Using a scientific calculator	Season	1
	Episode	02
	Time frame	1 period

Objectives :
- Discover the vocabulary for the main operations.
- Discover how to use the calculator for basic calculus (powers, fractions and memories).
- Become aware of some limitations of the calculator.

Materials :
- *Calculators.*
- *Slideshow with operations.*
- *Emulators for Casio and TI.*

1 – Vocabulary — 10 minutes

Using a slideshow, the teacher introduces some vocabulary of the main operations.

2 – Task sheet — Remaining time

Using their calculator, students have to answer some questions.

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Basic operations

Use your calculator to carry out each of the following computations, in just one instruction. Brackets may have to be used.

1. **a.** $\dfrac{2}{3,5 \times 4}$ **b.** $\dfrac{2}{3,5} + 4$ **c.** $(-2)^2$ **d.** $\dfrac{2}{3,5+4}$ **e.** $\sqrt{3,5+4}$ **f.** -5^2 **g.** 2×3^2 **h.** $\dfrac{2}{3,5} \times 4$

2. **a.** $\dfrac{3-2.25^2}{1.072-2}$ **b.** $3 \times \dfrac{4-\pi}{2}$ **c.** $\dfrac{3}{5.1 \times 6.7}$ **d.** $\dfrac{2+\pi}{\sqrt{\frac{3}{7}}} + 4$

3. Use your calculator to carry out the three following computations. Are the results equal ? Explain the differences.

[√] [9] [+] [1] [6] _ [√] [(] [9] [+] [1] [6] [)]

[√] [9] [+] [√] [1] [6]

Powers

1. Find out what key must be used to compute 2^5. Check your result by hand.

2. Use your calculator to carry out the following computations.

a. $(2,5 \times 3,5)^3$ **b.** $(-3,8)^4 + 7$ **c.** $\dfrac{3^3}{2}$ **d.** $5^{28} \times 2^8$

Fractions

1. Find out how to get the irreducible fraction equal to $\frac{45}{30}$ with your calculator.

2. Give the irreducible fraction equal to each of the following expressions :

a. $2 + \dfrac{3}{5} - 1 + \dfrac{2}{3}$ **b.** $\dfrac{2}{1+\frac{1}{3}}$ **c.** $\dfrac{\frac{2}{4}}{3}$

Negative and minus

There are two different keys "minus" on your scientific calculator.
The key [(-)] represents the sign of a number whereas [—] is used for the subtraction operation.

1. For each of the following expression, there is only one sign "minus". Find out what key should be used.

a. $4-3$; **b.** $-4+3$; **c.** $\frac{-12}{5}$; **d.** $\frac{8-12}{5}$; **e.** $\sqrt{17-5}$; **f.** 10^{-5}.

2. Here are two strings of keys : [5] [(-)] [2] and [5] [—] [2].
Are they correct or not ?

Memories

The key [→] or [STO] allows to store a number in the calculator's memory. This can be usefull if you need that number several times or in a programm. In each of the following situations, store the value of A in the memory and then compute an approximate value to 3DP of B.

1. $A = \dfrac{1+\sqrt{5}}{2}$ et $B = 1 - \dfrac{1}{A} - \dfrac{1}{A^2}$

2. $A = \dfrac{1-\sqrt{5}}{2}$ et $B = \dfrac{5A+3}{3A+2}$

Limitations of the calculator

Part A – First example

1. Using your calculator, compute the value of $987654322 \times 987654320 - 987654321^2$.

2. **a.** What is the units digit of $987654322 \times 987654320$?

b. What is the units digit of 987654321^2 ?

3. Are the results of the first and the second question consistent ? Explain shortly.

4. **a.** Expand and simplify : $(x+1)(x-1) - x^2$.

b. Use the previous answer to compute the result of the first expression of this exercice.

Part B – Second example

1. Use your calculator to find the best possible approximate value of $A = \dfrac{941664}{665857}$ and $B = \sqrt{2}$

2. What could you deduce about the numbers A and B ?

3. What are the units digits of 665857^2 and 941664^2 ?

4. What can you deduce ? Explain your answer.

Basic operations (to 4 DP) :

1. $0,1428$; $4,5714$; 4 ; $0,2666$; $2,7386$; -25 ; 18 ; $2,2857$.

2. $2,2225$; $1,2876$; $0,0878$; $11,8539$.

3. 19 ; 5 ; 7.

Powers :

1. $2^5 = 32$

2. $669,921875$; $215,5136$; $13,5$; $9,53 \times 10^{21}$.

Fractions :
$\frac{3}{2}$; $\frac{34}{15}$; $\frac{3}{2}$; $\frac{1}{6}$

Negative and minus :

1. [—] ; [(-)] ; [(-)] ; [—] ; [—] ; [(-)] .

2. Incorrect / Correct.

Memories :
$B = 0$; $B = A \approx -0,618$