



graphical calculators and the ALGEBRA 2.0. There is also a variety of activity sheets designed for the ClassPad 300 models. All of the activities and worksheets are designed for beginners to more advanced users of the G.C. and C.A.S. all useful for all secondary year levels. More have been added to the website since the last newsletter.

Please bookmark: [www.monacocorp.co.nz/casio](http://www.monacocorp.co.nz/casio)

## Websites of mathematical interest.

### Useful CAS Links:

Updated videos to support the use of the ClassPad 300 in the classroom.

<http://edu.casio.com/use/>

Navigating and terms explained. [http://extranet.edfac.unimelb.edu.au/DSME/CAS-CAT/ResourcesForTeachers/Teaching%20resources/CAS\\_cal\\_nav.pdf](http://extranet.edfac.unimelb.edu.au/DSME/CAS-CAT/ResourcesForTeachers/Teaching%20resources/CAS_cal_nav.pdf)

### Useful Graphical Links:

Some assistance with navigation. [http://www.prenhall.com/divisions/esm/app/calc\\_v2/index.html](http://www.prenhall.com/divisions/esm/app/calc_v2/index.html)

Updated since last time mentioned in an earlier newsletter.

<http://www.charliewatson.com/casio/casdata.html> An opportunity to get the science department involved. [http://www.meridiancg.com/products/prod\\_casio/pdf\\_files/excas-16.pdf](http://www.meridiancg.com/products/prod_casio/pdf_files/excas-16.pdf)

Updated documents to support the use of the FX9750G+ (and similar models) in the classroom.

<http://edu.casio.com/use/>

Activities using the FX9750G+ and CFX9850GB+.

[http://edu.casio.com/support/activity/problem\\_cfx9850g.html](http://edu.casio.com/support/activity/problem_cfx9850g.html)

### Maths in general:

Some sample vignette of mathematics explained. [www.mathematics.com.au](http://www.mathematics.com.au)

Some interactive java applets. <http://www.walter-fendt.de/m14e/index.html>

On-line activities, lessons and weblinks. <http://illuminations.nctm.org/>

Power point presentations. <http://www.emaths.co.uk/powerpoint.htm>

## Classroom Activities.

### Achievement Standard 90638 Calculus 3.4 2006 external paper

To be read in conjunction with the 2006 external paper.

#### Manipulate real and complex numbers, and solve equations

#### QUESTION ONE

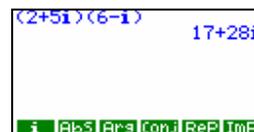
- (a) Write  $\frac{2}{3 + \sqrt{7}}$  with a rational denominator.

**Cannot be done on a graphic calculator.**

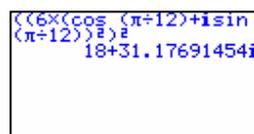
- (b)  $p$  and  $q$  are complex numbers, where  $p = 2 + 5i$  and  $q = 6 - i$ . Find  $pq$ , expressing your answer in rectangular form,  $a + bi$ .



OR

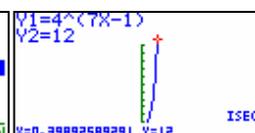


- (c) Write  $6cis\frac{\pi}{12}$  as a complex number in rectangular form,  $a + bi$ .

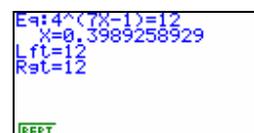


#### QUESTION TWO

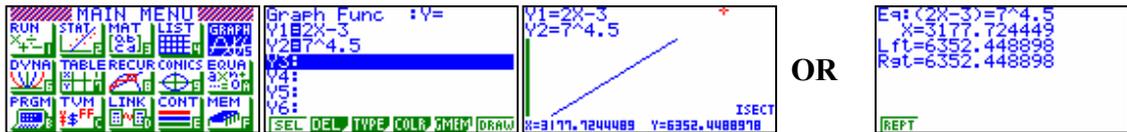
- (a) Solve  $4^{7x-1} = 12$ .



OR



- (b) Solve  $\log_7(2x - 3) = 4.5$   
 Rearrange to  $(2x - 3) = 7^{4.5}$

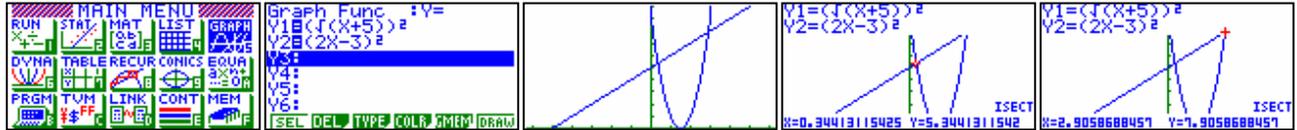


OR

**QUESTION THREE**

Solve the following equation:  $\sqrt{x+5} = 2x - 3$

Square both sides of the equation:  $\sqrt{(x+5)}^2 = (2x - 3)^2$



**QUESTION FOUR**

Solve  $z^3 = 64i$ , where  $z$  is a complex number. Write your answers in polar form,  $rcis\theta$ .

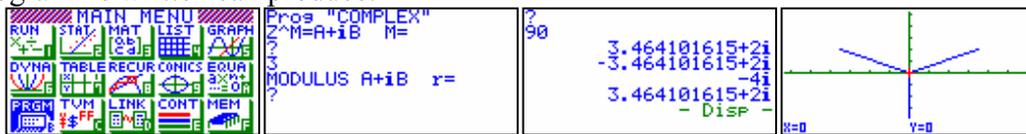
$z^3 = 64i = (4i)^3$  then  $z = (4cis(\pi/2 + 2n\pi))^3$ ,  $n \in I$

$z = (4cis(\pi/6 + 2n\pi/3))$ ,  $n \in I$

$z = (4cis(\pi + 4n\pi/6))$ ,  $n \in I$  etc.,

**Cannot be done on a graphic calculator.**

A programme written can produce:



Filename: COMPLEX

Deg

0 → A~Z

"Z^M=A+,B M="

? → M

"MODULUS A+iB r="

? → r

"ARGUMENT A+,B Θ="

? → Θ

ViewWindow -6.3,6.3,1,-5.1,5.1,1

Lbl 1

1 ÷ M × ( Θ + 2N × 180) → A

r^(1 ÷ M)(cos A + isin A) ◀

Plot 0,0

Plot r^(1 ÷ M)cos A, r^(1 ÷ M)sin A

Line

N+1 → N

N=M+1 ⇒ Goto 2

Goto 1

Lbl 2

Plot 0,0

**QUESTION FIVE**

One root of the equation  $z^3 - 10z^2 + 37z + p = 0$ , where  $p$  is real, is  $z = 3 + 2i$ . Find the value of  $p$  and the other two roots.

**If  $z = 3 + 2i$  is a root to this equation then  $z = 3 - 2i$  is too.**

Let  $f(z) = z^3 - 10z^2 + 37z + p = ((z-3)^2 + 4)(z-k)$  for some value of  $k$ . Expanding out gives:

$f(z) = z^3 - 10z^2 + 37z + p = ((z-3)^2 + 4)(z-k) = z^3 - 6z^2 + 13z - kz^2 + 6kz - 13k$ . Equating coefficients gives  $k = 4$  and hence  $p = -52$

Checking: Can be done on a graphic calculator. Select 4 points from the cubic found, e.g. (0, -52) (4, 0) (1, -24) (-1, -100)



### QUESTION SIX

Find the locus of the point representing  $z$  if  $\frac{z+i}{z-1}$  is purely imaginary.  
**Cannot be done on a graphic calculator.**

## Help desk.

### Question:

How do you get/ how does the fraction/decimal button work? Settings?

### Solution:

The fraction to decimal button also serves as the screen capture.

You need to go into link and turn the copy to off and then it will 'behave'.

### Question:

Would you please send me the instructions how to change my decimal solution to solving a linear equation on the GC to a fraction.

The question in particular was

$$(2x-4)/5 = 3x+1$$

### Solution:

In solver the calculator is using Newton-Raphson method (N-R) to solve and hence you will not get a fraction equivalent.

Solving these under the GRAPH icon will also yield a decimal answer - N-R again.

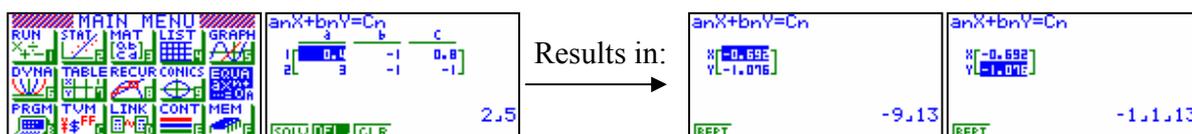
Entering them in Sim Eq, you will get the fraction answer:

$$y = (2x-4)/5$$

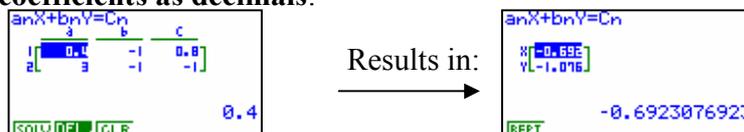
$$y = 3x+1$$

An example is illustrated below.

Entering the coefficients as fractions:



Entering the coefficients as decimals:



## A last word!

Well again, that's all I can fit onto the usual 4 pages! Have a great term 2! Hope to see you at a workshop or next term via this newsletter or otherwise! If you would like to contribute or have suggestions as to what you would like to have discussed via this medium, please do not hesitate to contact either by snail - mail, email, telephone, text or fax.

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