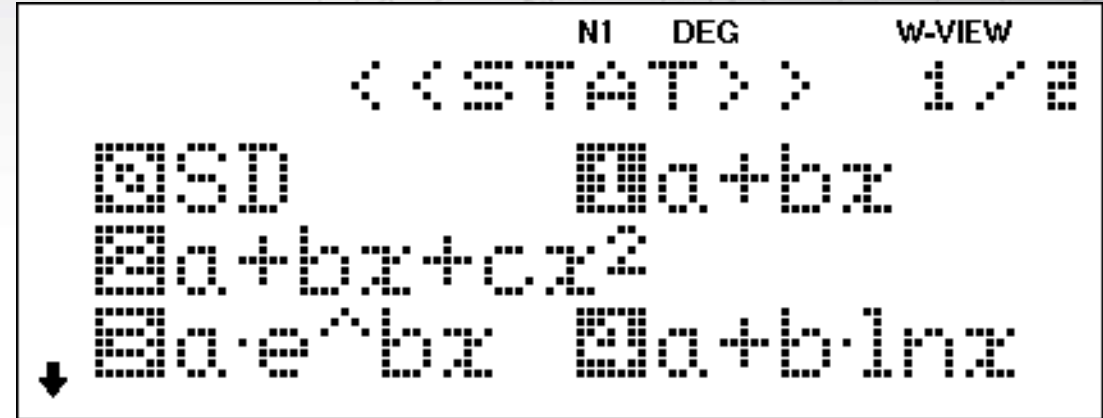
X	ANS
3100	145902.
3200	150609.
3300	155315.

3'300.



# Statistics Mode

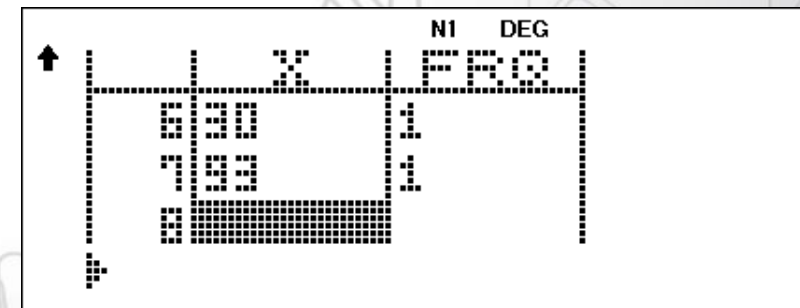
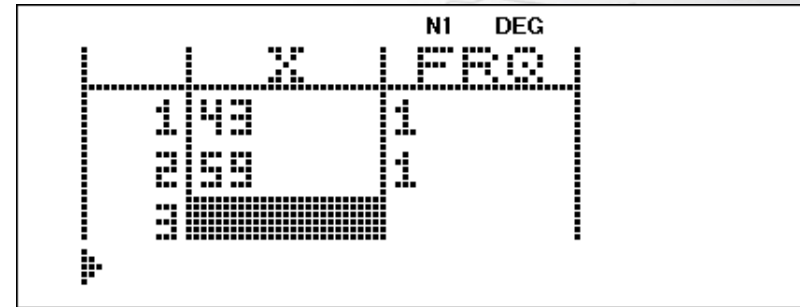
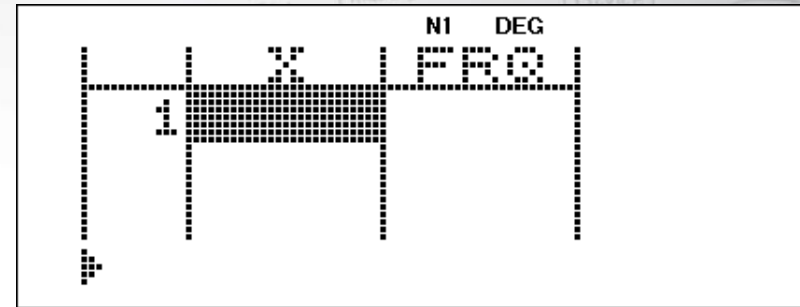
- Press  
- You have several options
  - 0: SD
    - Does statistical analysis for univariate data
  - 1:  $a + bx$ 
    - Does statistical analysis for bivariate data
  - 2:  $a + bx + cx^2$ 
    - Does statistical analysis for quadratic data
  - The rest of statistical analysis options are not relevant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

↓

BYARIABLE


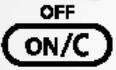
NI DEG

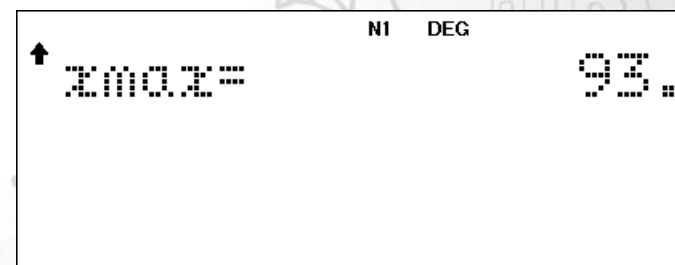
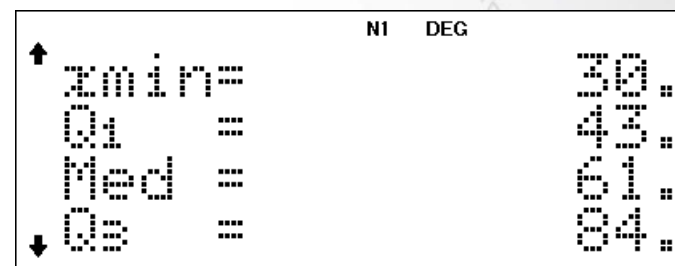
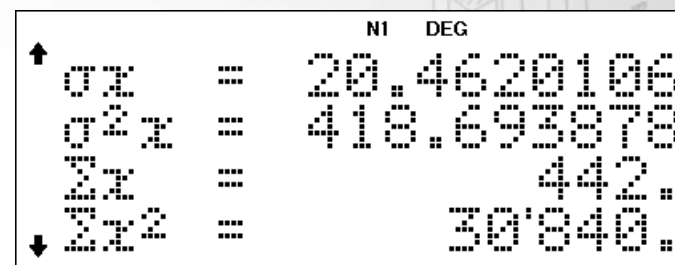
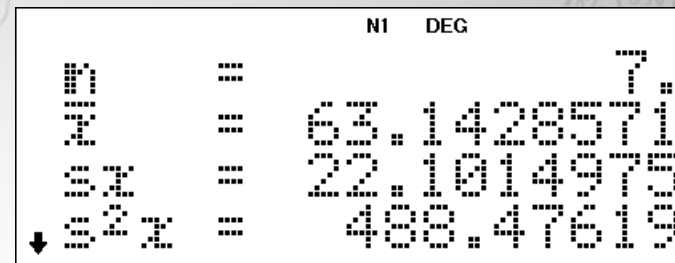
↑ <STATISTICS> 2/2

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.



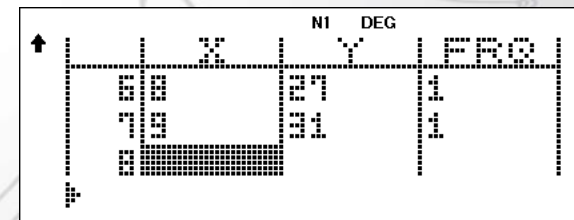
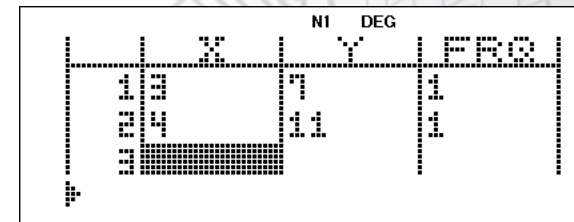


• E.g. Type in the data:




• 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  
BSTATISTICS VAL  
BREGRESSION VAL  
BVARIALE  
↓

NI DEG  
↑ <STATISTICS> 2/2  
BSUM  
BMIN/MAX  
BCOEFFICIENT

- 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.

```

NI DEG
n      =      7.
x̄      =      6.
sx     =      2.1602469
s²x   =      4.666666667
    
```

```

NI DEG
σx     =      2.
σ²x    =      4.
Σx     =      42.
Σx²    =      280.
    
```

```

NI DEG
xmin=      3.
xmax=      9.
y      =      19.
sy     =      8.6409876
    
```

```

NI DEG
s²y    =      74.66666667
σy     =      8.
σ²y    =      64.
Σy     =      133.
    
```

```

NI DEG
Σy²    =      2'975.
Σxy    =      910.
Σx²y   =      6'664.
Σx³    =      2'016.
    
```

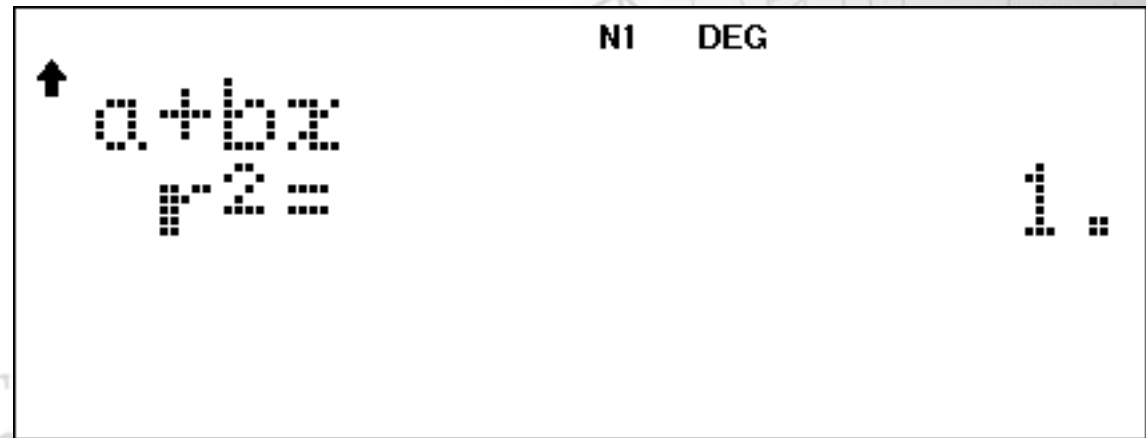
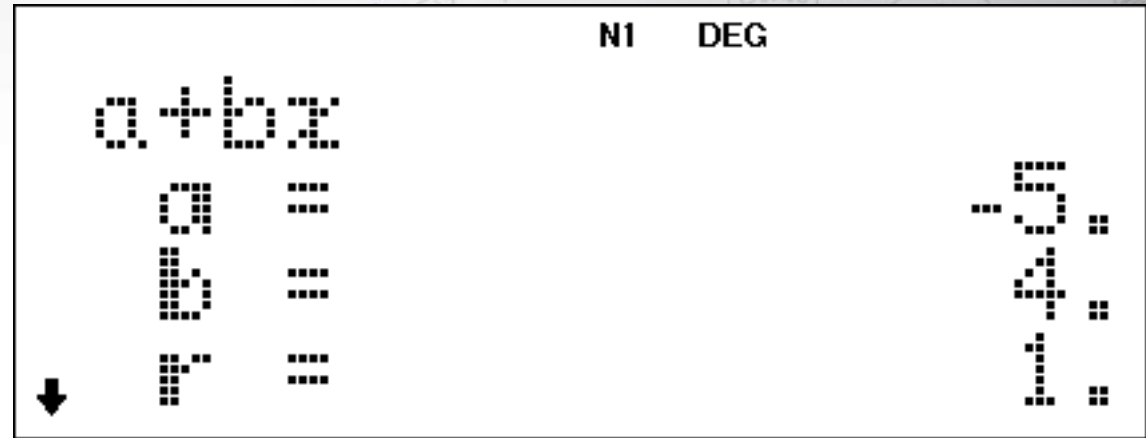
```

NI DEG
Σx⁴    =      15'316.
ymin=      7.
ymax=      31.
    
```

- 1: Regression Values

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

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

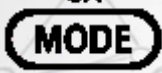






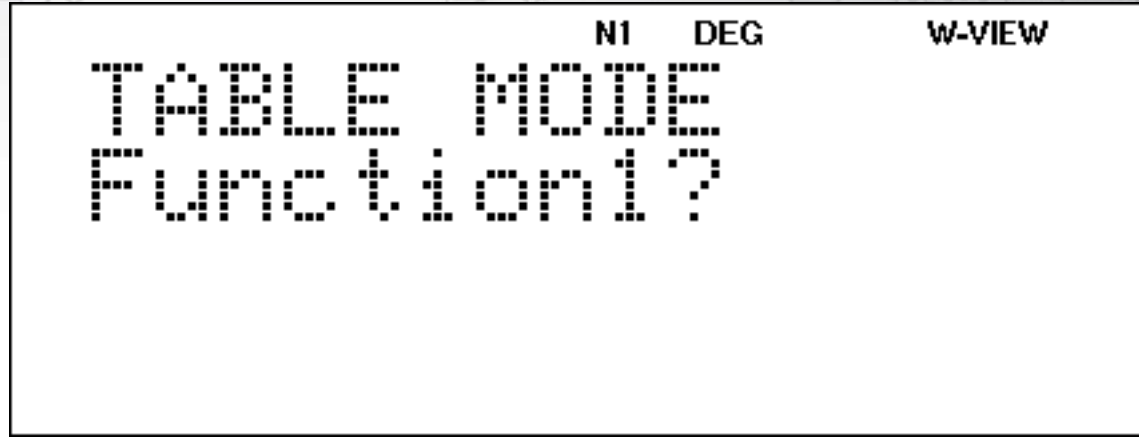
# Graphs







# Teaching Graphs

- Straight line graphs
- Lets start with the basics:
  - $Y = x$
- Press  
- Then  
- Press  4 times.



- Your table will look like this
- Use your  and  arrows to scroll through the table.

	X	N1	DEG
5		5	5
4		4	4
3		3	3

	X	N1	DEG
0		0	0
1		1	1
2		2	2

	X	N1	DEG
6		6	6
7		7	7
8		8	8

# Investigating Gradient

- Press **OFF ON/C**
- **=**
- For Function 2 press

**3** <sup>x<sup>3</sup></sup> **RCL** <sup>x</sup> **RCL** <sup>x<sup>3</sup></sup> <sup>x</sup>

**=**

**=**

**=**

N1 DEG W-VIEW  
X\_

N1 DEG W-VIEW  
Function2?

N1 DEG W-VIEW  
3X\_

N1 DEG  
X\_Start: 0.  
X\_Step: 1.

N1 DEG  
↑ X | ANS1 | ANS2 |  
0 | 0 | 0 |  
1 | 1 | 1 |  
2 | 2 | 2 |  
↓ | | | 0.

• Press **ON/C**

• Now press **←**

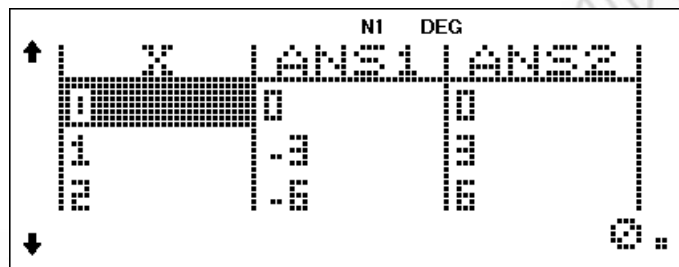
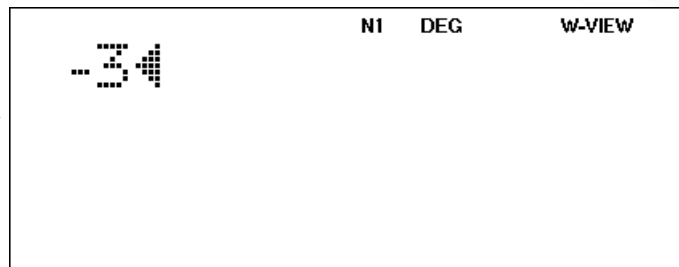
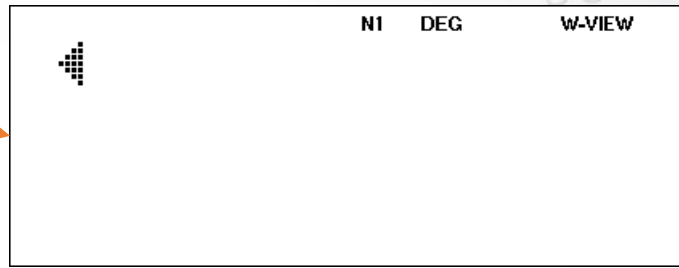
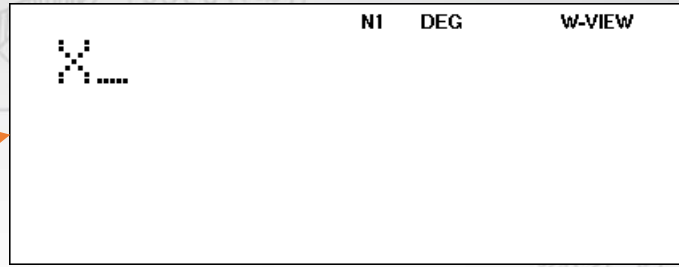
**(-)** **3**  
[NEG]

**=**

**=**

**=**

**=**







• Press **OFF ON/C**

**- 3**

**=**

**=**

**=**

**=  $\pi$**

N1 DEG W-VIEW  
X\_

N1 DEG W-VIEW  
X-3\_

N1 DEG W-VIEW  
X+3\_

N1 DEG  
X\_Start: 0.  
X\_Step: 1.

N1 DEG

X	ANS1	ANS2
0	.3	3
1	.2	4
2	.1	5

0.



# 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  $\text{D1}$

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

$=$

N1 DEG W-VIEW  
STORING D1  
SELECT FUNCTION

2ndF N1 DEG W-VIEW  
STORED!

N1 DEG W-VIEW  
 $\text{sin}^{-1}$

N1 DEG W-VIEW  
 $\text{sin}^{-1} \frac{1}{2}$

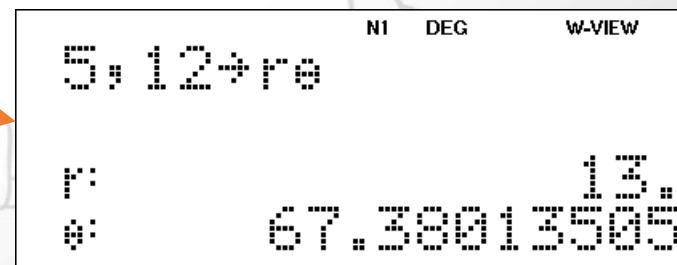
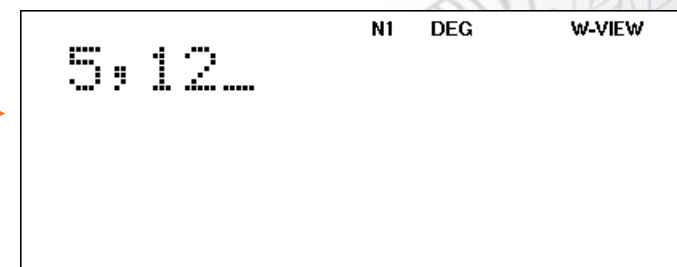
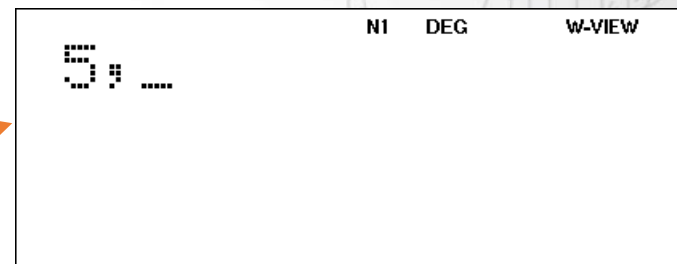
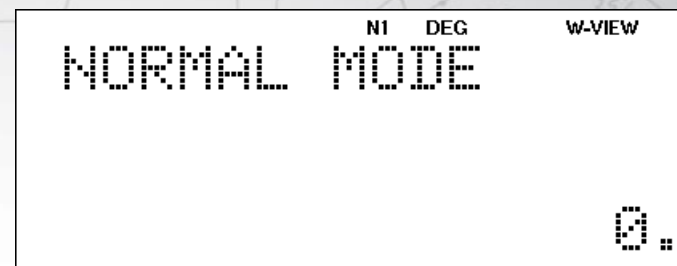
N1 DEG W-VIEW  
 $\text{sin}^{-1} \frac{1}{2} =$   
30.



# 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**

**=**

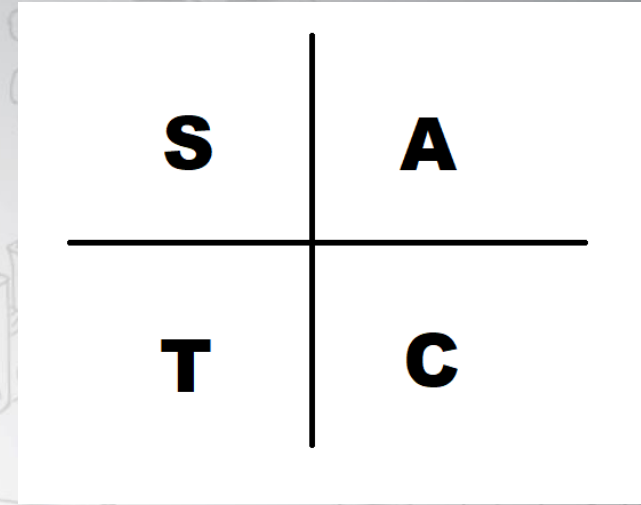
sinX\_ NI DEG W-VIEW


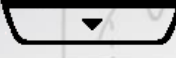
Function2? NI DEG W-VIEW

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

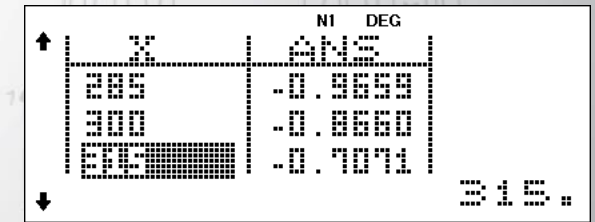
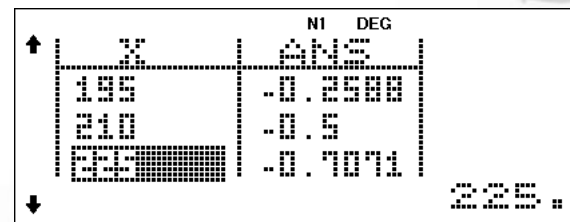
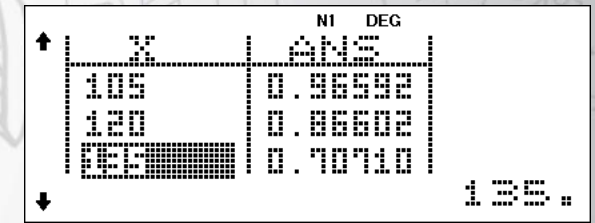
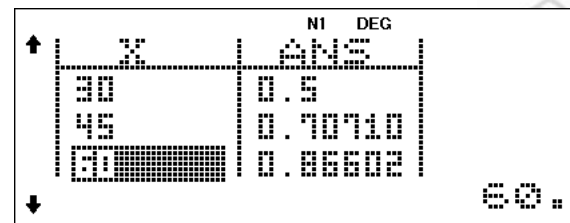
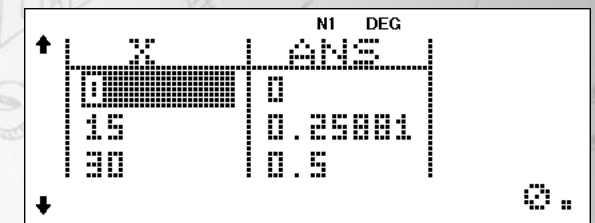
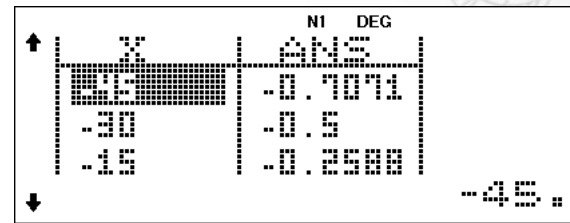
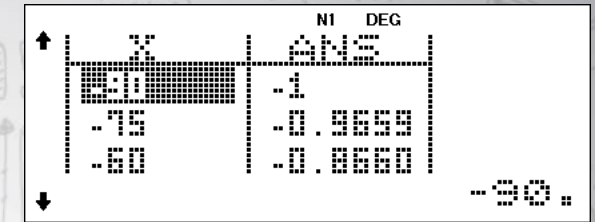
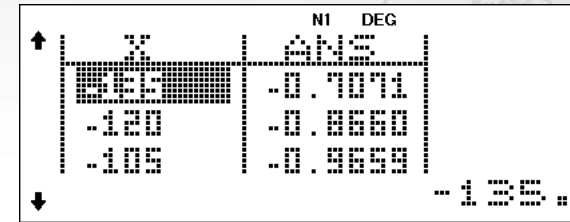
X\_Start: 0.  
X\_Step: 15.

X	ANS
0	0
15	0.25001
30	0.5



- 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	-		



# Trigonometry Graphs

- Let's start with a basic sin graph:

- Press **MODE** **2**

- Type in **sin**

- Press **RCL** **RCL**

- Press **=**

NI DEG W-VIEW  
<MODE>  
NORMAL STAT  
TABLE DRILL

NI DEG W-VIEW  
TABLE MODE  
Function1?

NI DEG W-VIEW  
sin\_

NI DEG W-VIEW  
sinX\_

NI DEG W-VIEW  
Function2?



- Press **=**
- Make your start -180 press

**(-)** **1** **8** **0**

**=**

- Make your step 15° press

**1** **5**

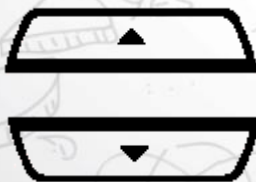
**=**

NI DEG	
X_Start:	0.
X_Step:	1.

NI DEG	
X_Start:	-180.
X_Step:	1.

NI DEG	
X_Start:	-180.
X_Step:	15.

NI DEG	
X	ANS
0	0
-180	-0.2500
-150	-0.5
	-180.



NI DEG	
X	ANS
-135	-0.7071
-120	-0.8660
	-0.9659
	-105.

NI DEG	
X	ANS
-60	-0.8660
-45	-0.7071
	-0.5
	-30.

NI DEG	
X	ANS
-15	-0.2500
0	0
	0.25001
	15.

NI DEG	
X	ANS
60	0.86602
75	0.96592
	1
	90.

NI DEG	
X	ANS
120	0.86602
135	0.70710
	0.5
	150.

NI DEG	
X	ANS
165	0.25001
180	0
	-0.2500
	195.

# GeoGebra

## Learn GeoGebra Classroom

Step 1: Find an Activity

Step 2: Create a Class

Step 3: Students Join Class

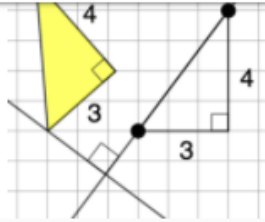
Step 4: Monitor Student Progress

Distance Learning with GeoGebra C...

Apps for GeoGebra Classroom

Create a Class from a Book

Other Helpful Tips



### Step 1: Find an Activity

### CREATE CLASS

Step 2: Create a Class

### Step 2: Create a Class

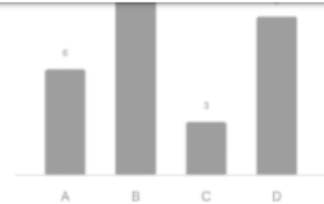
### GeoGebra Classroom

Live conversations with interactive math tools

Enter your class code

JOIN

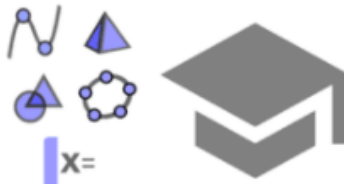
### Step 3: Students Join Class



### Step 4: Monitor Student Progress



### Distance Learning with GeoGebra



### Apps for GeoGebra Classroom



### Create a Class from a Book



### Other Helpful Tips

# Middle & High S. Math: 2200+ Resources

Author: [GeoGebra Team](#)

## Middle School Math Resources

Explore more than 500 interactive resources through which students can learn math concepts in a fun way!


- [Ratios, Proportions, and Percents](#)
- [PreAlgebra and Algebra 1](#)
- [Geometry](#)
- [Probability and Statistics](#)

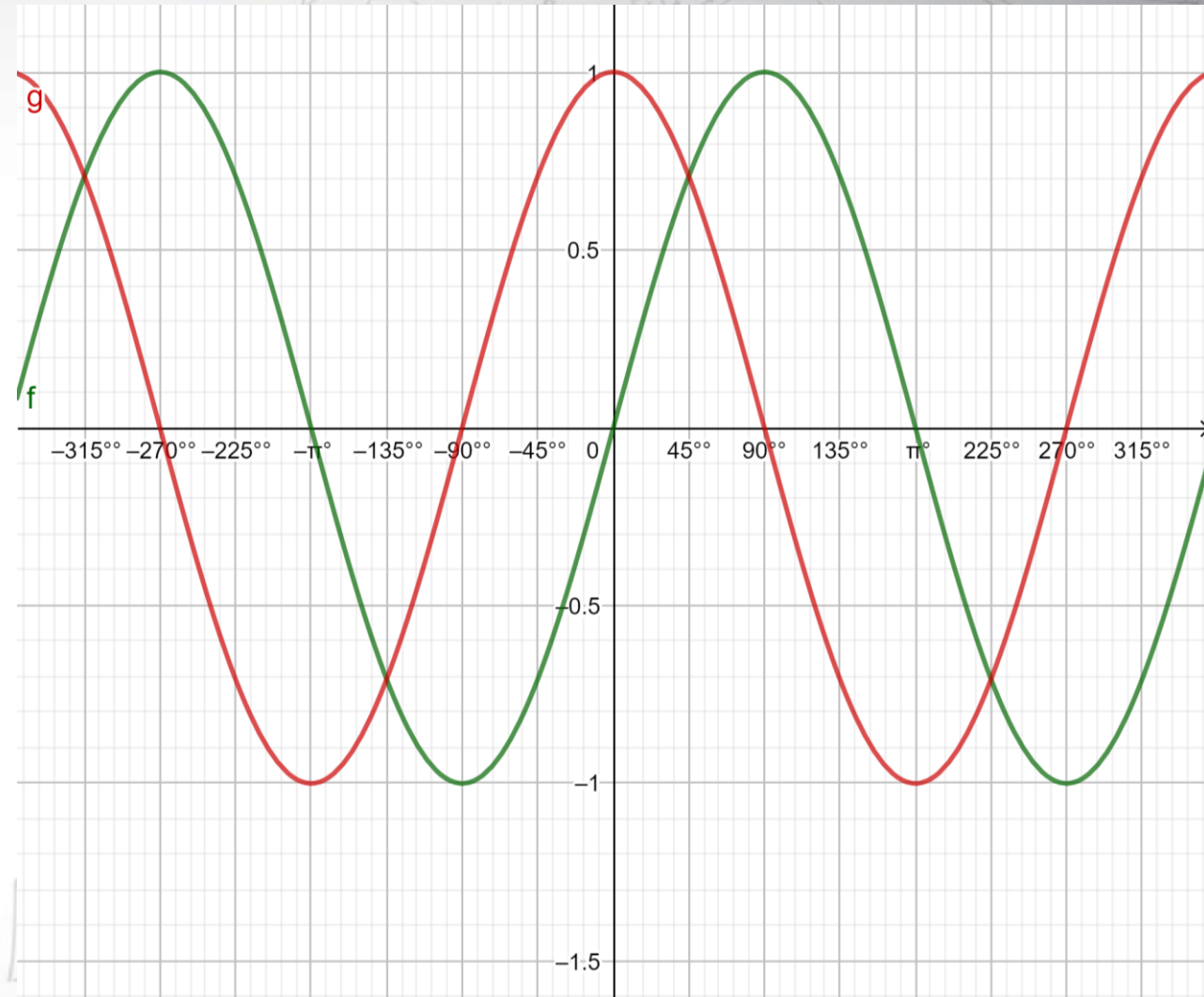
## High School Math Resources

Explore over 1700 resources through which high school students can learn math concepts in a fun and interactive way!

- [Algebra 1](#)
- [Geometry](#)
- [Functions](#)
- [Trigonometry](#)
- [Calculus](#)
- [Statistics](#)

# Using Geogebra to plot the graph.

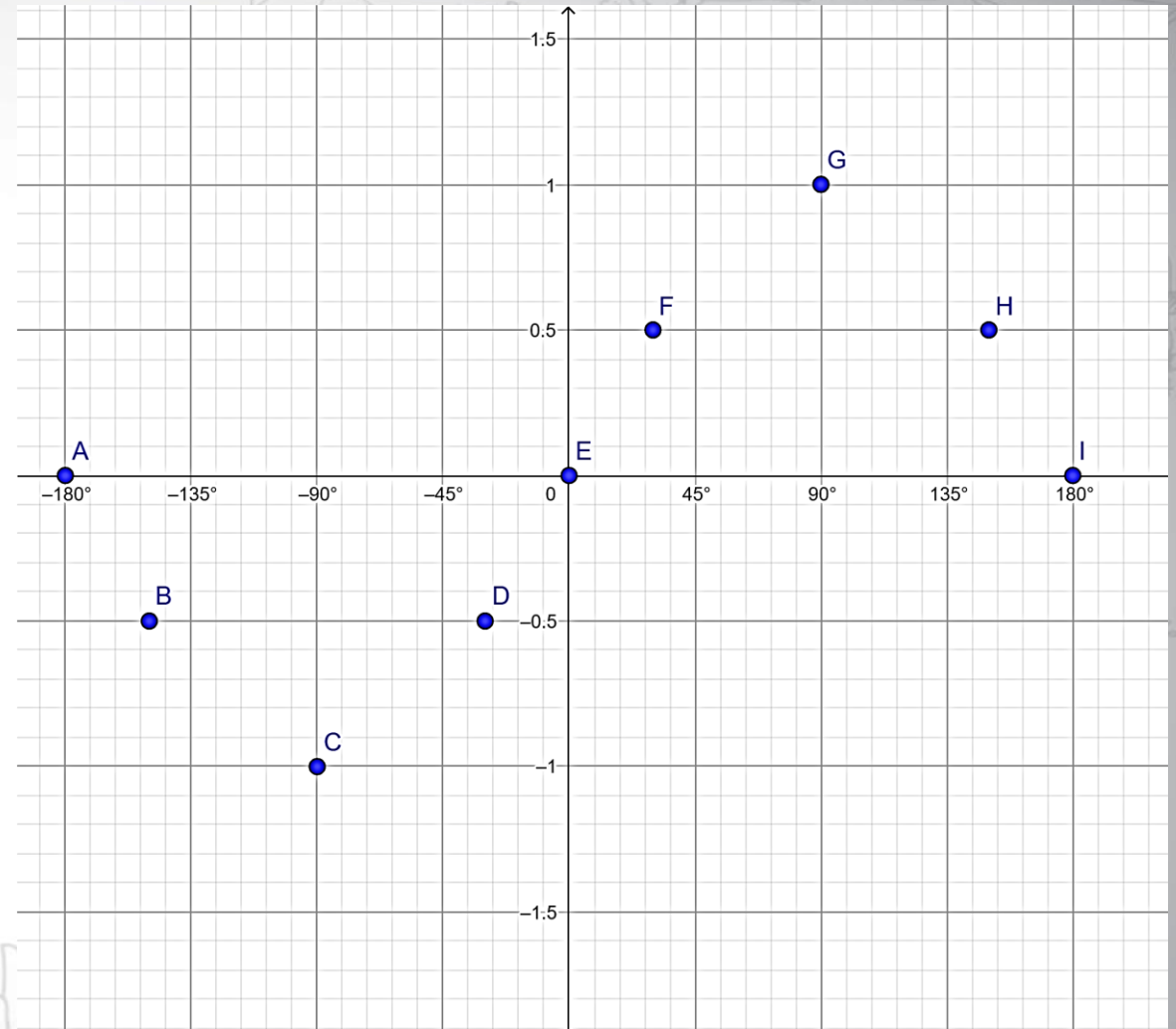
- Type in the graph  $y = \sin x$ .
- Remember that the x units are calculated in radians
  - To change them go to settings
  - Select axes 
  - X-axis
  - Change distance to 15 or 45 and copy degrees sign to it.





# Plotting coordinates

- Type in each coordinate pair
- Use the comma and not ;
  - ; Changes the units on the x-axis.
- Connect the dots using the shapes function.



# Investigating the effect of a

- $y = a \sin x$

- Press **ON/C**

- Leave the first sin x as is, so press **=**

- Type in **2** **sin** **RCL** **RCL**

**=**

**=**

**=**



sinX\_ NI DEG W-VIEW

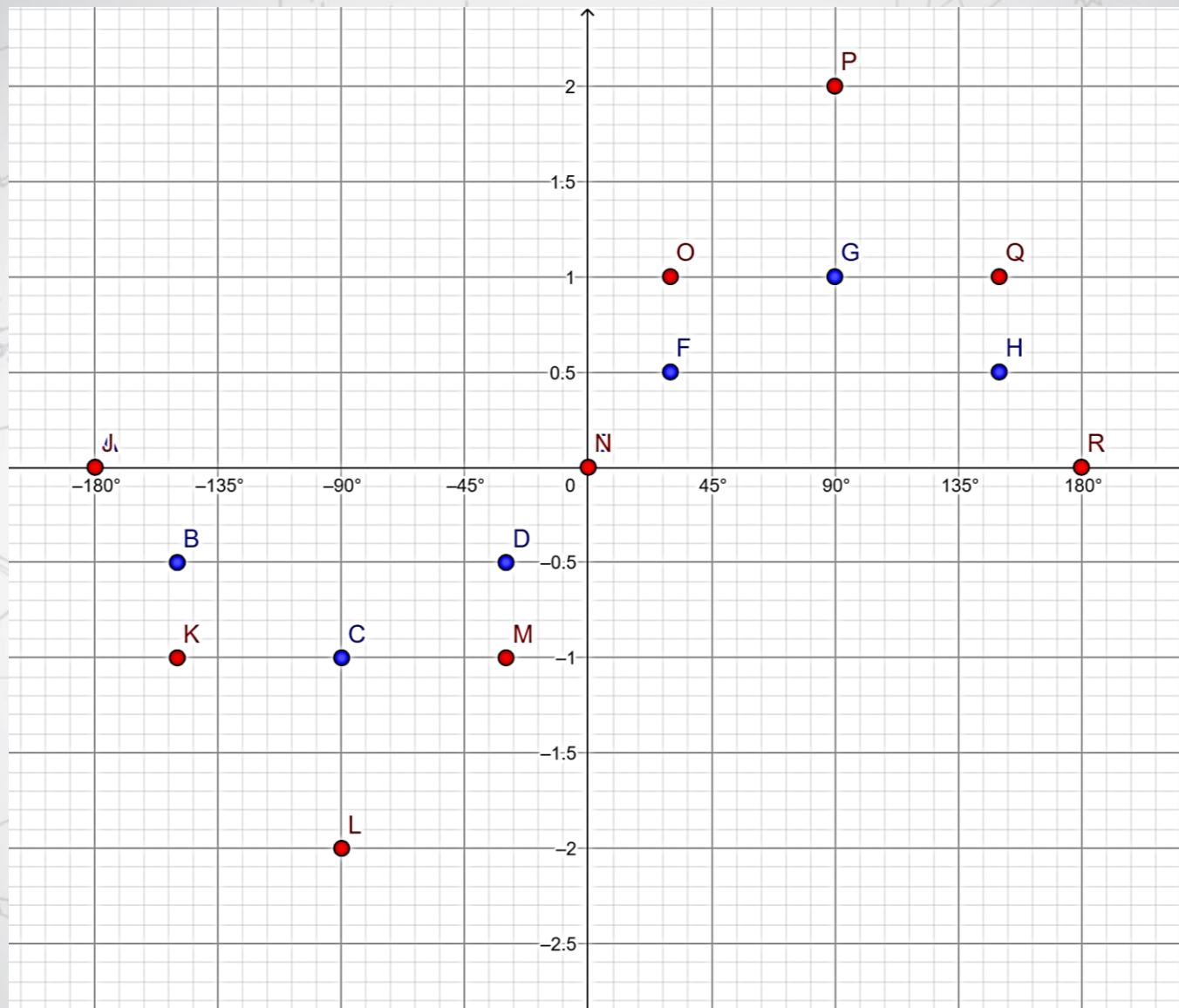
Function2? NI DEG W-VIEW

2sinX\_ NI DEG W-VIEW

X\_Start: NI DEG  
X\_Step: -180.  
15.

X	ANS1	ANS2
0	0	0
-155	-0.2500	-0.5176
-150	-0.5	-1
		-180.

# Plot the coordinates



• What about when  $a = \frac{1}{2}$  ?

• Press **ON/C**

**=** **ON/C**  
**1** **a/b** **2** **▶**

**sin** **RCL** **RCL**

**=**

**=** **=**

sinX\_ NI DEG W-VIEW

Function2? NI DEG W-VIEW

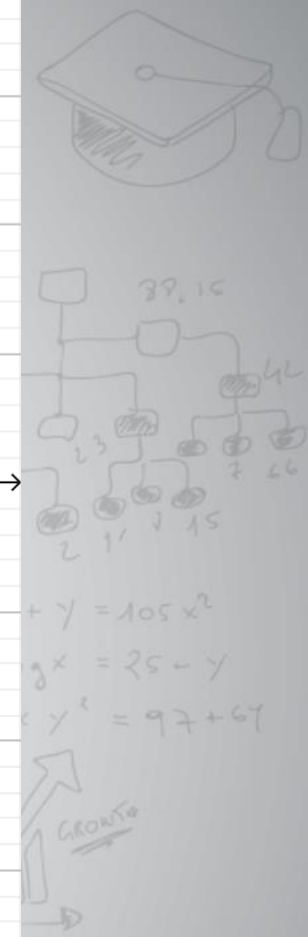
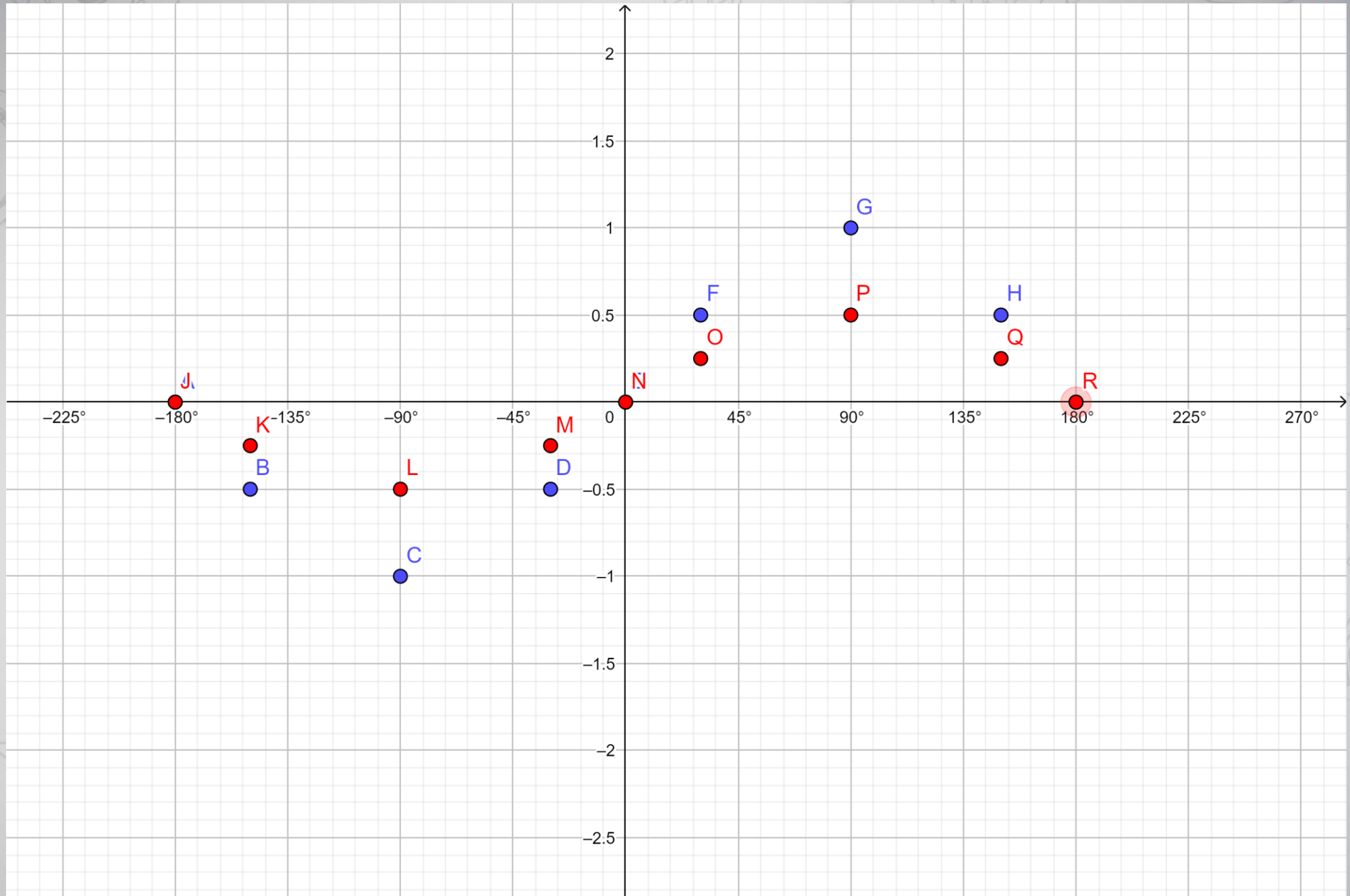
$\frac{1}{2}$  NI DEG W-VIEW

$\frac{1}{2}$ sinX\_ NI DEG W-VIEW

X\_Start: -180.  
 X\_Step: 15.

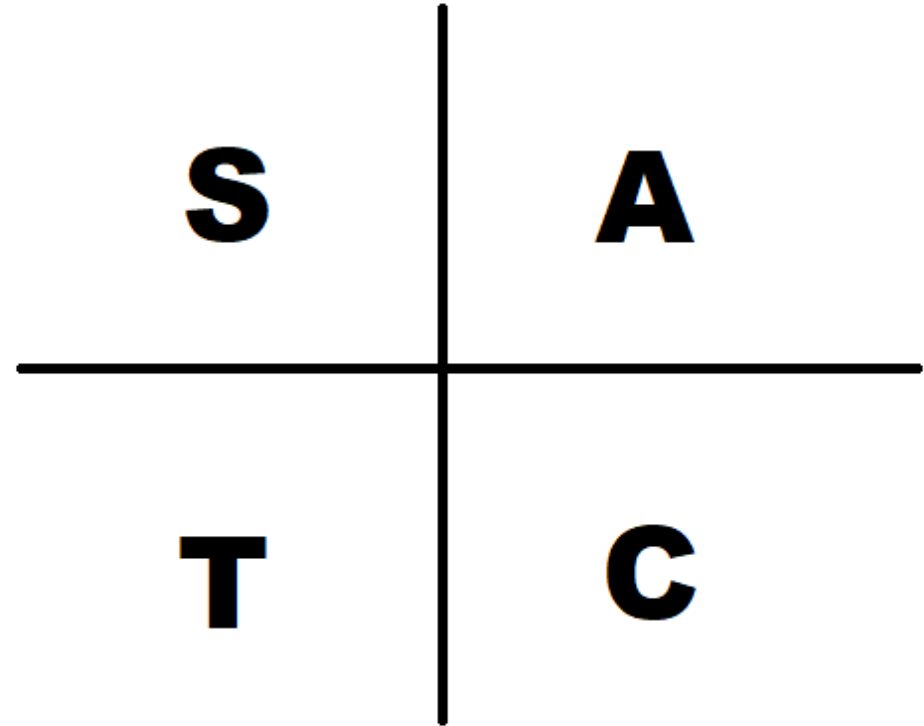
X	ANS1	ANS2
-180	0	0
-165	-0.2598	-0.1294
-150	-0.5	-0.25
		-180.





# Solving Trig Equations

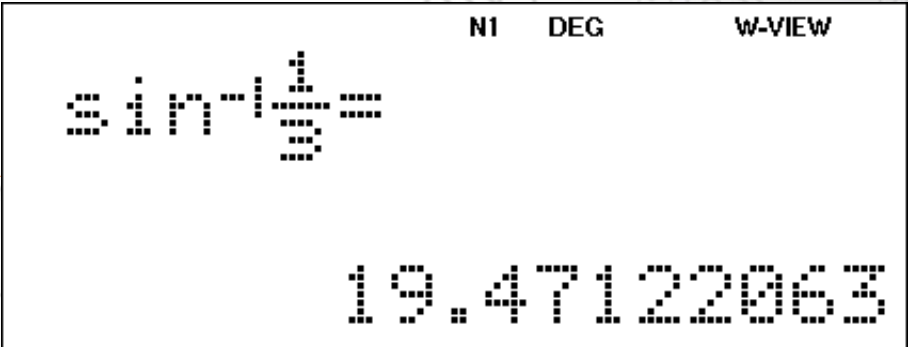
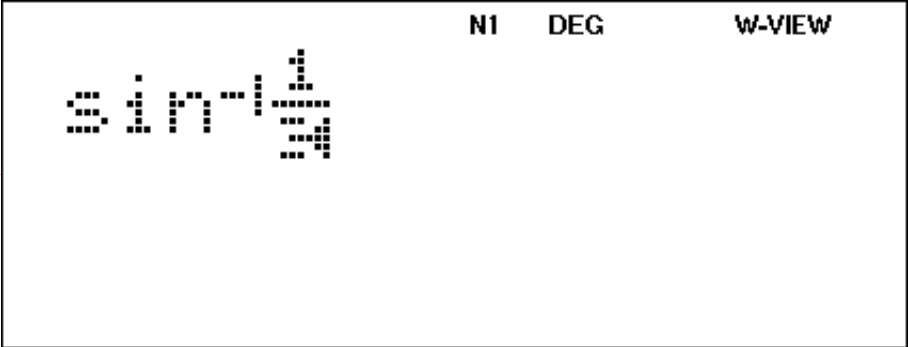
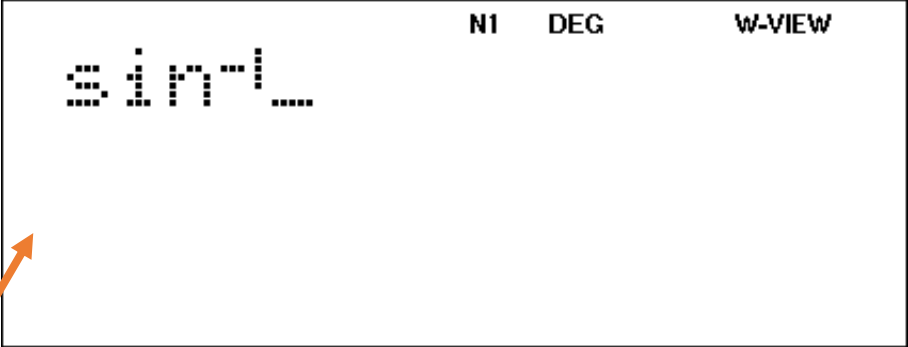
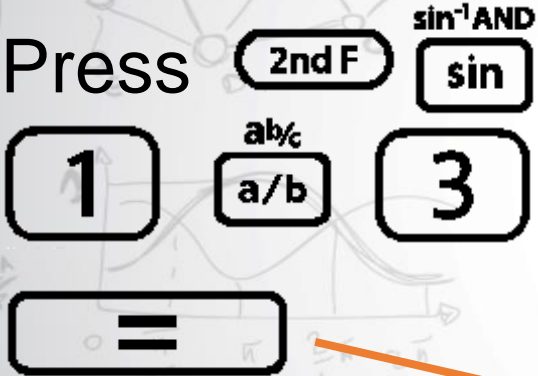
- Some tips
  - Start from the point the most far away from x.
  - Remember that you can only deal with x and things attached to x after dealing with the trig ratio.
  - Remember your graphs and how often they repeat
    - Sin and cos –  $360^\circ$
    - Tan  $180^\circ$



$$3 \sin(x + 30^\circ) = 1$$

$$30^\circ < x < 200^\circ$$

- Step 1: divide by 3:
- $\sin(x + 30^\circ) = \frac{1}{3}$
- Now we look for inverse sin:
- Press



# Now we can deal with the $x + 30^\circ$

- $x + 30^\circ = 19.47^\circ$
- For the reference angles:
  - $x + 30^\circ = 19.47^\circ$
- Sin means we add  $k360^\circ$
- Our general solution is
  - $x = 19.47^\circ - 30^\circ + k360^\circ$
  - $x = -10.53^\circ + k360^\circ$
  - $x = 180 - 19.47^\circ - 30^\circ + k.360^\circ$
  - $x = 130.53^\circ + k360^\circ$

NI DEG W-VIEW

ANS-30=

-10.52877937

NI DEG W-VIEW

180-19.47-30=

130.53



- For specific solution substitute  $k = -1, 0, 1, 2$  and look for answers between  $30^\circ < x < 200^\circ$ 
  - Tip – use your table 😊
  - $x = -10.53^\circ + k360^\circ$
  - $x = 130.53^\circ + k360^\circ$
- Our specific solution is:
  - $x = 130.53^\circ$

NI DEG W-VIEW

-10.53+Xx360...

NI DEG W-VIEW

130.53+Xx360...

NI DEG

X\_Start: -1 #

X\_Step: 1 #

NI DEG

	X	ANS1	ANS2
0	-10.53	130.53	
1	119.47	490.53	

-1 #

# 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 R199.99!
- 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)

