Ultimate Brackets

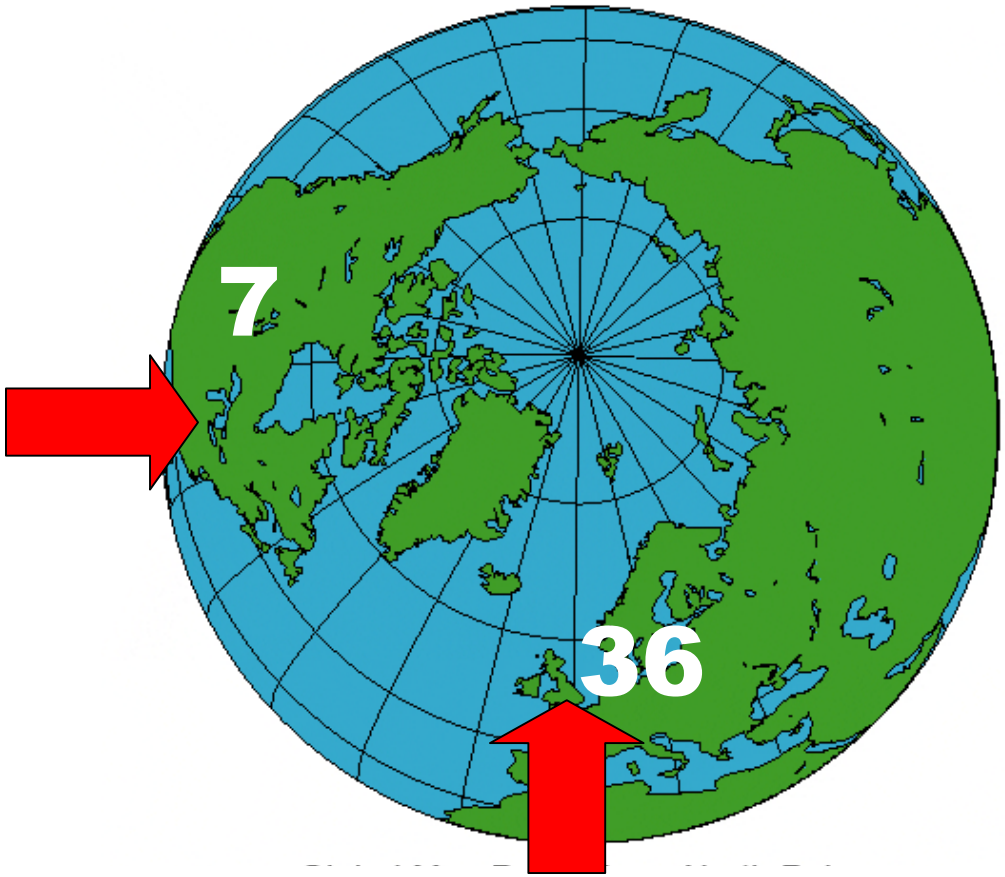
A World Premier

Session 101
Friday 8 March 2013
1:30 – 2:30pm
Convention Center Room 118 A

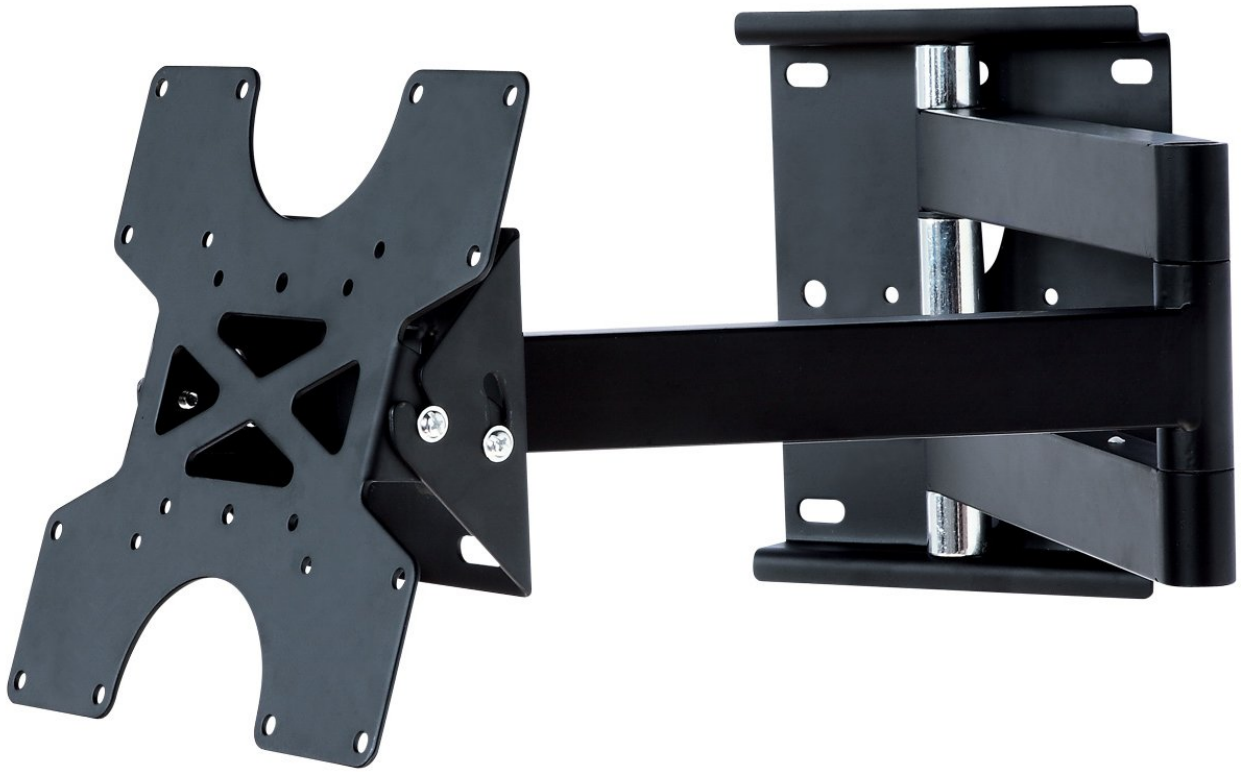
Nevil Hopley
Head of Mathematics
George Watson's College
(11-18 yrs Secondary School)
Edinburgh
Scotland

www.calculatorsoftware.co.uk/nspire

3346 Miles Away on a Bearing of 045°



Strictly Limited Offer of Tartan
TI-Nspire CX Cases at the end of this talk.



Session 101

Room 101 is a place introduced in the novel Nineteen Eighty-Four by George Orwell.

It is a torture chamber in the Ministry of Love in which the Party attempts to subject a prisoner to his or her own worst nightmare, fear or phobia.

(Source: Wikipedia)

This talk will have a….

Beginning

What is the fuss all about?

Middle

Play!

Behind the scenes.

End

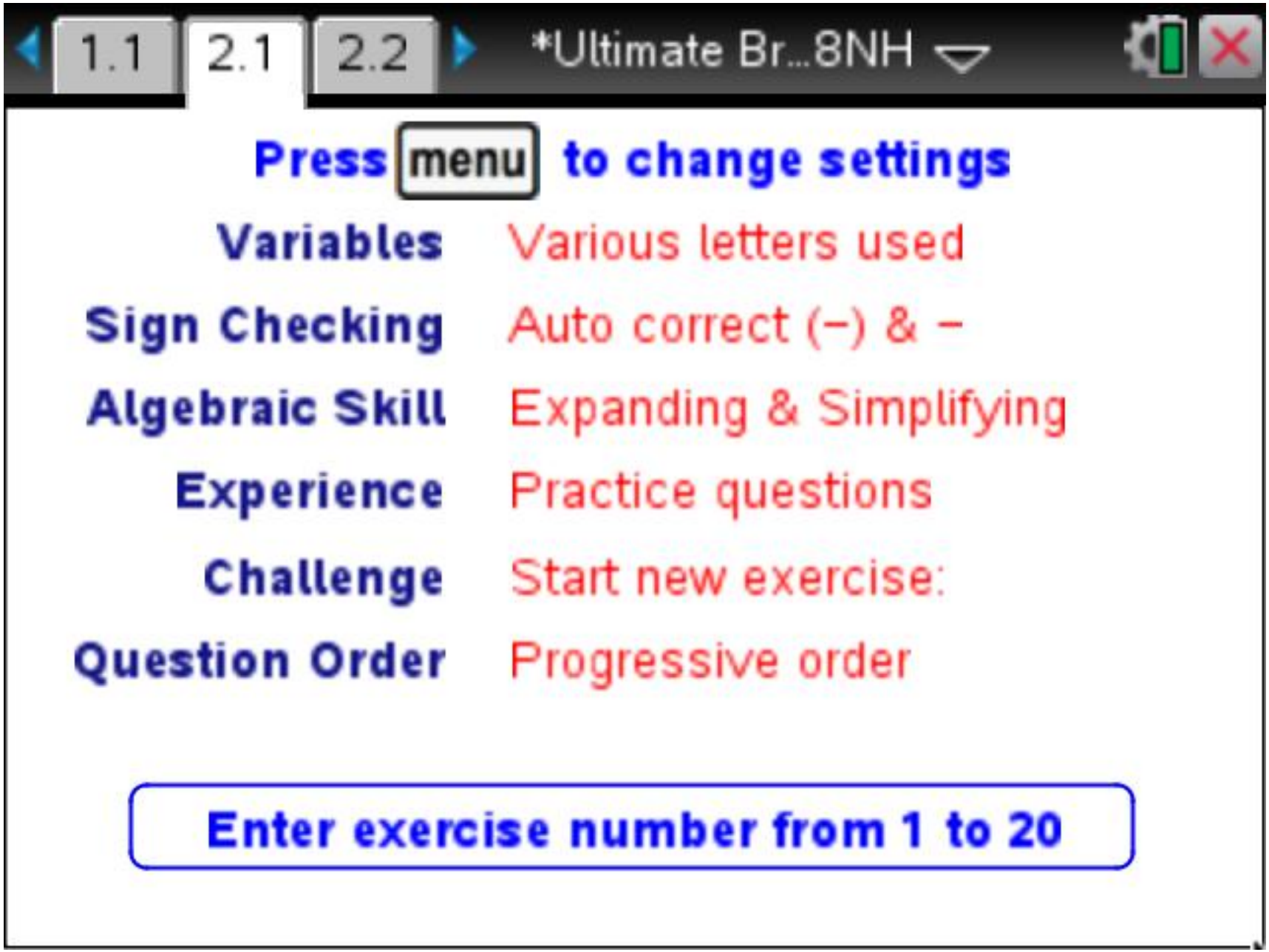
Top tips.

And you can download all that you see today from

www.calculatorsoftware.co.uk/nspire

Timeline


1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
Teaching
TI80
Casio
TI83/84 Programming
Nspire Lua
TI Pilot Site
TI Pilot Site
TI Nspire Authoring


1.1
2.1
2.2
*Ultimate Br...8NH
Press menu to change settings
Variables
Various letters used
Sign Checking
Auto correct (−) & −
Algebraic Skill
Expanding & Simplifying
Experience
Practice questions
Challenge
Start new exercise:
Question Order
Progressive order
Enter exercise number from 1 to 20


2

This is multiple choice - correct answer is A

- **a.** A
- **b.** B
- **c.** C
- **d.** D

Check Answer

Expanding: “Easiest” to “Hardest”

$$-(a-3)$$

$$-3(4+b)$$

$$c(3c+4)$$

$$3-(4+5d)$$

$$3+4(5e+6)$$

$$3+4f(5f+6)$$

Expanding: “Easiest” to “Hardest”

$3+4(5e+6)$

$c(3c+4)$

$3+4f(5f+6)$

$-3(4+b)$

$-(a-3)$

$3-(4+5d)$

Factorising: “Easiest” to “Hardest”

$-a-3$

$12b-3b^2$

c^2+c-12

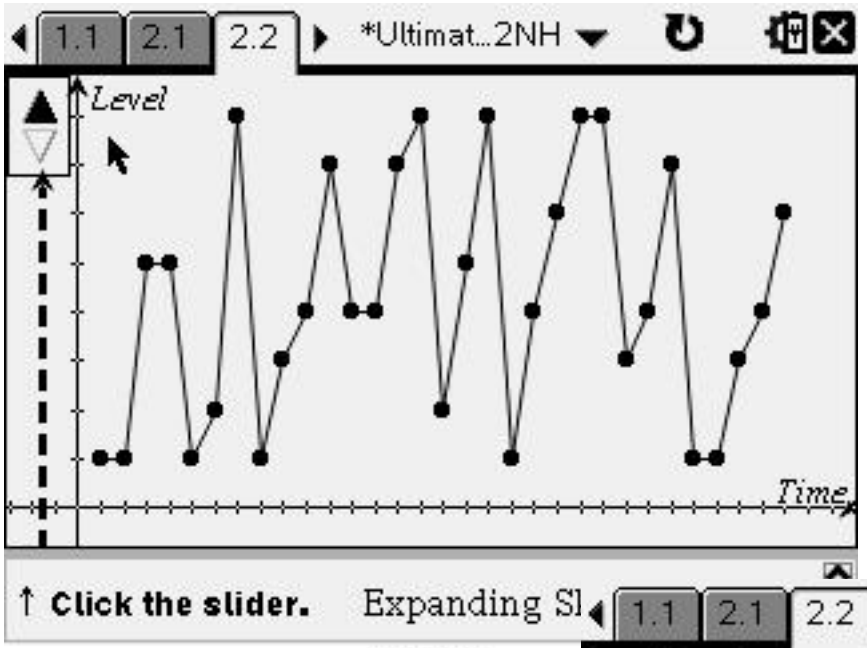
Factorising: “Easiest” to “Hardest”

$$12b-3b^2 = 3b(4-b)$$

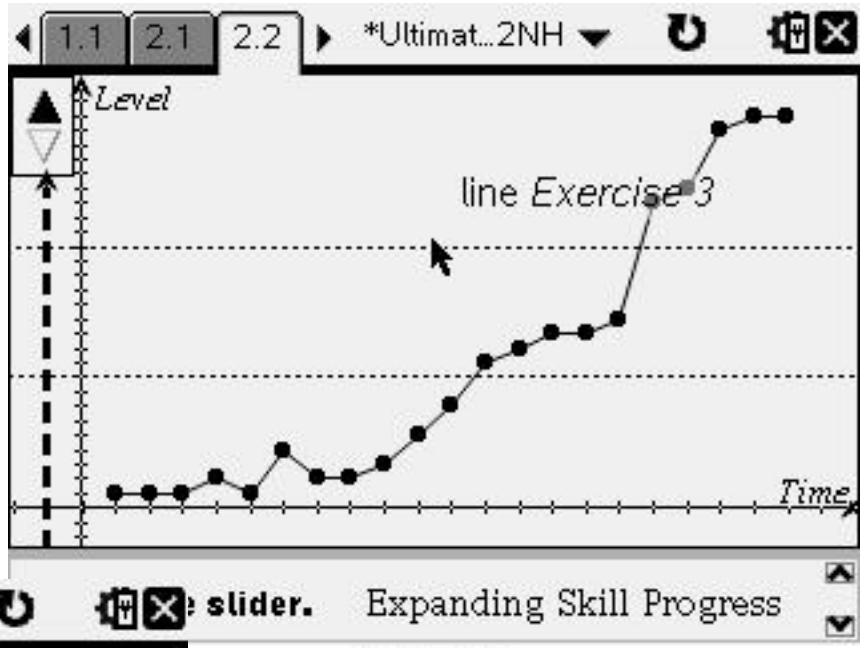
$$-a-3 = -(a+3)$$

$$c^2+c-12 = (c-3)(c+4)$$

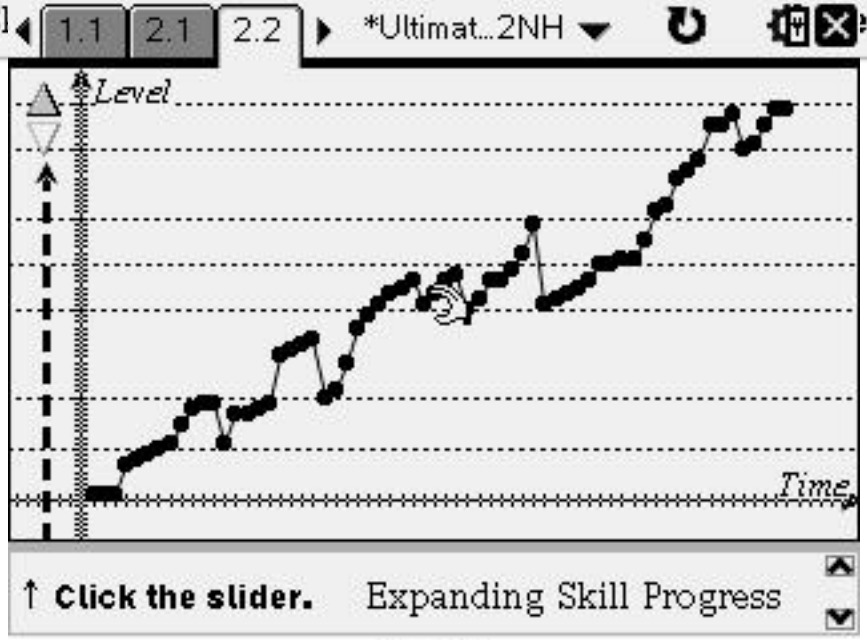
Progression



TayaH



MichaelB



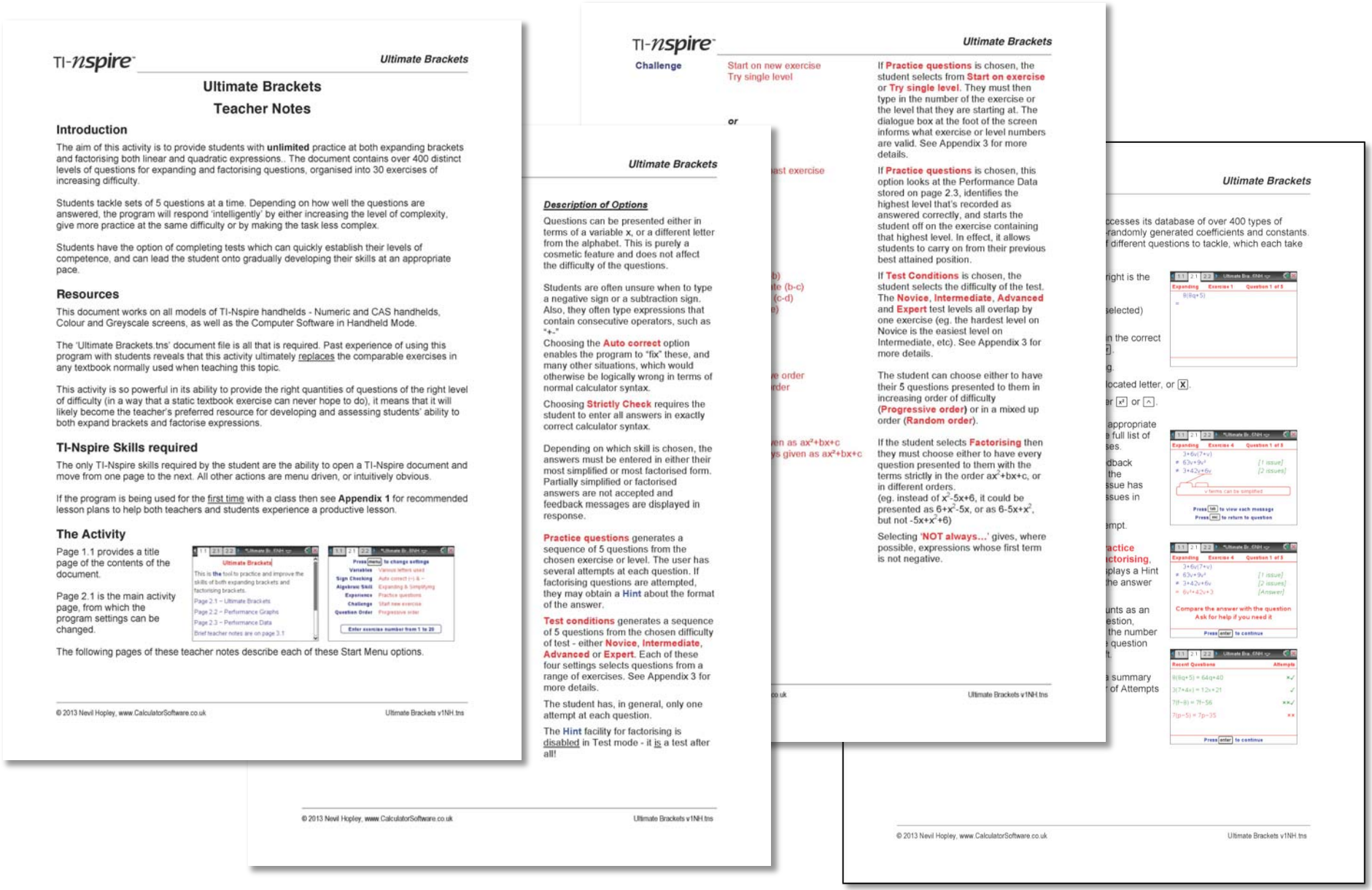
AdamC

Justification or Labour of Love?

$$\underset{\textit{hrs}}{51} + \underset{\textit{hrs}}{91} < \underset{\textit{hrs}}{4} \times \underset{\textit{skills}}{2} \times \underset{\textit{classes}}{3} \times \underset{\textit{students}}{26} \times \underset{\textit{years}}{7} + \underset{\textit{other classrooms}}{N}$$

$$142 < 4368 + N$$

Top Tips



TI-nspire

Ultimate Brackets

Ultimate Brackets
Teacher Notes

Introduction

The aim of this activity is to provide students with **unlimited** practice at both expanding brackets and factorising both linear and quadratic expressions.. The document contains over 400 distinct levels of questions for expanding and factorising questions, organised into 30 exercises of increasing difficulty.

Students tackle sets of 5 questions at a time. Depending on how well the questions are answered, the program will respond 'intelligently' by either increasing the level of complexity, give more practice at the same difficulty or by making the task less complex.

Students have the option of completing tests which can quickly establish their levels of competence, and can lead the student onto gradually developing their skills at an appropriate pace.

Resources

This document works on all models of TI-Nspire handhelds - Numeric and CAS handhelds, Colour and Greyscale screens, as well as the Computer Software in Handheld Mode.

The 'Ultimate Brackets.tns' document file is all that is required. Past experience of using this program with students reveals that this activity ultimately replaces the comparable exercises in any textbook normally used when teaching this topic.

This activity is so powerful in its ability to provide the right quantities of questions of the right level of difficulty (in a way that a static textbook exercise can never hope to do), it means that it will likely become the teacher's preferred resource for developing and assessing students' ability to both expand brackets and factorise expressions.

TI-Nspire Skills required

The only TI-Nspire skills required by the student are the ability to open a TI-Nspire document and move from one page to the next. All other actions are menu driven, or intuitively obvious.

If the program is being used for the first time with a class then see **Appendix 1** for recommended lesson plans to help both teachers and students experience a productive lesson.

The Activity

Page 1.1 provides a title page of the contents of the document.

Page 2.1 is the main activity page, from which the program settings can be changed.

The following pages of these teacher notes describe each of these Start Menu options.

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Challenge

Start on new exercise
Try single level

or

If **Practice questions** is chosen, the student selects from **Start on exercise** or **Try single level**. They must then type in the number of the exercise or the level that they are starting at. The dialogue box at the foot of the screen informs what exercise or level numbers are valid. See Appendix 3 for more details.

If **Practice questions** is chosen, this option looks at the Performance Data stored on page 2.3, identifies the highest level that's recorded as answered correctly, and starts the student off on the exercise containing that highest level. In effect, it allows students to carry on from their previous best attained position.

If **Test Conditions** is chosen, the student selects the difficulty of the test. The **Novice**, **Intermediate**, **Advanced** and **Expert** test levels all overlap by one exercise (eg. the hardest level on Novice is the easiest level on Intermediate, etc). See Appendix 3 for more details.

The student can choose either to have their 5 questions presented to them in increasing order of difficulty (**Progressive order**) or in a mixed up order (**Random order**).

If the student selects **Factorising** then they must choose either to have every question presented to them with the terms strictly in the order ax^2+bx+c, or in different orders.
(eg. instead of x^2-5x+6, it could be presented as $6+x^2-5x$, or as $6-5x+x^2$, but not $-5x+x^2+6$)

Selecting '**NOT always...**' gives, where possible, expressions whose first term is not negative.

Description of Options

Questions can be presented either in terms of a variable x, or a different letter from the alphabet. This is purely a cosmetic feature and does not affect the difficulty of the questions.

Students are often unsure when to type a negative sign or a subtraction sign. Also, they often type expressions that contain consecutive operators, such as "+-"
Choosing the **Auto correct** option enables the program to "fix" these, and many other situations, which would otherwise be logically wrong in terms of normal calculator syntax.

Choosing **Strictly Check** requires the student to enter all answers in exactly correct calculator syntax.

Depending on which skill is chosen, the answers must be entered in either their most simplified or most factorised form. Partially simplified or factorised answers are not accepted and feedback messages are displayed in response.

Practice questions generates a sequence of 5 questions from the chosen exercise or level. The user has several attempts at each question. If factorising questions are attempted, they may obtain a **Hint** about the format of the answer.

Test conditions generates a sequence of 5 questions from the chosen difficulty of test - either **Novice**, **Intermediate**, **Advanced** or **Expert**. Each of these four settings selects questions from a range of exercises. See Appendix 3 for more details.

The student has, in general, only one attempt at each question.

The **Hint** facility for factorising is disabled in Test mode - it is a test after all!

Ultimate Brackets v1NH.tns

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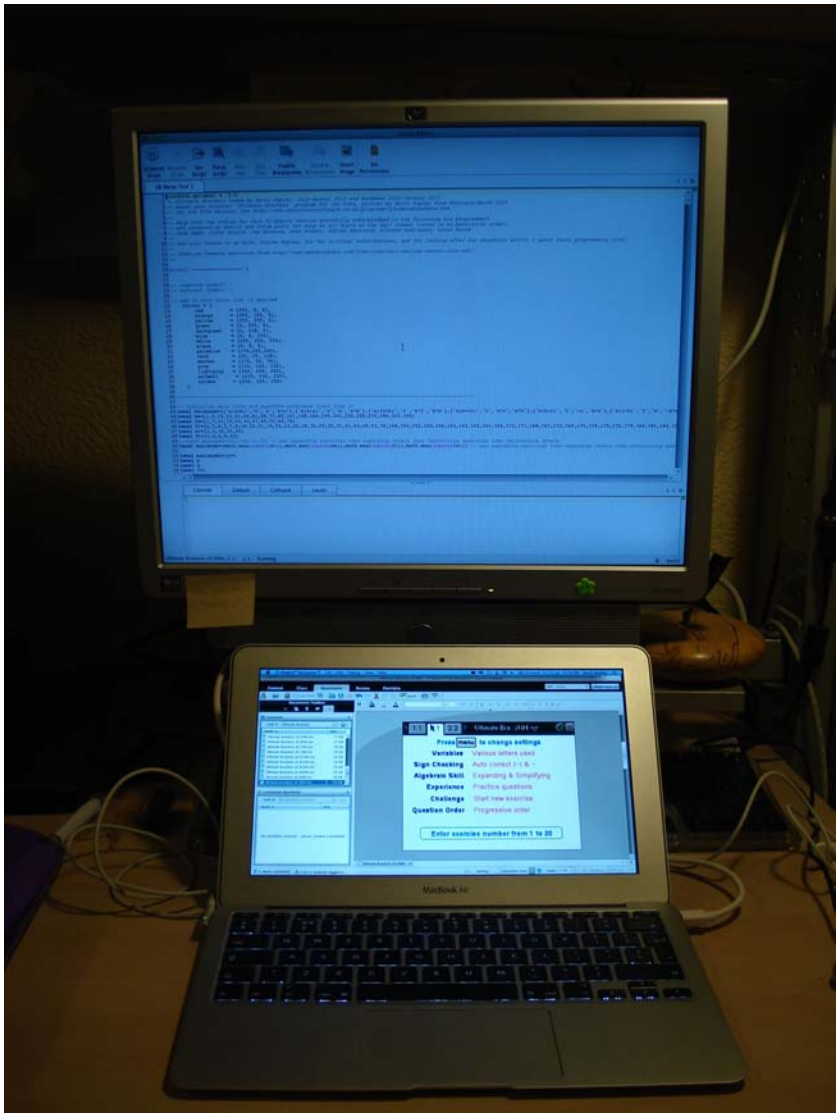
Lua Top Tips



```
-----------------------------------
function myFunc()
.
.
.
end
-----------------------------------

print("MyVar:", myVar)
```

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Want More of Me?

"Kilts and CAS in both Canada and Scotland"
Tomorrow Morning, 11:00-12:00pm
Session 342,
Marriott Franklin Hall 6

Thank you for coming to my talk.

Nevil Hopley

T3 National Trainer,
Scotland & UK.