

Learning Activity 41 : Introduction to the CAS calculator

Learning Behaviours: Ask inquisitive questions, Check work, Request further information, Attempt and complete tasks correctly.

Teacher: RNP

DATE: 3/3/2006

Class: 10 Maths Methods

Learning Activity Description

To become familiar with basic features of the CAS calculator. To become aware of its power and possibilities, and the differences from a scientific or graphics calculator. After a demonstration of the ClassPad300 using the multimedia projector (hooked up to a computer running the ClassPad manager), students worked through a self paced set of examples and problems to familiarise themselves with some of the features of the CAS (Computer Algebra System) calculator.

Examples were designed to reveal features of the CAS calculator that were the same as a scientific and/or graphical calculator and then go on to explore more advanced functions not available on scientific or graphical calculators, such as the ability to perform algebraic calculations.

Discussion Tool: Brainstorm, Discussion, Journal Entry

A 5 minute discussion followed ,comparing the features of the CAS calculator to a scientific or graphical calculator, students were then asked to write down their ideas on the usefulness or otherwise of the CAS calculator.

Student Comments:

Student responses from individual journal entries written after brainstorming and class discussion.

‘It might be ok. It’s a bit confusing though. People don’t like to try new things. But it will be good because it has functions the other calculator doesn’t have.’

‘I thought it was great. We should all have one!! It would definitely help us with our homework. But it would probably deskill a lot of us on our simple equations.’

‘I thought the Classpad was good once I learnt how to use it properly.’

‘I think that the calculator is awesome but will make maths too easy if we were allowed to use it in VCE. Later on if we needed to solve a question in Algebra we would have to rely on the computer algebra system.’

‘It’s really advanced, technology is advancing so quickly. Well done Casio!’

‘I think this calculator will become very useful. But will make us lazier, as we won’t have to do as much work. But it will make it easier for us to advance to a higher level. It is something I would enjoy using.’

'I thought it was a good program to get to know and use, but you most likely won't know how to solve an equation yourself.'

'It is very good, it would make doing equations easier. '

'This calculator is ok but it makes us use our brain less. I think we should be using our brain.'

'The program is good, it gives you the answer straight away but it doesn't show the working.'

'I like the new program, but it may deskill people and then when you get out in the real world they won't know how to do the sums without this program. ... a lot quicker for VCE exams. It may take a while to know how to use this program fully.'

'This calculator is ok but it would be too easy in exams. It is just giving us the answers. There'd be no reason to be in class to learn anything. But it would be good for really hard, complex questions'

'It's a bit confusing, but if I knew what all the buttons did it might be better.'

My first reaction to the program was "Wow, this is great!" After playing around with it for a while I have come to the conclusion that it is very confusing. To me it needs to be explained a bit better.'

'This program will be good use for maths classes in the future for when we get to a higher level. Although it would not be a good idea to always use it. We also need to learn for ourselves and not always rely on that thing, but still very clever, very good.'

'My first impression was finally they have made a calculator that can calculate algebra. Although it was difficult at first it was easier afterwards.'

'I thought it was complicated at first but if someone tells you, you can work it out. It does save writing it out but will stop us from learning to work out the answers ourselves.'

'Good because it saves time. Bad because we should not have to rely on another calculator.'

Teacher Journal:

This was actually two separate lessons.

The first lesson was unstructured. I demonstrated the features of the CAS calculator using the ClassPad manager (a computer emulation of the ClassPad300) and projected the calculator screen onto the board at the front of the room.

I then let the students experiment with the features of the calculator. There was a bit of confusion with students expecting to master it immediately.

I then resolved to run the next session with a bit more structure to it.

I made up a self paced tutorial which with the aid of diagrams and simple instructions led the students through the use of a basic set of functions of the calculator. The handout had a set of problems for the students to do both manually and on the CAS calculator.

This second lesson went more smoothly and students gained confidence with the CAS calculator.

Student comments were interesting.....

(These were recorded after the very first session.)

Some expressed initial relief and joy that here was a system that could do the algebra for them.

Those same students later had reservations about the CAS system, fearing it may deskill them.

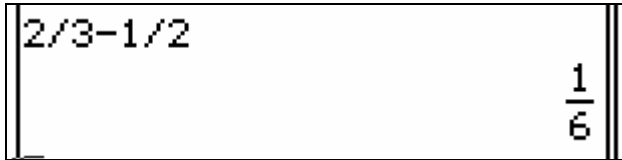
Other students exhibited cyberphobia type reactions, fear of the new technology. Confusion. Complicated.

Good for complex questions was another response.

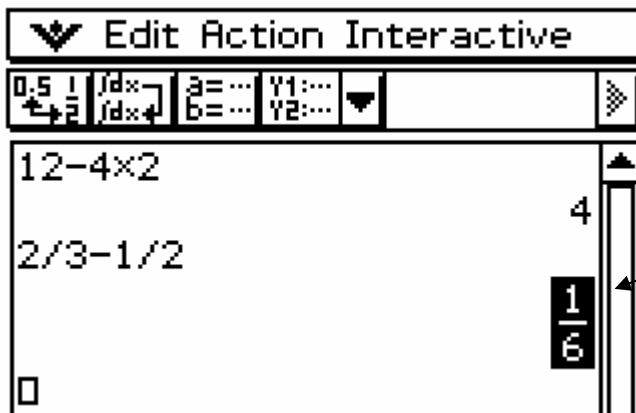
Next session students will use the CAS system to solve Linear Equations and Transform linear equations. (This is work we have been doing manually in class).

2. Fractions

⊕ $\frac{2}{3} - \frac{1}{2}$ Type $2 \div 3 - 1 \div 2$ and click on EXE



2/3-1/2
 $\frac{1}{6}$

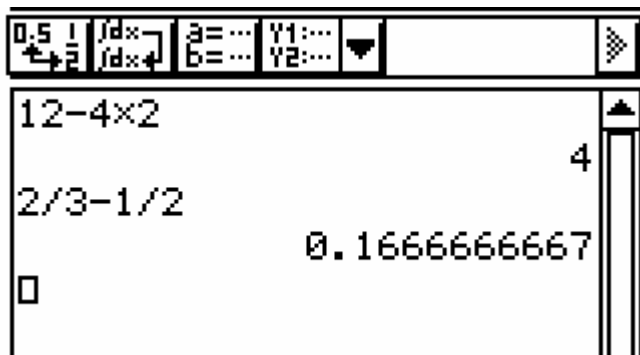


Edit Action Interactive
0.5 1 /dx- a=... Y1:...
↔ 2 /dx+ b=... Y2:...

12-4×2
2/3-1/2
 $\frac{1}{6}$

Click on the value 1/6 to highlight it

Click on this button to convert fraction to decimal or vice versa



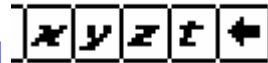
0.5 1 /dx- a=... Y1:...
↔ 2 /dx+ b=... Y2:...

12-4×2
2/3-1/2
0.166666667

5. Some simple algebra

- ⊕ **Addition and Subtraction** $5x - 3y - 2x + 4y$

Type in using the variable x and y keys on the soft keyboard and press EXE.



$5x - 3y - 2x + 4y$
 $3 \cdot x + y$

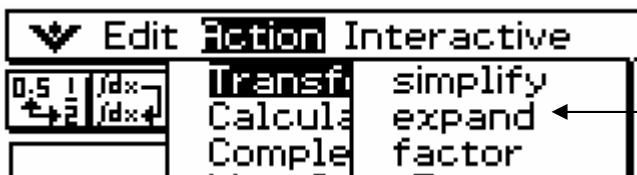
Can your scientific calculator do this????

- ⊕ **Multiplication** $3x^2y \times 4xy$

Type in using variable keys on soft keyboard press EXE

$3x^2y \times 4xy$
 $12 \cdot x^3 \cdot y^2$

- ⊕ **Expanding brackets** $2x(3x - 5)$



From the **Action**
> **Transformation**
menu choose
expand

Type in the expression to be expanded and press EXE

$\text{expand}(2x(3x - 5))$
 $6 \cdot x^2 - 10 \cdot x$

- ⊕ **Expanding something more complex** $(2x - 3)^4$

$\text{expand}((2x - 3)^4)$
 $16 \cdot x^4 - 96 \cdot x^3 + 216 \cdot x^2 - 216 \cdot x + 81$

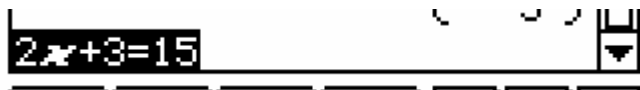
- ⊕ **Factorising** $3x^2 - 9x$

From the Action > Transformation menu choose factor
Type in the expression to be factorised and press EXE

$\text{factor}(3x^2 - 9x)$
 $3 \cdot x \cdot (x - 3)$

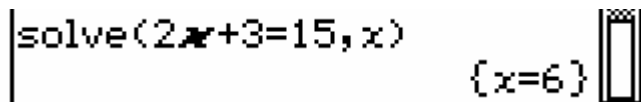
⊕ Solving equations $2x+3=15$

Type in the equation to be solved and highlight it.



From the [Interactive](#) > [Equation\Inequality](#) menu choose [solve](#) and press EXE

Accept the default that you want to solve for x



OK now it's up to you.

Try the examples, do them yourself on paper and then do with the CAS calculator and compare your answers.

Problem	Your answer	Answer from CAS Calculator
⊕ $12 \times 3 - 3 \times 10$		
⊕ $\frac{3}{4} + \frac{2}{3}$		
⊕ 2^{64}		
⊕ $\sqrt{32}$		
⊕ $4x + 3y - 2x + 7y + 2 - 1$		
⊕ $\frac{12x^2y^6}{6xy^2}$		
⊕ $\frac{3}{4} + \frac{2}{3}$ as a decimal		
⊕ Expand the brackets $5(2x+3)$		
⊕ Factorise $12x-4$		