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Maths + Coding

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Wi-fi: LTU Guest - MAVcon2024 - Latrobe2024



Mathematics and Coding: The Perfect Match

NEW
MATHEMATICS
PARADIGM

CODING TEACHES
MATHEMATICAL
THINKING

DIRECT LINK
TO SENIOR
CURRICULUM

"I have learned many useful skills for not just in digital technologies but also **problem solving and life skills.**" ... **Alexis**

"i was doing a non homework task **instead of my actual homework** because it was so much fun!" ... **Emily**

"It was **confusing, challenging** but it was **thrilling**. [It] was the reason I'm in my **current computer science elective.**" ... **Aasha**

"the possibility of pursuing technology or considering it **as a career**" ... **Phoebe**

From the students...

" I found myself working on the lessons and projects **after class.**" ... **Phoebe**

"I think it was **very easy to use.** I think it was very interesting. "

"...made me discover something amazing and **open up my eyes** to the world of **computer science.**" ... **Chloe**

"**ignited** my interest in coding" ... **Romy**

Melbourne Girls Grammar School, VIC



".. students have enjoyed being creative in conceptualising their own unique story line and different scenes.."

Stephanie Pavlou,
Head of Technologies

Toorak College, VIC



"an outstanding example of teacher resource design and the content"

Leigh Murphy,
STEM Teacher

St Margaret's Anglican Girls School, QLD



"give girls their very first taste of real coding.. have been able to make the most imaginative test-adventure games"

Brain Lovett,
Secondary Teacher

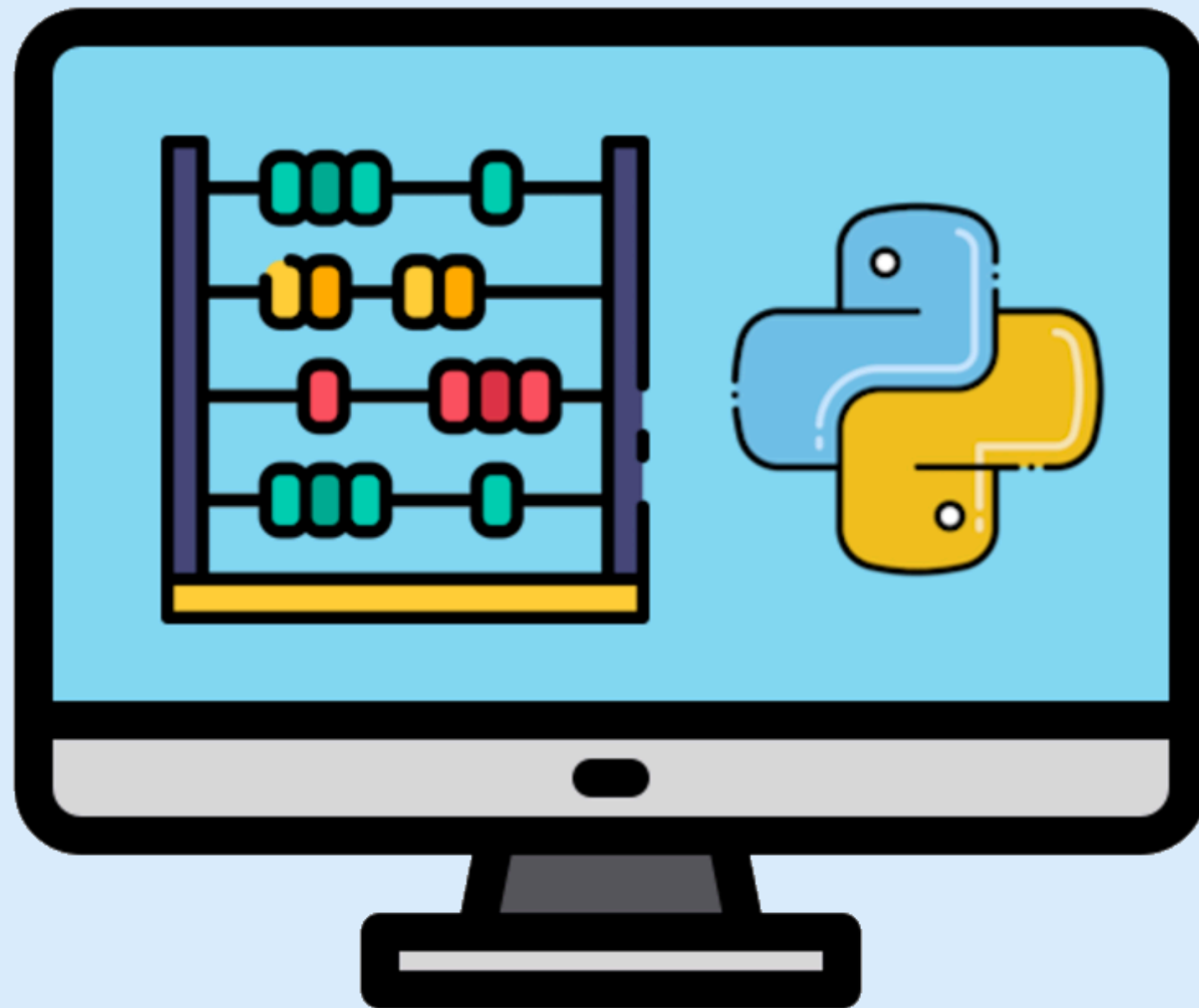
Haileybury Girls College, VIC



"provides a structured approach to teaching .., not only for our students, but also our teachers... [currently] in our 6th year of the program"

Eduard Schaepman,
Head of Computer Science

A Quick Demo!



<https://codeforschools.com/maths>

A Free “Textbook” for Pseudocode Useable from Year 7s to VCE!

Successful Pseudocoding Textbook v2.0 alpha


~ Beta Version ~




A free textbook providing plenty of worked examples, problems and solutions for mathematics students and teachers aimed to help develop pseudocoding knowledge and skills.

This work is licensed under [CC BY 4.0](https://creativecommons.org/licenses/by/4.0/)

 Google Doc

 Adobe PDF

 Microsoft Word



<https://codeforschools.com/textbook>



Introduction to Coding

A gentle introduction to the basics of Python programming.

You'll write programs to display colourful text and react to responses on the keyboard. You'll finish by writing a text adventure game!

For coverage of the Australian Curriculum click [here](#).

You're logged in as a teacher, giving to access to [extra resources](#) such as video tips, solutions to exercises, and lesson plans!

▶ Get Started

Or choose your lesson from the buttons below.

Lesson 1

Lesson 2

Lesson 3

Lesson 4

Lesson 5

Lesson 6

Lesson 7

Lesson 8

Optional Early Assignment



<https://codeforschools.com/intro>



Student Games:

A Cuckoo in Time - Amelia L

NASA Super Space Shuttle - Issy_T

The Haunted House - Lillian W

Golden Kangaroo Droppings - Niyati K



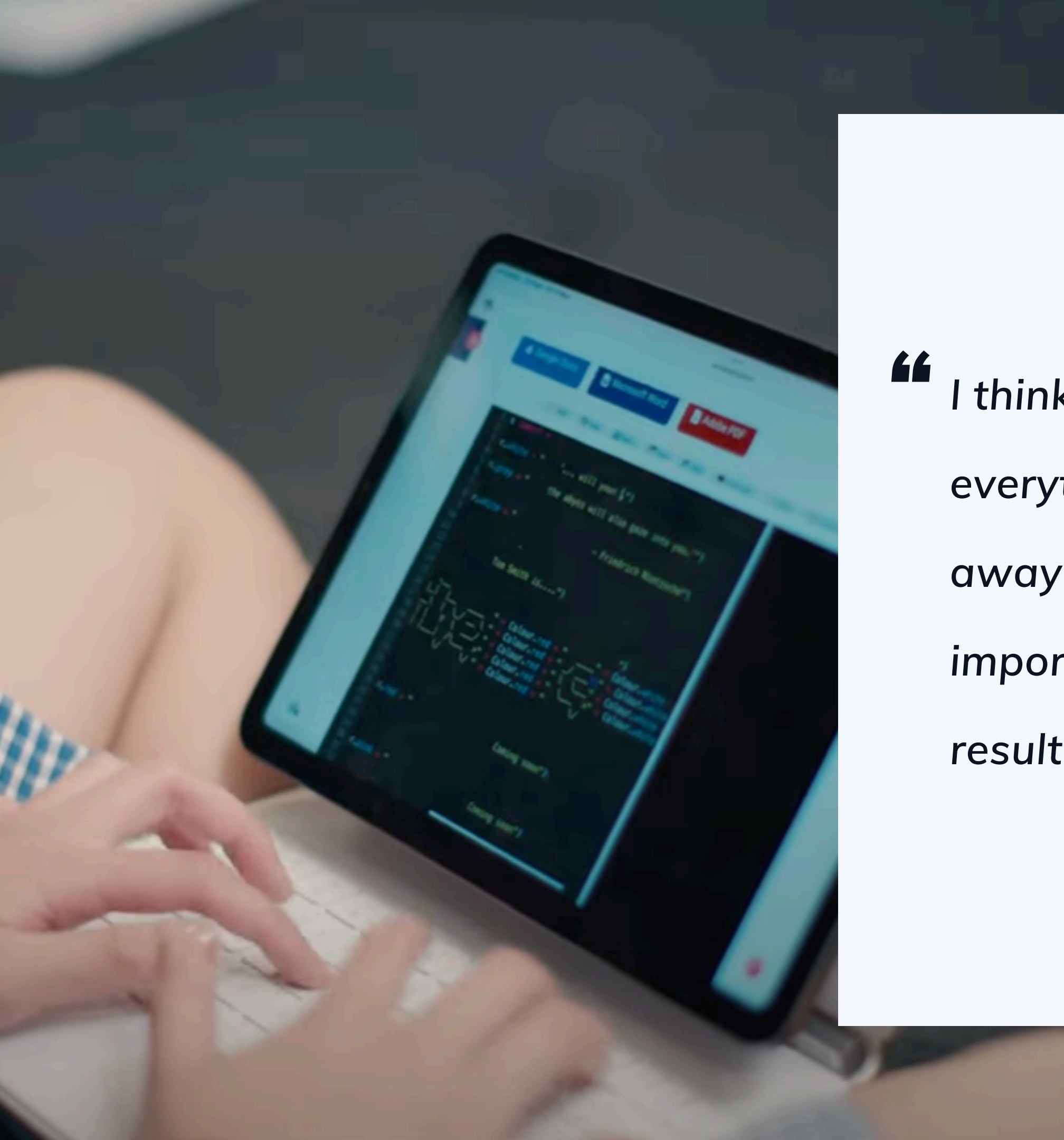
“ Once my teacher taught us what was happening in small bite-sized pieces I actually understood it really well, and I am really proud of what I have achieved. ”

- Niyati K

Why we love it...



- Allows for creativity
- Reinforces mathematical thinking
- Multiple entry and exit points
- Promotes academic risk taking
- Cross-curricular potential



“ I think people should understand that not everything is meant to be learned straight away, and although it can be hard it is important to persevere because the end result is always worth it. ”

- Amelia L

Integration into Mathematics

Years 7 and 8

Code for Schools:

- Introduction to coding
- Intermediate coding

Years 9 and 10

Introduction to TI Nspire:

- Yr 9 - Basic algebra and graphing
- Yr 10 - More advanced algebra, graphing, functions and statistics
- *TI programming tasks*

VCE

TI Nspire:

- Increasingly used to support VCE curriculums
- Increased focus in writing widgets/programs to address routine questions

Methods and Specialist:

- Pseudocode

Year 9 example

The screenshot displays the TI-nspire CX II CAS software interface. On the left is a virtual keypad with various mathematical functions and a QWERTY keyboard. The main workspace on the right shows a document titled "1.1" with the equation $\text{solve}(3 \cdot x + 2 = 6, x)$ entered. The solution $x = \frac{4}{3}$ is displayed to the right of the equation. Below the equation, the word "solv" is partially visible. The interface includes a top menu bar with "Content" and "Documents" tabs, a "Documents Toolbox" on the left, and a status bar at the bottom showing "Page Size: Handheld", "1.1", "Settings", "DEG", "Zoom: 207%", and "Boldness: 150%".

Content Documents

Documents Toolbox

Keypad + SideScreen

TEXAS INSTRUMENTS TI-nspire CX II CAS

esc on save + page doc menu tab

ctrl CAPS shift var clear

= trig 7 8 9 $\frac{\square}{\square}$ $\frac{\square}{\square}$

\wedge x^2 4 5 6 \times \div

ln log e^x 10^x 1 2 3 + -

() 0 \cdot (-) enter

EE A B C D E F G ? ! π H I J K L M N P , O P Q R S T U V W X Y Z $_$

1.1 *Doc CAPS DEG

$\text{solve}(3 \cdot x + 2 = 6, x)$

$x = \frac{4}{3}$

solv

Document1

Page Size: Handheld 1.1 Settings DEG Zoom: 207% Boldness: 150%

Year 10 example

The screenshot displays the TI-Nspire CX II CAS software interface. On the left is a virtual keypad with various mathematical and editing functions. The main workspace shows a document with a 'quad_solver' window open. The window has a title bar with tabs for pages 1.1, 1.2, and 1.3, and a 'quad_solver' button. The text inside the window provides instructions for running a program. The status bar at the bottom indicates the current page is 1.1, the mode is RAD, and the zoom is 215%.

Content Documents

Documents Toolbox

Keypad + SideScreen

TEXAS INSTRUMENTS TI-nspire CX II CAS

esc save tab ctrl CAPS shift var clear del trig 7 8 9 4 5 6 x ÷ ln log e^x 10^x () 0 . (-) enter EE A B C D E F G ?! H I J K L M N P O P Q R S T U V W X Y Z

1.1 1.2 1.3 quad_solver CAPS RAD

Welcome to Quad Solver!

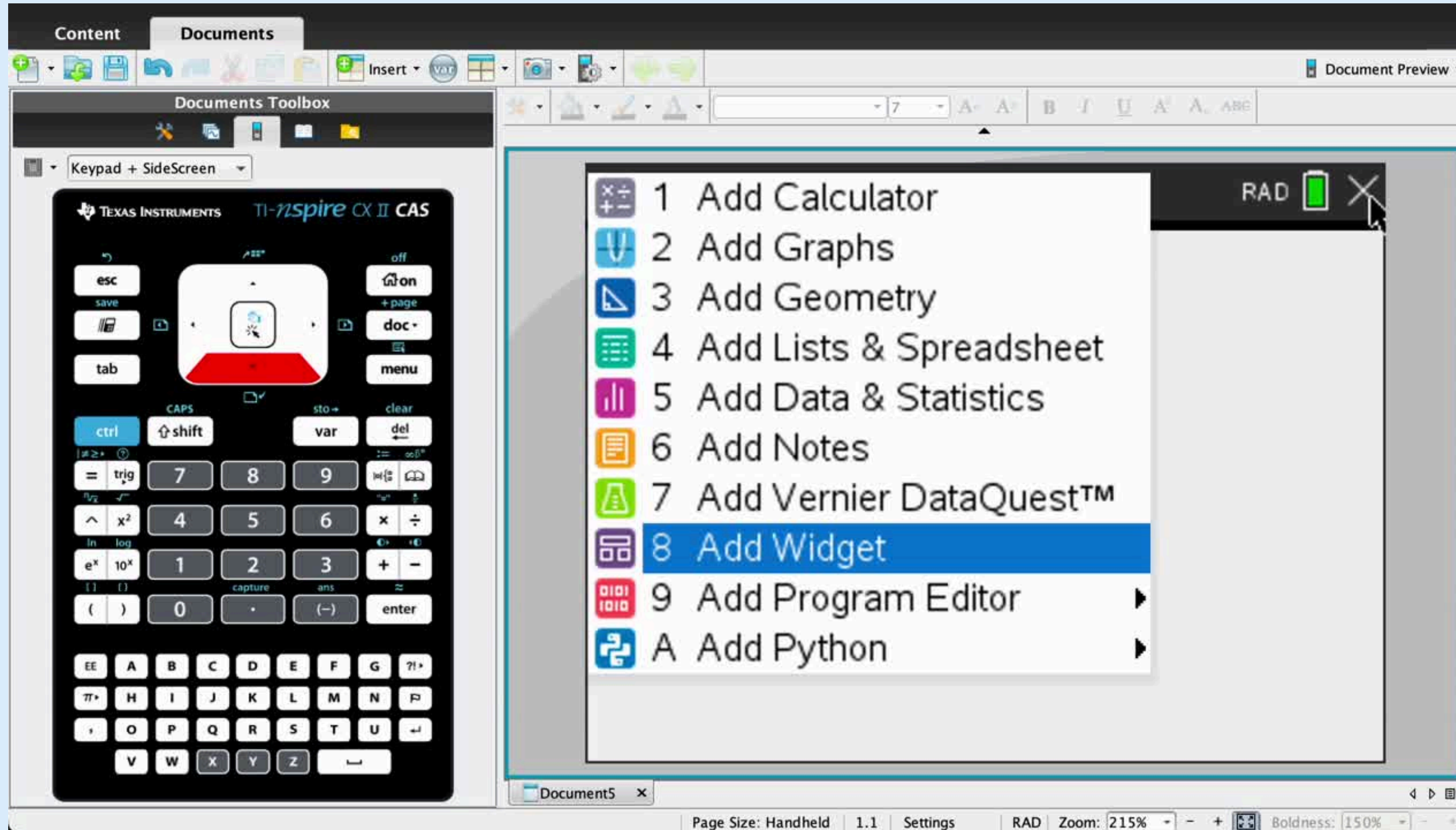
Follow these steps to get it running:

1. Go to page 1.2 and press ctrl+r.
2. Go to page 1.3 and replace the quadratic in blue with your own (in any form) and then press enter.
3. Click anywhere in the Python shell on Page 1.3 and press ctrl+r.

quad_solver x

Page Size: Handheld 1.1 Settings RAD Zoom: 215% Boldness: 150%

VCE (Methods) example



VCE (Methods) example

Consider the algorithm below, which prints the roots of the cubic polynomial $f(x) = x^3 - 2x^2 - 9x + 18$.

```
define f(x)
    return (x3 - 2x2 - 9x + 18)
c ← f(0)
if c < 0 then
    c ← (-c)
end if
while c > 0
    if f(c) = 0 then
        print c
    end if
    if f(-c) = 0 then
        print -c
    end if
    c ← c - 1
end while
```

In order, the algorithm prints the values

- A. -3, 3, 2
- B. -3, 2, 3
- C. 3, 2, -3
- D. 3, -3, 2

Thank you

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