

MEI®

Mathematics
Education
Innovation

Over 50 years
at the forefront
of Mathematics
Education

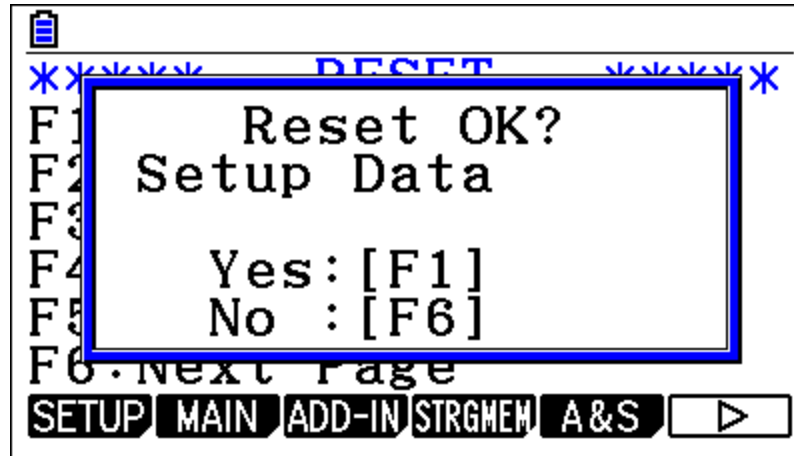
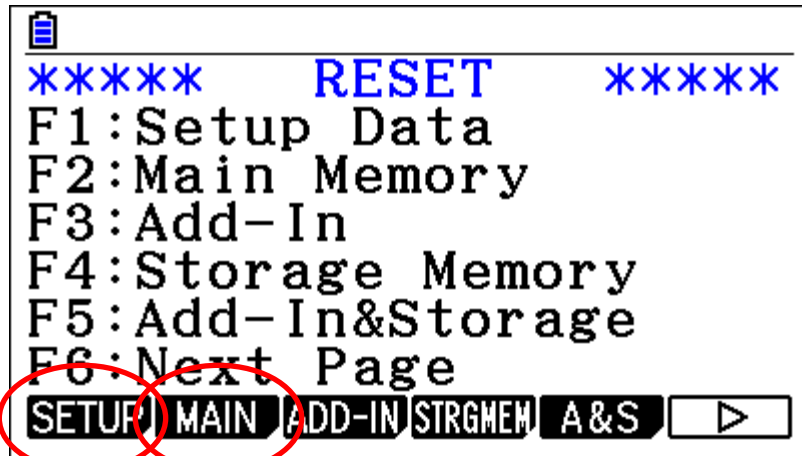
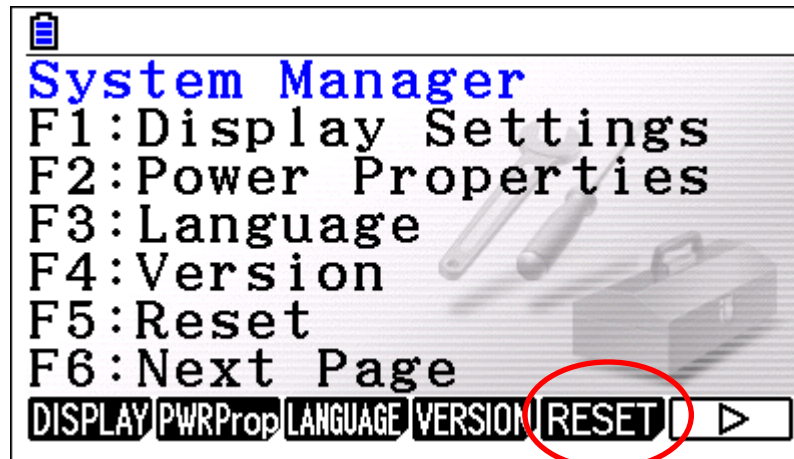
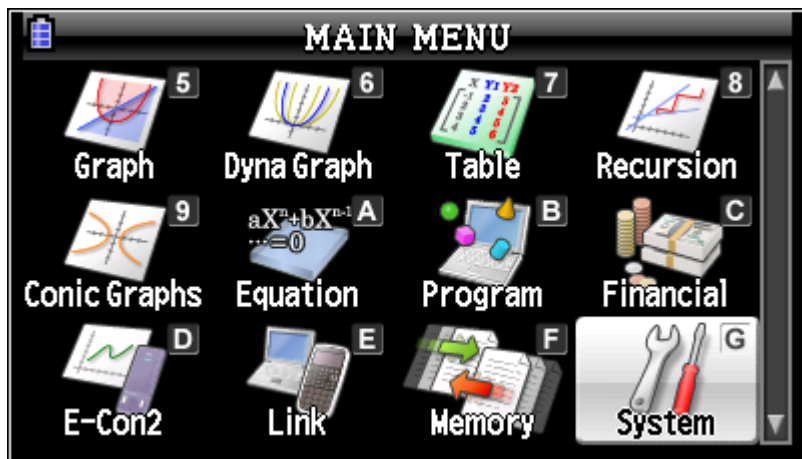
CASIO®



Teaching Further Pure using Graphing Technology

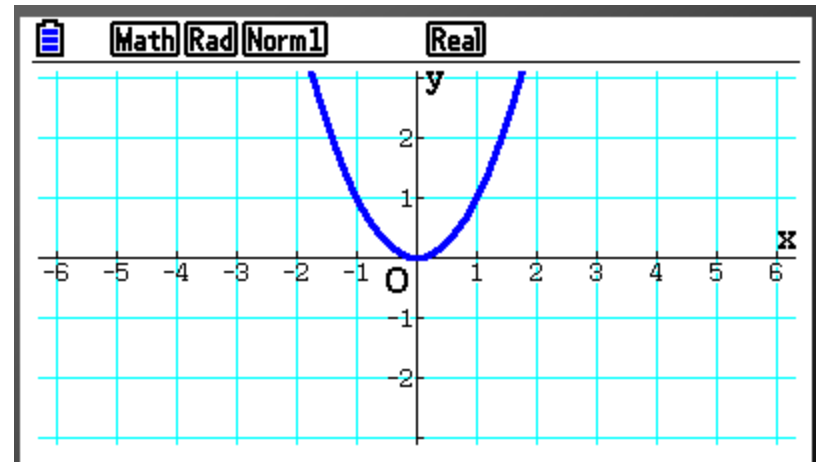
Fran Clarke & Penny Plows

Reset of Setup Data and Main Memory

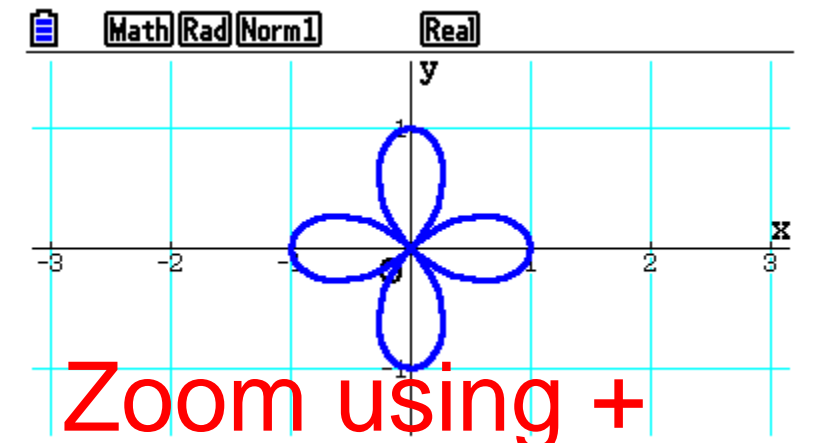


Graph Type and Zoom

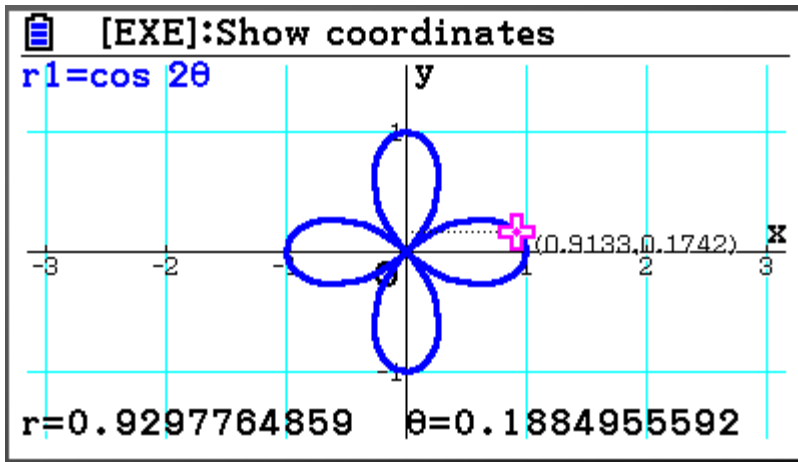
Math Rad Norm1 Real
 Graph Func : Y=
 Y1 = x^2 EXE [—]
 Y2: [—]
 Y3: [—]
 Y4: [—]
 Y5: [—]
 Y6: [—]
 Y r Xt Yt X



Math Rad Norm1 Real
 Graph Func : r=
 r1 = $\cos 2\theta$ [—]
 r2: [—]
 r3: [—]
 r4: [—]
 r5: [—]
 r6: [—]
 [SELECT] [DELETE] **TYPE** [OOL] [MODIFY] [DRAW]



Trace, View Win, Pitch and Table



Trace (F1)
Change Vwin pitch to $\pi/24$ or $\pi/12$

[Math] [Rad] [Norm1] [d/c] [Real]

Table Func : r =

$r_1 = \cos 2\theta$	[—]
$r_2 :$	[—]
$r_3 :$	[—]
$r_4 :$	[—]
$r_5 :$	[—]
$r_6 :$	[—]

[SELECT] [DELETE] [TYPE] [STYLE] [SET] [TABLE]

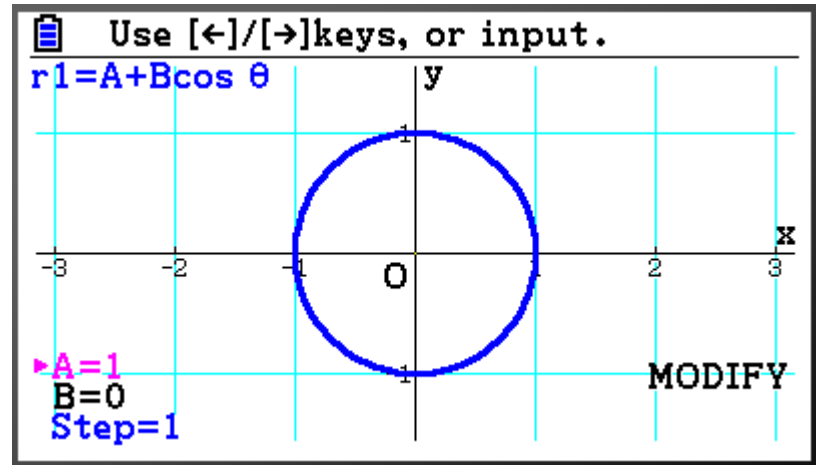
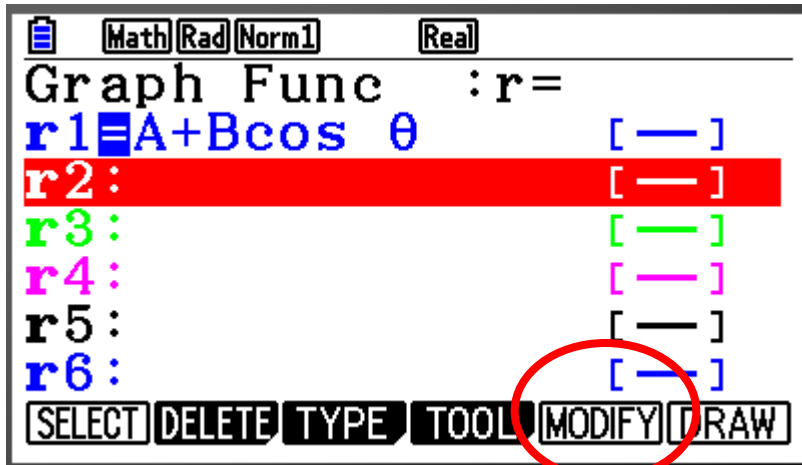
[Math] [Rad] [Norm1] [d/c] [Real]

Table Setting

θ

Start : 0
End : 6.2831853
Step : $\pi \lfloor 12$

Modify Function



Change A and B by scrolling or by direct input

NB Cannot zoom in Modify mode:
Exit once or twice to zoom

New A Level FM Spec

- <http://furthermaths.org.uk/files/2017-a-level-maths-fm-content.pdf>

MEI-Casio Resources

- <http://mei.org.uk/casio-networks>

Complex Numbers

- Solving any quadratic
- Four operations: +, −, ×, ÷
- Polynomial equations – roots in conjugate pairs
- Argand diagrams
- Modulus-argument form and conversion
- × and ÷ in mod-arg form, inc use of radians and compound angle formulae
- Simple loci
- De Moivre
- $e^{i\theta}$
- Complex roots
- Geometrical problems

e.g. solve

$$x^2 + 3x + 3 = 0$$

$$z^6 = 1$$

e.g. $(3+2i)$ and $(5-6i)$
 $(1+5i)+(1-5i)^*$

Experiment with

$$\cos(n\theta) + i\sin(n\theta)$$

$$[\cos(\theta) + i\sin(\theta)]^n$$

e.g. convert
 $2+2i$ into r, θ form

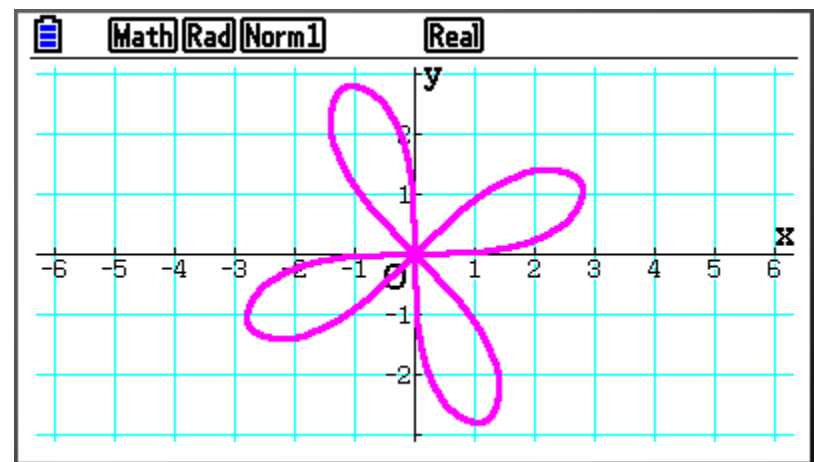
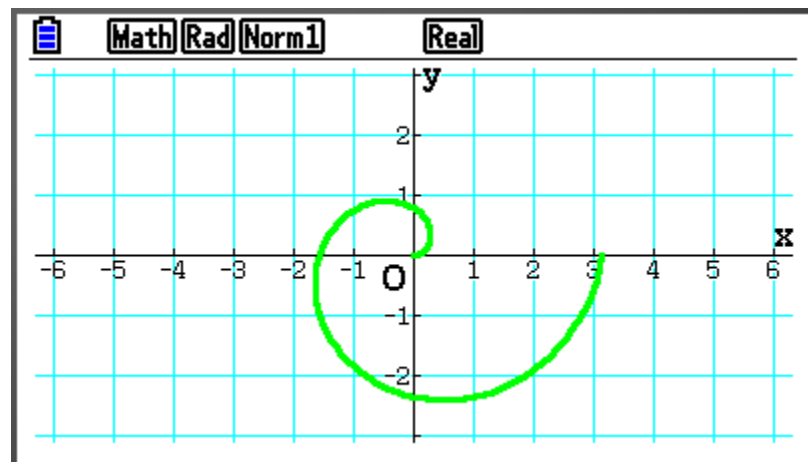
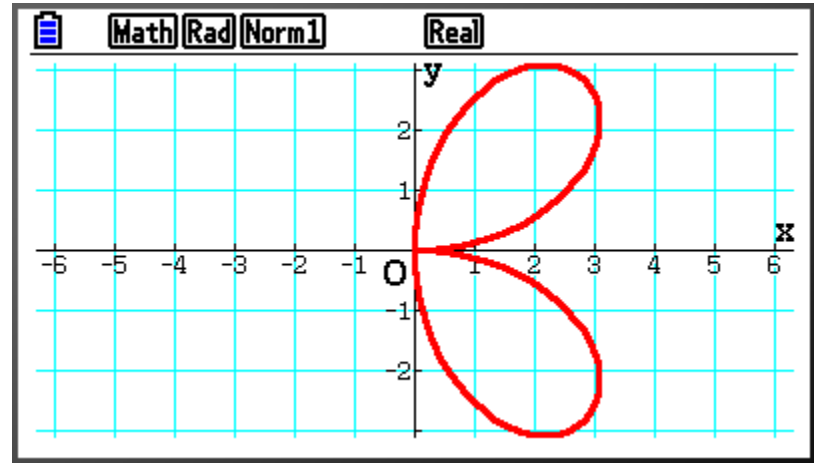
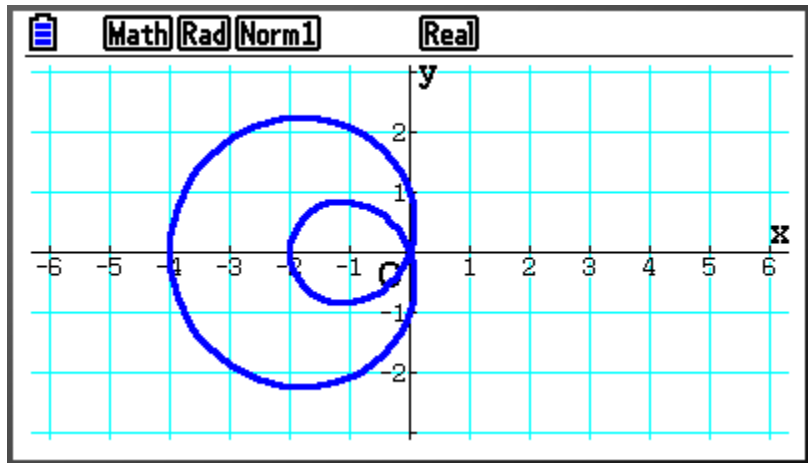
$|z| = 5, \arg z = \frac{2\pi}{3}$
 into $a+bi$ form

e.g. find $\sqrt{32 + 24i}$

Matrices

- Operations: +, −, ×
- Linear transformations in 2D and some 3D (3D vectors assumed)
- Successive transformations in 2D
- Invariant points and lines
- Determinants and inverses of 2×2 matrices
- Roots and coefficients of polynomial equations up to quartics
- Determinants and inverses of 3×3 matrices
- 3 linear simultaneous equations and geometrical interpretations
- <https://www.youtube.com/watch?v=jZFWL46YCK0>

Can you plot these curves?



Can you plot these curves?

Math Rad Norm1 Real

Graph Func : r =

r1=1-3cos θ

r2=4sin 2θ

r3=1/2 θ

r4=√(9sin 4θ)

SELECT DELETE TYPE TOOL MODIF

View Window

Ymin : -3.1
max : 3.1
scale: 1
Tθmin : 0
max : 3.14159265
ptch: 0.06283185

INITIAL TRIG STANDRD V-MEM SQUARE

View Window

Ymin : -3.1
max : 3.1
scale: 1
Tθmin : 0
max : 6.2831853
ptch: π/200

You need to change the max value of θ for graph 2 and the pitch for graph 4

Dynamic Graphing (Menu 6)

Math Rad Real

Dynamic Func: r=
 $r1=3\cos A\theta$
 $r2:$
 $r3:$
 $r4:$
 $r5:$
 $r6:$

SELECT DELETE TYPE VAR BUILT-IN RECALL

Math Rad Real

$r1=3\cos A\theta$
 Dynamic Var : A / ▷
 $A=1$

SELECT SET SPEED DYNA

Math Rad Real

$r1=3\cos A\theta$
 Dynamic Setting
 A
 Start: 1
 End : 5
 Step : 1

EXE

Math Rad Real

$r1=3\cos A\theta$
 Dynamic Var : A / ▷
 $A=1$

SELECT SET SPEED DYNA

About MEI

- Registered charity committed to improving mathematics education
- Independent UK curriculum development body
- We offer continuing professional development courses, provide specialist tuition for students and work with employers to enhance mathematical skills in the workplace
- We also pioneer the development of innovative teaching and learning resources