

Graphical Times.

Volume 11, Issue 42, 2012.



Welcome back to term 2! We hope you have had a restful break and are rearing to go in the lead up to Winter!

What's in here!

Included in this terms newsletter is:

Calculator activities for the Classpad 330+ and Casio graphic calculator

- Worksheet for the Classpad 330+ and similar models: The five platonic solids
- Worksheets for the FX9750GII and similar models: Graphing families
- Worksheets for the FX82AU: Mode settings on the FX82AU+

Term 2, 2012 pricing list. Valid for term 2 only, whilst stocks last.

N.B. The 2012 Graphic Technologies Catalogue is available on request.

Please email us: graph.tech@xtra.co.nz to receive your free copy.

Graphic Technologies Specials for Term 2.

See our **hot competitive pricing** valid until the end of July 2012.

See the pricing sheet for more products.

Product	# of Units	Price per unit (excl GST)
FX9750Gii – Buy 20 and receive 21, buy 40 and receive 42 ...	20	\$94.00
EA-200 Data Logger and EA- 2 Motion Sensor combined [Limited supply]	NA	\$600.00
Back up battery CR2032 [for graphic calculator]	5+	\$2.50



Workshop opportunities.

Workshop opportunities: If you would like to have a workshop for teachers and or students then please make contact with *Graphic Technologies*. A large number of schools are taking up this opportunity either singularly or as a cluster of schools (with both the graphic calculator and the ClassPad330+), to look at how the graphic calculator and CAS could impact on and be integrated into classroom practice. With NZQA having acknowledged that year 12 & 13 students without a graphical calculator being disadvantaged, a large number of schools are taking up the opportunity to upskill teachers and students on this mathematics/statistics technology.



Websites of interest...

Doodling in Math: Spirals, Fibonacci, and Being a Plant [Part 3 of 3].

<http://www.youtube.com/watch?v=14-NdQwKz9w&feature=youtu.be>

The lot! From the presenter in the above.

<http://vihart.com/>

Online practice assessment task from ESA PUBLICATIONS.

<http://www.esa.co.nz/?type=standard&page=78>

<http://www.esa.co.nz/?type=blogdisplay&blogid=55>

<http://www.esa.co.nz/?type=blogdisplay&blogid=56>

The Klein Project is an ICMI initiative with the aim of creating a community for learning about the connections between school mathematics and contemporary research in the mathematical sciences. At present the vehicle for this is a “Klein vignette”, a short piece of writing that links a piece of secondary school mathematics to an advanced idea. You can see more on the blog at <http://blog.kleinproject.org>.

Program to support the use of the FX9750Gii

In 2011 Casio Education NZ launched the 'Top Schools Program' to support schools using the new model of FX82AUplus scientific calculator. Registration numbers and general feedback indicated that the resources provided were of great benefit, so Casio Education NZ is launching a similar program in 2012 to support schools currently using (or wanting to use) the FX9750Gii graphic calculator. Details will be revealed early term 2, so look out for an information pack in the post. The goal is to have all senior students in New Zealand using a graphics calculator so that no one is disadvantaged during examinations. Professional development courses will be offered in conjunction with Graphic Technologies supporting the program which looks to offer a sample calculator and comprehensive 'How to get started on your FX9750Gii' instructional manual. Details of the program can be uploaded from www.casio.edu.monacocorp.co.nz mid-May.

Worksheets downloaded off the web.

Visit Monaco Corporation or Graphic Technologies website to view and download worksheets. There are links to other informative mathematics education websites too. For teachers we currently offer a large number of 'classroom ready' resources available and are designed primarily for the CASIO® FX82AU, FX9750Gii, FX9750G, FX9750G+, CFX9850GB, CFX9850GB+, CFX9850GC+, FX9750GA+ and FX9750Gii models of graphical calculators and the ALGEBRA 2.0. There is also a variety of activity sheets designed for the ClassPad300, 300+, 330A and 330A+ models. All of the activities and worksheets are designed for beginners to advanced users of the GC and CAS. More have been added to the website since the last newsletter.

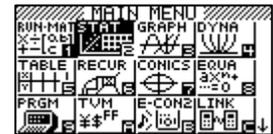
Please visit: www.casio.edu.monacocorp.co.nz and <http://graphic-technologies.co.nz>.

Some features of the FX9750Gii explored

1. Expectation Algebra, if A and B are independent events

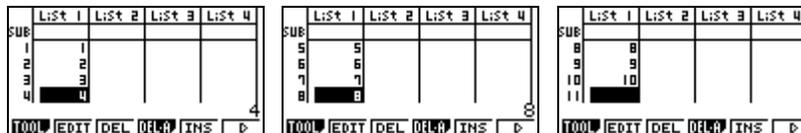
mean (A + B) = mean (A) + mean (B)	Var (A + B) = VAR(A) + VAR(B)	Var (A - B) = VAR(A) + VAR(B)
mean (nA) = n × mean (A)	VAR (nA + mB) = n ² VAR(A) + m ² VAR(B)	
mean (A - B) = mean (A) - mean (B)	VAR (nA - mB) = n ² VAR(A) + m ² VAR(B)	

In this statistics icon you can apply basic row, column manipulations and have access to univariate and bivariate analysis of statistical data.



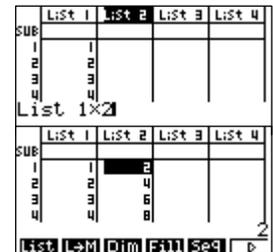
Example 1: Enter in the numbers 1, 2, 3, 4, 5, 6, 7, 8, 9 and 10 into **List 1**.

As shown below, press **EXE** after each entry and the cursor will move down to the next row.



Now, move the cursor with the arrows so that it is 'sitting' over the **List 2** as shown here.

What we want to do is multiply List 1 entries by 2 – so press **OPTN**, then **F1**, for List and again so that 'List' appears on the screen - see diagram. Now press 1 then × 2 and then **EXE**.



F1

The list values in List 1 have been doubled, as seen in List 2. Now view the summary statistics of List 1 and List 2 data.

\bar{x} = 5.5 σ^2 = 3.02765035 σ = 1.755177 s_x = 3.02765035 n = 10	\bar{x} = 11 σ^2 = 15.40 σ = 3.924413 s_x = 6.0553007 n = 10
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You can see that these follow the Expectation Algebra rules: $E(X) = 5.5$ and $E(2X) = 11$ along with $VAR(X) = \sigma^2 = 3.02765035\dots^2$ and $VAR(2X) = (2\sigma)^2 = 4\sigma^2 = 6.0553007\dots^2$

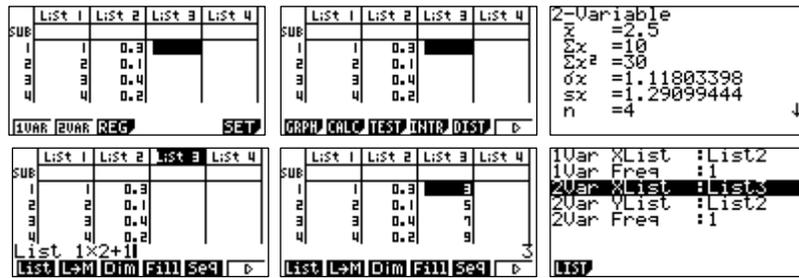
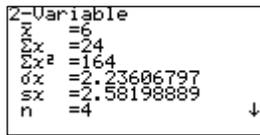
Example 2:

Given the following probability distribution:

x	1	2	3	4
$P(X=x)$	0.3	0.1	0.4	0.2

Calculate

- $E(X) = 2.5$
- $VAR(X) = 1.11803398...^2$
- $E(2X+1) = 6$
- $VAR(2X+1) = 2.23606797...^2$



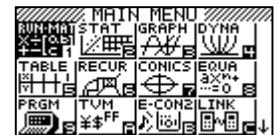
2. Polynomial factorization and Long Division of Polynomials

The factor theorem is used to remove known zeros from a polynomial, producing a lower degree polynomial whose zeros may be easier to find. Abstractly, the method is as follows:

- ‘Guess’ a zero of the polynomial $f(x)$
- Use the factor theorem to conclude that $(x - a)$ is a factor of $f(x)$
- Compute the polynomial $g(x) = f(x)/(x - a)$ using polynomial long division.

Setting up a ‘guess and check’ method on the calculator involves assigning a value to x and making substitutions of these values into the equation and attempting to get the answer zero. This results in the finding of linear factors – using the factor theorem (and remainder theorem).

Select **RUN** mode from the Main Menu by using the arrow keys to highlight the **RUN** icon or pressing 1.



Example: Factorise the polynomial equation $x^3 + 2x^2 - x - 2 = 0$

Answer: Type into the calculator the following:

SHIFT VARS F4 → X F6 F5
then type in the equation, $x^3 + 2x^2 - x - 2$ then **EXE**.



A ‘?’ will be displayed, this is the calculator way of asking for an input value. Enter in 0 [the calculator is calculating $(0)^3 + 2(0)^2 - (0) - 2 = -2$] then **EXE**.

The display on the calculator will be:



Now try some other values by pushing the **EXE** button and entering in a value for x . The following screen results show that:



$(x - 1)$ is a factor,
as $f(1) = 0$.



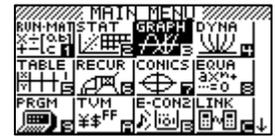
$(x + 2)$ is a factor
as $f(-2) = 0$.



$(x + 1)$ is a factor.
as $f(-1) = 0$.

Hence, $x^3 + 2x^2 - x - 2 = (x - 1)(x + 2)(x + 1)$.

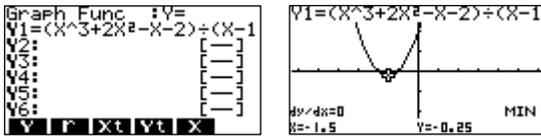
Select **GRAPH** mode from the Main Menu by using the arrow keys to highlight the **GRAPH** icon or pressing 3.



Once you have found one root to the polynomial you can graph the resulting:

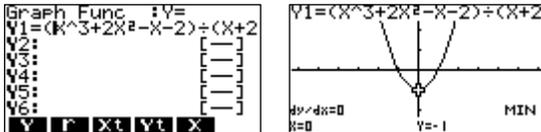
$$g(x) = f(x)/(x - a)$$

- (a) Using $(x - 1)$ as a factor gives a parabola $y = (x + 1.5)^2 - 0.25 = x^2 + 3x + 2 = (x + 1)(x + 2)$ by finding the minimum point and using the completed square format.



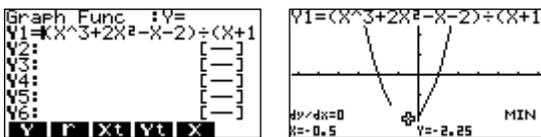
Therefore the other factors are $(x + 1)$ and $(x + 2)$.

- (b) Using $(x + 2)$ as a factor gives a parabola $y = (x + 0)^2 - 1 = x^2 - 1 = (x + 1)(x - 1)$ by finding the minimum point and using the completed square format.



Therefore the other factors are $(x + 1)$ and $(x - 1)$.

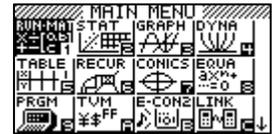
- (c) Using $(x + 1)$ as a factor gives a parabola $y = (x + 0.5)^2 - 2.25 = x^2 + x - 2 = (x - 1)(x + 2)$ by finding the minimum point and using the completed square format.



Therefore the other factors are $(x - 1)$ and $(x + 2)$.

3. Le Hopitals' Rule for LIMITS.

Select **RUN** mode from the main menu by using the arrow keys to highlight the **RUN** icon or pressing 1.



$$\lim_{x \rightarrow -2} \frac{(x + 2)^3}{(x + 2)} = \lim_{x \rightarrow -2} (x + 2)^2 = (-2 + 2)^2 = 0$$

But . . . what if the limit were not so simple!

Le Hopitals' Rule: If $\lim_{x \rightarrow a} \frac{f(x)}{g(x)} = \frac{0}{0}$ then $\lim_{x \rightarrow a} \frac{f'(x)}{g'(x)} = \lim_{x \rightarrow a} \frac{f(x)}{g(x)}$

Example 1: $\lim_{x \rightarrow 0} \frac{\sin x}{x} = \lim_{x \rightarrow 0} \frac{\cos x}{1} = \frac{\cos 0}{1} = \frac{1}{1} = 1$

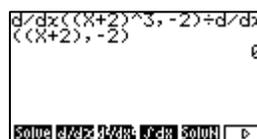
Example 2: $\lim_{x \rightarrow -2} \frac{(x + 2)^3}{(x + 2)} = \lim_{x \rightarrow -2} \frac{3(x + 2)^2}{1} = \frac{3(-2 + 2)^2}{1} = \frac{0}{1} = 0$

Example 1:



Press **EXE** for the solution.

Example 2:



Press **EXE** for the solution.

Note: d/dx is found using the key presses **OPTN** then **CALC**, then **d/dx**.

A last word!

Well again, that's all I can fit onto the 4 pages! Enjoy the term! Hope to see you at some workshops or hear from you 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 us either by snail - mail, email, website, telephone, text or fax.

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